# NATIVE AMERICAN LANDSCAPES OF ST. CATHERINES ISLAND, GEORGIA

## II. THE DATA

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# INTRODUCTION

This is the second (of three parts) addressing the aboriginal landscapes of St. Catherines Island, Georgia. Part I of this series provided the contextual and theoretical framework for addressing the aboriginal landscapes of St. Catherines Island. Part II presents the empirical data generated to answer the following questions that have guided our long-term research:

1. How and why did the human landscape (settlement patterns and land use) change through time?
2. To what extent were subsistence and settlement patterns shaped by human population increase, intensification, and competition for resources?
3. What factors can account for the emergence of social inequality in Georgia's Sea Islands?
4. Can systematically collected archaeological evidence resolve the conflicting ethnohistoric interpretations of the aboriginal Georgia coast (the so-called Guale problem)?

Part II begins with the chronological controls derived to monitor the temporal landscape of St. Catherines Island. After considering the strengths and weaknesses of radiocarbon approaches available to us, we derive the island-specific reservoir correction factor necessary to integrate results from marine and terrestrial sampling. Working from a database of 239 radiocarbon dates from St. Catherines Island, we compare and contrast this $^{14}C$ framework with the established ceramic sequence for the region, revising the ceramic chronology as necessary for the present application. We also develop a method of incremental growth sequencing in *Mercenaria mercenaria* to establish seasonality estimates for nearly 100 of the archaeological sites tested in the island-wide survey.

We then turn to the specifics of the archaeological landscape, sampled across the diverse habitats of St. Catherines Island. We present site-by-site details for the island-wide and shoreline archaeological surveys and, in separate chapters, Elizabeth Reitz discusses the vertebrate zooarchaeological remains recovered. We also reanalyze the mortuary evidence from St. Catherines Island and summarize our findings from the more extensive excavations at the Meeting House Field and Fallen Tree sites. The final chapter introduces a new paleoenvironmental perspective available from recent tree-ring research along the Georgia coastline.

Part III of this series synthesizes the diverse empirical and theoretical threads to reconstruct the changing configuration of St. Catherines Island during the past 5 millennia, to examine the predictions derived from human behavioral ecology. Drawing on Central Place Theory and diet-breadth modeling, we evaluate the long-term trends in site positioning on the Pleistocene core and Holocene beach ridges of St. Catherines Island. Working from the diet-breadth model, we look at the issues of prey choice and resource depression through time. We critically evaluate the changing aboriginal landscape of St. Catherines Island by dissecting the available evidence on chronology, settlement pattern, subsistence, seasonality, bioarchaeology, and ritual activity from the Late Archaic through Spanish mission periods. Finally, we evaluate the evidence for population increase, occupational periodicity, resource intensification, and the emergence of social inequality along the aboriginal Georgia coast, ending with a reconsideration of the Guale problem in light of the new data available on economic intensification, residential mobility, and paleoclimatic fluctuations.

# CHAPTER 13. RADIOCARBON DATING ON ST. CATHERINES ISLAND

DAVID HURST THOMAS

The research program discussed here relies on the results of 239 $^{14}C$ dates processed on samples recovered from St. Catherines Island. To be sure, this diverse chronometric database provides the primary macrochronological controls for this study, but the $^{14}C$ evidence must be carefully evaluated in terms of the known compositional, statistical, and systematic anomalies known to influence the outcome. The following discussion focuses on three major issues—contamination effects, fractionation effects, and reservoir effects—and then establishes protocols for standardizing and evaluating the results of the extensive $^{14}C$ record available from St. Catherines Island.

## CONTAMINATION EFFECTS

Radiocarbon dating derives its success in archaeology in part from the ability of modern instruments to precisely measure the proportions of $^{14}C$ to $^{12}C$ in relevant archaeological materials. Archaeological samples, however, are sometimes contaminated by carbon-containing compounds not present in the original organic material being dated (Taylor, 1987: 35). Shell samples in particular can be tainted by younger, foreign carbon derived from groundwater bicarbonates. Such contamination is restricted to the exterior surfaces of shell samples and can routinely be removed by leaching them in acid prior to analysis. For all the $^{14}C$ results reported in this chapter, the processing laboratories have pretreated shell samples with dilute acid to etch away the outer layers. The samples were then attacked with more acid to produce carbon dioxide, which was then employed as the carbon source. The resulting benzene syntheses and counting procedures followed standard laboratory guidelines. We feel these safeguards satisfactorily remove all inappropriate carbon compounds from the shell samples.

## FRACTIONATION EFFECTS

Another problem for the archaeologist is the fractionation of carbon isotopes in nature.[1] Specifically, $^{14}C$ is known to have a mass about 17 percent and 8 percent greater than that of the $^{12}C$ and $^{13}C$ isotopes, respectively. During certain biochemical processes, such as photosynthesis, the lighter isotopes are differentially incorporated into living organisms, creating a certain degree of variability in $^{14}C/^{13}C/^{12}C$ ratios that cannot be attributed solely to the passage of time. This fact undermines one of the rudimentary assumptions on which the $^{14}C$ method rests.

Fortunately, such fractionation effects are generally regular and predictable in addition to being relatively well understood. Although marine carbonates and terrestrial wood samples differ in their $\delta$ values, this problem is partially alleviated by conventional radiocarbon laboratory procedures, in which the variable isotopic ratios are normalized to a common scale. When working with shell determinations, however, the fractionation effect must be specifically considered, both in the laboratory and in application of specific dates. In their important discussion dealing with the standards of reporting $^{14}C$ data, Stuiver and Polach (1977) have urged investigators to report $\delta^{13}C$ values, either measured or estimated relative to the PDB[2] standard. Such measured values can be supplied by commercial radiocarbon laboratories upon request and most of the shell samples reported in this chapter include a laboratory-derived $\delta^{13}C$ value.[3]

But some investigators neglect to request that fractionation be measured by the radiocarbon laboratory. To compare these uncorrected results with "corrected" $^{14}C$ determinations, it becomes necessary to estimate the $\delta^{13}C$ correction. Stuiver and Polach (1977: 358) suggest that for marine shells, a value of 410 ± 70 years be added to all uncorrected radiocarbon ages.[4]

For the suite of $^{14}C$ dates available from St. Catherines Island, we calculate an empirically derived fractionation value for the large suite of radiocarbon dates available from St. Catherines Island. More than two-thirds of the marine shell $^{14}C$ samples discussed here have a $\delta^{13}C$ value provided by the commercial radiocarbon laboratory. For instance, our major age supplier, Beta Analytic, Inc., provided three specific values: the $^{14}C$ age (in years B.P. ± 1 $\sigma$), $\delta^{13}C$ ($^{13}C/^{12}C$), and the $^{13}C$ adjusted $^{14}C$ age. Our empirically derived fractionation correction factor is the difference between the uncorrected $^{14}C$ age and the adjusted $^{13}C$ age.[5]

## RESERVOIR EFFECTS

Speaking specifically of St. Catherines Island, we think that shell samples tend to provide more reliable results than charcoal samples from the same context. Not only are shell samples vastly more abundant, but, unlike charcoal, Holocene-age marine shells are not subject to contamination by organic carbon from modern vegetation decay (thereby reducing the importance of chemical cleaning). Large shell fragments do not move as readily through the stratigraphic column and do not have the problem of rootlet contamination (a difficulty with charcoal samples). Excreted by short-lived organisms, these shells are more abundant than reliable charcoal samples found in most shell middens. Shells are also commonly preserved in pieces large enough to avoid the need for more expensive AMS dating (Deo et al., 2004). For all of these reasons, $^{14}C$ dating of marine shells will always be important for refining the archaeological chronology along the Georgia coast.

More than three decades ago, Joseph Caldwell clearly recognized the importance of combining radiocarbon dating with ceramic analysis to establish the cultural chronology of the Georgia coast. In a paper presented at the Southeastern Archaeological Conference in October 1970, Caldwell reported 13 new radiocarbon dates from his excavations on St. Catherines Island. Because he was aware of the potential problems involved in the radiocarbon dating of marine shells, Caldwell deliberately paired some charcoal and shell determinations. Assessing the results from his first two field seasons of research on St. Catherines Island, Caldwell concluded, "radiocarbon determinations made from oyster shell do not appear to differ significantly from determinations made from charred wood. In this connection, some of you will recall that a few years ago modern oyster shells from adjacent Sapelo Island collected in 1955 were run at the University of Michigan (M-614) and did not differ significantly from Michigan's wood standard" (Caldwell, 1971: 1).[6] Elsewhere in the same paper, however, Caldwell reported a suspicion that "our shell determinations, while compatible with charred wood determinations, may be running slightly later." He wisely reassured that "of course we shall continue to look for an oyster shell correction factor and other factors based on the available amount of radiocarbon in the biosphere at a particular time."

Ten years later, we reported the results of our own excavations of several Refuge-Deptford burial mounds on St. Catherines Island. We analyzed 29 radiocarbon dates, nearly one-quarter of them processed on marine shell, and although referencing "reservoir effects" (Thomas and Larsen, 1979: 138), we basically relied on Caldwell's previous experiments and dismissed the problem.

Today, we realize that our assumption was incorrect. A significant reservoir effect is operating here because, relative to the atmosphere, ocean water is depleted in $^{14}C$, transmitting this deficiency to marine organisms. This means that $^{14}C$ determinations processed on marine samples should routinely appear to be "older" than $^{14}C$ dates run on contemporary terrestrial samples.

This skewing effect is readily apparent in our St. Catherines Island research. From our database of 106 $^{14}C$ determinations on archaeological samples, we can define 11

TABLE 13.1
**Comparison of Paired Charcoal–Marine Shell $^{14}$C Determinations from St. Catherines Island**[a]

| | | |
|---|---|---|
| Pair 1: Meeting House Field (9Li21), Midden D, level 3[b,c] | | |
| Beta-30268 | *Mercenaria* | 710 ± 80 B.P. |
| Beta-30269 | Charcoal | 290 ± 60 B.P. |
| Pair 2: Meeting House Field, Midden D, level 3FN-2 | | |
| Beta-30270 | *Crassostrea* | 790 ± 80 B.P. |
| Beta-30269 | Charcoal | 290 ± 60 B.P. |
| Pair 3: Meeting House Field, Midden E, Test Pit I (30–40 cm) FN-2 | | |
| Beta-20806 | *Crassostrea* | 760 ± 60 B.P. |
| Beta-21973 | Charcoal | 320 ± 60 B.P. |
| Pair 4: 9Li170, Test Pit I (10–20 cm) FN-2 | | |
| Beta-20805 | *Crassostrea* | 530 ± 70 B.P. |
| Beta-20810 | Charcoal | 330 ± 60 B.P. |
| Pair 5: Wamassee Head (9Li13), Test Pit I (40–50 cm) | | |
| Beta-20804 | *Mercenaria* | 820 ± 70 B.P. |
| Beta-20811 | Charcoal | 360 ± 60 B.P. |
| Pair 6: Meeting House Field, Midden E, Test Pit I (30–40 cm) FN-2 | | |
| Beta-20806 | *Crassostrea* | 760 ± 60 B.P. |
| Beta-21972 | Charcoal | 440 ± 50 B.P. |
| Pair 7: Meeting House Field, Midden 21 (level 3) FN-2 FN-3 | | |
| Beta-30263 | *Mercenaria* | 950 ± 60 B.P. |
| Beta-30264 | Charcoal | 540 ± 60 B.P. |
| Pair 8: Meeting House Field, Midden 21 (level 3) | | |
| Beta-30265 | *Crassostrea* | 730 ± 50 B.P. |
| Beta-30264 | Charcoal | 540 ± 60 B.P. |
| Pair 9: Meeting House Field (9Li21), Midden E, Test Pit I (80–90 cm) FN-2 | | |
| Beta-20808 | *Crassostrea* | 680 ± 60 B.P. |
| Beta-21974 | Charcoal | 590 ± 50 B.P. |
| Pair 10: Johns Mound (Stage II/Central Pit) | | |
| UGA-64 | *Crassostrea* | 1190 ± 60 B.P. |
| UGA-61 | Charcoal | 900 ± 60 B.P. |
| Pair 11: Seaside Mound I (Feature 15/Central Tomb) | | |
| UGA-1826 | *Crassostrea* | 1630 ± 60 B.P. |
| UGA-112 | Charcoal | 1430 ± 115 B.P. |

[a] All shell dates have been corrected for fractionation; see table 13.4 for more complete contextual information.
[b] Note that the same charcoal determination (Beta-30229) appears in both pairs 1 and 2.
[c] This difference is statistically significant ($p < 0.05$).

cases of charcoal and marine shell pairs, which we presume date the same behavioral event (table 13.1 and fig. 13.1). Seven of these coeval pairs derive from our excavations at Meeting House Field, a large Irene-period site located on the western margin of St. Catherines Island (as discussed in chap. 25). The additional shell-charcoal paired dates derive from excavations at Johns Mound (Caldwell, 1971; Larsen and Thomas, 1982), Seaside Mound I (Thomas and Larsen, 1979: 84–98), Wamassee Head (Caldwell, 1971; see also chap. 20), and 9Li170, a small oyster shell midden located 130 m east of Yankee Bridge Road (see chap. 20).

Figure 13.1 plots the temporal distribution of the paired terrestrial-marine radiocarbon dates from St. Catherines Island. In every case, the $^{14}$C determination based on

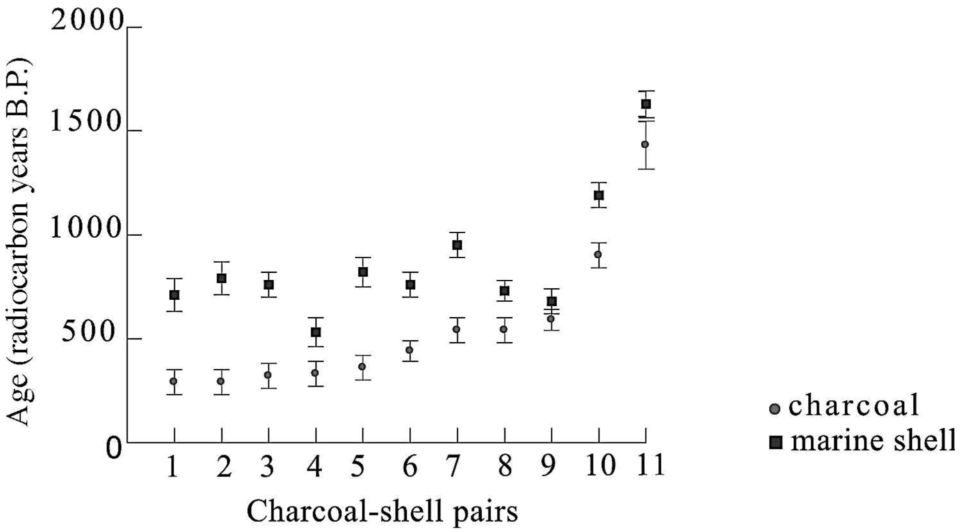


Fig. 13.1. The temporal distribution of paired, uncorrected charcoal-shell $^{14}C$ dates from St. Catherines Island, Georgia (data extracted from table 13.1).

marine shell predates the equivalent, supposedly contemporaneous date processed on charcoal. Momentarily setting aside the uncertainties associated with the individual $^{14}C$ determinations, the shell samples date between 90 and 500 $^{14}C$ years older than their charcoal counterparts. This difference is statistically significant ($p < 0.05$) in two-thirds (7 of 11) of these cases.

The mean age differential between the charcoal and shell dates is 320 ± 146 (standard error = 40.9) years, while the Y-intercept for the regression line describing this relationship is 424 years (fig. 13.2). While both of these statistics suggest useful information about the skewness inherent in marine shell $^{14}C$ ages on St. Catherines Island, we will follow the now conventional radiocarbon procedure of deriving a marine reservoir correction by $^{14}C$ dating of known-age shells.[7]

In other words, $^{14}C$ dating of zooarchaeological marine shells should play a prominent role in establishing and refining the cultural chronologies of the coastal Southeast. But for this potential to be fully realized, archaeologists must adopt a more refined, more informed, and more critical attitude toward the way in which marine $^{14}C$ dates are used in everyday practice.

## Correcting for Reservoir Effects

In the early development of radiocarbon dating methods, investigators concluded that when living samples of freshwater organisms produced apparent $^{14}C$ ages of up to 1600 years (Taylor, 1987: 34), the materials had been contaminated by carbonates derived from bedrock limestone. As a result, $^{14}C$ determinations for marine samples will always appear "older" than $^{14}C$ dates on contemporary terrestrial samples. This difficulty can be overcome by computing correction factors based on such apparent age differences, which enables archaeologists to compare shell samples with $^{14}C$ ages of contemporary terrestrial samples.

The ocean acts as a large carbon reservoir, where the residence of $^{14}C$ is considerably longer than in the atmosphere. Combined with the upwelling of more ancient carbon from the deep ocean, this effect creates an age of marine samples that is several hundred years older than contemporary atmospheric samples. Temporal fluctuations occur in both atmospheric $^{14}C$ activity and patterns of ocean circulation, causing the $^{14}C$ activity of surface seawater to vary by region and over time.

For years, some $^{14}C$ laboratories did not correct for either fractionation or reservoir

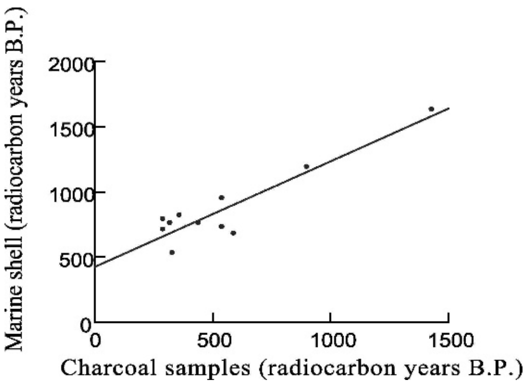


Fig. 13.2. Regression of paired charcoal and shell dates from St. Catherines Island.

effects in marine shell, due to the view that, in many regions, they approximately cancel each other. Typical fractionation effects for marine shell carbonates adjust $^{14}C$ values in marine shell samples by about 400 years, a value roughly equal to what was considered the "average" apparent age of surface ocean water (based on measurements in the Atlantic Ocean; Broecker et al., 1960).

Research has demonstrated that reservoir effects (the incorporation of ancient carbonates in living organisms) commonly plague $^{14}C$ dates processed on marine shell. These effects are attributed primarily to upwelling, in which water from deeper ocean contexts is periodically brought upward and mixed with surface ocean water. When such upwelling is uncommonly high, the apparent $^{14}C$ age of water can be in excess of 1000 years, in part because the slow mixing of deep ocean waters leaves the global marine radiocarbon reservoir depleted of $^{14}C$ relative to the atmosphere. Even within somewhat restricted areas, localized upwelling can induce variations up to the equivalent of 200–300 years in the reservoir effects. Marine shell species can also be heavily influenced by effects of estuaries, bayous, inland waterways, and bay environments (Broecker and Olson, 1961). In such environments, living shell can also be seriously affected by the discharge of carbonate-rich freshwater, which causes variability in apparent ages of up to a millennium (Berger et al., 1966).

Modern investigators realize the importance of independently evaluating each coastal region (and subregions such as estuaries and bays) to determine not only the general magnitude, but also the degree of variability exhibited by marine shell carbonates of equivalent ages. Localized reservoir age estimates ($\Delta R$ values) are typically derived by computing $^{14}C$ determinations on prebomb, known-age marine shells. These samples were collected alive before the beginning of large-scale testing of thermonuclear devices, which injected large amounts of artificial $^{14}C$ into the atmosphere and oceans (Berger et al., 1966). This protocol derives a conventional $^{14}C$ estimate, which normalizes the results to a $\delta^{13}C$ value that corrects for isotopic fractionation. Sometimes, the amount of fossil $^{14}C$ (Suess effect) in the oceans can be measured at the time of collection to yield a reservoir age correction for the region in which the shell was derived. Whereas the preindustrial global mean reservoir correction, $R(t)$, is about 400 years, local variations ($\Delta R$) can also be several hundred years as well. $\Delta R$ values have been compiled on a global basis (Stuiver and Pearson, 1986; Stuiver and Braziunas, 1993).

Regional differences between atmospheric and marine ages are compiled in a global database of marine reservoir corrections (http://www.calib.org/) that is currently available to assist in computing localized $\Delta R$ values (Reimer and Reimer, 2001). Although the geographic coverage is heavily weighted toward Europe and North America, as of July 2003, relevant studies were entirely absent for the Atlantic coastal region between Long Island Sound (NY) and the Florida Keys. For this reason, we elected to investigate marine reservoir effect along the Carolina–Georgia–Florida coastline.

## $^{14}C$ Dating of Modern Control Samples

We began to evaluate reservoir effects along the Southeastern Atlantic Coast in the mid-1980s. Our first step was to search for suitable modern, prebomb mollusks in various museum collections. After submitting more than three-dozen requests for such materials, we were surprised to find how difficult it was to locate modern mollusks collected during the first half of the 20th century. Thanks to diligent efforts by several colleagues, however, we finally collected sufficient samples to serve as baseline documentation for our study.

The following modern mollusk samples were obtained for the reservoir effect study:

FLORIDA MUSEUM OF NATURAL HISTORY: Through the courtesy of Jerald T. Milanich (Curator, Department of Anthropology) and Kurt Auffenberg (Collection Manager, Malacology), we obtained specimens of *Mercenaria campechiensis* from three localities on the north Florida Coast. One valve from each sample was submitted to Beta Analytic, Inc. for $^{14}C$ analysis, and the following dates were processed:

Beta-23085 (UF 16170): Collected March 25, 1946, by T. Van Hyning at Summer Haven (on the inland waterway south of Matanzas Inlet), St. Johns County, Florida; although technically not a prebomb sample, the full impact of nuclear testing did not manifest itself until the mid-1950s (Stuiver et al., 2005), and we have elected to processing the sample anyway; the results are quite similar to other results from the South Carolina–Georgia coastline (excepting St. Catherines Island, as will be discussed below.

Beta-23083 (UF 16171): Collected January 4, 1932, by T. Van Hyning 1 mile south of Matanzas Inlet, St. Johns County, Florida.

Beta-23084 (UF 16172): Purchased August 29, 1929, from a Gainesville fish market by T. Van Hyning. The *Mercenaria* was collected by J. D. Williams from St. Augustine, Florida.

These dates would seem to be satisfactory and will be utilized in calculating the reservoir age determination.

As an additional safeguard, we submitted the opposite valve from each of these three *Mercenaria* to Teledyne Isotopes and report these results in table 13.2. We were gratified to find that these independently derived $^{14}C$ results were statistically identical to those previously determined by Beta Analytic. To avoid unwarranted duplication (and the problems resulting from a lack of statistical independence), we utilized just one $^{14}C$ date for each mollusk sample (electing to use the Beta Analytic determinations for subsequent computations because of smaller standard errors).

NATIONAL MUSEUM OF NATURAL HISTORY (SMITHSONIAN INSTITUTION): Through the courtesy of Jerry Harasewych (Associate Curator, Division of Mollusks), we obtained a variety of recently de-accessioned shell samples. Although the exact date of collection is unknown, Dr. Harasewych suggested that the catalogue date is not more than 20 years after collection. The following samples were processed:

Beta-24550: *Busycon* sp. from Beaufort, North Carolina; catalogued March 2, 1932.

Beta-24548: *Crassostrea virginica* from Amelia Island, Florida; catalogued Febuary 1, 1884.

Beta-24552: *Busycon* sp. from St. Augustine, Florida; catalogued ca. 1900.

Beta-24549 (94-C-3): *Busycon canaliculatum* from Cocoa, Florida; catalogued January 18, 1950.

A 40-g sample from the growth portion of each shell was submitted to Beta Analytic, Inc. for analysis; the results appear in table 13.2.

Sample Beta-24529 is clearly spurious. Because the $^{14}C$ age estimate for this channeled whelk is extraordinarily ancient for a "modern" shell, we requested further details from the laboratory regarding this sample: "I've gone back and triple checked the computer calculations, chemistry notes and statistical analysis of the counter tape. No error surfaced" (Murray Tamers, personal commun., January 25, 1988). Clearly, the dated specimen was collected long after the organism's demise, and thus Beta-24549 has been excluded from all reservoir factor computations. The other three dates are fully satisfactory and utilized in the reservoir age determination.

AMERICAN MUSEUM OF NATURAL HISTORY: Through the courtesy of William Emerson (then Curator, Department of Fossil and Living Invertebrates), we obtained AMNH-8179, a single *Busycon carica*. Part of the John C. Jay collection, this specimen was collected around 1850 from an unspecified locality on the South Carolina coast. A 40-g sample from the

TABLE 13.2
**$^{14}C$ Ages, $\delta^{13}C$, and $\Delta R$ Values of Known-Age Shells from the Carolina–Florida Coast**

| Lab ID | Location | Species | Collection year | Raw $^{14}C$ age B.P. | $\delta^{13}C$ ‰ | $^{14}C$ Age B.P. | Reservoir age (years) | $\Delta R$ |
|---|---|---|---|---|---|---|---|---|
| Beta-21410 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 102.7 ± 0.7 | −1.9 | 170 ± 60 | 76 ± 60 | −280 ± 60 |
| Beta-21411 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 50 ± 90 | −0.5 | 460 ± 90 | 366 ± 90 | 10 ± 90 |
| Beta-21412 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 101.6 ± 0.9 | −1.0 | 270 ± 70 | 270 ± 70 | −180 ± 70 |
| Beta-177688 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 100.67 ± 0.5 | −0.7 | 350 ± 40 | 256 ± 40 | −100 ± 70 |
| Beta-177689 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 101.54 ± 0.7 | −0.8 | 290 ± 60 | 196 ± 60 | −160 ± 60 |
| Beta-177690 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 101.37 ± 0.7 | −0.7 | 350 ± 60 | 256 ± 60 | −100 ± 60 |
| Beta-177691 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 100.6 ± 0.6 | −1.5 | 340 ± 50 | 246 ± 50 | −110 ± 50 |
| Beta-177692 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 100.33 ± 0.7 | −0.7 | 370 ± 60 | 276 ± 60 | −80 ± 60 |
| Beta-177693 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 101.07 ± 0.7 | −1.0 | 310 ± 60 | 216 ± 60 | −140 ± 60 |
| Beta 24550 | Beaufort, NC | *Busycon* sp. | 1930 | 150 ± 70 | −0.1 | 560 ± 70 | 412 ± 70 | 102 ± 70 |
| Beta-22439 | Kiawah, SC | *Mercenaria mercenaria* | 1938 | 140 ± 60 | −2.8 | 510 ± 60 | 368 ±60 | 47 ± 60 |
| Beta-21788 | S. Carolina | *Busycon carica* | 1840 | 210 ± 70 | 0.9 | 640 ± 70 | 525 ± 70 | 148 ± 70 |
| Beta-24548 | Amelia Island, FL | *Crassostrea virginica* | 1880 | 140 ± 90 | −0.6 | 540 ± 90 | 431 ± 90 | 67 ± 90 |
| Beta-24552 | St. Augustine, FL | *Busycon* sp. | 1900 | 290 ± 70 | 0.8 | 720 ± 70 | 640 ± 70 | 265 ± 70 |
| [Paired dates, same organism] | | | | | | | | |
| Beta-23085 | Matanzas Inlet, FL | *Mercenaria campechiensis* | 1946 | 100 ± 60 | −0.4 | 510 ± 60 | 320 ± 60 | 40 ± 61 |
| I-15084 | Matanzas Inlet, FL | *Mercenaria campechiensis* | 1946 | 230 ± 80 | −0.9 | 630 ± 80 | 440 ± 80 | 160 ± 81 |
| [Paired dates, same organism] | | | | | | | | |
| Beta-23083 | Matanzas Inlet, FL | *Mercenaria campechiensis* | 1932 | 260 ± 80 | −0.9 | 660 ± 80 | 509 ± 80 | 200 ± 80 |
| I-15082 | Matanzas Inlet, FL | *Mercenaria campechiensis* | 1932 | <250 | −3.7 | <600 | — | — |
| [Paired dates, same organism] | | | | | | | | |
| Beta-23084 | St. Augustine, FL | *Mercenaria campechiensis* | 1929 | 110 ± 50 | −0.3 | 515 ± 55 | 369 ± 55 | 58 ± 55 |
| I-15083 | St. Augustine, FL | *Mercenaria campechiensis* | 1929 | 200 ± 80 | −3.7 | 540 ± 80 | 394 ± 80 | 83 ± 80 |
| [Rejected "modern" ages] | | | | | | | | |
| Beta-24549 | Cocoa, FL | *Busycon canicululatum* | 1950 | 27,440 ± 340 | — | — | — | — |
| Beta-177694 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 860 ± 60 | −0.8 | 1260 ± 60 | — | — |
| Beta-177695 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 970 ± 60 | −1.3 | 1360 ± 70 | — | — |
| Beta-177696 | St. Catherines Island, GA | *Crassostrea virginica* | 1910 | 1450 ± 60 | −1.8 | 1830 ± 70 | — | — |

growth edge was submitted to Beta Analytic, Inc. for analysis, and the results (Beta-21788) appear in table 13.2. This date is satisfactory and is utilized to calculate the reservoir age determination.

CHARLESTON MUSEUM: Al Sanders (Head Curator) graciously supplied us with the following sample:

Beta-22439 (IN14854): *Mercenaria mercenaria* collected by T. K. Ellis on Kiawah Island (South Carolina) on March 30, 1939.

One valve was submitted to Beta Analytic Inc. for $^{14}C$ analysis, and this date is utilized to calculate the reservoir age determination.

These nine mollusk samples provide a diverse mix, spanning several species and approximately 800 km of coastline, from Beaufort (North Carolina) to Cocoa (Florida). Because none of the available prebomb, known-age mollusks came from the Georgia coast, we needed to look for a way to augment the modern control sample.

We knew that a commercial oyster industry had once flourished in the waters surrounding St. Catherines Island (see the discussion in chap. 6, this volume). In the late 19th century, Augustus Oemler erected an oyster factory on the south end of St. Catherines Island. Oysters, collected by hand from nearby creeks and marshes, were prepared in a large boiler connected to the southern end of the island by a causeway. Two additional boilers were added later, one just east of Back Creek Road (at Hoke's Dock; see figs. 13.3 and 13.4) and another immediately east of the King New Ground Field boundary (just 100 m or so from Johns Mound). Figure 13.5 shows the fully operational oyster factory at King New Ground, which demonstrates that the photograph was taken sometime in the early 20th century. The apparently inexhaustible supply of oysters disappeared during the 1920s, forcing the once flourishing oyster factories of St. Catherines Island to close. Today, the rusting boilers and massive spoil heaps of oyster shells remain visible evidence of this industry.

Since virtually all of the shells within these factory middens derived from *Crassostrea* individuals harvested between about 1900 and 1920, we anticipated that such known-age mollusks might be a useful addition to the reservoir effect study. In June of 1987, we asked Mr. Royce Hayes (Superintendent of St. Catherines Island) to collect appropriate samples of *Crassostrea virginica* for $^{14}C$ analysis. We processed three $^{14}C$ dates on these samples—one from each locale—and the results were so promising that in March 2003, Mr. Hayes collected additional samples for analysis.

In total, we ran a dozen $^{14}C$ determinations on shells collected from the oyster boiling factories on St. Catherines Island. The four dates from the Back Creek oyster boiler (Beta-21412, Beta-177688, Beta-177689, and Beta-177690) are fully consistent, clustering between 270 and 350 radiocarbon years B.P. The four dates from the King New Ground boiler (Beta-21411, Beta-177691, Beta-177692, and Beta-177693) are likewise consistent, ranging between 310 and 460 radiocarbon years B.P.

Problems arose with the $^{14}C$ determinations from the South End boiler: Beta-21410 (170 ± 60 $^{14}C$ years B.P.), Beta-177694 (1260 ± 60 $^{14}C$ years B.P.), Beta-177695 (1360 ± 70 $^{14}C$ years B.P.), Beta-177696 (1830 ± 70 $^{14}C$ years B.P.). While Beta-21410 is rather young, it falls within an acceptable range for the "modern" mollusk samples listed in table 13.2. The three other radiocarbon dates from the South End oyster boiler are clearly a millennium or so too ancient to be considered modern.

Seeking an answer to this anomaly, we returned to each sampling location at South End. We hypothesized that the construction of the shell causeway in this area must have incorporated oyster shells from the ancient aboriginal middens that exist nearby. Accordingly, we rejected $^{14}C$ determinations Beta-177694, Beta-177695, and Beta-177696 from further consideration in the reservoir age study.

But the remaining nine samples of *Crassostrea virginica* from St. Catherines Island (four each from both the Back Creek and King New Ground boilers and date Beta-21410 from South End) are entirely acceptable for the $^{14}C$ analysis of modern shells.

Fig. 13.3. The early 20th century oyster boiler at Hoke's Dock; photograph taken May 2003. Four $^{14}C$ dates were processed on oyster shells samples from the accumulated oyster shell midden evident on the left side of the photograph.

We estimate the age of harvest for each sample to be A.D. 1910 ± 10 years.

### Computing the Reservoir Age and $\Delta R$

To summarize the discussion to this point: We have derived a control sample of prebomb mollusks that have been dated by 17 independent $^{14}C$ determinations (winnowed from an initial sample of the 24 dates on 21 individuals specimens, as listed in table 13.2). Although more than half of this sample consists of known-age *Crassostrea virginica* from St. Catherines Island, the overall control sample encompasses at least four species collected along a 800-km stretch along the Atlantic Ocean, from Beaufort, North Carolina, to just south of St. Augustine, Florida. The maximum uncertainty in the date of collection is ±10 years, which we consider to be negligible in comparison with the average experimental uncertainty.

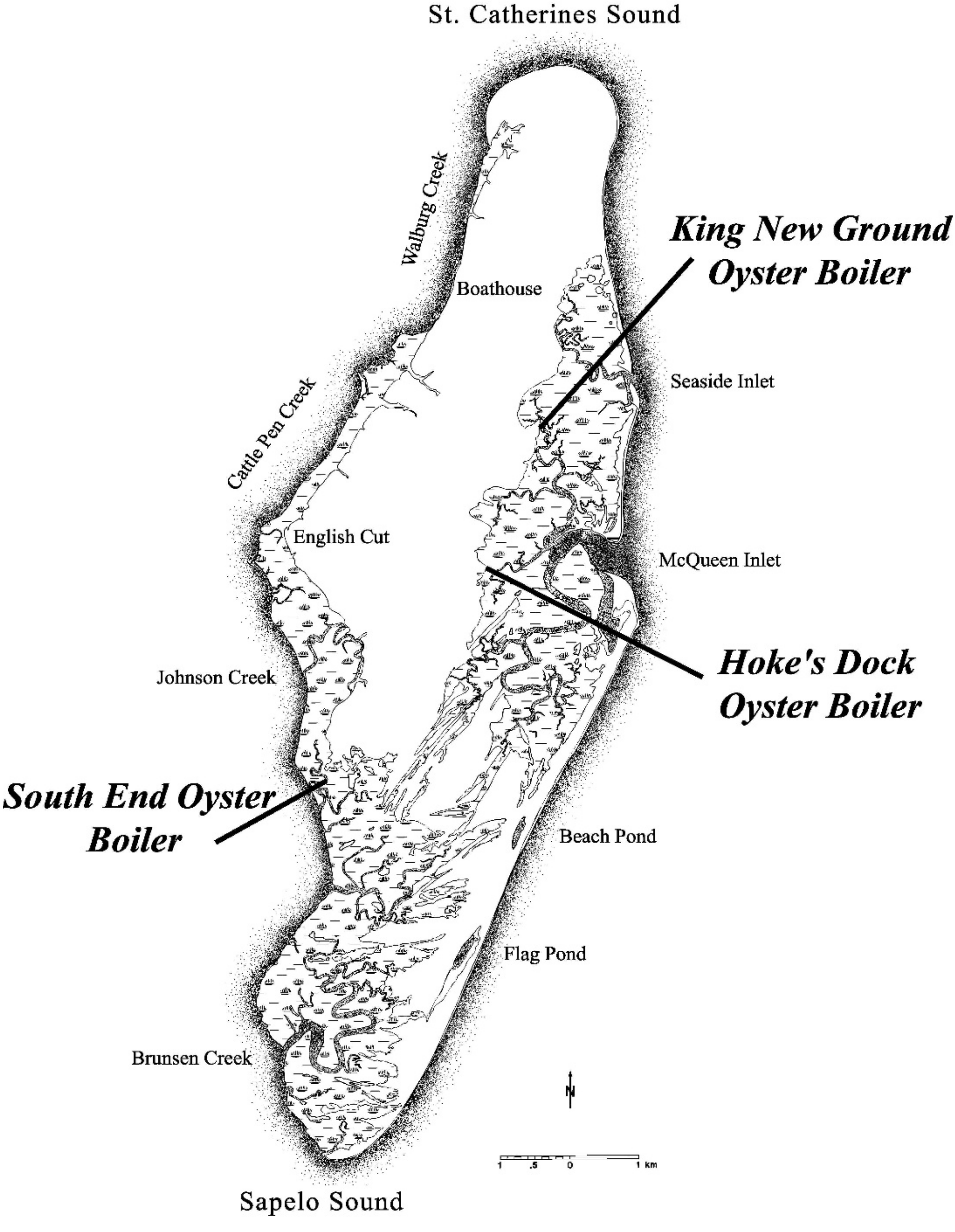


Fig. 13.4. Map showing the location of early 20th century oyster processing facilities on St. Catherines Island; radiocarbon samples have been processed on oyster shells recovered from each of these locations.

Fig. 13.5. Photograph of the oyster factory at King New Ground Field, St. Catherines Island; photograph taken sometime during the early 20th century. Four $^{14}C$ dates were processed on oyster shells samples from the accumulated oyster shell midden evident in the foreground.

Radiocarbon ages from marine samples have commonly been calibrated in two ways. It is possible to (1) apply a correction for the marine reservoir age, $R(t)$, to the conventional $^{14}C$ and then calibrate using an atmospheric calibration curve or (2) apply a correction for the regional variation from marine reservoir age, $\Delta R$, and then calibrate using the standard marine calibration curve (originally proposed by Stuiver et al., 1986 [and revised in Stuiver et al., 1998a], per procedures outlined in Stuiver and Braziunas, 1993). Following Reimer and Reimer (2001: 461), we will employ the latter method "because atmospheric $^{14}C$ are attenuated in the ocean, which results in fewer 'wiggles' in the calibration curve."

Table 13.2 presents the reservoir age for the Carolina–Florida coastal sample, computed according to the definitions employed on the Marine Reservoir Correction Database website (http://www.calib.org/; see also Reimer and Reimer, 2001):

**$^{14}$C age BP** = conventional radiocarbon age (half-life = 5568 years; corrected for isotopic fractionation) as defined by Stuiver and Polach (1977),

**Reservoir age** = measured marine $^{14}C$ – atmospheric $^{14}C$ at time $t$ (as defined by Stuiver et al., 1986),

**Δ*R*** = difference between the regional and global marine $^{14}C$ = measured marine $^{14}C$ – marine model $^{14}C$ age at time *t*.

For those unfamiliar with the nomenclature and conventions, we will derive the reservoir age and Δ*R* for Beta-23083 to illustrate how such computations were accomplished.

FIND THE MEASURED $^{14}C$ AGE: This procedure requires that we first derive a measured $^{14}C$ estimate on a modern, prebomb marine sample from a known locality and collection date. Such conventional age estimates take the apparent $^{14}C$ age normalized to a $\delta^{13}C$ value of −25 percent of the PDB standard (Stuiver and Polach, 1977).

The *Mercenaria campechiensis* valve used for date Beta-23083 was collected in 1932 from Matanzas Inlet, Florida. Ideally, its radiocarbon age should be about 20 years B.P. (where "before present" is taken to mean "before 1950"). The difference between this target date and the obtained $^{14}C$ date will define the reservoir age of this particular hard clam.

When Beta Analytic processed the sample, they found the raw $^{14}C$ result to be 260 ± 80 radiocarbon years B.P. The sample was then tested for isotopic fractionation, and the resulting ratio of $^{13}C$ to $^{12}C$ was determined to be $\delta^{13}C = -0.9$. When the raw age was corrected to account for such fractionation, the conventional $^{14}C$ age was calculated to be 660 ± 80 radiocarbon years B.P.[8]

FIND THE ATMOSPHERIC $^{14}C$ AGE: The atmospheric age was interpolated to the nearest INTCAL98 calibration dataset (Stuiver et al., 1998a: table 1). For the known-age sample Beta-23083 ($t$ = 1932), the appropriate $^{14}C$ age is found by interpolating between the 1925 age (138 ± 3) and the 1935 age (156 ± 4), for the $^{14}C$ age of 151 ± 4 years B.P.

FIND THE GLOBAL MARINE $^{14}C$ AGE: The global marine $^{14}C$ age is available from the decadal marine calibration dataset, MARINE98 (Stuiver et al., 1998b; based on figures in supporting table downloaded from http://depts.washington.edu/qil/datasets/marine98_14c.txt). For sample Beta-23083 ($t$ = 1932), the appropriate (global) marine $^{14}C$ age, interpolated between the 1930 age (458.2 ± 4.0) and the 1940 age (465.3 ± 7.4), is 460 ± 5 years B.P.

COMPUTE THE RESERVOIR AGE: The reservoir age, *R*, is the difference between the measured marine $^{14}C$ age and the atmospheric $^{14}C$ for the year 1932:

660 years B.P. − 151 years B.P.
= 509 $^{14}C$ years B.P.

This means that, whereas the known age of harvest was about 20 years B.P., the measured radiocarbon date is nearly 500 years too old. This difference is the reservoir effect for this single $^{14}C$ determination.

The error term in this case is based on counting statistics and the uncertainty in marine calibration dataset (Reimer and McCormac, 2002: 163). The specific error term is computed as the square root of the summed variances. In this case, the error is the square root of $(80^2 + 4^2) = 80.0$.

COMPUTE ΔR: The difference between the regional and global marine determinations is:

Δ*R* = conventional marine $^{14}C$
− marine model $^{14}C$ age (at time *t*)
= 660 ± 80 − 460 ± 5 years
= 200 ± 80 $^{14}C$ years B.P.

As before, the error term is given by the square root of the summed variances. In this case, the error is the square root of $(80^2 + 5^2) = 80.2$.

For Beta-23083, this Δ*R* value means that the global marine correction factor under corrects the known age of this specimen by 200 years. Table 13.1 details the difference between the conventional $^{14}C$ age for each sample and the model age for the calendar year of collection, the Δ*R* corrections, and the uncertainties associated with these age estimates for various shell samples from the Carolina–Florida coast.

Figure 13.6 shows that the ΔR values follow a distinctly bimodal distribution because the nine Δ*R* values from St. Catherines Island are consistently lower than the eight Δ*R* values from the rest of the sample. These distributions suggest that the two

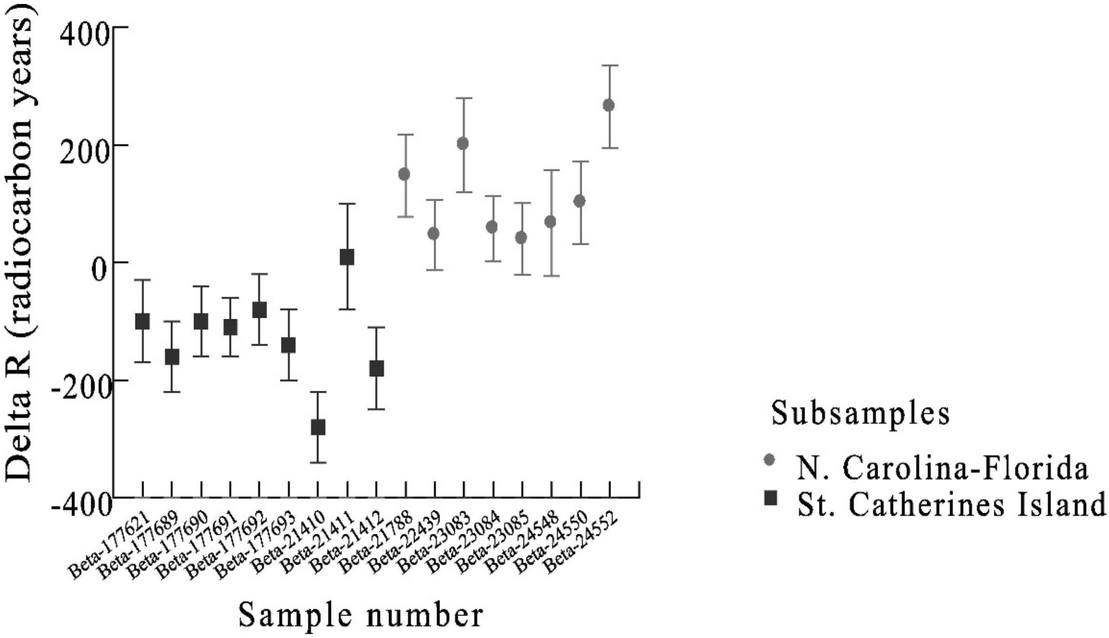


Fig. 13.6. The distribution of ΔR values for known-age shells from the Carolina–Florida coast.

subsamples were drawn from different statistical populations, and, for this reason, we will compute separate means and error terms for the two groups, which do not overlap at all.

Following current $^{14}C$ protocols, we compute the central tendency of $\Delta R$ values as the weighted mean of the individual $\Delta R$ values (e.g., Reimer and Reimer, 2001; Reimer and McCormac, 2002). The nine $\Delta R$ values for *Crassostrea virginica* from St. Catherines cluster around a regional mean $\Delta R$ of $-134.03$ years. The eight remaining $\Delta R$ values from the Carolina–Florida coast define a regional mean $\Delta R$ of 106.05 years.[9]

Following Reimer and Reimer (2001: 461) and Reimer et al. (2001: 131), we will define the uncertainty around the regional mean $\Delta R$ as the maximum of (1) the standard deviation (the sigma mean based on the reported error in the conventional sample $^{14}C$ shell ages) and (2) the scatter sigma (the square root of the variance divided by the number of samples). For the $n = 9$ samples from St. Catherines Island, the sigma mean is 20.76 and the sigma scatter is 26.46, so we will employ the larger value to estimate the error of the regional $\Delta R$ mean. For the remaining eight samples from the Carolina–Florida coast, the standard deviation is 23.78 and the scatter sigma is 25.65, so in this case as well we will employ the scatter sigma to estimate the error of the regional $\Delta R$ mean.

To summarize, we have first derived approximations for the two regional means for $\Delta R$ (the difference between the regional and global marine $^{14}C$ estimates) that characterize the prebomb, modern samples listed in table 13.2: St. Catherines Island: 134 ± 26, Southeastern Coastal Sample: 106 ± 26.

Why two means for $\Delta R$? After all, St. Catherines Island (Georgia) lies near the midpoint of our Southeastern Atlantic Coastal sample, which includes modern shells from sites ranging from Beaufort (North Carolina) to Matanzas Inlet (Florida). If the Southeastern Coastline were truly an integral unit, then a single, regional mean for $\Delta R$ should suffice.

Although relevant comparable values are scarce, the mean $\Delta R$ value for the Carolina–Florida subsample (106 ± 26 years) compares favorably with the other available regional average $\Delta R$ values (available from the online Marine Reservoir Correction Database) for the Bahamas and Florida (36 ± 14 years), Long Island Sound, New York (165 ± 78) and the Gulf of Maine (38 ± 40 years).

The $^{14}C$ dates on modern oyster shells from St. Catherines Island differ considerably from the data available for the Atlantic Seaboard, producing an extraordinarily negative mean $\Delta R$ value of $-134 \pm 26$—one of the most extreme values to be recorded (Paula Reimer, personal commun.).

## Discussion

When combined with the upwelling of ancient carbon from the deep ocean, the apparent ages of marine samples are several hundred years older than contemporaneous atmospheric samples. Dissolved inorganic carbon in the upper ocean is influenced by the exchange with both the atmosphere and the radiocarbon-depleted deep ocean, with a $^{14}C$ content intermediate between the two. In order to date marine materials, it is essential to separate the $^{14}C$ of the ocean surface from that of atmospheric $CO_2$. Regional patterns of $\Delta R$ are controlled by diverse factors, including localized circulation patterns, the relative inflow off freshwater sources (presumably carrying older carbonates), spatial variations in upwelling, water mass mixing, and variable air–sea gas exchange. $\Delta R$ values can likewise vary in marine mollusk samples due to species, habitat, and/or substrate (Dye, 1994a; Forman and Polyak, 1997; Hogg et al., 1998; Reimer and Reimer, 2001). In areas where waters are continuously exchanged with open ocean water and vertically well mixed (with concentrated upwell offshore), reservoir effects tend to increase. Estuarine processes and dilution by freshwater most likely reduces reservoir effects within tidal waters.

It is clear that the intertidal species *Crassostrea* found on St. Catherines Island were sampling a different $^{14}C$ reservoir than the surface mixed layer commonly assumed for such marine samples (perhaps due to intense wave action or exposure during low tide that caused atmospheric mixing in shallow and estuarine waters).[10] Whatever the reason, it seems likely that similar processes operated during the prehistoric past, thereby generating younger apparent $^{14}C$ dates in the archaeological oyster samples. The St. Catherines Island-specific mean value for $\Delta R$ ($-134 \pm 26$) provides a way to estimate this effect.[11]

It may be that species-specific factors are operating here, meaning that the regional mean $\Delta R$ values computed on *Crassostrea virginica* (oysters) might not be directly transferable to, say, *Mercenaria mercenaria* (the hard clam values that we commonly used for $^{14}C$ dating on St. Catherines Island). As noted above, the available paired $^{14}C$ dates indicate that whereas oyster shell–charcoal pairs had a mean differential of 279 ± 138 radiocarbon years B.P. ($n = 8$), the corresponding mean age differential for clam shell–charcoal pairs is 430 ± 26 radiocarbon years B.P. ($n = 3$). While these results are not statistically significant, the samples suggest the possibility that *Mercenaria* and *Crassostrea* might require different reservoir corrections (see Goodfriend and Rollins, 1998; Hogg et al., 1998). While recognizing this possibility, the lack of modern controls on *Mercenaria* populations from St. Catherines Island makes such a species-level calculation of $\Delta R$ values impossible at this point.

We must also note that, as a practical matter for deriving this first approximation, we assume that $\Delta R$, the global reservoir $^{14}C$ age of the ocean's surface water, has remained stable through time for a given region. For example, in an analysis of paired terrestrial–marine archaeological samples from coastal Ireland, Reimer et al. (2001) found that $\Delta R$ appears to have remained constant over at least the past 2000 years (and possibly the last 6000 years).

We also recognize that a number of studies indicate that in certain regions, marine $\Delta R$ values have fluctuated through time (Ingram and Southon, 1996), largely due to changing patterns of ocean circulation or regional upwelling (in which deeper, older water may cause $\Delta R$ to vary temporally). Using paired $^{14}C$ determinations of closely associated marine shell and carbonized plant materials from San Miguel Island

(California), Kennett et al. (1997) detected significant changes in $\Delta R$ during the Holocene. These reflect apparent changes in regional patterns of oceanic circulation, suggesting the derivation of different $\Delta R$ values for different periods of time.

Similarly, in the Pacific Northwest, the commonly accepted procedure has been to subtract 801 $\pm$ 23 years from a marine shell to arrive at a comparable age for terrestrial samples. This is a two-part figure: The mean global, preindustrial value in the Northern Hemisphere is 400 years, a figure based on comparing global atmospheric $^{14}C$ with ocean surface concentrations of $^{14}C$ (Stuiver et al., 1998b). The remaining 401-year difference for coastal waters of the state of Washington is due to local upwelling, which brings older, $^{14}C$-depleted water to the surface. Based on their analysis of marine shell–charcoal pairs from archaeological sites in Puget Sound and the Gulf of Georgia, Deo et al. (2004) found that most samples dating between 0 and 3000 cal B.P. did indeed support this modern correction value. In samples dating between 500 and 1200 cal B.P., however, the reservoir correction value dipped to $\Delta R = 500$ (much larger than the modern value, suggesting a decrease in offshore upwelling). Ingram (1998) suggests a correlation between upwelling and precipitation, a finding that reflects a north–south trend along the Pacific coast, where $\Delta R$ ranges from $\pm$ 220 years in southern California to $\pm$ 290 years in northern California (Ingram and Southon, 1996).

Although we recognize the possibility that the $\Delta R$ values could have changed through time, we lack any specific information to document such a change. The paired samples, reported earlier in this chapter, are insufficient to establish changing patterns of $\Delta R$ through time along the southeastern U.S. coastline. This would require a specifically designed study, pairing terrestrial and marine samples for the entire 4000-year range of known human occupation of St. Catherines Island. Without these results, we must assume that $\Delta R$ has been constant for St. Catherines Island and can be reliably calculated as the difference in $^{14}C$ years between known-age marine samples and the marine model age for time *t*.

Although the subregional $\Delta R$ values derived in this study gloss over considerable variability, the overarching trend is clear: It is likely that the anomalous $\Delta R$ values reflect the fact that the oysters and clams on St. Catherines Island derive from a lagoon or estuary environment that likely does not reflect open ocean conditions (perhaps reflected in the less extreme $\Delta R$ values derived from the Carolina–Florida coastal sample).

## SUMMARY: CALIBRATING THE $^{14}C$ DATES

We can now calibrate the entire dataset of $^{14}C$ dates available from St. Catherines Island. To show how this is done, we return to the 11 paired shell–charcoal dates, presented in table 13.3. This summary section recaps the various procedures involved and provides an opportunity to assess how well the regional $\Delta R$ mean corrects the marine shell dates relative to their charcoal counterparts.

All calibrations discussed in this volume are based on the CALIB 5.0.1 Radiocarbon Calibration Program (as initially presented by Stuiver and Reimer, 1993, and updated in Stuiver et al., 2005). For nonmarine samples, we have used the IntCal04 curve (Reimer et al., 2004). For marine samples, we employed the Marine04 curve, which takes into account the "global" ocean effects (Hughen et al., 2004); to accommodate estimated local effects on St. Catherines Island, we input the regional difference of $\Delta R = -134 \pm 26$ (derived above).

### Calibrating the Results

The results can now be converted from radiocarbon age to calibrated calendar years by computing the probability distribution of the $^{14}C$ sample's true age (Stuiver and Reimer, 1993).[12] This distribution is assumed to be normal, with a standard deviation given by the square root of the total sigma. As discussed above, the uncertainty in marine samples also accounts for the variability in the appropriate $\Delta R$ values. The

TABLE 13.3
**Calibrated Results for Paired Charcoal–Marine Shell $^{14}C$ Determinations from St. Catherines Island[a]**

| Paired charcoal–marine shell $^{14}C$ determinations | | | Radiocarbon age calibrated[b] ($\pm 2\sigma$) |
|---|---|---|---|
| Pair 1: Meeting House Field (9Li21), Middens D and E, level 3 | | | |
| Beta-30268 | *Mercenaria* | 710 ± 80 | cal A.D. 1340–1650 |
| Beta-30269 | charcoal | 290 ± 60 | cal A.D. 1450–1950 |
| Pair 2: Meeting House Field, Midden D, level 3 | | | |
| Beta-30270 | *Crassostrea* | 790 ± 80 | cal A.D. 1280–1560 |
| Beta-30269 | charcoal | 290 ± 60 | cal A.D. 1450–1950 |
| Pair 3: Meeting House Field, Midden E, Test Pit I (30–40 cm) | | | |
| Beta-20806 | *Crassostrea* | 760 ± 60 | cal A.D. 1330–1540 |
| Beta-21973 | charcoal | 320 ± 60 | cal A.D. 1450–1790 |
| Pair 4: 9Li170, Test Pit I (10–20 cm) | | | |
| Beta-20805 | *Crassostrea* | 530 ± 70 | cal A.D. 1480–1820 |
| Beta-20810 | charcoal | 330 ± 60 | cal A.D. 1450–1660 |
| Pair 5: Wamassee Head (9Li13), Test Pit I (40–50 cm) | | | |
| Beta-20804 | *Mercenaria* | 820 ± 70 | cal A.D. 1290–1500 |
| Beta-20811 | charcoal | 360 ± 60 | cal A.D. 1440–1650 |
| Pair 6: Meeting House Field, Midden E, Test Pit I (30–40 cm) | | | |
| Beta-20806 | *Crassostrea* | 760 ± 60 | cal A.D. 1320–1550 |
| Beta-21972 | charcoal | 440 ± 50 | cal A.D. 1410–1630 |
| Pair 7: Meeting House Field, Midden 21 (level 3) | | | |
| Beta-30263 | *Mercenaria* | 950 ± 60 | cal A.D. 1190–1420 |
| Beta-30264[b] | charcoal | 540 ± 60 | cal A.D. 1300–1450 |
| Pair 8: Meeting House Field, Midden 21 (level 3) | | | |
| Beta-30265 | *Crassostrea* | 730 ± 50 | cal A.D. 1340–1570 |
| Beta-30264[b] | charcoal | 540 ± 60 | cal A.D. 1300–1450 |
| Pair 9: Meeting House Field (9Li21), Midden E, Test Pit I, (80–90 cm) | | | |
| Beta-20808 | *Crassostrea* | 680 ± 60 | cal A.D. 1420–1630 |
| Beta-21974 | charcoal | 590 ± 50 | cal A.D. 1290–1420 |
| Pair 10: Johns Mound (Stage II/Central Pit) | | | |
| UGA-64 | *Crassostrea* | 1190 ± 60 | cal A.D. 950–1230 |
| UGA-61 | charcoal | 900 ± 60 | cal A.D. 1020–1250 |
| Pair 11: Seaside Mound I (Feature 15/Central Tomb) | | | |
| UGA-1826 | *Crassostrea* | 1630 ± 60 | cal A.D. 480–770 |
| UGA-112 | charcoal | 1430 ± 115 | cal A.D. 400–880 |

[a] A regional reservoir correction of −134 ± 26 has been applied to all marine shell dates. The calibrated values for all charcoal–shell pairs are statistically indistinguishable ($p < 0.01$).
[b] Note that the same charcoal determination (Beta-30264) appears in pairs 7 and 8.

appropriate probability function is applied to each calendar year, then these probabilities are ranked and summed to determine the one-sigma (68.3%) and two-sigma (95.4%) confidence intervals. Finally, the relative areas under the probability curve are plotted at both levels.

To illustrate this procedure, we will calibrate one of the charcoal-shell pairs discussed above. Figure 13.7 plots the probability distribution associated with Beta-30270, a marine shell date from Midden D at Meeting House Field (corrected for reservoir effects as discussed above). The raw radiocarbon age of 790 ± 80 (Beta-30270) converts to a one-sigma range of cal A.D. 1340–1470 (appropriately rounded, as discussed above). Figure 13.7 shows these re-

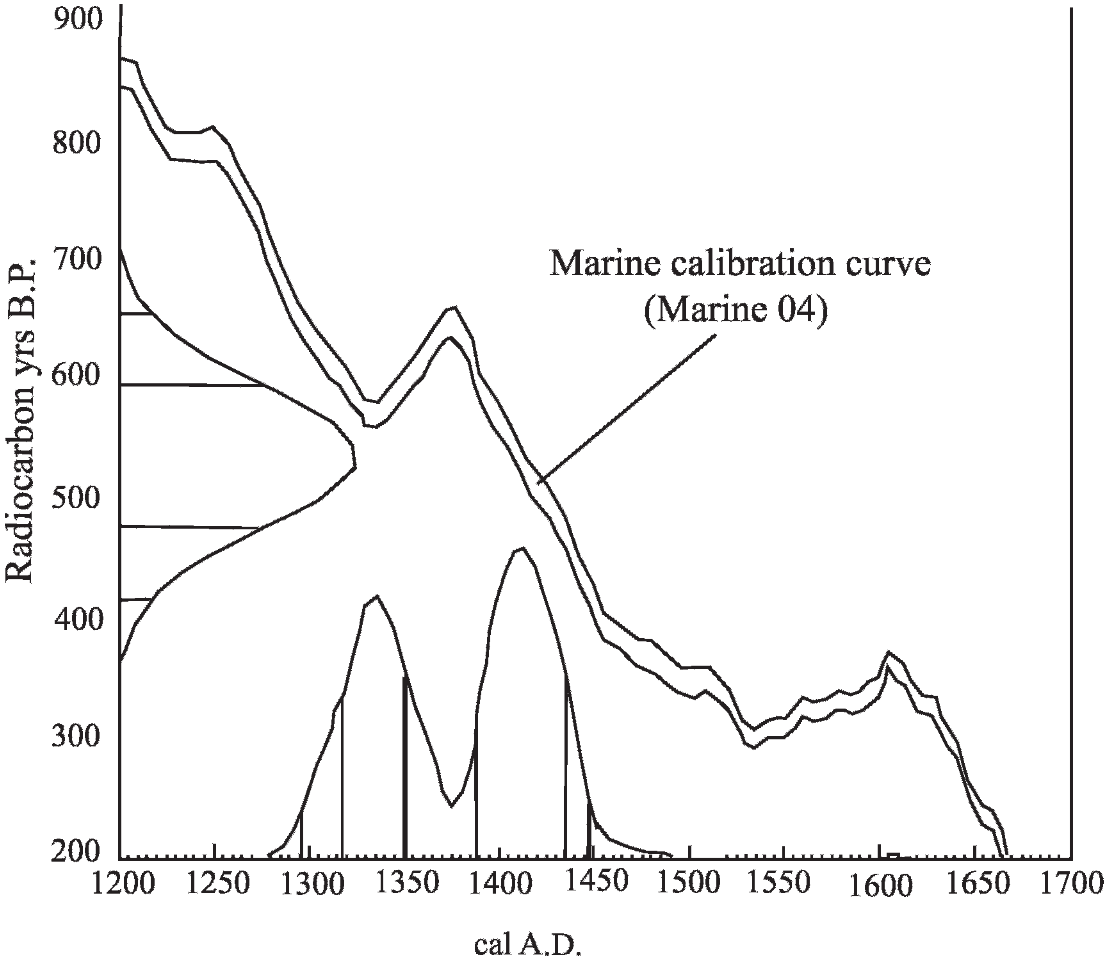


Fig. 13.7. Calibrating Beta-30270 using the intercept-based technique (Method A). The *y*-axis plots the raw $^{14}C$ age (790 ± 80) and the dark, wavy line derives from the decadal marine calibration dataset (Marine04; Reimer et al., 2004). The calibrated mean age (cal A.D. 1430) and confidence limits are determined by plotting the intersections between the two orthogonal axes and marine calibration curve.

sults in graphic format, with the uncorrected probability distribution along the *y*-axis (expressed in radiocarbon years B.P.) and the calibrated curve appears on the *x*-axis; both curves show the one- and two-sigma limits. The marine calibration curve appears as the superimposed diagonal.

Figure 13.8 shows comparable results for the charcoal sample Beta-30264 (also recovered from Meeting House Field). The frequency distributions are plotted according to the conventions explained for figure 13.7; the only difference is that the jagged terrestrial conversion curve is superimposed as a diagonal (and, of course, the marine reservoir effect has not been applied to this terrestrial sample). The one-sigma age of this bimodal distribution is cal A.D. 1320–1350 (accounting for 38.6% of the probability distribution) and cal A.D. 1390–1435 (representing 61.4% of the distribution). The two-sigma limits are cal A.D. 1300–1450.

Table 13.3 and figure 13.9 provide the results obtained by calibrating the probability distributions for the 22 paired charcoal–marine shell dates discussed earlier in this chapter. The comparison of paired block

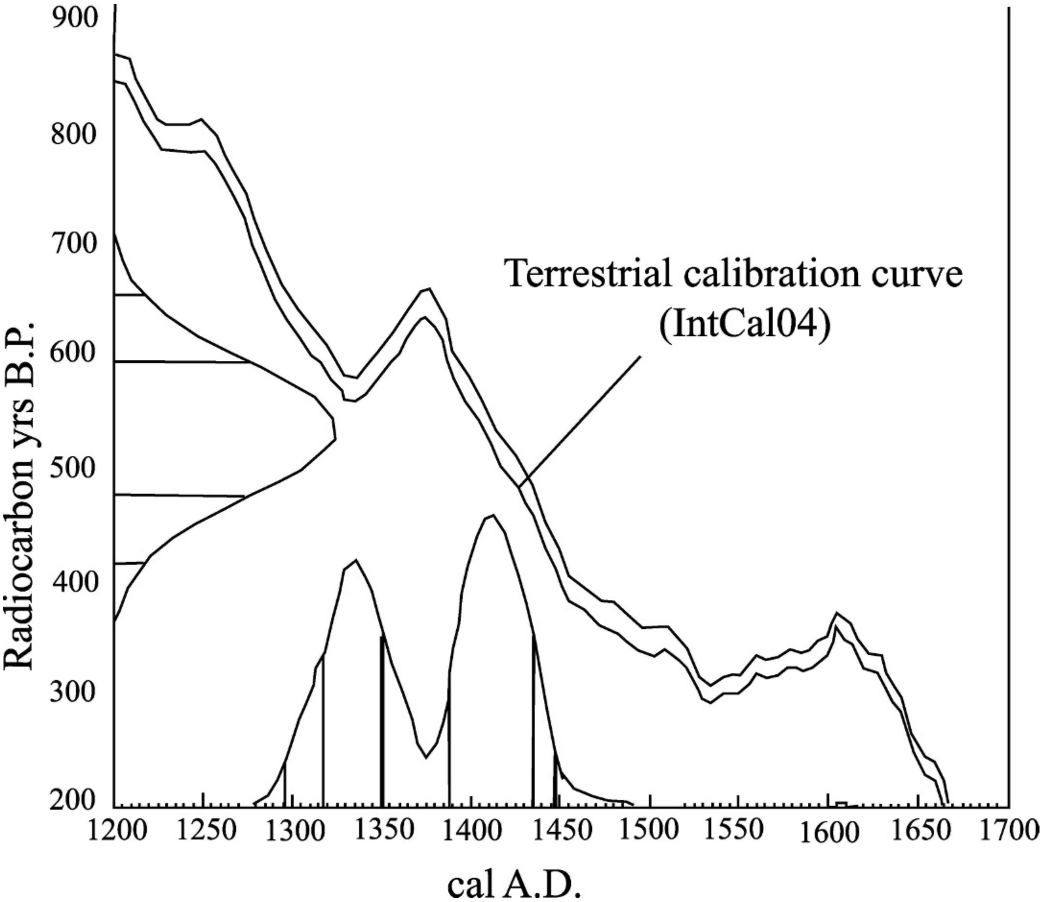


Fig. 13.8. Calibrating Beta-30264 using the IntCal04 calibration curve (Reimer et al., 2004).

plots clearly demonstrates the interrelationships of the calibrated $^{14}C$ dates, at both the one- and two-sigma levels. In all 11 pairs, the charcoal and marine shell dates overlap significantly, reinforcing the conclusion derived above that the local reservoir factor ($-134 \pm 26$ radiocarbon years) satisfactorily resolves the discrepancy between atmospheric and marine samples on St. Catherines Island.

## CALIBRATING THE SAMPLE

In this volume, we will discuss the 239 $^{14}C$ determinations presently available from St. Catherines Island. To derive a local reservoir correction, we processed 12 radiocarbon dates on modern oyster shells (these data were discussed earlier in this chapter; see table 13.1). The $^{14}C$ dates available from noncultural contexts, primarily organics and marine shell samples collected in conjunction with vibracore sampling and surface geological reconnaissance, are listed in table 29.1.

An additional 186 radiocarbon dates are available from samples recovered from archaeological investigations on St. Catherines Island, primarily those that involved burial mounds and shell middens. Eleven of these dates were processed by Joseph Caldwell and his team from the University of Georgia; the remaining $^{14}C$ determinations resulted from investigations by the American Museum of Natural History. All of the archaeological radiocarbon dates were calibrated according to the conventions outlined earlier in this chapter. The results, to-

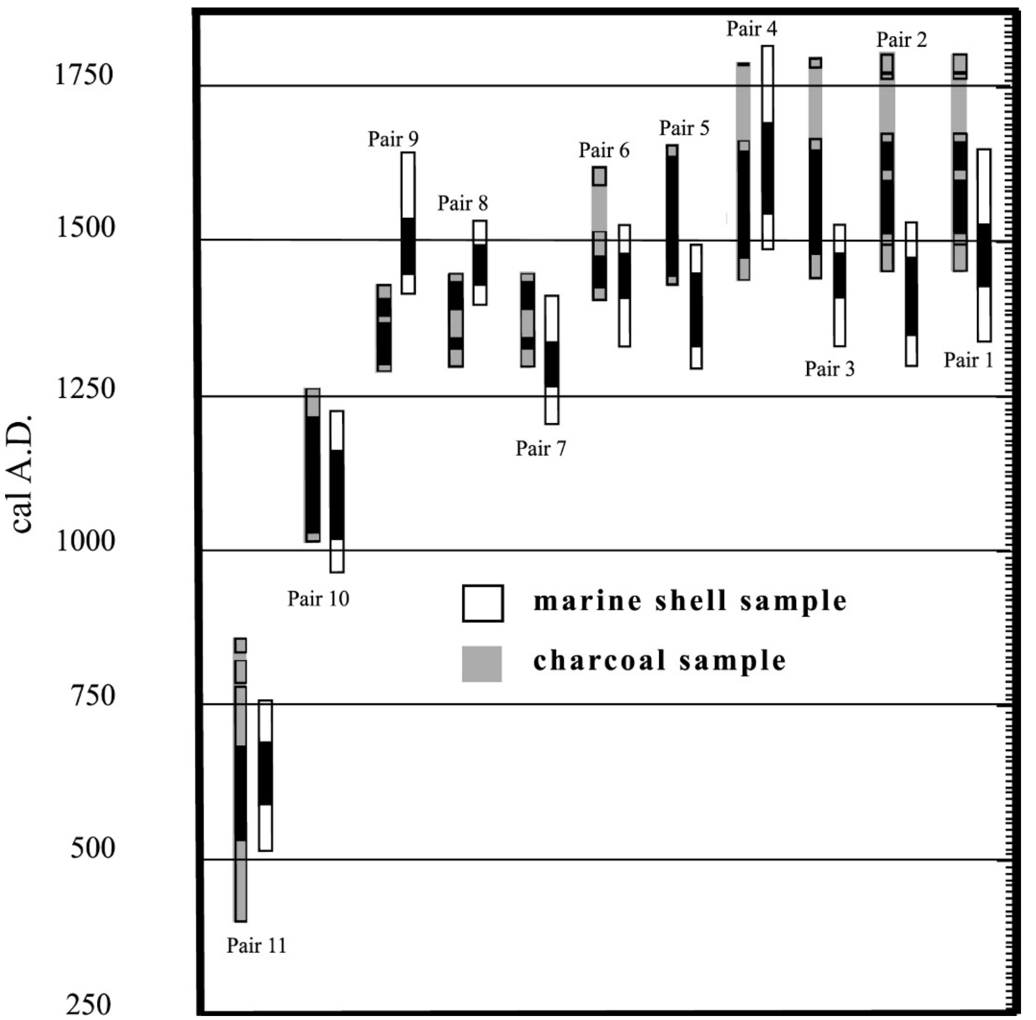


Fig. 13.9. Calibrated results for paired charcoal-marine shell $^{14}C$ determinations from St. Catherines Island. A regional reservoir correction of $-134 \pm 26$ has been applied to all marine shell dates. The calibrated values for each charcoal-shell are statistically indistinguishable ($p = < 0.01$).

gether with the appropriate provenience information, appear in table 13.4 (see p. 365). The context and significance of these dates are applied in several subsequent chapters (especially chap. 20 and 24).

## NOTES

1. In this context, "fractionation" refers to alterations in the ratios of isotopic carbon species as a function of their atomic mass (Taylor, 1987: 35).
2. "PDB" is an abbreviation for "PeeDee Belemnite", a limestone employed as the international reference standard for expressing carbon stable isotopic ratios.
3. Throughout this discussion, we will employ the rounding conventions advocated by Stuiver and Polach (1977: 362). That is, for all calculations, we will supply one more digit than can be accurately accounted for; in reporting estimated ages and statistical uncertainties, figures like 8234 ± 256 or 42,786 ± 2322 would be rounded, respectively, to 8230 ± 260 and 42,800 ± 2300. When the uncertainty is less than 100 years, rounding off to the nearest multiple of 10 will be followed between 50 and 100 years, and rounding off to the nearest multiple of 5 below 50 years.
4. The CALIB program previously included an option for adding an arbitrary correction for missing fraction values. This correction differs depending on whether the $^{14}C/^{12}C$ ratio is measured or the $^{14}C/^{13}C$ (in some AMS [abbreviation for Accelerator Spectrometer] sys-

tems). Future revisions of CALIB will not employ this correction (Paula Reimer, personal commun.).

5. In a few cases, the radiocarbon dates were not corrected for isotopic fractionation by the laboratory; averaging across the corrected marine shell samples from St. Catherines Island, we found that the average isotopic correction fraction is 393 ± 20 radiocarbon years. We used this rounded value (390 ± 20 radiocarbon years) to correct those $n = 21$ $^{14}$C determinations on marine shell for which isotopic fractionation values are unavailable from the radiocarbon laboratory.

6. In some locations, e.g., the corals of the Red Sea, bomb $^{14}$C can be seen as early as 1954 (Reimer, personal commun.). Additionally, a shell collected in 1955 and dated by Broecker and Olsen (1959) showed a smaller reservoir correction than older shells from the same region (Reimer and McCormac, 2002).

7. Despite the small sample sizes involved, table 13.1 hints that a species effect might be operating here. For the $n = 8$ oyster shell–charcoal pairs, the mean age differential is 279 ± 138 radiocarbon years B.P. The corresponding mean age differential for clam shell–charcoal pairs is 430 ± 26 radiocarbon years B.P. ($n = 3$). While this difference is not statistically significant ($t = 1.830$, $p = 0.100$), this small sample of paired dates suggests that *Mercenaria* and *Crassostrea* might require different reservoir corrections.

8. Although previous derivations of reservoir age have employed a correction to account for the fossil fuel (or Suess effect; see Taylor, 1987: 36–37), no fossil fuel corrections are necessary when reservoir age is calculated by the above definition (Stuiver et al., 1998a).

9. Whereas the simple mean treats each variate as equally significant, the *weighted mean* assigns an importance, or "weight", to the various observations. In the case of $\Delta R$, the individual $\Delta R$ values are inversely weighted according to their associated error terms (expressed as weight = 1/error$^2$). In effect, the smaller the error, the higher the weight assigned to a given value of $\Delta R$. The various error estimates associated with the mean of $\Delta R$ likewise affect the weighting of the initial, sample-specific error estimate.

10. We also note that the Carolina–Florida samples demonstrate a fairly large scatter of $\Delta^{13}$C variations (from 0.9 to −3.7 ‰). It is unclear whether this variability reflects actual variability within the mixed layer, fast-paced changes through time, or the collection of samples from lagoons or estuaries that do not reflect open ocean conditions (Southon et al., 2002: 171).

11. Although we cannot entirely discount a problem with diagenic modification of the St. Catherines Island oyster samples—perhaps some kind of modification during the factory processing of these oysters during the early 20th century—only rarely do marine shell samples suffer postdepositional contamination (Hogg et al., 1998: 975).

12. Since its inception, the CALIB program has facilitated the calibration of raw $^{14}$C determinations using both an intercept (Method A) and a probability distribution (Method B) approach. Telford et al. (2004) have recently demonstrated that the intercept method of calibration, while quite popular, exhibits an "undesirable behavior" in being highly sensitive to the mean of the $^{14}$C date and adjustments of the calibration curve. Telford recommends that the full probability distribution function provides the best estimate of the calibrated age. Beginning with version 4.4, CALIB accepted this recommendation and no longer supports the intercept (Method A) technique (Reimer, personal commun.). For this reason, we employ only the probability distribution range throughout the remainder of this study.

TABLE 13.4
**Radiocarbon Dates (*n* = 184) from Archaeological Sites Located on St. Catherines Island**

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| Long Field Feature | — | Beta-183638 | Upright log | Wood (*Pinus*) | 150 ± 50 | −27.7 | 100 ± 50 | — | 1 |
| South New Ground Mound | 9Li12 | UGA-1688 | Primary humus | Charcoal | 1890 ± 60 | — | — | 40 B.C.–A.D. 250 | 2 |
| South New Ground Mound | 9Li12 | UGA-1689 | Primary humus | Charcoal | 2160 ± 60 | — | — | 370 B.C.–50 | 2 |
| Wamassee Head | 9Li13 | UGA-120 | Excavation A | *Crassostrea* | 490 ± 90 | ** | 880 ± 90 | A.D. 1200–1490 | 5 |
| Wamassee Head | 9Li13 | UGA-116 | Excavation B | *Crassostrea* | 1680 ± 70 | — | 2070 ± 70 | 30 B.C.–A.D. 340 | 5 |
| Wamassee Head | 9Li13 | Beta-20802 | TP I (0–10) | *Mercenaria* | 190 ± 60 | −1 | 580 ± 60 | A.D. 1470–1700 | 1 |
| Wamassee Head | 9Li13 | Beta-20803 | TP I (40) | *Crassostrea* | 1670 ± 80 | −2.1 | 2040 ± 80 | A.D. 20–400 | 1 |
| Wamassee Head | 9Li13 | Beta-20804 | TP I (50) | *Mercenaria* | 420 ± 70 | −0.5 | 820 ± 70 | A.D. 1290–1500 | 1 |
| Wamassee Head | 9Li13 | Beta-20811 | TP I (40–50) | Charcoal | 360 ± 60 | — | — | A.D. 1440–1650 | 1 |
| South End Mound I | 9Li13 | Beta-225472 | Burial 6 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| South End Mound I | 9Li13 | Beta-225477 | Burial 16 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| South End Mound I | 9Li13 | Beta-225478 | Burial 20 | Human bone | 440 ± 40 | −13.4 | 630 ± 40 | A.D. 1290–1400 | 1, AMS date |
| South End Mound I | 9Li13 | Beta-225479 | Burial 24 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| South End Mound I | 9Li13 | Beta-225480 | Burial 25 | Human bone | 400 ± 40 | −13.1 | 600 ± 40 | A.D. 1290–1410 | 1, AMS date |
| South End Mound I | 9Li13 | Beta-225481 | Burial 28 | Human bone | 300 ± 40 | −13.7 | 490 ± 40 | A.D. 1320–1470 | 1, AMS date |
| Shell Field 2 | 9Li15 | Beta-20812 | TP III (30–40) | *Crassostrea* | 1830 ± 70 | −0.9 | 2230 ± 70 | 250 B.C.–A.D. 150 | 1 |
| Shell Field 2 | 9Li15 | Beta-20813 | TP I (basal) | *Crassostrea* | 1580 ± 70 | −1.1 | 1970 ± 70 | A.D. 90–440 | 1 |
| Shell Field 2 | 9Li15 | Beta-20814 | TP I (0–10) | *Crassostrea* | 1640 ± 60 | −1.3 | 2030 ± 60 | A.D. 40–370 | 1 |
| Johns Mound | 9Li18 | UGA-64 | Stage II | *Crassostrea* | 800 ± 60 | ** | 1190 ± 60 | A.D. 950–1230 | 3 |
| Johns Mound | 9Li18 | UGA-61 | Central Pit | Charcoal | 900 ± 60 | ** | — | A.D. 1020–1250 | 5 |
| Johns Mound | 9Li18 | Beta-225471 | Burial 3 | Human bone | 830 ± 40 | −14.2 | 1010 ± 40 | A.D. 900–1160 | 1, AMS date |
| Johns Mound | 9Li18 | Beta-225475 | Burial 10 | Human bone | 880 ± 40 | −13.5 | 1070 ± 40 | A.D. 890–1020 | 1, AMS date |
| | 9Li19 | UGA-58 | Midden 2 | Charcoal | 1070 ± 60 | ** | — | A.D. 780–1150 | 5 |
| | 9Li19 | UGA-60 | Midden 2 | *Crassostrea* | 1180 ± 60 | ** | 1570 ± 60 | A.D. 560–840 | 5 |
| Marys Mound | 9Li20 | UGA-1687 | Primary humus | Charcoal | 1250 ± 70 | — | — | A.D. 650–950 | 3, 6 |
| Marys Mound | 9Li20 | UGA-1685 | Stage II | *Crassostrea* | 700 ± 60 | ** | 1090 ± 60 | A.D. 1150–1290 | 3, 6 |
| Marys Mound | 9Li20 | Beta-225470 | Burial 2 | Human bone | 860 ± 40 | −14.7 | 1030 ± 40 | A.D. 900–1150 | 1, AMS date |
| Marys Mound | 9Li20 | Beta-225473 | Burial 6 | Human bone | 740 ± 40 | −14.5 | 9100 ± 40 | A.D. 1030–1210 | 1, AMS date |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| Meeting House Field | 9Li21 | Beta-20806 | TP I (30–40) | *Crassostrea* | 380 ± 60 | −2 | 760 ± 60 | A.D. 1320–1550 | 1 |
| Meeting House Field | 9Li21 | Beta-20807 | TP I (60–70) | *Crassostrea* | 310 ± 60 | −1.8 | 690 ± 60 | A.D. 1410–1650 | 1 |
| Meeting House Field | 9Li21 | Beta-20808 | TP I (80–90) | *Crassostrea* | 310 ± 60 | −2.9 | 680 ± 60 | A.D. 1420–1630 | 1 |
| Meeting House Field | 9Li21 | UGA-1009 | TP I (40–50) | Charcoal | 580 ± 60 | — | — | A.D. 1290–1430 | 2 |
| Meeting House Field | 9Li21 | UGA-1010 | TP I (90–100) | Charcoal | 690 ± 60 | — | — | A.D. 1220–1400 | 2 |
| Meeting House Field | 9Li21 | Beta-21972 | MD E (30–40) | Charcoal | 440 ± 50 | — | — | A.D. 1410–1630 | 1 |
| Meeting House Field | 9Li21 | Beta-21973 | MD E (40–50) | Charcoal | 320 ± 60 | — | — | A.D. 1450–1790 | 1 |
| Meeting House Field | 9Li21 | Beta-21974 | MD E (80–90) | Charcoal | 590 ± 50 | — | — | A.D. 1290–1420 | 1 |
| Meeting House Field | 9Li21 | Beta-30262 | MD 12 (level 3) | *Mercenaria* | 450 ± 60 | ** | 840 ± 60 | A.D. 1290–1470 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30263 | MD 21 (level 3) | *Mercenaria* | 560 ± 60 | ** | 950 ± 60 | A.D. 1190–1420 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30264 | MD 21 (level 3) | Charcoal | 540 ± 60 | ** | — | A.D. 1300–1450 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30265 | MD 21 (level 3) | *Crassostrea* | 340 ± 50 | ** | 730 ± 50 | A.D. 1340–1570 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30266 | MD H (level 2) | *Mercenaria* | 390 ± 60 | ** | 780 ± 60 | A.D. 1310–1520 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30267 | MD H (level 8) | *Mercenaria* | 600 ± 80 | ** | 990 ± 80 | A.D. 1090–1420 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30268 | MD M (level 3) | *Mercenaria* | 320 ± 80 | ** | 710 ± 80 | A.D. 1340–1650 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30269 | MD M (level 3) | Charcoal | 290 ± 60 | ** | — | A.D. 1450–1950 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30270 | MD M (level 3) | *Crassostrea* | 400 ± 80 | ** | 790 ± 80 | A.D. 1280–1560 | 1, 6 |
| Meeting House Field | 9Li21 | Beta-30271 | MD N (level 3) | *Mercenaria* | 1060 ± 70 | ** | 1450 ± 70 | A.D. 670–980 | 1, 6 |
| Seaside I | 9Li26 | UGA-SC3 | — | *Crassostrea* | 2350 ± 220 | ** | 2740 ± 220 | 1240–130 B.C. | 2 |
| Seaside I | 9Li26 | UGA-104 | — | *Crassostrea* | 2220 ± 100 | ** | 2610 ± 100 | 780–260 B.C. | 2 |
| Seaside I | 9Li26 | UGA-112 | Tomb | Charcoal | 1430 ± 115 | — | — | A.D. 390–870 | 2 |
| Seaside I | 9Li26 | UGA-1826 | Feature 15 | *Crassostrea* | 1240 ± 60 | ** | 1630 ± 60 | A.D. 510–770 | 2 |
| Cunningham Mound E | 9Li28 | UGA-1559 | Primary humus | Charcoal | 1440 ± 60 | — | — | A.D. 440–680 | 2 |
| Cunningham Mound E | 9Li28 | UGA-1561 | Primary humus | Charcoal | 1430 ± 60 | — | — | A.D. 440–760 | 2 |
| Cunningham Mound A | 9Li43 | UGA-1254 | Feature 3 | Charcoal | 2970 ± 80 | — | — | 1410–980 B.C. | 2 |
| Cunningham Mound A | 9Li43 | UCLA-1997C | Feature 3 | Charcoal | 2150 ± 60 | — | — | 370–50 B.C. | 2 |
| Cunningham Mound A | 9Li43 | UGA-1560 | Feature 4 | Charcoal | 1860 ± 70 | — | — | A.D. 1–340 | 2 |
| Cunningham Mound A | 9Li43 | UGA-1562 | Central pit | Charcoal | 3410 ± 80 | — | — | B.C. 1910–1520 | 2 |
| Cunningham Mound A | 9Li43 | Beta-225469 | Burial 1 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| Cunningham Mound B | 9Li44 | UGA-1007 | Primary humus | Charcoal | 1870 ± 60 | — | — | A.D.1–320 | 2 |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. (±1σ) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] (±2σ) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| Cunningham Mound B | 9Li44 | UGA-1008 | Feature 1 | Charcoal | 2160 ± 70 | — | — | 380–50 B.C. | 2 |
| Cunningham Mound B | 9Li44 | UCLA-1978 | Feature 1 | Charcoal | 2500 ± 60 | — | — | 790–420 B.C. | 2 |
| Cunningham Mound B | 9Li44 | UGA-1684 | Primary humus | Charcoal | 1850 ± 60 | — | — | A.D. 30–340 | 2 |
| Cunningham Mound C | 9Li45 | UGA-1253 | Primary humus | Charcoal | 2380 ± 80 | — | — | 770–230 B.C. | 2 |
| Cunningham Mound C | 9Li45 | UCLA-1997A | Feature 1 | Charcoal | 1410 ± 60 | — | — | A.D. 530–770 | 2 |
| Cunningham Mound C | 9Li45 | UGA-1686 | Feature 2 | Charcoal | 3010 ± 60 | — | — | 1410–1060 B.C. | 2 |
| Cunningham Mound D | 9Li46 | UGA-1255 | Primary humus | Charcoal | 2805 ± 60 | — | — | 1130–830 B.C. | 2 |
| Cunningham Mound D | 9Li46 | UCLA-1997D | Primary humus | Charcoal | 1430 ± 60 | — | — | A.D. 440–760 | 2 |
| McLeod Mound | 9Li47 | UCLA-1997E | Primary humus | Charcoal | 3250 ± 60 | — | — | 1670–1420 B.C. | 2 |
| McLeod Mound | 9Li47 | UGA-1557 | Primary humus | Charcoal | 2660 ± 60 | — | — | 980–600 B.C. | 2 |
| McLeod Mound | 9Li47 | UGA-1554 | Central tomb | *Mercenaria* | 2370 ± 70 | ** | 2760 ± 70 | 880–470 B.C. | 2 |
| McLeod Mound | 9Li47 | UGA-1555 | Central tomb | *Mercenaria* | 2290 ± 80 | ** | 2290 ± 80 | 340 B.C.–A.D. 80 | 2 |
| McLeod Mound | 9Li47 | UGA-1256 | Mound fill | Charcoal | 1840 ± 70 | — | — | A.D. 20–390 | 2 |
| McLeod Mound | 9Li47 | Beta-223513 | Burial 2 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| McLeod Mound | 9Li47 | Beta-223514 | Burial 10 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| McLeod Mound | 9Li47 | Beta-223515 | Burial 14 | Human bone | 1340 ± 50 | −15.1 | 1500 ± 50 | — | 1, AMS date |
| McLeod Mound | 9Li47 | Beta-223516 | Burial 15 | Human bone | 1410 ± 50 | −14.7 | 1580 ± 50 | — | 1, AMS date |
| McLeod Mound | 9Li47 | Beta-223517 | Burial 16 | Human bone | 1270 ± 50 | −15.1 | 1430 ± 50 | — | 1, AMS date |
| McLeod Mound | 9Li47 | Beta-223518 | Burial 17 | Human bone | 1470 ± 40 | −14.5 | 1640 ± 50 | — | 1, AMS date |
| Jack Drive 1 | 9Li49 | Beta-218101 | TP III (0–10) | *Mercenaria* | 320 ± 40 | −2.9 | 680 ± 40 | A.D. 1430–1620 | 1, AMS date |
| Jack Drive 1 | 9Li49 | Beta-20829 | TP I (30–40) | *Mercenaria* | 1310 ± 60 | −1.6 | 1700 ± 60 | A.D. 430–690 | 1 |
| Seaside II | 9Li62 | UGA-1552 | Feature 1 | *Crassostrea* | 2340 ± 70 | ** | 2730 ± 70 | 810–410 B.C. | 2 |
| Seaside II | 9Li62 | UGA-1553 | Feature 1 | *Crassostrea* | 2650 ± 70 | ** | 3040 ± 70 | 1240–830 B.C. | 2 |
| Seaside II | 9Li62 | UGA-1556 | Burial 8 | Charcoal | 450 ± 70 | — | — | A.D. 1320–1640 | 2 |
| Seaside II | 9Li62 | Beta-225474 | Burial 8 | Human bone | 870 ± 40 | −17.2 | 1000 ± 40 | A.D. 880–1160 | 1, AMS date |
| Seaside I | 9Li62 | Beta-225476 | Burial 10 | Human bone | Insufficient collagen recovered; date aborted | | | — | 1, AMS date |
| | 9Li97 | Beta-183637 | TP III (10–20) | *Mercenaria* | 1130 ± 40 | −2.7 | 1500 ± 50 | A.D. 660–890 | 1 |
| | 9Li117 | Beta-183635 | TP I (level?) | *Mercenaria* | 450 ± 50 | −3.1 | 810 ± 50 | A.D. 1310–1480 | 1 |
| | 9Li137 | Beta-217217 | TP II (30–40) | *Mercenaria* | 3560 ± 70 | −2 | 3930 ± 80 | 2400–1920 B.C. | 1 |
| | 9Li137 | Beta-217218 | TP IV (30–40) | *Mercenaria* | 2970 ± 40 | −0.1 | 3380 ± 40 | 1590–1340 B.C. | 1, AMS date |
| | 9Li137 | Beta-217219 | TP IV (30–40) | *Mercenaria* | 3020 ± 70 | −1.1 | 3410 ± 80 | 1690–1520 B.C. | 1 |
| | 9Li165 | Beta-183629 | TP IV (20–30) | *Mercenaria* | 990 ± 50 | −0.9 | 1390 ± 50 | A.D. 730–1000 | 1 |
| | 9Li165 | Beta-183630 | TP IV | *Mercenaria* | 960 ± 50 | −1.3 | 1350 ± 60 | A.D. 760–1050 | 1 |
| | 9Li169 | Beta-183628 | TP II (10–20) | *Mercenaria* | 400 ± 60 | −1.6 | 780 ± 60 | A.D. 1310–1520 | 1 |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| | 9Li169 | Beta-183627 | TP II (10–20) | *Mercenaria* | 460 ± 60 | −1.8 | 850 ± 60 | A.D. 1280–1470 | 1 |
| | 9Li169 | UGA-105 | Midden 3 | *Crassostrea* | 740 ± 120 | ** | 1130 ± 120 | A.D. 880–1350 | 5 |
| | 9Li169 | UGA-SC2 | Midden 3 | *Crassostrea* | 910 ± 200 | ** | 1300 ± 200 | A.D. 570–1330 | 5 |
| | 9Li169 | UGA-SC1 | Midden 1 | *Crassostrea* | 1270 ± 180 | ** | 1660 ± 180 | A.D. 200–990 | 5 |
| | 9Li169 | Beta-21397 | TP III (10–20) | *Mercenaria* | 420 ± 70 | −0.5 | 820 ± 70 | A.D. 1290–1500 | 1 |
| | 9Li169 | Beta-215813 | TP II (10–20) | *Mercenaria* | 470 ± 40 | −2.6 | 840 ± 60 | A.D. 1290–1470 | 1 |
| | 9Li169 | Beta-215812 | TP II (0–10) | *Mercenaria* | 690 ± 60 | −2.3 | 1040 ± 60 | A.D. 1060–1300 | 1 |
| | 9Li170 | Beta-21395 | TP I (20–30) | *Mercenaria* | 190 ± 60 | −1.4 | 580 ± 60 | A.D. 1470–1700 | 1 |
| | 9Li170 | Beta-21396 | TP I (10–20) | *Mercenaria* | 350 ± 70 | −1.2 | 740 ± 70 | A.D. 1330–1620 | 1 |
| | 9Li170 | Beta-20805 | TP I (10−20) | *Crassostrea* | 140 ± 70 | −1.3 | 530 ± 70 | A.D. 1480–1820 | 1 |
| | 9Li170 | Beta-20810 | TP I (10–20) | Charcoal | 330 ± 60 | — | — | A.D. 1450–1660 | 1 |
| North Pasture 3 | 9Li171 | Beta-218094 | TP II (20–30) | Charcoal | 180 ± 40 | −28.3 | 130 ± 40 | A.D. 1670–1950 | 1 |
| North Pasture 3 | 9Li171 | Beta-20809 | TP IV (10–20) | *Crassostrea* | 690 ± 70 | −0.4 | 1090 ± 70 | A.D. 1040–1300 | 1 |
| | 9Li173 | Beta-21406 | TP II (60–70) | *Mercenaria* | 2470 ± 80 | −1.5 | 2850 ± 80 | 1020–560 B.C. | 1 |
| | 9Li173 | Beta-21407 | TP V (30–40) | *Mercenaria* | 1610 ± 80 | −0.9 | 2010 ± 70 | A.D. 50–410 | 1 |
| Greenseed Field 2 | 9Li179 | Beta-21403 | TP III (30–40) | *Mercenaria* | 1220 ± 60 | −0.6 | 1630 ± 60 | A.D. 480–770 | 1 |
| Greenseed Field 2 | 9Li179 | Beta-21404 | TP III (20–30) | *Mercenaria* | 1300 ± 70 | −1 | 1700 ± 70 | A.D. 400–700 | 1 |
| Long Field 3 | 9Li180 | Beta-217220 | TP I (10–20) | *Mercenaria* | 800 ± 40 | −2.5 | 1170 ± 40 | A.D. 1010–1220 | 1, AMS date |
| Long Field 3 | 9Li180 | Beta-217221 | TP I (10–20) | *Mercenaria* | 840 ± 70 | −2.4 | 1220 ± 70 | A.D. 890–1230 | 1 |
| Rice Field 1 | 9Li184 | Beta-217222 | TP I (0–10) | *Mercenaria* | 1110 ± 50 | −1.6 | 1490 ± 50 | A.D. 660–900 | 1 |
| | 9Li187 | Beta-183636 | TP I (10–20) | *Mercenaria* | 1240 ± 50 | −2.4 | 1610 ± 50 | A.D. 550–780 | 1 |
| Davy Field 1 | 9Li189 | Beta-215815 | TP I (20–30) | *Mercenaria* | 460 ± 40 | −2.2 | 830 ± 50 | A.D. 1300–1470 | 1 |
| Davy Field 1 | 9Li189 | Beta-215814 | TP I (0–10) | *Mercenaria* | 210 ± 60 | −2.2 | 580 ± 60 | A.D. 1470–1700 | 1 |
| South New Ground 5 | 9Li192 | Beta-20824 | TP III (10–20) | *Mercenaria* | 400 ± 60 | −1.3 | 790 ± 60 | A.D. 1310–1560 | 1 |
| South New Ground 5 | 9Li192 | Beta-20825 | TP I (20–30) | *Mercenaria* | 430 ± 60 | −1.2 | 820 ± 60 | A.D. 1300–1490 | 1 |
| South End Field | 9Li194 | Beta-218095 | TP V(20–30) | *Crassostrea* | 950 ± 40 | −1.2 | 1340 ± 40 | A.D. 810–1030 | 1 |
| South End Field | 9Li194 | Beta-218096 | TP V (20–30) | *Crassostrea* | 890 ± 90 | −1.2 | 1280 ± 90 | A.D. 780–1200 | 1 |
| South End Field | 9Li194 | Beta-217223 | TP IV (0–10) | *Mercenaria* | 1050 ± 40 | −0.9 | 1450 ± 40 | A.D. 690–920 | 1, AMS date |
| South End Field | 9Li194 | Beta-217224 | TP IV (10–20) | *Mercenaria* | 1050 ± 40 | −1.4 | 1440 ± 40 | A.D. 700–940 | 1, AMS date |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| South End Field | 9Li194 | Beta-20817 | TP II (20–30) | *Crassostrea* | 410 ± 60 | −1.3 | 800 ± 60 | A.D. 1310–1500 | 1 |
| South End Field | 9Li194 | Beta-20818 | TP V (20–30) | *Crassostrea* | 860 ± 90 | −1 | 1260 ± 90 | A.D. 800–1220 | 1 |
| | 9Li196 | Beta-217225 | TP II (0–10) | *Mercenaria* | 1290 ± 50 | −2 | 1670 ± 50 | A.D. 460–700 | 1 |
| | 9Li196 | Beta-217226 | TP II (10–20) | *Mercenaria* | 1380 ± 50 | −2.2 | 1760 ± 50 | A.D. 390–650 | 1 |
| | 9Li196 | Beta-217227 | TP II (20–30) | *Mercenaria* | 1440 ± 50 | −1.5 | 1830 ± 50 | A.D. 280–570 | 1 |
| | 9Li197 | Beta-218097 | TP I,R-1 (20–30) | *Mercenaria* | 1580 ± 80 | −0.6 | 1980 ± 80 | A.D. 50–450 | 1 |
| | 9Li197 | Beta-218098 | TP I,R-1 (30–40) | *Mercenaria* | 1300 ± 70 | −0.7 | 1700 ± 70 | A.D. 400–700 | 1 |
| | 9Li197 | Beta-20821 | TP I (0–10) | *Mercenaria* | 470 ± 60 | −1.4 | 860 ± 60 | A.D. 1280–1490 | 1 |
| | 9Li197 | Beta-20822 | TP I (40–50) | *Mercenaria* | 2850 ± 80 | −1.4 | 3240 ± 80 | 1480–1050 B.C. | 1 |
| | 9Li198 | Beta-218099 | TP I (10–20) | *Mercenaria* | 980 ± 40 | −0.7 | 1380 ± 40 | A.D. 770–1010 | 1 |
| | 9Li198 | Beta-218100 | TP I (20–30) | *Mercenaria* | 750 ± 60 | −1.2 | 1150 ± 60 | A.D. 1000–1260 | 1 |
| | 9Li198 | Beta-20823 | TP I (40–50) | *Mercenaria* | 1030 ± 50 | −1.2 | 1420 ± 50 | A.D. 710–980 | 1 |
| | 9Li200 | Beta-20815 | MD 2 (30–50) | *Crassostrea* | 720 ± 70 | −1.5 | 1110 ± 70 | A.D. 1020–1290 | 1 |
| | 9Li200 | Beta-20816 | MD 3 (50–70) | *Crassostrea* | 890 ± 70 | −1.3 | 1280 ± 70 | A.D. 810–1160 | 1 |
| | 9Li200 | Beta-20819 | MTP1 (20–30) | *Mercenaria* | 810 ± 70 | −1.8 | 1190 ± 70 | A.D. 920–1240 | 1 |
| | 9Li200 | Beta-20820 | MD 2 (40–50) | *Mercenaria* | 1100 ± 70 | −1.4 | 1490 ± 70 | A.D. 640–950 | 1 |
| | 9Li200 | Beta-20826 | MTP1 (0–10) | *Crassostrea* | 810 ± 60 | −1.6 | 1200 ± 60 | A.D. 930–1220 | 1 |
| | 9Li200 | Beta-20827 | MTP1 (30–40) | *Crassostrea* | 1370 ± 70 | −1.1 | 1760 ± 70 | A.D. 350–660 | 1 |
| | 9Li211 | Beta-20828 | TP III (20–30) | *Mercenaria* | 510 ± 60 | −2.3 | 880 ± 60 | A.D. 1270–1450 | 1 |
| | 9Li211 | Beta-183634 | TP IV (20–30) | *Crassostrea* | 520 ± 50 | −1.9 | 900 ± 50 | A.D. 1260–1440 | 1 |
| | 9Li211 | Beta-183633 | TP IV (0–10) | *Crassostrea* | 510 ± 60 | −2.2 | 890 ± 60 | A.D. 1260–1450 | 1 |
| | 9Li214 | Beta-183631 | TP VI (10–20) | *Mercenaria* | 870 ± 60 | −1.7 | 1260 ± 60 | A.D. 860–1170 | 1 |
| | 9Li214 | Beta-183632 | TP VI (30–40) | *Mercenaria* | 750 ± 60 | −2.5 | 1120 ± 60 | A.D. 1030–1280 | 1 |
| | 9Li216 | Beta-217228 | TP I (20–30) | *Mercenaria* | 440 ± 40 | −1.7 | 830 ± 40 | A.D. 1310–1460 | 1 |
| | 9Li216 | Beta-217229 | TP I (30–40) | *Mercenaria* | 290 ± 40 | −1.9 | 670 ± 40 | A.D. 1440–1630 | 1, AMS date |
| | 9Li217 | Beta-21402 | TP I (20–30) | *Mercenaria* | 1500 ± 90 | −2 | 1880 ± 90 | A.D. 140–590 | 1 |
| | 9Li220 | Beta-21400 | TP II (10–20) | *Mercenaria* | 1430 ± 70 | −1.7 | 1810 ± 70 | A.D. 270–620 | 1 |
| | 9Li220 | Beta-21401 | TP II (0–10) | *Mercenaria* | 1280 ± 70 | −0.8 | 1680 ± 70 | A.D. 420–720 | 1 |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| Duncan Field | 9Li225 | Beta-217230 | TP III (10–20) | *Mercenaria* | 1270 ± 40 | −1.7 | 1650 ± 40 | A.D. 500–710 | 1 |
| Duncan Field | 9Li225 | Beta-217231 | TP IV (20–30) | *Mercenaria* | 1310 ± 40 | −3.6 | 1660 ± 40 | A.D. 490–700 | 1, AMS date |
| Duncan Field | 9Li225 | Beta-21405 | TP III (20–30) | *Mercenaria* | 1230 ± 70 | −0.7 | 1630 ± 70 | A.D. 460–780 | 1 |
| | 9Li228 | Beta-217232 | TP II (0–10) | *Mercenaria* | 1660 ± 40 | −2 | 2040 ± 40 | A.D. 70–320 | 1 |
| | 9Li228 | Beta-217233 | TP II (10–20) | *Mercenaria* | 1700 ± 50 | −1.9 | 2080 ± 50 | 10 B.C.–A.D. 270 | 1 |
| | 9Li228 | Beta-217234 | TP II (20–30) | *Mercenaria* | 1820 ± 50 | −2.6 | 2190 ± 50 | 150 B.C.–A.D. 140 | 1 |
| | 9Li230 | Beta-215820 | TP I (top) | *Mercenaria* | 820 ± 50 | −2.1 | 1200 ± 50 | A.D. 950–1220 | 1 |
| | 9Li230 | Beta-215819 | TP I (bottom) | *Mercenaria* | 960 ± 70 | −2.5 | 1330 ± 70 | A.D. 740–1080 | 1 |
| | 9Li230 | Beta-21398 | TP I (30–40) | *Mercenaria* | 910 ± 70 | −0.9 | 1310 ± 70 | A.D. 780–1130 | 1 |
| | 9Li230 | Beta-21399 | TP I (0–10) | *Mercenaria* | 700 ± 90 | −1.7 | 1140 ± 90 | A.D. 950–1300 | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-215824 | N789 E801 83cmbs | *Crassostrea* | 3770 ± 50 | −3.8 | 4120 ± 60 | 2580–2200 B.C. | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-215823 | N789 E801 23cmbs | *Crassostrea* | 3510 ± 50 | −2.5 | 3880 ± 60 | 2260–1920 B.C. | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-215822 | N784 E801 67cmbs | *Crassostrea* | 3430 ± 50 | −2.6 | 3800 ± 60 | 2160–1770 B.C. | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-215821 | N782 E801 66cmbs | *Crassostrea* | 3780 ± 50 | −3 | 4140 ± 50 | 2600–2270 B.C. | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-21408 | TP I (60–70) | *Mercenaria* | 3470 ± 80 | −1.7 | 3860 ± 80 | 2300–1810 B.C. | 1 |
| St. Catherines Shell Ring | 9Li231 | Beta-21409 | TP I (10–20) | *Mercenaria* | 3980 ± 90 | −1.2 | 4370 ± 90 | 2950–2470 B.C. | 1 |
| | 9Li233 | Beta-217235 | TP II (10–20) | *Mercenaria* | 910 ± 60 | −1.1 | 1300 ± 60 | A.D. 800–1120 | 1 |
| | 9Li233 | Beta-217236 | TP III (10–20) | *Mercenaria* | 990 ± 50 | −2.1 | 1360 ± 50 | A.D. 780–1030 | 1 |
| | 9Li235 | Beta-217237 | TP II (10–20) | *Mercenaria* | 810 ± 40 | −2.9 | 1170 ± 40 | A.D. 1010–1220 | 1, AMS date |
| | 9Li235 | Beta-217238 | TP II (20–30) | *Mercenaria* | 870 ± 40 | −3.5 | 1220 ± 40 | A.D. 660–970 | 1, AMS date |
| North Pasture 1 | 9Li238 | Beta-217239 | TP II (10–20) | *Mercenaria* | 1160 ± 60 | −5.8 | 1470 ± 70 | A.D. 940–1180 | 1 |
| North Pasture 1 | 9Li238 | Beta-217240 | TP II (20–30) | *Mercenaria* | 1240 ± 60 | −2.6 | 1610 ± 60 | A.D. 510–790 | 1 |
| North Pasture 1 | 9Li238 | Beta-217241 | TP I (10–20) | *Mercenaria* | 1110 ± 40 | −4.2 | 1450 ± 40 | A.D. 690–920 | 1, AMS date |
| North Pasture 1 | 9Li238 | Beta-217242 | TP I (20–30) | *Mercenaria* | 1150 ± 60 | −2.9 | 1510 ± 70 | A.D. 610–920 | 1 |
| Seaside Field | 9Li252 | Beta-217243 | TP II (0–25) | *Mercenaria* | 1050 ± 50 | −5.1 | 1380 ± 50 | A.D. 780–1030 | 1 |

TABLE 13.4—(*Continued*)

| Site name | Site no. | Code/Lab no. | Provenience | Material | $^{14}C$ age B.P. ($\pm 1\sigma$) | $^{13}C/^{12}C$ | Adjusted age B.P. | Radiocarbon age calibrated[a] ($\pm 2\sigma$) | Source[b] |
|---|---|---|---|---|---|---|---|---|---|
| Seaside Field | 9Li252 | Beta-217244 | TP II (25–50) | *Mercenaria* | 1060 ± 40 | −1.6 | 1440 ± 40 | A.D. 700–940 | 1, AMS date |
| South End Mound II | 9Li273 | UGA-3458 | Feature B | *Crassostrea* | 870 ± 80 | ** | 1260 ± 80 | A.D. 810–1200 | 4 |
| South End Mound II | 9Li273 | UGA-3459 | Feature B | *Crassostrea* | 650 ± 70 | ** | 1040 ± 70 | A.D. 1050–1340 | 4 |
| South End Mound II | 9Li273 | UGA-3460 | Unit IIIc | Charcoal | 2140 ± 170 | — | — | 750 B.C.–A.D. 240 | 4 |
| South End Mound II | 9Li273 | UGA-3461 | Unit V | Charcoal | 230 ± 70 | — | — | A.D. 1490–1950 | 4 |
| Mission Santa CataLina | 9Li274 | Beta-20830 | Structure 4 | *Crassostrea* | 330 ± 60 | −2 | 710 ± 60 | A.D. 1390–1640 | 1 |
| Mission Santa CataLina | 9Li274 | Beta-20831 | Structure 4 | *Crassostrea* | 150 ± 60 | −1.6 | 540 ± 60 | A.D. 1490–1810 | 1 |
| Mission Santa CataLina | 9Li274 | Beta-21975 | Convento | *Crassostrea* | 300 ± 70 | −0.4 | 710 ± 70 | A.D. 1350–1640 | 1 |
| Mission Santa CataLina | 9Li274 | Beta-21976 | Convento | *Crassostrea* | 580 ± 70 | −0.8 | 980 ± 70 | A.D. 1130–1420 | 1 |
| Hayes Island | 9Li1620 | Beta-215817 | TP II (10–20) | *Mercenaria* | 830 ± 50 | −3.2 | 1190 ± 50 | A.D. 970–1220 | 1 |
| Hayes Island | 9Li1620 | Beta-215818 | TP II (30–40) | *Mercenaria* | 2040 ± 60 | −2.4 | 2410 ± 60 | 400–80 B.C. | 1 |
| Hayes Island | 9Li1620 | Beta-215816 | TP I (0–10) | *Mercenaria* | 1090 ± 70 | −1.8 | 1470 ± 80 | A.D. 650–990 | 1 |

[a] For the purposes of this table we have omitted the "cal" in the age designation throughout.

[b] Sources: (1) this volume; (2) Thomas and Larsen (1979: table 4); (3) Larsen and Thomas (1982); (4) Larsen and Thomas (1986: table 6); (5) Caldwell (1971); (6) Larsen and Thomas (1982).

** indicates that the $^{13}C/^{12}C$ ratio is unavailable for this radiocarbon date.

# CHAPTER 14. THE CERAMIC TYPOLOGY

Debra Peter Guerrero and David Hurst Thomas

In his synthesis of W.P.A. excavations in Chatham County, Georgia, Chester DePratter (1991) summarized the development and status of the Northern Georgia coastal ceramic sequence, which provides the baseline for the current discussion (see table 14.1). In this chapter we explicitly define the protocols of our analysis, including the ceramic attributes employed and the appropriate type descriptions involved. Our intent at this point is to explain how the St. Catherines Island ceramics were described and classified. In chapter 15, we will employ the $^{14}C$ database from St. Catherines Island to reexamine the temporal intervals assigned to each ceramic period by DePratter.

## CERAMIC ANALYSIS: PROTOCOLS

The ceramics recovered during the St. Catherines Island-wide survey were analyzed initially during 1979 and 1980 by Deborah Mayer O'Brien and Debra Peter Guerrero, under the general guidance of Chester DePratter (per the criteria spelled out by DePratter, 1979a). If a given sherd could not be assigned to a specific type listed on table 14.1, it was described based on its temper, decoration, and surface finish. Rims were described as folded or unfolded, with any decoration noted. Although burnishing is a surface treatment, during the initial analysis it was considered a specific type when it was on the exterior of the sherd. The ceramics were counted but not weighed. Sherds under 1.5 cm in diameter were neither analyzed nor counted.

In 1988, we began computer coding the sherd frequencies. Predictably, time lag between the actual analysis and the computer coding raised uncertainties about some of the sherd and rim descriptions. In addition, after being exposed to the ceramics of Mission Santa Catalina de Guale (an almost exclusively Altamaha period site) for 8 years, we felt it was necessary to revisit the late precontact and contact period sites. As a result, the ceramics from 40 sites in the Island-wide survey were reanalyzed in 1989.

The two analyses differ in several ways. In 1989, burnishing was treated as a surface treatment rather than part of the type, and was noted as exterior, interior, or both. In the 1979/1980 period, however, the burnishing specification was not given. In these unspecified cases a code was used to indicate that the burnishing could have been in the interior, exterior, or both. Furthermore, in the later analysis the circular element in the square or rectangle that appears in Irene and Altamaha ceramics was given a different type code from the generic Irene and Altamaha types. Aside from these two differences, the later analysis remained consistent with the framework used in 1979/1980.

As we broadened the scope of this monograph, we augmented the Island-wide survey sites with the results of several additional survey and excavation projects conducted on St. Catherines Island (including DePratter's shoreline survey and the various excavations at Meeting House Field and Fallen Tree). In every case, the ceramics were classified according to the criteria set out in this chapter.

## ATTRIBUTE-LEVEL TERMINOLOGY

To the extent possible, analysis of ceramics from St. Catherines Island attempted to apply the following descriptive criteria.

### Surface Treatments

**Burnished:** A smoothed or highly polished surface, either interior or exterior, possibly produced by using a stone or other tool.

**Shell scraped:** The interior or exterior of the vessel was scraped with the edge of a sea-shell, producing a shallow linear engraving.

**Brushed or scraped:** Rough, nonuniform markings possibly produced by rubbing the surface of the vessel with plant material.

**Nodes:** Any small round or oval projection of clay appliqued onto or formed from the vessel.

**Incised and punctated:** Used when both decorative techniques (incising and punctating) appear on a sherd in any style or pattern formation.

**Complicated stamped:** Use of a decorated, carved paddle to produce a combination of linear and curvilinear design elements.

**Corn cob impressed:** Irregular and somewhat rounded impressions produced by rolling a corn cob over the vessel surface.

**Cordmarked:** Stamping with a cordmarked paddle. The impression of the twined cord is usually visible. The edge of the cord wrapped paddle is also used, usually on the bases and rims.

**Simple stamped:** A design that consists of shallow, longitudinal grooves that may have a parallel arrangement or may be applied in a cross stamped pattern.

**Check stamped:** Probably produced by stamping with a carved paddle, this design consists of a grill of raised lands that intersect to form squares, rectangles, rhomboids, or triangles.

**Incised:** Includes sherds with any of the following: linear or curvilinear incising, single or multiple lines; complicated or simple designs.

**Linear stamped:** Use of a decorated paddle, rocker, or cylinder creating a uniform linear design.

**Curvilinear stamp with a circle within a square:** A specific design that consists of curvilinear elements, occasionally interspersed with a raised circle within a raised square. This design was produced by a carved paddle.

### Rim Forms

**Folded stamped:** A folded rimsherd that appears to have been produced by repeated stamping with a paddle edge. This technique seems to have sealed the rimfold to the sherd body as well as providing decoration.

**Cane/reed punctate:** Circular punctations produced by a hollow instrument, such as the end of a cane or reed, and applied to an unfolded rim.

**Folded cane/reed punctate:** Folded rimsherd with a single row of cane/reed punctates near the bottom of the rimfold.

**Folded crescent punctate:** A single row of crescent shaped impressions near the bottom of a folded rim and occasionally extending beyond the rimfold and into the sherd body.

**Folded square or rectangular punctate:** A single row of square or rectangular shaped impressions on a folded rimsherd.

**Folded angular punctated:** Punctations produced by a flat-ended instrument in a stab and drag fashion creating an angled or saw tooth pattern near the seam of a folded rimsherd.

**Punctate rim:** A single row of small punctations, produced by a sharp instrument, appearing just below the vessel lip.

**Cane/reed punctate rimstrip:** An unfolded rim with a band of clay appliquéd near the lip of the vessel and punctated according to the cane/reed method.

**Pinched rimstrip:** A thick band of clay applied near the lip of the vessel and decorated with deep indentations separated by narrow raised areas. This style appears to have been produced by pinching together the strip or band of clay.

**Incised rim:** Any number of horizontal incised lines, either linear or curvilinear, below the vessel lip.

**Rimstrip on body:** A punctated rimstrip (as described above) in which the rimstrip moves away from the rim and down into the body of the vessel.

**Noded rim:** A plain unfolded rim with nodes attached near the lip.

**Triangular punctated rim:** A single row of triangular shaped impressions below the lip of an unfolded rimsherd.

**Punctated and incised rim:** An unfolded rim decorated with both incising and punctations.

**Folded fingernail impressed:** Impression made on the fold of a rimsherd by a fingernail; creates a thin crescent shape.

**Folded fingerprint impressed:** A design created by pressing the flat part of a finger onto the rimfold; produces an oval, finger-shaped impression.

**Flat lip:** A plain rim with a flattened, almost squared-off lip.

## CERAMIC TYPES

The earliest archaeological research along the Georgia coast proceeded without the benefit of chronology, as most investigators sought to recover artifacts for display or for personal collections (DePratter, 1979a: 110). Moreover, these early collectors made little attempt to establish time–space relationships between the various ceramic complexes encountered (e.g., Jones, 1873; Thomas, 1891; Moore, 1897).

Systematic research on the coastal Georgia ceramic chronology began with the work of Preston Holder (1938), who worked in several village sites in Glynn County (see also Waring, 1968a, 1968b, 1968c; DePratter, 1979a). Soon thereafter, critical excavations were conducted in Chatham County at a series of mounds and stratified village sites (Caldwell 1939a, 1943; Caldwell and Waring, 1939a, 1939b; Caldwell and McCann, 1941; see also DePratter, 1991: 157–158). These W.P.A.-sponsored excavations ultimately provided the stratigraphic control necessary to discriminate distinctive ceramic periods represented on the Georgia Coast. The basic Chatham County sequence has evolved significantly in the half-century following Caldwell's earliest work (e.g., Larson, 1958a, 1969, 1978, 1980a; Steed, 1970; DePratter, 1975, 1977a, 1979a, 1984, 1989b; Cook, 1977, 1979; DePratter and Howard, 1977, 1980; Milanich, 1977; Pearson, 1977a, 1979a; Crook, 1978a, 1986; Cook and Snow, 1983; Williams and Thompson, 1999).

As noted above, all the aboriginal ceramics reported in this volume were classified into DePratter's (1979a, 1991) ceramic sequence for the Northern Georgia coast. At this point, we approach this sequence strictly from a morphological perspective; in chapter 15, however, we examine the temporal estimates against the available $^{14}C$ data from St. Catherines Island.[1]

The following ceramic types were used in the analysis of all aboriginally manufactured ceramics recovered from St. Catherines Island.

### St. Simons Plain

This type description is based on Waring (1968b), as modified by DePratter (1978: 114).

**Paste:** *Method of manufacture:* modeling and molding. *Temper:* vegetal fibers; occasionally fine to medium sand also present.

**Texture:** Medium to fine depending on sand content. Occasional "soapy" feeling.

**Color:** Cores generally range from buff to black with several distinct layers often present. Exterior surfaces are generally buff to orange, and occasionally brown to black; interiors are buff to black.

**Surface finish:** Both interior and exterior surfaces are smoothed but not burnished. Interiors sometimes shell scraped.

Decoration: None.

**Form:** *Rim:* Generally straight or slightly incurving, not tapered. *Lip:* Rounded or flattened; occasionally thickened. *Body:* Simple bowls. *Base:* Round to flattened. *Appendages:* None.

**Temporal assignment:** St. Simons Plain is the earliest pottery present in the coastal Georgia area. It is the pottery type in use during the St. Simons I phase, and it persists into the St. Simons II phase times.

### St. Simons Punctated

This type description follows Waring (1968b), as modified by DePratter (1978: 114).

**Paste:** Same as St. Simons Plain.

**Surface finish:** Similar to St. Simons Plain, but sometimes more carefully smoothed.

**Decoration:** *Technique:* single, discrete impressions made in vessel surface prior to drying vessel. Impressions made with reeds, bone (?) fragments, periwinkle shells, and other objects, providing a wide range of shapes that range from circles and crescents to diamonds and irregular forms. Punctating implements are sometimes pressed perpendicularly into the vessel surface to produce isolated punctuates. In other cases, however, the punctating implement was "dragged" or "trailed" between punctates to produce a series of punctates connected by an incised line. A variation of this technique involved incising a line and then placing a series of punctates along it. Punctations also occasionally occur on vessels that also contain linear incising.

**Design:** At least two basic modes can be distinguished: random punctation and linear punctation. Random punctation (usually of a single shape on any given vessel) is scattered randomly (without pattern) over all or on a portion of a vessel's surface. There are two types of linear punctation. In some cases, the decoration consists of

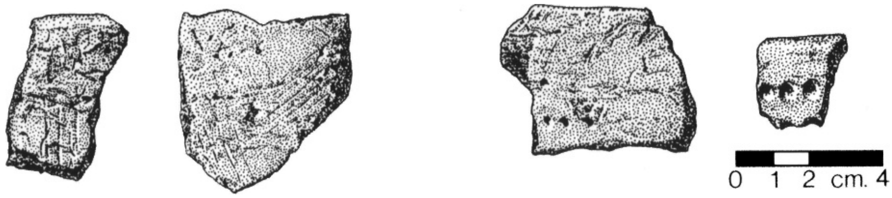


Fig. 14.1. St. Simons Incised (left pair) and St. Simons Punctated (right pair) sherds from John and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1979: fig. 32).

individual punctates placed side by side in a linear (or occasionally curvilinear) arrangement. In other cases, the punctates are linear in arrangement but had a trailed or incised line to connect individual punctates. Linear punctation of both types is typically applied in 2 to 12 horizontal rows directly below the rim. Occasional widely spaced longitudinal rows or bands of punctates are also present.

**Distribution:** Punctation typically covers the entire surface of a vessel with the exception of its base. On some vessels, decoration is restricted to a horizontal band just below the rim. Occasional vertical bands also occur.

**Form:** Same as St. Simons Plain.

**Temporal assignment:** Appearance marks beginning of St. Simons II phase.

Figure 14.1 depicts a pair (left side) of St. Simons incised and a pair of St. Simons puntated (right side) sherds from Johns and Marys Mounds (after Larsen and Thomas, 1979: fig.32)

### St. Simons Incised

This type description follows DePratter (1979a: 114).

**Paste:** Same as St. Simons Plain.

**Surface finish:** Same as St. Simons Plain with occasional smoothing.

**Decoration:** *Technique:* Incisions are made into the vessel exterior with instruments of various shapes and diameters. Depth and shape of resulting incisions varies depending on shape of instrument and amount of pressure applied to incising instrument. Incisions range from broad, shallow trailed lines to rounded or angular incisions to deep grooves that nearly cut through to the interior wall of the vessel. *Design:* Occurs most often as a series of parallel, horizontal lines directly below the rim. These lines may be met by vertical bands of incising that originate at the base of the vessel. Zones of short horizontal lines separated by undecorated areas also occur, but less frequently. Cross-hatch incising occasionally occurs as well. Most incising is linear, although curvilinear examples are sometimes present. *Distribution:* Most frequently restricted to a narrow band directly below the rim, though occasionally covering the entire exterior surface. Undecorated areas may separate zones of incision.

**Form:** Same as St. Simons Plain.

**Temporal assignment:** Dates to St. Simons II phase.

### St. Simons Incised and Punctated

This type description follows DePratter (1979a: 115).

**Paste:** Same as St. Simons Plain.

**Surface finish:** Same as St. Simons Plain.

**Decoration:** *Technique:* Combines both incising and punctation on same vessel. Occasionally more than one implement is used to decorate the same vessel. *Design:* Variable. There are different combinations of linear and curvilinear incisions, with random and linear punctation. *Distribution:* Same as St. Simons Incised.

**Temporal Assignment:** St. Simons II phase.

### Refuge Punctated

This type description is based on a preliminary description for "Aberrant Incised and Punctated Pottery", which was included in a section of W.P.A Quarterly Report (March 1, 1940); additional information was drawn from Waring (1968e) and DePratter (1979a: 115–121).

**Paste:** *Method of manufacture:* Earliest examples modeled, later examples coiled. *Temper:* Abundant sand. *Texture:* Paste can be extremely sandy and friable on most examples, occasionally finer. *Color:* Surface color most often reddish buff but occasionally gray to brown. The core is usually the same color as the exterior, but in some examples it is sharply differentiated.

**Surface Finish:** Interiors range from smooth to poorly finished, but sandy texture is apparent on all sherds. Shell scraping is occasionally present.

**Decoration:** *Technique:* Punctations are created with a variety of pointed or blunted implements. Implements are held either perpendicular or at angle to the vessel's surface. *Design:* Linear or random punctuations, with linear punctations in rows and sometimes in zones. Punctations are occasionally combined with incising and dentate stamping. *Distribution:* Often continuous over most of the exterior vessel surface, but occasionally zoned. Interior punctation is sometimes present on punctated, simple stamped, or incised sherds.

**Vessel Form:** *Rim:* Incurving to straight. *Lip:* Rounded to squared; occasionally stamped. *Body:* Hemispherical bowls most common; deeper, straight-sided jars also occur. *Base:* Rounded.

**Temporal Assignment:** Decoration is a continuation of punctation, which originated on St. Simons Punctated; vessel shapes likewise continue St. Simons ceramic forms. Refuge Punctated is present only during the earliest portion of Refuge I phase.

### Refuge Incised

This type description follows DePratter's (1979a: 121) modification of Caldwell and Waring (1939a).

**Paste:** Same as Refuge Punctated.

**Surface Finish:** Same as Refuge Punctated.

**Decoration:** *Technique:* Poorly executed, irregular incising made with a variety of blunt or pointed implements. Incisions are usually shallow. *Design:* Inadequate sample. *Distribution:* Usually restricted to the zone just below rim on exterior; occasionally found on interior as well.

**Vessel Form:** Same as Refuge Punctated.

**Temporal Assignment:** Represents a continuation of incising that originated during the St. Simons period. Represented only in the earliest portion of Refuge I phase.

### Refuge Simple Stamped

This type description follows DePratter's (1979a: 121–122) modification of Caldwell and Waring (1939a).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Grit and sand in considerable quantities. *Texture:* Medium to coarse; some sherds very sandy. *Color:* Core is buff, red-buff, light gray, or dark gray; occasionally two sharply differentiated colors appear in the same cross section. Surface color ranges from buff through gray to black.

**Surface Finish:** Interiors range from carelessly smoothed to finely finished, and scraping is occasionally present. Sandy paste creates coarse interiors on many sherds.

**Decoration:** *Technique:* Stamped and malleated, probably applied with a dowel, a bundle of sticks, or a thong wrapped paddle. *Design:* Consists of arrangements of shallow, longitudinal grooves that may be parallel or cross-stamped. *Distribution:* Over the entire exterior of vessel, but decoration is sometimes obliterated at the base. Tetrapodal supports, when present, are likewise decorated. Interiors are also occasionally decorated.

**Vessel Form:** *Rim:* Straight or occasionally slightly flaring. *Lip:* Squared or rounded and often tilted outward, giving the effect of beveling on the outer edge; sometimes lips are stamped. *Body:* Conoidal jar or hemispherical bowl. On jars, the equator is often slightly wider than the rim diameter. *Base:* Conoidal or rounded. When tetrapodal supports occur the base is roughly squared. *Appendages:* Tetrapodal supports sometimes present.

**Temporal Assignment:** Develops from simple stamping found as a rare minority type on fiber-tempered ceramics of the St. Simons series. Continues through Refuge I,

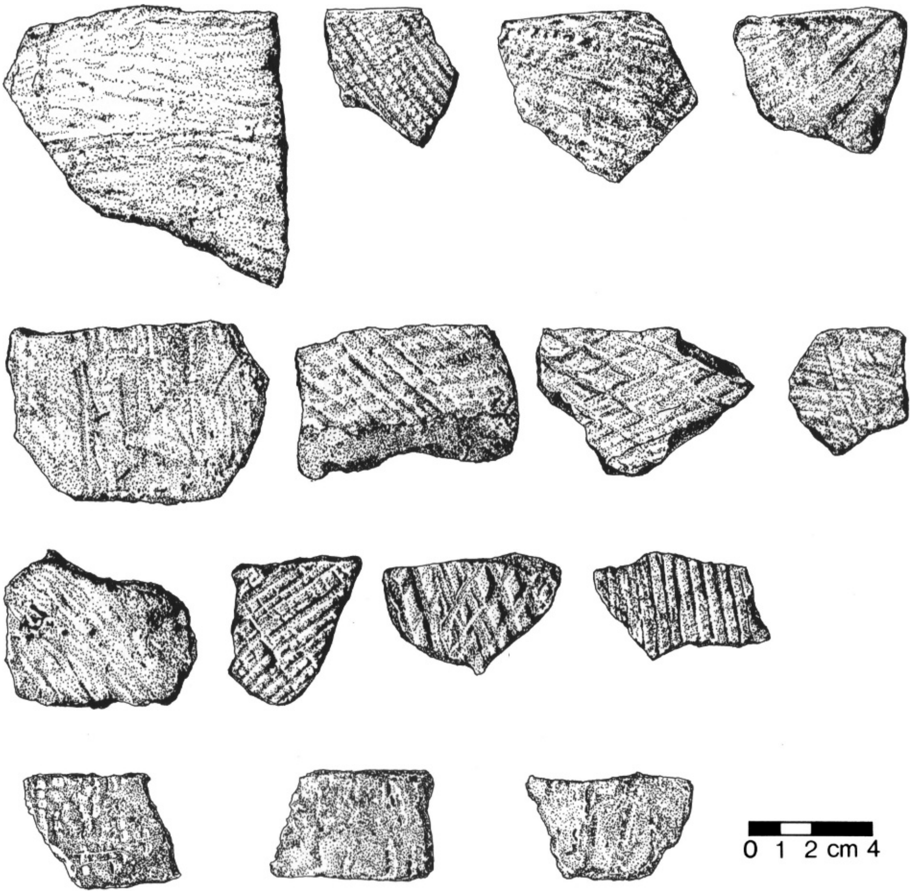


Fig. 14.2. Refuge Simple Stamped (top three rows) and Refuge Dentate Stamped sherds from McLeod Mound, St. Catherines Island (after Thomas and Larsen, 1979: figs. 63 and 68).

Refuge II, Refuge III, Deptford I, and Deptford II phases. Early examples are poorly executed, usually on sandy hemispherical bowls, while subsequent examples are cylindrical jars with rounded or conoidal bases.

Figure 14.2 illustrates Refuge simple stamped sherds (top three rows) and Refuge dentate stamped sherds from McLeod Mound (after Thomas and Larsen, 1979: figs. 63 and 68).

### Refuge Plain

This type description follows DePratter (1979a: 122).

**Paste:** Same as Refuge Simple Stamped.

**Surface Finish:** Interiors range from carelessly smoothed to finely finished, and the interiors are occasionally scraped. Exteriors show same range of finishing as interiors. Interiors and exteriors are coarse and friable due to sand content.

**Decoration:** Occasional interior punctation or simple stamping

**Vessel Form:** Same as Refuge Simple Stamped.

**Temporal Assignment:** Same as Refuge Simple Stamped.

### Refuge Dentate Stamped

This type description follows DePratter (1979a: 122–123).

**Paste:** Same as Refuge Simple Stamped.

**Surface Finish:** Same as Refuge Simple Stamped.

**Decoration:** *Technique:* Sometimes applied with a single-cog rocker or roulette, while occasional sherds suggest a double or triple-cog roulette. Some examples indicate use of a narrow comblike implement. *Design:* Impressions are characteristically fine and clear. Single, double, or occasionally triple lines of dentate stamping are typically widely spaced without apparent patterning and sometimes occur in association with simple stamping or punctation. *Distribution:* Scattered lines of dentate stamp distributed over the surface with no apparent pattern. Occasionally occurs on interior vessel walls.

**Vessel Form:** Same as Refuge Simple Stamped.

**Temporal Assignment:** At the Refuge site, this type occurred in a Refuge III context, but it may occur slightly earlier or slightly later at other sites.

### Deptford Linear Check Stamped

This type description essentially follows Caldwell and Waring (1939a), with slight modifications made by DePratter (1979a: 123–124).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Fine to medium quartz grit. *Texture:* Medium to coarse; very sandy. *Color:* Core continuous with color of both surfaces, meeting at a point of differentiation in the middle of the sherd cross section. The whole core is occasionally dark gray to black with a peculiar yellow or buff film on the exterior surface; this is not a true film, but rather a color change incidental to firing. Exterior surface is usually orange or buff, but frequently dark gray to black. Interior surface color ranges from buff through dark gray to black.

**Surface Finish:** Vessel interiors were smoothed while the clay was damp, leaving a gritty and carelessly finished surface. Marks from a smoothing implement are frequently visible.

**Decoration:** *Technique:* The design may have been rouletted or rolled on the vessel wall with a carved wooded rocker or cylinder, although paddles were likely used in most cases. *Design:* The design consists of a repeated parallel arrangement of two longitudinal lands that contain a series of finer transverse lands. The number of design elements on a single stamp ranges from one to eight. The design motifs are placed so carefully that the entire series of longitudinal lands has the superficial appearance of having been executed with a single stamp. The longitudinal lands are invariably heavier and usually higher than the transverse lands. There is considerable variation in the width of the longitudinal lands themselves, ranging from 2 mm to 6 mm. They may be, either rounded, sloped, or flat. A variation of this general design is one in which the transverse lands appear only in the alternating interspaces. The design is invariably applied in such a manner that the longitudinal lands intersect the rim obliquely. Several rim sherds show decoration of the interior in which bands of triangular or reed punctates proceed vertically down from the lip for a distance of 10 cm. *Distribution:* Usually over the entire exterior of the vessel, but occasionally decoration is restricted to only a portion. Interior decoration is present on a small percentage of sherds.

**Vessel Form:** *Rim:* Straight to slightly flaring. Usually squared or stamped beveled, though sometimes rounded; occasionally an oval folded rim occurs. *Body:* Cylindrical with a slight shoulder tapering to the base. *Base:* Conoidal or occasionally rounded. *Appendages:* None.

**Temporal Assignment:** This type appears late in the Refuge period or early in the Deptford period. Interior decoration and sandy paste suggest affinities with the Refuge period; however, the lack of abraders and its usual association with Deptford Checked Stamped indicates a slightly later date.

### Deptford Check Stamped

Caldwell and Waring (1939a) originally called this type Deptford Bold Check Stamped; this type description follows modifications proposed by DePratter (1979a: 124–125).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Fine to medium quartz grit. *Tex-*

*ture:* Medium to coarse, often sandy. *Color:* Core continuous with the color of both surfaces, meeting at a point of differentiation in the middle of the sherd cross section. Occasionally, the whole core is dark gray to black with a peculiar yellow or buff film on the exterior surface. This does not represent true filming but a color change incidental to firing. Exterior surface color is usually orange or buff, but frequently dark gray to black. Interior surface color ranges from buff through dark gray to black.

**Surface Finish:** Vessel interiors were smoothed while the clay was damp, leaving a gritty and carelessly finished surface. Marks of the smoothing implement are frequently visible.

**Decoration:** *Technique:* Stamping with a flat, rectangular paddle. *Design:* The design consists of a grill of raised lands that intersect to form squares, rectangles, rhomboids, or triangles. There is a characteristic variability in the size of the checks, which range from 3 mm to 10 mm on the side. In many cases, the lands may be as wide as the depressed areas are square, which produces a very coarse, massive effect. The depressed areas are deep, sometimes as much as 3 mm, and are usually square-cut. Earlier examples are rhomboid-shaped; later examples are rectangular. There is an increase in the size of individual checks through time. *Distribution:* Over the entire exterior of the vessel.

**Vessel Form:** *Rim:* Straight to slightly flared. *Lip:* Usually squared or stamped-beveled; sometimes rounded; occasionally an oval folded rim is noted. *Body:* Cylindrical with a slight shoulder tapering to the base. *Base:* Round or conoidal; occasionally with tetrapods. *Appendages:* Tetrapodal supports occasionally present.

**Temporal Assignment:** Originates as diamond- or rhomboid-shaped checks that become larger through time. Transition from diamonds to rectilinear checks occurs at the end of the Refuge II or at the beginning of Deptford I phase.

Figure 14.3 displays Deptford Check Stamped (top three rows) and Deptford Cord Marked sherds from Seaside Mound I (after Thomas and Larsen, 1979: figs. 69 and 71).

### Deptford Cord Marked

This type description follows DePratter (1979a: 126).

**Paste:** Same as Deptford Check Stamped.

**Surface Finish:** Same as Deptford Check Stamped.

**Decoration:** *Technique:* Stamping produced with a cord-wrapped paddle. Individual cords are usually large and distinct. *Design:* Individual cord impressions are widely spaced and often not parallel. Usually impressions are vertical, and occasionally oblique to rim. Cross-stamping is uncommon. *Distribution:* Sometimes in zone directly below rim; in other cases decoration covers the entire exterior of the vessel.

**Vessel Form:** Same as Deptford Check Stamped.

**Temporal Assignment:** This type occurs during the two Deptford phases on most of the north Georgia coast, although a similar type may occur as early as Refuge II at the mouth of the Savannah River and in inland areas.

### Deptford Complicated Stamped

This type description follows Caldwell and Waring's (1939a) description of Brewton Hill Complicated Stamped, as modified by DePratter (1979a: 126–127).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Fine grit and sand in considerable quantities. *Texture:* Medium to fine. *Color:* Core ranges from buff through dark gray to black; exterior surface ranges from yellow through orange to black; interior surface ranges from buff to black.

**Surface Finish:** Interiors are roughly smoothed and occasionally burnished. Tool marks are sometimes visible.

**Decoration:** *Technique:* Stamped with a large and elaborately carved paddle. *Design:* Characteristically fine, the lands are low and quite distinct. The design elements consist of spiral interlocking scrolls, concentric circles, snowshoes, swirls, "figure sixes", and "figure eights". *Distribution:* Usually over the entire exterior of the vessel, although plain areas set off by dentate stamping are occasionally present.

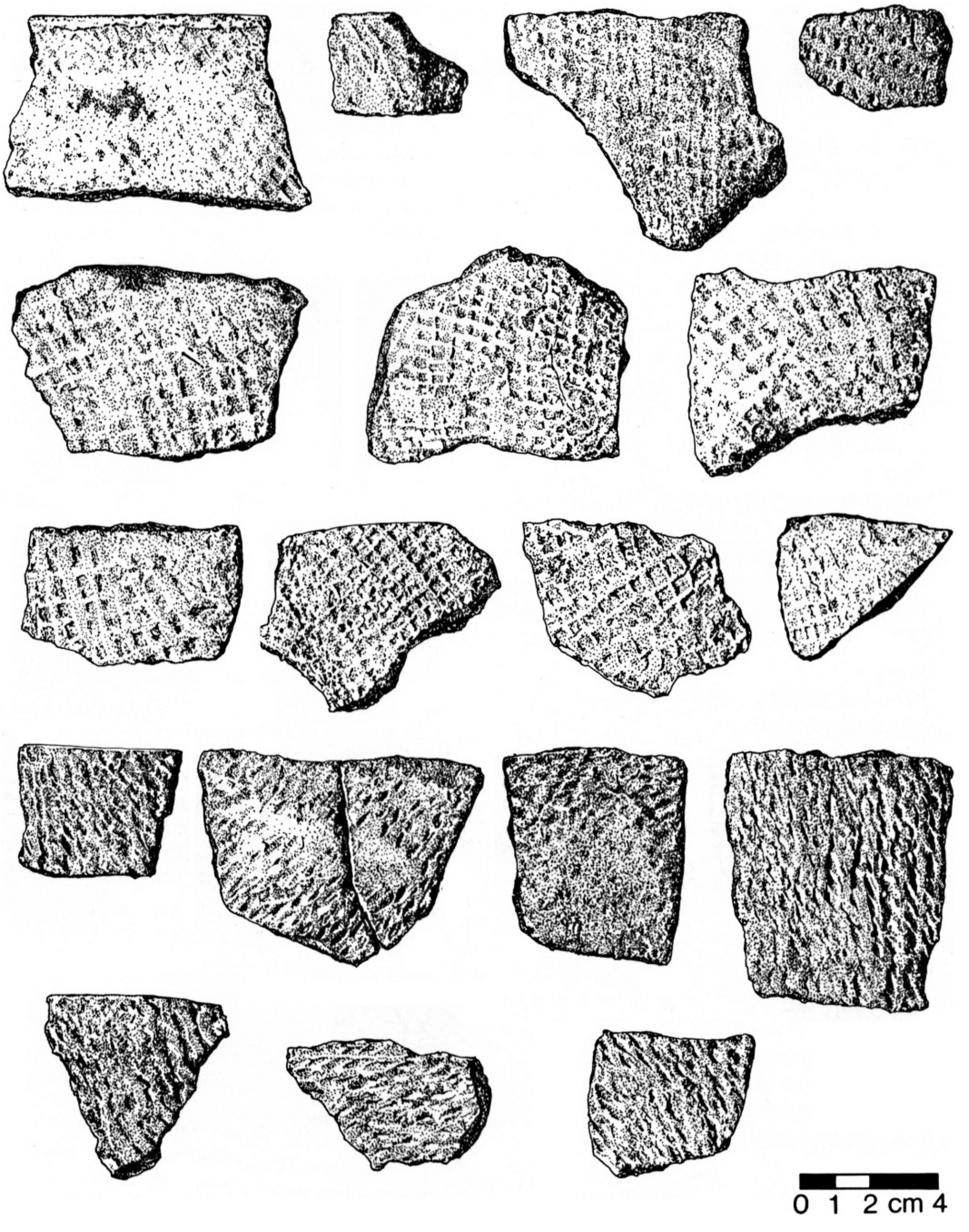


Fig. 14.3. Deptford Check Stamped (top three rows) and Deptford Cord Marked sherds from Seaside Mound I, St. Catherines Island (after Thomas and Larsen, 1979: figs. 69 and 71).

**Vessel Form:** *Rim:* Straight, not tapered. *Lip:* Squared, occasionally rounded. *Body:* Cylindrical, elongated with straight, slightly flaring sides that taper down to the base. *Base:* Round and conical. At the Deptford site, many vessels had tetrapods. *Appendages:* Tetrapodal supports occasionally present.

**Temporal Assignment:** Appears late in the Deptford period (Deptford II). Possesses marked similarities to Swift Creek ceramics from farther south and west.

### Oemler Complicated Stamped

This type description follows DePratter (1979a: 128).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Abundant fine sand; occasional medium grit. *Texture:* Medium to fine. Not as coarse or gritty as Refuge or early Deptford types. *Color:* Usually buff, red-buff, or gray on surface. Core occasionally differentiated, with grays and blacks predominating.

**Surface Finish:** Interiors are usually carefully smoothed and occasionally almost burnished, although some sherds are poorly smoothed. Shell scraping or brushing is occasionally present.

**Decoration:** *Technique:* Stamped with a carved paddle. *Design:* A number of distinct motifs are present in Chatham County: (a) nested diamonds, (b) herring bone, (c) alternating zones of triangle-filled pyramids and rows of diamond-shaped lozenges separated by heavy lines. No curvilinear stamping known to be present. *Distribution:* Over the entire vessel surface.

**Vessel Form:** *Rim:* Straight to slightly flaring; sometimes sharply everted. *Lip:* Rounded to squared; often sharply planed, forming broad flat lip. *Body:* Cylindrical jar. *Base:* Rounded. *Appendages:* None.

**Temporal Assignment:** Probably dates to the Refuge III phase.

Oemler Complicated Stamped sherds from the Cunningham Mound group are illustrated in figure 14.4 (after Thomas and Larsen, 1979: fig. 73).

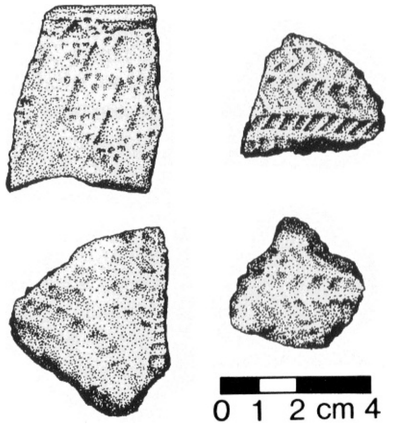


Fig. 14.4. Oemler Complicated Stamped sherds from the Cunningham Mound group, St. Catherines Island (after Thomas and Larsen, 1979: fig.73).

### Wilmington Cord Marked

This type description follows that of Caldwell and Waring (1939a), as modified by DePratter (1979a: 129, 1991: 177). This type was formerly referred to as "Wilmington Heavy Cord Marked".

**Paste:** *Method of manufacture:* Coiling. *Temper:* Crushed sherd or crushed, low-fired clay fragments, from 3 cm to 5 cm in diameter. *Texture:* The surface is fine, but often lumpy. *Color:* The color of the exterior and interior surfaces ranges from buff through reddish brown to dark gray. The core color is sometimes the same as that of the surfaces, but occasionally it is a sharply differentiated dark gray.

**Surface Finish:** Interiors are carelessly smoothed, but lumpy due to the presence of large fragments of clay tempering. Shell scraping occasionally occurs on interiors.

**Decoration:** *Technique:* Stamping with a paddle wrapped with heavy cords. *Design:* The cord impressions are characteristically large and have a vertical parallel arrangement. Cord impressions sometimes intersect the rim obliquely. *Distribution:* Cord impressions over the entire vessel surface. Occasionally the edge of the cord-wrapped paddle was used to stamp the base.

**Vessel Form:** *Rim:* Straight; occasionally slightly incurving. *Lip:* Usually rounded but occasionally squared or stamped-beveled. *Body:* The typical vessel form is cylindrical that lacks a shoulder and tapers down to the base. *Base:* Round to slightly conoidal. *Appendages:* None.

**Temporal Assignment:** First appears during the Wilmington I phase. Similar to Deptford Cord Marked except for differences in temper.

### Wilmington Plain

This type description follows DePratter (1979a: 129–130, 1991: 177–179).

**Paste:** Same as Wilmington Cord Marked.

**Surface Finish:** Exterior finish ranges from careless smoothing to infrequent burnishing. Interiors are usually carelessly smoothed but lumpy due to presence of large fragments of clay tempering. Shell scraping is common on vessel interiors.

**Decoration:** None.

**Vessel Form:** Same as Wilmington Cord Marked.

**Temporal Assignment:** Same as Wilmington Cord Marked.

### Wilmington Fabric Marked

This type description is extrapolated from DePratter (1991: 177–180).

**Paste:** Same as Wilmington Cord Marked.

**Surface Finish:** Same as Wilmington Cord Marked.

**Decoration:** Uniform decoration apparently produced by impressing the vessel with a woven material, such as a mat or basket.

**Vessel Form:** Same as Wilmington Cord Marked.

**Temporal Assignment:** Same as Wilmington Cord Marked.

### Wilmington Brushed

This type description follows DePratter (1979a: 130–131).

**Paste:** Same as Wilmington Cord Marked.

**Surface Finish:** Same as Wilmington Cord Marked.

**Decoration:** *Technique:* Combing or brushing with bundled sticks, grass, or other implements. *Design:* The design consists of very fine, faint, and closely spaced combing or brushing impressions. Orientation of impressions relative to rim not known. *Distribution:* On some vessels, brushing covers the entire exterior surface. On other vessels, the body is cord marked and only the base is brushed.

**Vessel Form:** Most available sherds appear to be from conoidal jars or hemispherical bowls similar to those on which Wilmington Cord Marked occurs, although this association is uncertain.

**Temporal Assignment:** Known primarily from sites with Wilmington II phase occupations; however, this type may also occur during the Wilmington I phase.

### Walthour Complicated Stamped

This type description follows DePratter (1979a: 130).

**Paste:** Same as Wilmington Heavy Marked.

**Surface Finish:** Same as Wilmington Heavy Marked.

**Decoration:** *Technique:* Stamping with a carved paddle. *Design:* The design consists of curvilinear elements carved on a wooden paddle. Stamping is generally faint and overstamping is common. Concentric circles and figure eights are common design elements, though others may occur. *Distribution:* The decoration covers the entire exterior of the vessel.

**Vessel Form:** *Rim:* Straight. *Lip:* Rounded or carelessly squared. *Body:* The conoidal jar and the hemispherical bowl are the most common forms. *Base:* Round to slightly conoidal. *Appendages:* None.

**Temporal Assignment:** Same as Walthour Check Stamped.

### Walthour Check Stamped

This type description follows DePratter (1979a: 130).

**Paste:** Same as Wilmington Cord Marked.

**Surface Finish:** Same as Wilmington Cord Marked.

**Decoration:** *Technique:* Stamping with a carved paddle. *Design:* The design consists of a grill of raised lands that generally intersect to form squares or rectangles, although rhomboid-shaped checks occasionally occur. Checks range between 2 mm and 10 mm on a side. Impressions are usually shallow and indistinct, and overstamping is common. *Distribution:* Decoration covers the entire exterior of the vessel.

**Vessel Form:** *Rim:* Straight, occasionally slight flaring. *Lip:* Rounded or carelessly squared; occasionally stamped. *Body:* The conoidal jar and the hemispherical bowl are the most common forms. *Base:* Round to slightly conoidal. *Appendages:* None.

**Temporal Assignment:** Occurs only during the Wilmington I phase, as a development from Deptford Check Stamped; this type was manufactured for only a brief interval, probably less than 100 years.

St. Catherines Cord Marked vessels from Johns and Marys Mounds are shown on figure 14.5 (after Thomas and Larsen, 1982: figs. 9 and 29).

### St. Catherines Cord Marked

This type description follows Steed (1970), as modified by DePratter (1979a: 131, 1991: 180–181).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Crushed sherd or crushed, low-fired clay fragments. Fragments are usually smaller than the tempering used in Wilmington Heavy Cord Marked. *Texture:* Typically fine. *Color:* Interiors and exteriors are gray to buff. The core is usually the same color as the surface, but it is occasionally a sharply differentiated dark gray to black.

**Surface Finish:** Interiors are carelessly smoothed, but not as lumpy as those of Wilmington Cord Marked due to the smaller size of the temper fragments. Interior shell scraping is common.

**Decoration:** *Technique:* Stamping with a cord wrapped paddle. *Design:* Cord impressions are medium to large and are cross-stamped at approximately a 45° angle to the rim. *Distribution:* Cordmarking covers the entire exterior of the vessel except for the base, which is typically stamped with the edge of the cord-wrapped paddle.

**Vessel Form:** *Rim:* Straight or occasionally slightly flared. *Lip:* Usually squared or rounded; often cord marked. *Body:* Cylindrical jars with occasional flaring rim and straight sides. *Base:* Rounded. *Appendages:* None.

**Temporal Assignment:** Restricted to St. Catherines period.

St. Catherines Cord Marked sherds from Johns and Marys Mound are illustrated on figure 14.6 (after Larsen and Thomas, 1982: figs. 33 and 34).

### St. Catherines Burnished Plain

This type description follows Steed (1970), as modified by DePratter (1979a: 131).

**Paste:** Same as St. Catherines Cord Marked.

**Surface Finish:** Interiors are carelessly smoothed. The exteriors are burnished, often executed in parallel alignments or in an undulating, "fluted" surface.

**Decoration:** None.

**Vessel Form:** *Rim:* Straight or incurving. *Lip:* Squared or rounded. *Body:* Several forms include hemispherical bowls, deep straight-sided jars, and cazuela bowls. *Base:* Rounded. *Appendages:* None.

**Temporal Assignment:** Restricted to St. Catherines period.

Figure 14.7 depicts examples of St. Catherines Burnished Plain vessels from Johns and Marys Mounds (after Larsen and Thomas, 1982, figs. 11a and 27).

### St. Catherines Net Marked

This type description follows Steed (1970), as modified by DePratter (1979a: 131–132).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Crushed sherd or crushed low-fire clay fragments. Clay fragments are larger than those found in other St. Catherines types. *Texture:* The texture of the surface is fine, but often lumpy. *Color:* Interiors and exteriors are gray to buff, and often orange. The color of the core is usually the same as the surface, but it is occasionally a sharply differentiated dark gray to black.

**Surface Finish:** Interiors are carelessly smoothed but lumpy due to the presence of large fragments of clay tempering. Shell scraping occurs occasionally on interiors.

**Decoration:** *Technique:* Stamping with a net-wrapped paddle. *Design:* Irregular stamping and overstamping of vessel surface, resulting in a rough, uneven surface. Both knots and webbing impressions are visible on most sherds; width of mesh varies from 9.5 mm to 19 mm. *Distribution:* Net impressions are visible over entire vessel surface.

**Vessel Form:** *Rim:* Straight, occasionally slightly incurving. *Lip:* Usually squared or rounded. *Body:* Occurs on both hemispherical bowls and deep cylindrical jars. *Base:* Rounded. *Appendages:* None.

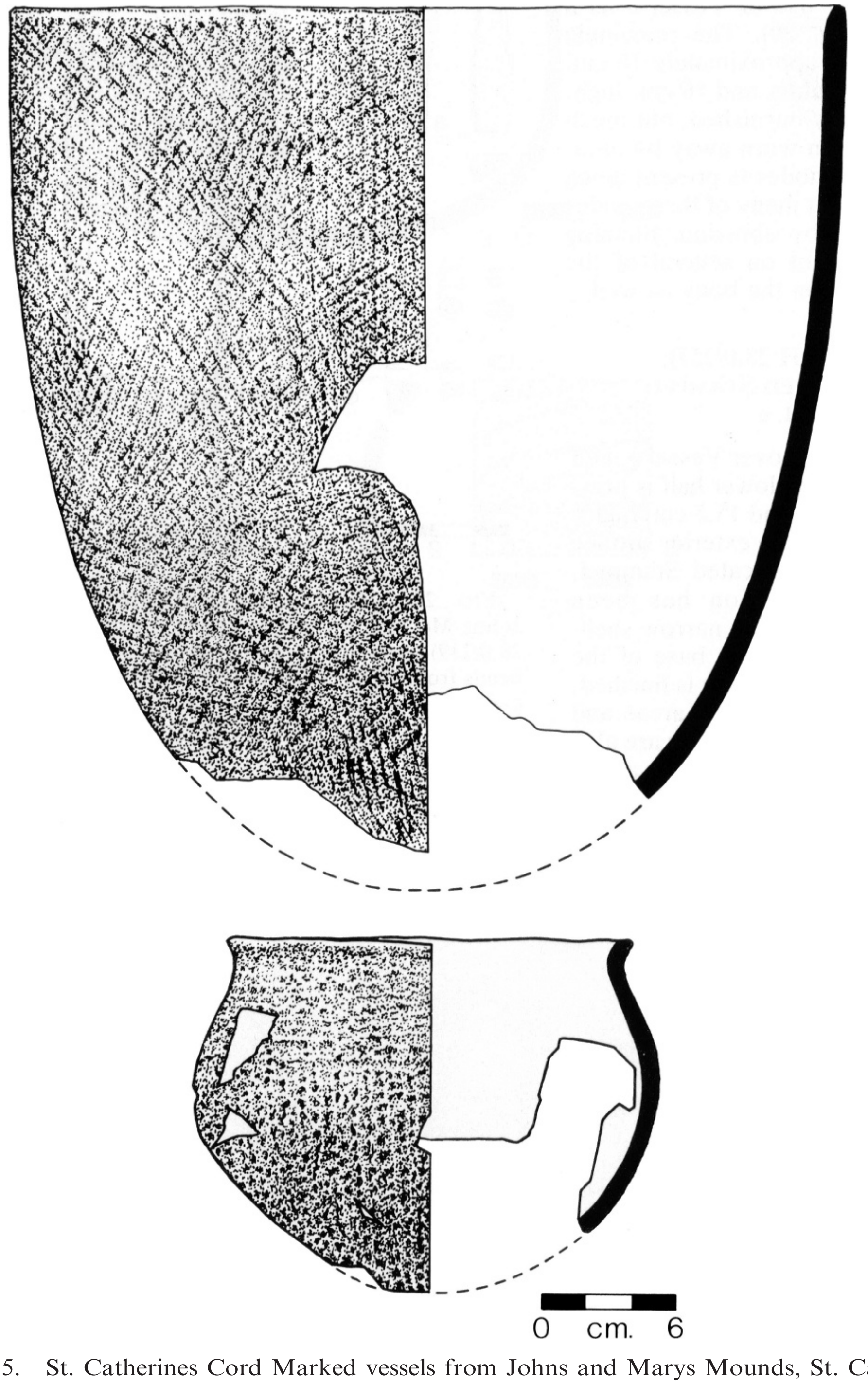


Fig. 14.5. St. Catherines Cord Marked vessels from Johns and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1982: figs. 9 and 29).

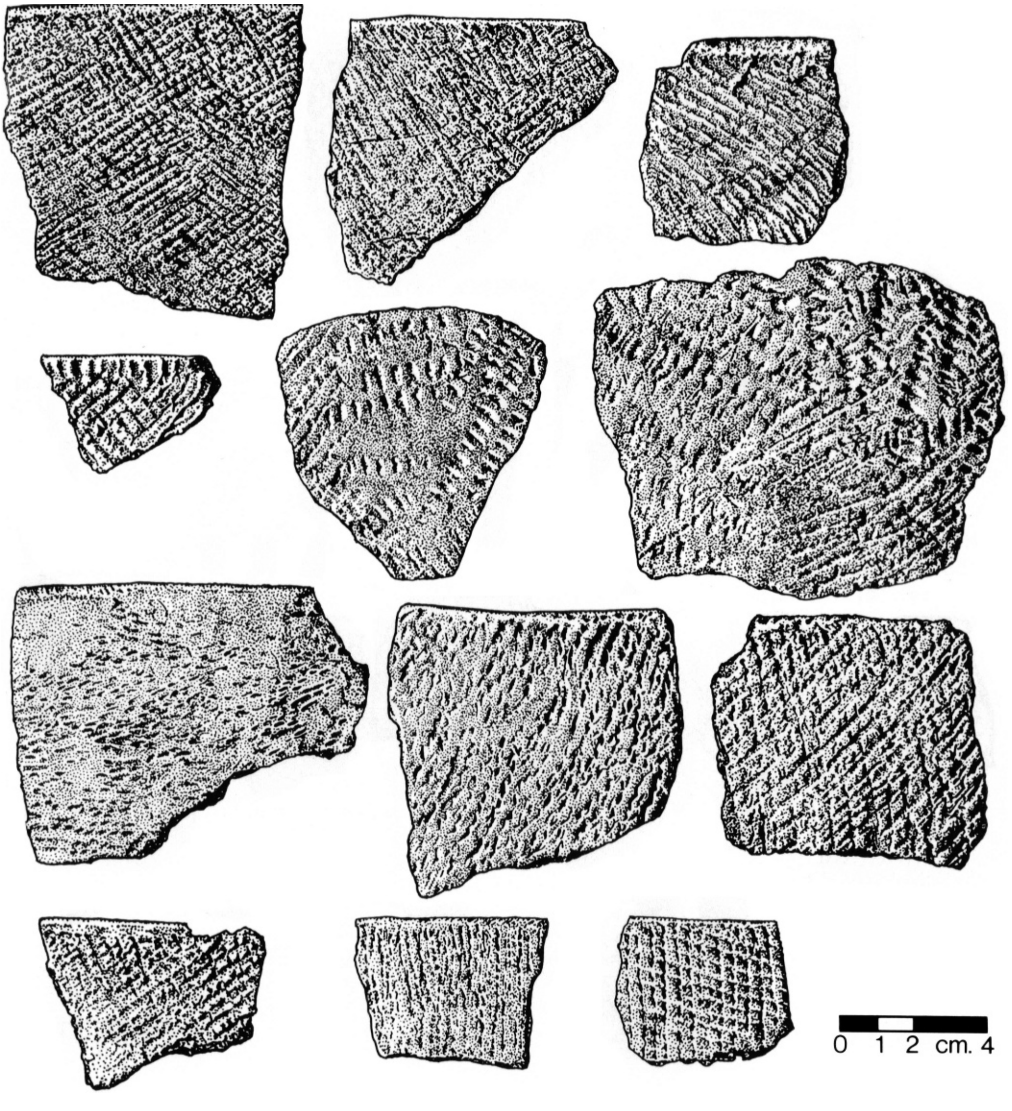


Fig. 14.6. St. Catherines Cord Marked sherds from Johns and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1982: figs. 33 and 34).

**Temporal Assignment:** Restricted to St. Catherines period.

ST. CATHERINES PLAIN

This type description follows DePratter (1979a: 132).

**Paste:** Same as St. Catherines Fine Cord Marked.

**Surface Finish:** Exteriors are smoothed, but not burnished. Occasionally evidence of smoothed-over shell scraping on both interiors and exteriors.

**Decoration:** None.

**Vessel Form:** Same as St. Catherines Burnished Plain.

**Temporal Assignment:** Restricted to St. Catherines period.

SAVANNAH BURNISHED PLAIN

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 186).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Fine sand and grit. *Texture:* Paste

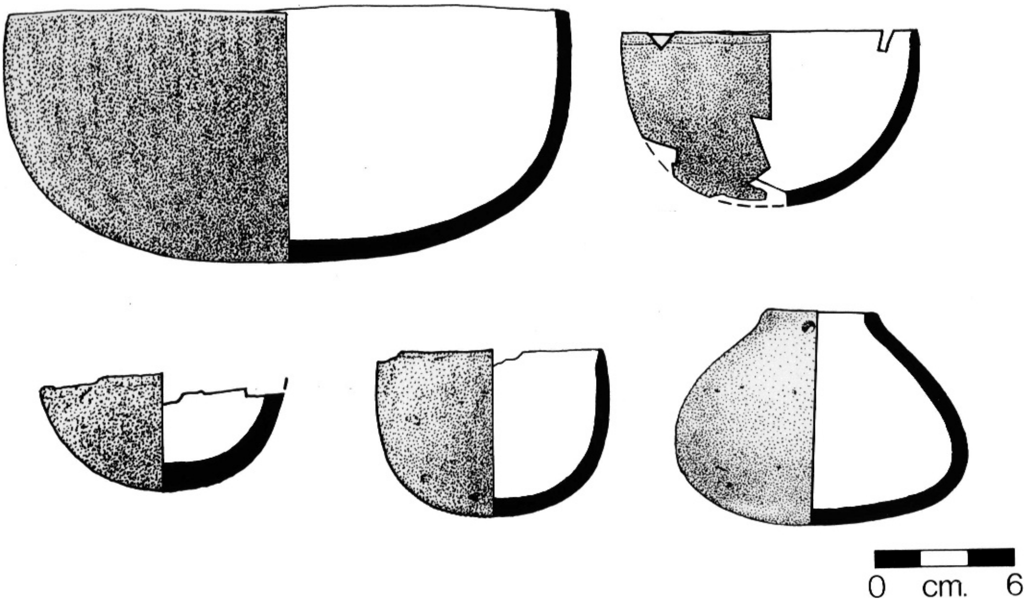


Fig. 14.7. St. Catherines Burnished Plain vessels from Johns and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1982: figs. 11a and 27).

fine and compact at the Irene site. *Color:* The core ranges in color from gray to buff; there is considerable variation in surface color, which ranges from bright yellow through red and buff to dark gray.

**Surface Finish:** Exteriors and interiors may be smoothed, polished, or burnished. Horizontal smoothing marks are often visible. Burnishing and polishing usually occur on the exterior, while smoothing occurs on the interior.

**Decoration:** Carefully made vertical or slanting tooling is found on the rim area of carinated bowls.

**Vessel Form:** *Rim:* Incurving or straight, occasionally flared; usually tapered. *Lip:* Rounded or squared, although sometimes the edge of the lip is squared and the inner edge rounded. *Base:* May be rounded, conical, or flat; a bowl from Eulonia has a concave base. *Body:* Considerable variation exists, though the most common forms are carinated, shallow, and hemispherical bowls. Bowls that belly at the bottom and that rise evenly to a constricted mouth, hemispherical bowls with flaring rims, and boat-shaped vessels and dishes all occur. *Appendages:* None.

**Temporal Assignment:** Restricted to the Savannah period.

Savannah Cord Marked vessels from Johns and Marys Mound are illustrated on figure 14.8 (after Larsen and Thomas, 1982: figs. 11b, 9c, and 29a).

### Savannah Cord Marked

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 183–186).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Generally grit, with occasional crushed sherd. *Texture:* Paste medium to coarse present at all sites. Grit-tempered sherds are generally sandy; sherd-tempered sherds have a slightly finer texture, and the paste is often lumpy. *Color:* Interiors are dark gray through red buff. Surface color varies from light buff through light gray. The exterior coloring is often a lighter shade than that of the interior.

**Surface Finish:** Interiors show considerable variability that ranges from careless smoothing through burnishing. Interior shell scraping also occurs.

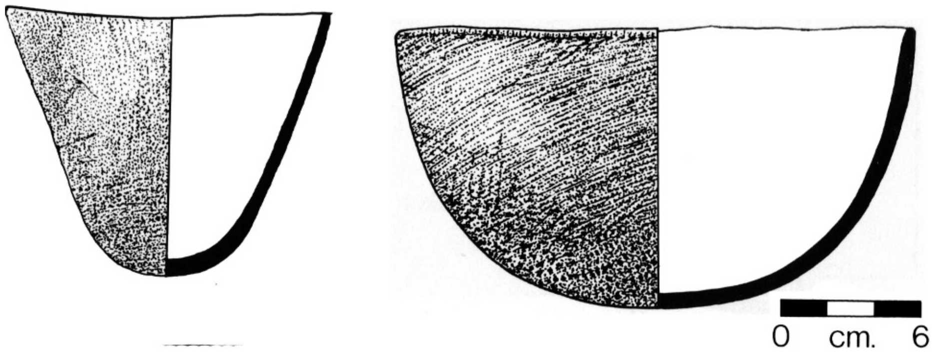


Fig. 14.8. Savannah Cord Marked vessels from Johns and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1982: figs. 11b and 9c).

**Decoration:** *Technique:* Stamped with a flat, cord-wrapped paddle, which is also used to bevel the rim. The rounded side of the paddle was almost invariably applied in finishing the bottom, giving the appearance of a basket impression. *Design:* The impressions are characteristically fine and clear and are generally cross-stamped. Most rims are finished with a series of vertical cord impressions, while the bottoms are finished with narrow impressions of the side of the paddle. *Distribution:* Over the entire exterior of the vessel.

**Vessel Form:** *Rim:* Straight to flared, sometimes everted; usually slightly tapered. Excess clay from the finishing of the rim is often flattened by the application of the paddle. *Lip:* Squared, rounded, or stamped-beveled. *Body:* At the Irene site, the most typical shape is a globular vessel with a flaring rim, short throat, well-defined shoulder, and a rounded base. Other vessels have a straight rim, lack a shoulder, and have an elongated straight body that tapers to the base. *Base:* Round or conical. *Appendages:* None.

**Temporal Assignment:** Restricted to the Savannah period.

Savannah Cord Marked sherds from Johns and Marys Mounds are illustrated on figure 14.9 (after Larsen and Thomas, 1982: figs. 36 and 39).

### Savannah Check Stamped

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 186–187).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Variable-sized quartz grit and gravel. *Texture:* Ranges from fine to coarse; usually sandy. *Color:* The core varies from buff to dark gray, and is often the same color as the surface. Surface color varies from buff to red through light brown through dark gray.

**Surface Finish:** The interior is smooth and often burnished.

**Decoration:** *Technique:* Stamped with a flat, probably oblong, carved paddle. *Design:* Consists of a grill of raised lines that intersect to form squares or diamonds. The distance between the intersection of the lines varies from 3 mm to 6 mm. Raised lines of the grill are uniform in width over a single vessel, and the range of variability in the sample is from 1 mm to 2 mm. The execution is generally good, although at times it is rather faint. Examples of overstamping occur, although they are rare and are usually limited to the bottom sherds. Incidental decorative features are very rare and were perhaps applied only during the last period of the utilization of this type. They may take the form of a double row of horizontal reed punctations in the rim area, relieved by large nodes riveted to the vessel wall. The punctations circle above and/or below the nodes. Several examples of a polished or smoothed folded rim have been noted, probably also late. This form of rim was invariably finished after stamping. *Distribution:* Over the entire exterior of the vessel.

**Vessel Form:** *Rim:* Usually flared, though can be everted, occasionally straight, and

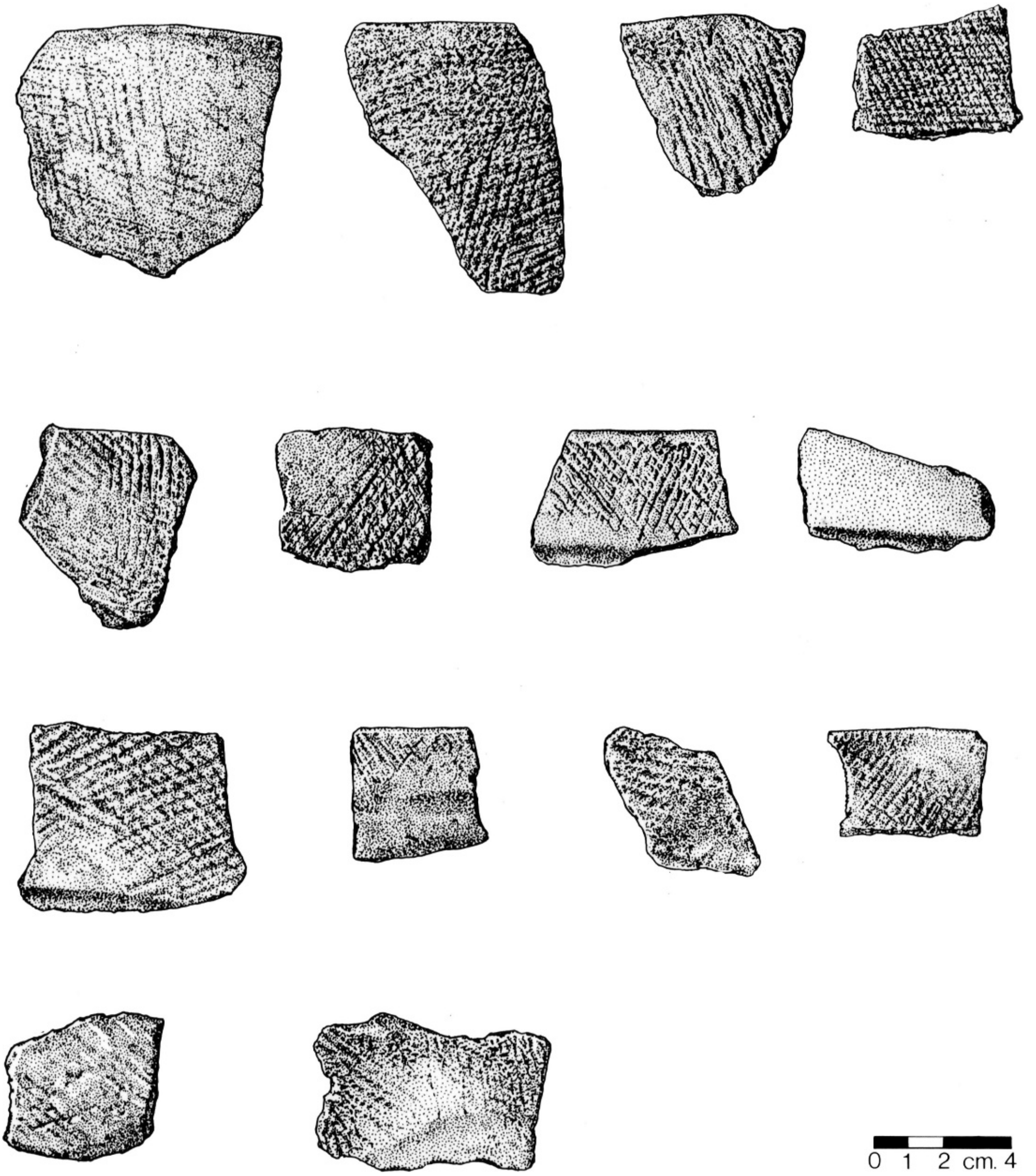


Fig. 14.9. Savannah Cord Marked sherds from Johns and Marys Mounds, St. Catherines Island (after Larsen and Thomas, 1982: figs. 36 and 39).

sometimes (however infrequently) incurving. Rim folding has been noted, and rims are frequently tapered. *Lip:* Usually squared or stamped-beveled; sometimes rounded. *Body:* Globular, generally with a flaring rim, a short throat, and a well-defined shoulder. *Base:* Round. *Appendages:* None.

**Temporal Assignment:** Restricted to the Savannah II and III phases.

### Savannah Complicated Stamped

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 188–189).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Grit, occasionally gravel. *Texture:* Medium-grained, sometimes coarse. *Color:* The core is buff through black, with varying surface color that is characteristically darker than that of the core. Surface colors vary from dark gray through buff to orange.

**Surface Finish:** Interiors are almost invariably burnished.

**Decoration:** *Technique:* Stamped with a flat carved paddle; sometimes the paddle was used to bevel the outer edge of the rim. *Design:* Motifs include figure eights, concentric circles, a single terminal element of the figure eight, concentric circles with a cross in the center, and a simple figure eight with a cross in the center of each terminal circle. The execution of the stamps is massive, bold, and square cut. The lands and incised lines vary both in width and depth. Application is deliberate and the stamping clear. Overstamping frequently occurs. Lands may vary from 2 mm to 6 mm in width. Many of the stamps are not as bold, but are finely and delicately executed. The cutting of these stamps is not square, but the lines are like fine shallow grooves. Motifs are identical with the bolder type. *Distribution:* Over the entire exterior of the vessel.

**Vessel Form:** *Rim:* Straight to flaring, sometimes everted. *Lip:* Squared, rounded, or stamped-beveled. *Body:* Typical shape is a globular or cylindrical vessel with a flaring rim, a short throat, and a well-defined shoulder that tapers down to the base. The vessels are usually large, sometimes with diameters greater than 30 cm. *Base:* Round. *Appendages:* None.

**Temporal Assignment:** Restricted to the Savannah III phase.

### Irene Plain

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 189).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Grit, and occasionally gravel. *Texture:* Medium-grained and sandy. *Color:* The core varies from buff through red through gray. Surfaces are buff through red-buff through red-brown through gray.

**Surface Finish:** Exteriors and interiors are smoothed and burnished, and sometimes sandy.

**Decoration:** Generally there is no decoration. Appliqué' reed punctate bands have been noted just below the rim on elongate globular vessels. The occurrence of regularly spaced ovoid pellets is a very common and distinctive feature of this type. These are generally smaller than the incidental decorative nodes that occur on Irene Complicated Stamped, and in addition are not riveted to the side of the vessel. On wide-mouthed bowls with incurving rims, the ovoid pellets are in the shoulder region. On hemispherical bowls that lack a shoulder, they are in a comparable area.

**Vessel Form:** *Rim:* Incurving, straight, or flared. *Lip:* Rounded or squared. *Body:* Wide-mouthed bowls are the most common form; however, hemispherical bowls and elongated globular vessels with decided rim flare frequently occur. *Base:* Round or flat. *Appendages:* None except for the previously mentioned decorative pellets.

**Temporal Assignment:** This type is restricted to the Irene period.

Figure 14.10 depicts Irene Plain vessels from South End Mound I (after Larsen and Thomas, 1986: figs. 9b and 10c).

### Irene Incised

This type description follows Caldwell and Waring (1939a), as modified by DePratter (1991: 192–193).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Grit. *Texture:* Medium-grained, though sometimes coarse and lumpy. *Color:* Core varies from buff to gray. The color is usually the same as that of both surfaces without inner differentiation. The surfaces exhibit various shades of dark gray; they are occasionally buff.

**Surface Finish:** The exteriors and interiors are smoothed or burnished.

**Decoration:** *Technique:* Incising and punctation. *Design:* The design consists of a horizontal band of repeating or alternating design elements. There is little embellishment of the design motifs and apparently no attempt of solid area decoration. There is considerable variety in the execution of the incising. The lines are generally narrow and

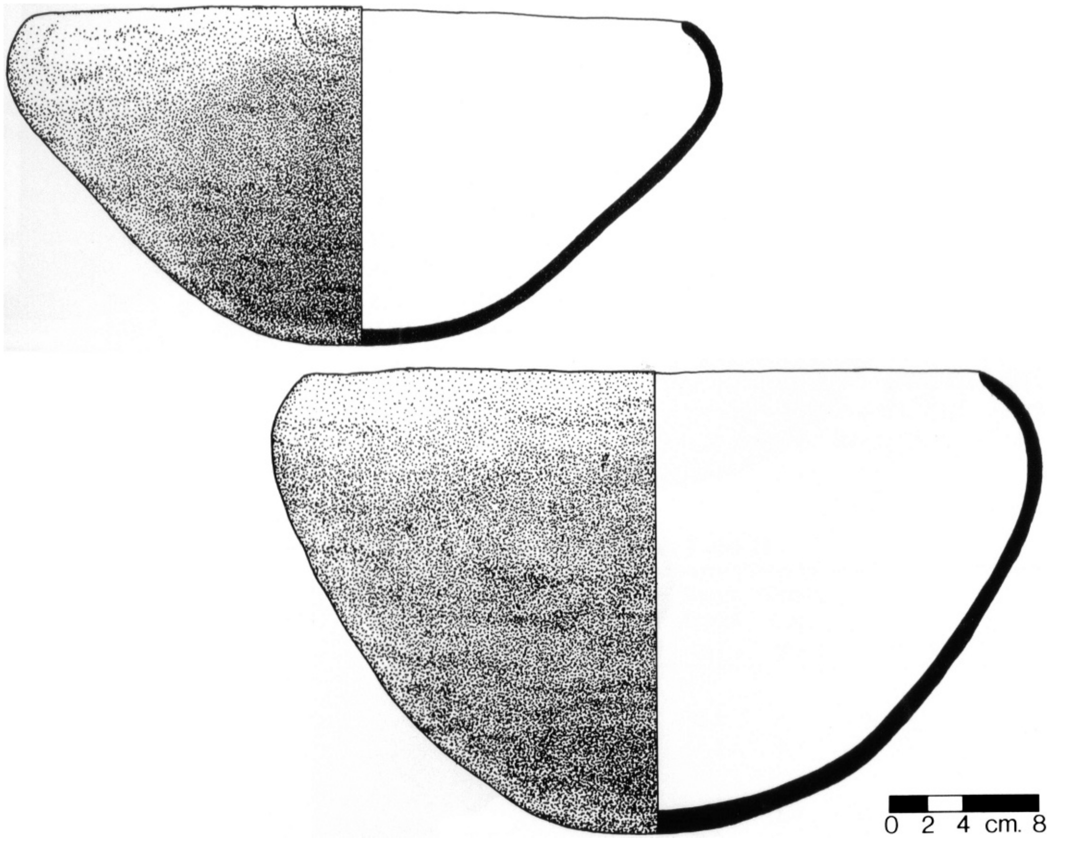


Fig. 14.10. Irene Plain vessels from South End Mound I, St. Catherines Island (Larsen and Thomas, 1986: figs. 9c and 10c).

weak and appear hastily drawn. The width of the incising tends to vary from less than 1.0 mm to 3.5 mm, with an average of about 1.5 mm. *Distribution:* Incisions occur along the rim and shoulder.

**Vessel Form:** *Rim:* Incurving, sometimes straight or folded. *Lip:* Rounded or squared. *Body:* The wide-mouthed bowl is the most common vessel form of this type at the Irene site. Globular vessels with elongated, straight throats also occur. *Base:* Rounded or flat. *Appendages:* Decorative nodes and rim flanges are rare.

**Temporal Assignment:** This type is restricted to the Irene II phase.

### Irene Complicated Stamped

This type definition follows Caldwell and Waring (1939a), as modified by DePratter (1991: 191–192).

**Paste:** *Method of manufacture:* Coiling. *Temper:* Grit; occasionally gravel. *Texture:* Medium-grained; sometimes coarse. *Color:* The core is usually gray or buff, but is sometimes identical with that of the surfaces. Surfaces are dark gray through red to light buff.

**Surface Finish:** Exteriors are variable, and they may or may not be smoothed prior to stamping. Interiors are smoothed or burnished.

**Decoration:** *Technique:* Carved paddle. *Design:* The filfot cross is the only design motif employed on this type in Chatham County. The center of the cross is formed either by the intersection of the four arms or by the projection of these from the sides of a central square element. The arms themselves consist of four to nine parallel lands. The primary land of each arm turns or angles back to form a square or circular terminal element, while the other lands follow the first. The central and terminal elements of the design may themselves contain either a raised square or a circle. The execution of the stamping is rather variable. While the grooves are usually shallow, the unit design may be either clearly depicted or else obliterated by overstamping. Incidental decorative features occur frequently and are always confined to the area above the shoulder and immediately below the lip. These may consist of one or two horizontal lines of hollow reed punctations, appliqué, collars or nodes, and pinched appliqué bands. The appliqué and collars appear to be a development of the folded rim and may themselves contain reed punctations, a series of nodes or rosettes. The rosette decoration consists of regularly placed pellets of clay that were pressed with the end of a hollow reed. The large nodes were riveted to the side of the vessel and were often decorated with the end of a hollow reed. *Distribution:* Paddle stamping is found over the entire exterior of the vessel. The incidental decorative features occur in the rim area.

**Vessel Form:** *Rim:* Generally flaring and usually straight or incurving on hemispherical bowls. *Lip:* Rounded or squared. *Body:* Generally elongate globular with a slight shoulder. Wide-mouthed hemispherical bowls also occur. *Base:* Round. *Appendages:* None, except the incidental decorative nodes.

**Temporal Assignment:** Restricted to the Irene period.

Figure 14.11 depicts Irene Complicated Stamped vessels from South End Mound I (after Larsen and Thomas, 1986: figs. 9a and 10a).

### Irene Burnished Plain

This type description follows DePratter (1991: 193).

**Paste:** Same as Irene Plain, although paste in burnished plain can be less coarse.

**Surface Finish:** Exteriors are burnished, while interiors are usually smoothed or burnished.

**Decoration:** None.

**Vessel Form:** Found in a variety of forms, including bowls with incurving or straight rims, flared rim jars, and occasional "specialty forms" (such as boat-shaped, gravy boat, etc).

**Temporal Assignment:** Restricted to the Irene period.

### Altamaha Series

In his synthesis of W.P.A. excavations in Chatham County, DePratter (1991: 157) deferred discussion of aboriginal ceramics from the historic period, citing his on-going research of materials recovered during Stanley South's extensive excavations at Santa Elena, South Carolina.

In this report, we will do the same. We have excavated for two decades at Mission Santa Catalina de Guale, located near Wamassee Head on St. Catherines Island (Thomas, 1987; Larsen, 1990). Several descriptive monographs are currently in preparation for publication. These describe the results of our excavations, although a detailed discussion of historic period aboriginal wares will be postponed until these data are presented in full. For present purposes, we will employ DePratter's (1991) terminology, but will postpone specific type definitions.

**Altamaha Line Block** ceramics are grit tempered and decorated with a paddle stamping characterized by blocks of parallel and perpendicular lines, arranged around a central (and often circular) node. A number of investigators have noted the clear-cut relationship to the preceding Irene ceramic complex, with the "line block" patterning viewed as an evolved filfot cross (common in Irene series ceramics), executed with straight lines rather than scrolls (Larson 1953; Brewer, 1985; Braley et al., 1986, 1990; Saunders, 2000a). As DePratter (personal commun.) has pointed out, rectilinear stamping is properly termed "line block stamped", but much of the material is actually cross simple stamped; separating the two techniques is time-consuming and imprecise. Perhaps, because a very similar effect is created by both techniques, it is not important to separate them at all. Problems such as this one must await further, more detailed ceramic studies of the ceramics at Mission Santa Catalina and elsewhere.

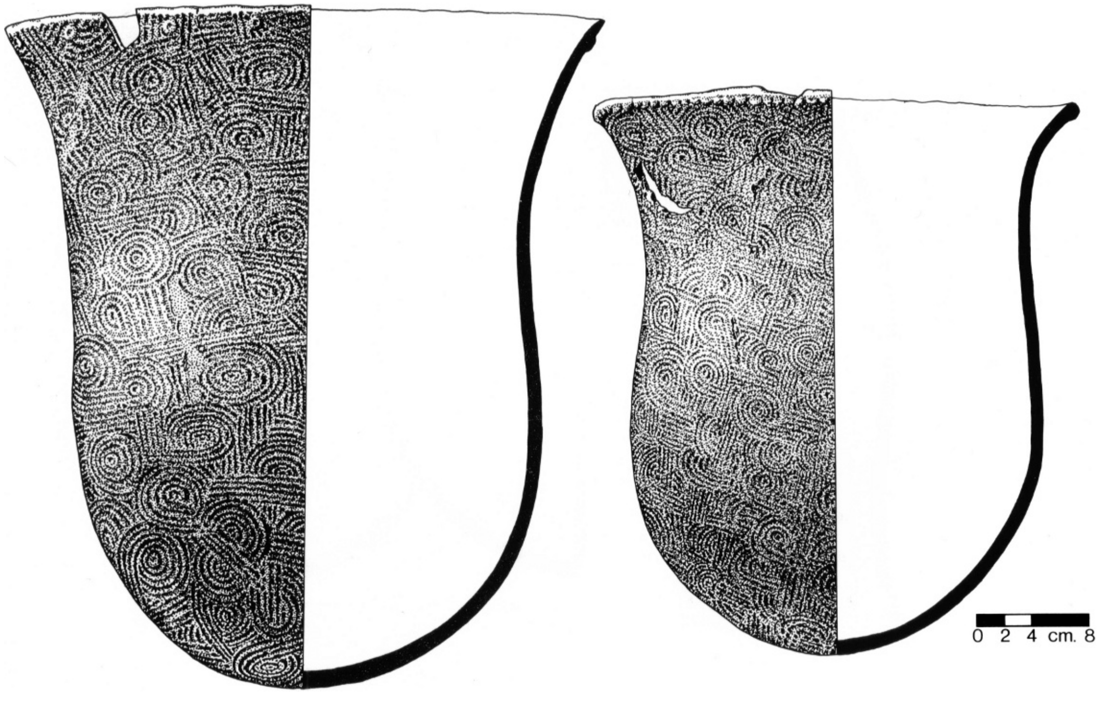


Fig. 14.11. Irene Complicated Stamped vessels from South End Mound I, St. Catherines Island (after Larsen and Thomas, 1986: figs. 9a and 10a).

Altamaha Line Block stamped sherds from Johns Mound are depicted on figure 14.12 (after Larsen and Thomas, 1982: fig. 37).

On the **Altamaha Red Filmed** type (DePratter, 1991: table 1), surfaces are commonly burnished (or at least well smoothed) and contain an interior or exterior film of red paint on the entire vessel or distributed in zones. DePratter (1991: table 1) likewise describes an **Altamaha Check Stamped** type, but no such sherds were recovered during the excavations on St. Catherines Island discussed here.

## NOTE

1. For completeness, we include DePratter's (1991) temporal estimates as part of the ceramic type descriptions; see chap. 15 for a discussion of these estimates in light of the new $^{14}C$ evidence from St. Catherines Island.

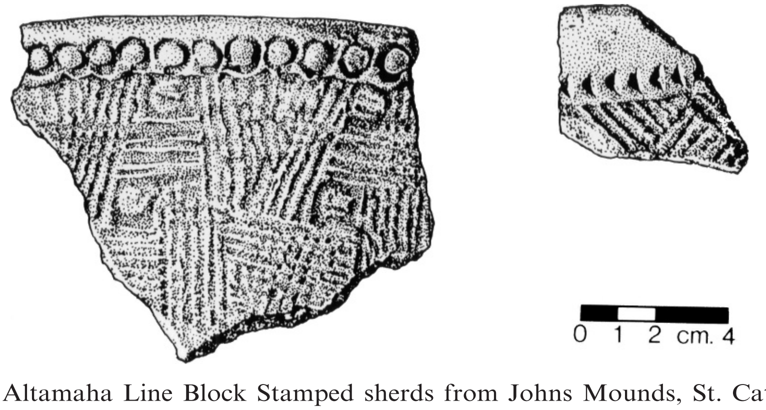


Fig. 14.12. Altamaha Line Block Stamped sherds from Johns Mounds, St. Catherines Island (Larsen and Thomas, 1982: figs. 37a and 37b).

TABLE 14.1
**Raw Ceramic Counts from Sites Recorded in the St. Catherines Island Transect Survey**

| Ceramic type | 9Li8 | 9Li13 | 9Li15 | 9Li17 | 9Li19 | 9Li22 | 9Li49 | 9Li50 | 9Li51 | 9Li52 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | 319 | 2835 | 1 | | | | | | | |
| Altamaha circ. in square | 17 | 52 | | | | | | | | |
| Altamaha line block stamped CIC | | 2 | | | | | | | | |
| Altamaha incised | 1 | | | | | | | | | |
| Altamaha check stamped | 4 | 15 | | | | | | | | |
| Altamaha red filmed | 3 | 16 | | | | | | | | |
| Altamaha simple stamped | 1 | | | | | | | | | |
| Altamaha, decorated | 1 | 6 | | | | | | | | |
| Irene complicated stamped | 26 | 1 | 1 | | 330 | | | | 20 | |
| Irene incised | | | 4 | | 22 | | | | | |
| Irene cord marked | | | | | 1 | | | | | |
| Irene plain | | 2 | | | 95 | | | | | 1 |
| Irene decorated | | | | | 30 | | | | | |
| Grit tempered plain | 134 | 297 | 11 | | 52 | | 2 | | | |
| Grit tempered decorated | 628 | 658 | 12 | | 53 | | 3 | 27 | 2 | |
| Grit tempered misc. | 55 | 232 | 5 | | 53 | | 1 | | 7 | |
| Grit-shell plain | | 1 | | | | | | | | |
| Grit-shell decorated | | | | | 1 | | | | | |
| Savannah check stamped | | 2 | | | 12 | | | | 3 | |
| Savannah complicated stamped | | | | | 4 | | | | | |
| Savannah cord marked | | | | | 1 | | | | | |
| Savannah plain | | 5 | | 1 | 20 | | 2 | | 2 | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | 42 | 117 | 2 | | 12 | | | | | |
| Sand tempered plain | 17 | 86 | | | 19 | | | | | |
| Sand tempered misc. | 15 | 74 | 8 | | 15 | | 1 | | 1 | |
| St. Catherines decorated | | | | | 3 | | | | | |
| St. Catherines cord marked | | 1 | | | 80 | | | | | |
| St. Catherines fine cord marked | 2 | 7 | | | 62 | 9 | | | | |
| St. Catherines net marked | | | | | 48 | 1 | | | | |
| St. Catherines plain | | 2 | | | 94 | 12 | | | | |
| St. Catherines misc. | | | | | 7 | | | | | |
| Clay tempered plain | | 2 | | | 1 | | | | | |
| Clay tempered decorated | 1 | 21 | | | 3 | | | | | |
| Clay tempered misc. | 3 | 13 | | | 11 | | | | | |
| Clay/grit tempered plain | | 1 | | | | | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | 4 | | | | 1 | | | | |
| Clay/sand tempered plain | | 16 | | | 8 | | | | | |
| Clay/sand tempered decorated | 3 | 14 | | | | | | | 2 | |
| Clay/sand tempered misc. | | 5 | 1 | | 5 | | | | | |
| Clay/shell tempered plain | | 5 | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | 1 | | | | | |
| Wilmington heavy cord marked | | 3 | | | 16 | | | | | |
| Wilmington plain | | 13 | | | 7 | | | | | |
| Wilmington misc. | | | | | 2 | | | | | |
| Walthour check stamped | | 72 | 2 | | | | | | | |
| Walthour complicated stamped | | 45 | | | | | | | | |
| Deptford check stamped | 1 | 54 | 25 | | 10 | | | | | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | 3 | | | 1 | | | | | |
| Deptford linear check stamped | | 4 | 9 | | | | | | | |
| Deptford decorated | | 6 | | | | | | | | |
| Deptford misc. | | 18 | 1 | | | | | | | |
| Refuge plain | 8 | 100 | | | | 1 | | | | |
| Refuge decorated | | 31 | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | 56 | 4 | | | 1 | | | | |
| Refuge punctated | | | | | | | 2 | | | |
| Refuge incised | | | | | | | 3 | | | |
| Refuge misc. | | 5 | | | | 3 | 1 | | | |
| Sand/grit tempered plain | 5 | 3 | | | 13 | | 2 | | | |
| Sand/grit tempered misc. | 8 | 18 | 3 | | 3 | | 10 | | | |
| Sand/grit tempered decorated | 7 | 24 | | | 8 | | 6 | | | |
| Sand/shell tempered plain | | 2 | | | | | | | | |
| Sand/shell tempered decorated | | | | | 2 | | | | | |
| St. Simons incised | | 1 | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | 4 | | | 6 | 3 | | | | |
| St. Simons misc. | | 12 | | | | | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | 1 | | | | | | | | |
| Misc. ceramic fragments | 2 | 45 | 1 | | 1 | 1 | 22 | | | |
| Totals by site | 1303 | 5012 | 90 | 1 | 1112 | 32 | 55 | 27 | 37 | 1 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li55 | 9Li57 | 9Li84 | 9Li87 | 9Li118 | 9Li128 | 9Li134 | 9Li137 | 9Li159 | 9Li162 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | | | | |
| Altamaha circ. in square | | | 3 | | | 1 | 2 | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 2 | | 35 | 25 | | 11 | | | | |
| Irene incised | | | 13 | 4 | | 1 | | | 1 | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | | | 28 | 8 | | 28 | | | | 1 |
| Irene decorated | | | 1 | 1 | 2 | 4 | | | | |
| Grit tempered plain | | | 3 | | | | 1 | | | |
| Grit tempered decorated | | | 8 | | | | | | | |
| Grit tempered misc. | 11 | | 2 | 1 | 5 | 1 | | | | |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | | 1 | | |
| Savannah plain | | | 10 | | 2 | 3 | | | | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | | | 5 | | | | | 1 | | |
| Sand tempered plain | | | 5 | | | | | | | |
| Sand tempered misc. | | | 1 | | | | | 2 | | |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | | | | | | | | 9 | | |
| St. Catherines net marked | | | | | | | | 26 | | |
| St. Catherines plain | | | | | | 17 | | 34 | | 1 |
| St. Catherines misc. | | | | | | | | 3 | | |
| Clay tempered plain | | | | | | | | | | |
| Clay tempered decorated | | | | | | | | 10 | | 1 |
| Clay tempered misc. | | | | | | | | 4 | | |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | | | | | | | |
| Clay/sand tempered decorated | | | | | | | | | | |
| Clay/sand tempered misc. | | | | | | | | | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | | | | | 5 | 2 | | |
| Wilmington plain | | 3 | | | | | | 1 | | 4 |
| Wilmington misc. | | | | | | | | | | |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | | | | | | | | | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | | | | | | | | | |
| Deptford linear check stamped | | | | | | | | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | | | | | | | 42 | | |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | | | | | | | 24 | | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | | | | 3 | | |
| Sand/grit tempered plain | | | | | | | | | | |
| Sand/grit tempered misc. | | | | | | | | 1 | | |
| Sand/grit tempered decorated | | | | | | | | | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | 5 | | |
| St. Simons incised and punctated | | | | | | | | 1 | | |
| St. Simons simple stamped | | | | | | | | 2 | | |
| St. Simons plain | | | | | | | | 33 | | |
| St. Simons misc. | | | | | | | | 106 | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | 6 | | |
| St. Johns plain | | | 8 | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | 1 | | | | 1 | 4 | 1 | | | |
| Totals by site | 14 | 3 | 122 | 39 | 10 | 70 | 9 | 316 | 1 | 8 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li163 | 9Li164 | 9Li165 | 9Li167 | 9Li169 | 9Li170 | 9Li171 | 9Li172 | 9Li173 | 9Li174 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 34 | | 1 | | | 17 | | | 36 | |
| Irene incised | 2 | | | | | | | | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | 1 | | | | | 11 | | | 1 | |
| Irene decorated | | | | | | | | | | |
| Grit tempered plain | | | | | 3 | 12 | | | | 1 |
| Grit tempered decorated | 55 | | | | 2 | 11 | | | | 4 |
| Grit tempered misc. | 1 | | 2 | | | 4 | 1 | | | 5 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | 28 | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | 26 | | 12 | | | |
| Savannah plain | 1 | | | | 13 | | | | 1 | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | 1 | | | | 7 | | | | 2 | |
| Sand tempered plain | | | | | | | | | 1 | |
| Sand tempered misc. | | | | | 9 | | | | 3 | 3 |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | | | | | | | 1 | | | |
| St. Catherines net marked | | | 4 | | | | | | | |
| St. Catherines plain | | | 21 | | | | | | | |
| St. Catherines misc. | | | | | | | | | | |
| Clay tempered plain | | | | | | | | | 7 | |
| Clay tempered decorated | | | | | 5 | | | | 2 | |
| Clay tempered misc. | | | | | | | | | | |
| Clay/grit tempered plain | | | | | | 1 | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | | | | | | | |
| Clay/sand tempered decorated | 1 | | | | | | | | | |
| Clay/sand tempered misc. | 1 | | | | | | | | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | | 3 | | 1 | | | | |
| Wilmington plain | | 2 | | | | | | | 1 | |
| Wilmington misc. | | | | | | | | | | |
| Walthour check stamped | | | | | | | | | 2 | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | | | | 8 | | | 1 | 48 | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | | | | | | | | 6 | |
| Deptford linear check stamped | | | | | | | | | 4 | |
| Deptford decorated | | | | | | | | | 2 | |
| Deptford misc. | | | | | | | | | 2 | |
| Refuge plain | | | | | | | | | 11 | |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | | | | 6 | | | | 8 | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | 3 | | | |
| Refuge misc. | | | | | 2 | | 1 | | 16 | |
| Sand/grit tempered plain | 24 | | | | | | | | 1 | |
| Sand/grit tempered misc. | | | | 1 | 1 | | | | | 3 |
| Sand/grit tempered decorated | | | | | 1 | | | | 2 | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | | | 1 | | | | 3 | |
| St. Simons misc. | | | | | 1 | | 3 | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | | 1 | | | 2 | 1 | | | 2 | |
| Totals by site | 121 | 3 | 28 | 4 | 115 | 58 | 21 | 1 | 161 | 16 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li175 | 9Li176 | 9Li177 | 9Li178 | 9Li179 | 9Li180 | 9Li181 | 9Li182 | 9Li183 | 9Li184 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 3 | 36 | 2 | | | | 2 | 11 | | |
| Irene incised | | 4 | | | | | 2 | | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | | 7 | 3 | | | | 10 | 6 | 4 | |
| Irene decorated | | 3 | | | | | 1 | | | |
| Grit tempered plain | 8 | | | | | 1 | | 5 | 5 | |
| Grit tempered decorated | | | | | | | | 8 | 1 | |
| Grit tempered misc. | 3 | 15 | | 1 | | | | 9 | 1 | 1 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | | | | |
| Savannah plain | | | | | | | | | 1 | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | | | 2 | 1 | | 5 | | | | |
| Sand tempered plain | | 1 | 1 | 1 | | 1 | | | | |
| Sand tempered misc. | | 1 | | 6 | | 1 | 1 | | | 1 |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | | | 1 | | | | | | | |
| St. Catherines net marked | | | | 5 | | | | | | |
| St. Catherines plain | | | | 11 | | | | | 10 | |
| St. Catherines misc. | | | | | | | | | | |
| Clay tempered plain | | | | 6 | | | | | 2 | |
| Clay tempered decorated | | | | | | | | | | |
| Clay tempered misc. | 2 | 1 | 2 | 14 | | 1 | | | | |
| Clay/grit tempered plain | | 1 | | | | | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | | | | | | 4 | |
| Clay/sand tempered decorated | | | | | | | | | | |
| Clay/sand tempered misc. | | 1 | | | | | | | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | 6 |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | 1 | | 2 | 15 | | | | | |
| Wilmington plain | | 2 | | 2 | 12 | | | | | 4 |
| Wilmington misc. | | 1 | | | | | | | | |
| Walthour check stamped | | 1 | | 1 | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | 3 | | 2 | | | | | | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | | | | | | | | | |
| Deptford linear check stamped | | | | 2 | | | | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | | | 2 | | | | | | |
| Refuge plain | | 1 | | | | 1 | | | | |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | 3 | | | | | | |
| Refuge simple stamped | | | | | | | | | | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | | | | | | |
| Sand/grit tempered plain | | | | | | | | 1 | | |
| Sand/grit tempered misc. | | 2 | | | | | | 2 | | |
| Sand/grit tempered decorated | | | | | | 1 | 1 | 1 | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | | | | | | | | |
| St. Simons misc. | | | | | | | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | 1 | 2 | 1 | 1 | | | | 1 | | |
| Totals by site | 17 | 93 | 12 | 60 | 27 | 11 | 17 | 44 | 28 | 12 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li185 | 9Li186 | 9Li187 | 9Li188 | 9Li189 | 9Li190 | 9Li191 | 9Li192 | 9Li193 | 9Li194 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | | 7 | | | 5 | 94 | 96 | 155 | 1 | 2 |
| Irene incised | | 1 | | | | 1 | | | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | | 3 | | | | 14 | 12 | 12 | | |
| Irene decorated | | 1 | | | | 10 | | 1 | | |
| Grit tempered plain | | 22 | | | | | 5 | | | |
| Grit tempered decorated | | 111 | | | | 1 | | | | 12 |
| Grit tempered misc. | 2 | 29 | | | 1 | | 7 | 1 | | 17 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | 13 | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | | | | |
| Savannah plain | | 4 | | | | 3 | 1 | 33 | | 1 |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | | 3 | | | | 1 | | 4 | | |
| Sand tempered plain | | 2 | | | | | | | | 4 |
| Sand tempered misc. | | | | | | 3 | | 3 | 1 | 7 |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | 3 | | | | | | | | | |
| St. Catherines net marked | 1 | | | | | 1 | | | | |
| St. Catherines plain | 2 | 1 | | | | | | | | 1 |
| St. Catherines misc. | | | | | | | | | | 1 |
| Clay tempered plain | | | | | | | | | | |
| Clay tempered decorated | | | | | | | | | | 2 |
| Clay tempered misc. | 1 | 2 | | | | 1 | | | | 6 |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | | | | | 1 | | | | | 4 |
| Clay/grit tempered decorated | | | | | | | | | | 1 |
| Clay/sand tempered plain | | | | | | | | | | |
| Clay/sand tempered decorated | | | | | | 1 | | 1 | | 1 |
| Clay/sand tempered misc. | | | | | | | | | 2 | 2 |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | 1 | | | | | | | | 1 |
| Wilmington plain | 1 | 6 | | | | | | | | 31 |
| Wilmington misc. | | | | | | | | | | |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | 6 | | | | | | | | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | | | | | | | | | 9 |
| Deptford linear check stamped | | | | | | | | | | |
| Deptford decorated | | | | | | | | | | 1 |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | | | | | | | | | |
| Refuge decorated | 1 | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | 5 | | | | | | | | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | 1 | | | | | | | | |
| Sand/grit tempered plain | | | | | | 2 | | | | 2 |
| Sand/grit tempered misc. | | 1 | 3 | 3 | 2 | | | | | |
| Sand/grit tempered decorated | | 7 | | | | | | | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | 1 | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | | | | | | | | 1 |
| St. Simons misc. | | | | | | | | | | 1 |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | 2 |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | | 2 | | | | | 1 | 3 | | 2 |
| Totals by site | 11 | 216 | 3 | 3 | 22 | 132 | 122 | 213 | 4 | 111 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li195 | 9Li196 | 9Li197 | 9Li198 | 9Li199 | 9Li200 | 9Li201 | 9Li202 | 9Li203 | 9Li204 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | 3 | | | | | | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | | | 267 | | 19 | | 3 | 4 | | 43 |
| Irene incised | | | 30 | | 9 | | | 4 | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | 1 | | 39 | | 27 | | 4 | | | 8 |
| Irene decorated | | 1 | 6 | | 2 | | | | | |
| Grit tempered plain | | | 36 | | | | | 5 | | 18 |
| Grit tempered decorated | | | 50 | | 4 | | | 7 | 1 | 28 |
| Grit tempered misc. | 1 | | 10 | | 8 | 1 | | 4 | | 18 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | 7 | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | 9 | | | | | |
| Savannah plain | | | 3 | 2 | 3 | | | 2 | | 30 |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | | | 11 | | 26 | | | | | 4 |
| Sand tempered plain | | | 3 | | 4 | | | 1 | | 1 |
| Sand tempered misc. | 5 | 2 | 3 | 1 | | | | | 2 | 8 |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | 23 | | | | 1 | |
| St. Catherines fine cord marked | | | | | 4 | 1 | | | | |
| St. Catherines net marked | | | | | 1 | 9 | | | | |
| St. Catherines plain | | | | 3 | 29 | 19 | | | 2 | |
| St. Catherines misc. | | | | | | | | | 5 | |
| Clay tempered plain | | | 1 | 1 | 1 | | | 1 | 3 | |
| Clay tempered decorated | | | | 1 | 12 | 2 | | | 1 | 1 |
| Clay tempered misc. | | 4 | 8 | 1 | 2 | | | | | 3 |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | | | 1 | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | 5 | | | | 2 | 2 | | | | 6 |
| Clay/sand tempered decorated | | 2 | | | | | | | | |
| Clay/sand tempered misc. | 2 | 4 | 4 | | 1 | | | 2 | | 1 |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | | 1 | 21 | 1 | 1 | | | |
| Wilmington plain | | 21 | 4 | 10 | 3 | 26 | 12 | | | |
| Wilmington misc. | | 8 | 2 | 2 | 5 | | | | | 1 |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | | 2 | | 1 | | | | | |
| Deptford complicated stamped | | | | | | | | | | |
| Deptford cord marked | | | | | | | | | | |
| Deptford linear check stamped | | | 14 | | | | 1 | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | | | | 24 | | | | | |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | | | | 6 | | | | | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | 2 | | | | | |
| Sand/grit tempered plain | | | | | | | | | | 2 |
| Sand/grit tempered misc. | | | | | | | | | | |
| Sand/grit tempered decorated | 15 | | | | 2 | | | | | 12 |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | 4 | | 12 | | | | | |
| St. Simons misc. | | | 2 | | | | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | 2 | | 2 | | 9 | 1 | | 2 | 1 | 1 |
| Totals by site | 34 | 42 | 502 | 22 | 278 | 62 | 21 | 32 | 16 | 185 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li205 | 9Li206 | 9Li207 | 9Li208 | 9Li209 | 9Li210 | 9Li211 | 9Li212 | 9Li214 | 9Li215 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | 63 | | | 4 | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 42 | 76 | 210 | 115 | 3 | 4 | | 10 | 3 | |
| Irene incised | 2 | 12 | 4 | 1 | | | | 1 | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | 3 | 17 | 11 | 10 | | | | 2 | | 1 |
| Irene decorated | | 5 | | | 1 | | | 1 | | |
| Grit tempered plain | | | 11 | | | 57 | | | | |
| Grit tempered decorated | | 8 | 47 | | 1 | 50 | 20 | | 11 | |
| Grit tempered misc. | 13 | 37 | 48 | 13 | 1 | 22 | 2 | 1 | 29 | 2 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | 18 | | | | 12 | | 1 | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | 1 | | | |
| Savannah plain | 3 | 2 | 16 | 22 | | 4 | 16 | 2 | | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | 2 | 4 | 1 | | | 1 | | 1 | 7 | |
| Sand tempered plain | | 10 | 7 | | | 3 | 1 | | | |
| Sand tempered misc. | 4 | 5 | 1 | 4 | | 2 | | | 1 | |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | 11 | 1 | | | | | | | 2 | |
| St. Catherines fine cord marked | 1 | 17 | | | | | | | 58 | |
| St. Catherines net marked | | 2 | | | | 8 | | | | |
| St. Catherines plain | | 4 | 4 | 1 | 10 | 6 | 2 | | 2 | |
| St. Catherines misc. | 2 | | | | | | | | | |
| Clay tempered plain | | 3 | | 2 | | 10 | | | 1 | |
| Clay tempered decorated | | 2 | | 2 | | 1 | | | | |
| Clay tempered misc. | | 6 | 3 | | 1 | 11 | 1 | | 1 | |
| Clay/grit tempered plain | | | | 1 | | 19 | 1 | | | |
| Clay/grit tempered misc. | | 1 | | 4 | | | 3 | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | | 3 | 8 | | | 3 | |
| Clay/sand tempered decorated | | 3 | | | | | | | | |
| Clay/sand tempered misc. | 1 | 2 | 1 | | | | | | 2 | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | 1 | | 1 | 3 | | | | 3 |
| Wilmington plain | | | | 1 | 19 | 4 | | | | 3 |
| Wilmington misc. | | | | | | 1 | | | | |
| Walthour check stamped | | | | | 5 | 1 | | | | |
| Walthour complicated stamped | | | | 1 | 4 | | | | | |
| Deptford check stamped | | | | | | 4 | | | | |
| Deptford complicated stamped | | | 2 | | 1 | | | | | |
| Deptford cord marked | | | | | | | | | | |
| Deptford linear check stamped | | | | | | | | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | | | | 5 | | | | | |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | 1 | | | | | | | | | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | | | | | | |
| Sand/grit tempered plain | | | 6 | | | | | | | |
| Sand/grit tempered misc. | | | | 2 | | | | | 6 | |
| Sand/grit tempered decorated | 1 | 1 | 4 | | 1 | 1 | 2 | | 2 | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | | | | | | | | |
| St. Simons misc. | | | | | | | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | 17 | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | 1 | 1 | 1 | | 4 | 2 | | 3 | | |
| Totals by site | 87 | 219 | 396 | 179 | 60 | 285 | 78 | 21 | 133 | 9 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li216 | 9Li217 | 9Li218 | 9Li220 | 9Li221 | 9Li222 | 9Li223 | 9Li224 | 9Li225 | 9Li226 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | 1 | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 20 | | 1 | | | | | | | 52 |
| Irene incised | 4 | | | | | 1 | | | 2 | 2 |
| Irene cord marked | | | | | | | | | | |
| Irene plain | | | 4 | | | | | | 2 | 22 |
| Irene decorated | | | | | | | | | | 2 |
| Grit tempered plain | 6 | | | | | | | | | |
| Grit tempered decorated | 2 | | | | | 1 | 1 | | | |
| Grit tempered misc. | 1 | | | | | 5 | | | | 8 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | | | | |
| Savannah plain | | | | | | | | | | 1 |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | 8 | | | | | | 3 | | | |
| Sand tempered plain | 3 | | | | | | | | | |
| Sand tempered misc. | | | | | | | 1 | | | 1 |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | | | | | | | | 3 | | |
| St. Catherines net marked | | | | | | | | | | |
| St. Catherines plain | 1 | | | | | | 2 | | | |
| St. Catherines misc. | | | | | | | | | | |
| Clay tempered plain | | | | | | | | | | 2 |
| Clay tempered decorated | | | | | | | 4 | | | |
| Clay tempered misc. | | | | | | | | | | |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | | | | 4 | | | |
| Clay/sand tempered decorated | | | | | | | 4 | | | |
| Clay/sand tempered misc. | | | | | | | 2 | | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | | 8 | 3 | | | 13 | 7 | |
| Wilmington plain | | 41 | | 44 | 30 | | 1 | | | |
| Wilmington misc. | | | | 4 | 6 | | 1 | | | |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | 1 | | | | | | | | | |
| Deptford complicated stamped | | | | | | | 2 | | 1 | |
| Deptford cord marked | | | | | | | 8 | 1 | | |
| Deptford linear check stamped | | | | | | | | | | |
| Deptford decorated | | | | 1 | | | 2 | | | |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | | | 6 | | | 3 | 2 | | |
| Refuge decorated | | | | | | | | | 2 | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | | | | | | 6 | | 3 | 4 |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | | | | | 3 | |
| Sand/grit tempered plain | 5 | | | | | | | | 1 | |
| Sand/grit tempered misc. | | | | | | | | | | |
| Sand/grit tempered decorated | | | | | | | | | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | 5 | | | | | | | | | |
| St. Simons misc. | 1 | | | | | | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | | | 3 | 4 | | 1 | 1 | | | 1 |
| Totals by site | 57 | 41 | 8 | 67 | 39 | 8 | 46 | 19 | 21 | 95 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li227 | 9Li228 | 9Li229 | 9Li230 | 9Li231 | 9Li232 | 9Li233 | 9Li234 | 9Li235 | 9Li236 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | 13 | 4 | 237 | | | 1 | | 13 | | |
| Irene incised | | | 2 | | | | | | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | 1 | 1 | 37 | | | | | 4 | | |
| Irene decorated | | 4 | 4 | | | | | | | |
| Grit tempered plain | 2 | 4 | | | | 2 | | | | |
| Grit tempered decorated | 1 | | | 1 | | 5 | | | | |
| Grit tempered misc. | | | 4 | | | | | 2 | | 3 |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | 26 | | | | | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | 6 | | | | | | |
| Savannah plain | | | 22 | 1 | | | | 1 | | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | 5 | | 4 | | | | | | | |
| Sand tempered plain | | | 4 | | | 2 | | 2 | | |
| Sand tempered misc. | 3 | | 3 | 2 | | 3 | | 7 | | |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | | | | | | | |
| St. Catherines fine cord marked | | 5 | 3 | | | | | | | |
| St. Catherines net marked | | | | | | | 4 | | | |
| St. Catherines plain | | | | | | 1 | 1 | 2 | | |
| St. Catherines misc. | | | | | | | | | | |
| Clay tempered plain | | | 2 | | | | | | | |
| Clay tempered decorated | | | 7 | 1 | | | | | | |
| Clay tempered misc. | 3 | 1 | 3 | | | | | | | |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | 2 | | | | | | | | | |
| Clay/grit tempered decorated | | | | 1 | | | | | | |
| Clay/sand tempered plain | | | 9 | | | | | | | |
| Clay/sand tempered decorated | | 1 | | 2 | | | | | | |
| Clay/sand tempered misc. | | 1 | 16 | | | 3 | | | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | | | 2 | | | | | | | |
| Wilmington plain | | | 5 | | | 7 | 1 | | | |
| Wilmington misc. | | | 3 | | | 1 | | | | |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | 12 | | | |
| Deptford check stamped | | 23 | | | | | | | | |
| Deptford complicated stamped | | 1 | | | | | | | | |
| Deptford cord marked | | 1 | | | | 1 | | | | |
| Deptford linear check stamped | | 9 | | | | | | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | | | | | | | | | |
| Refuge plain | | 2 | | | | | | | 3 | |
| Refuge decorated | | 1 | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | 6 | | | | | | | 1 | |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | 1 | | | | | | | | |
| Sand/grit tempered plain | 12 | | 3 | | | | | | | |
| Sand/grit tempered misc. | | 1 | 2 | | | | | | | |
| Sand/grit tempered decorated | 13 | | | | | | | | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | 1 | | | | | | | | | |
| St. Simons incised | | | | | 1 | | | | | |
| St. Simons punctated | | | | | 1 | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | | | 176 | | | | | |
| St. Simons misc. | | 1 | | | 88 | 1 | | | | |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | 2 | 3 | | | | | | 1 | 1 | |
| Totals by site | 84 | 70 | 372 | 14 | 266 | 27 | 18 | 32 | 5 | 3 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li237 | 9Li238 | 9Li239 | 9Li240 | 9Li241 | 9Li242 | 9Li243 | 9Li244 | 9Li245 | 9Li246 |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | | | 21 | | | | |
| Altamaha circ. in square | | | | | | | | | | |
| Altamaha line block stamped CIC | | | | | | | | | | |
| Altamaha incised | | | | | | | | | | |
| Altamaha check stamped | | | | | | | | | | |
| Altamaha red filmed | | | | | | | | | | |
| Altamaha simple stamped | | | | | | | | | | |
| Altamaha, decorated | | | | | | | | | | |
| Irene complicated stamped | | | 1 | 8 | 73 | 7 | 41 | 56 | 5 | |
| Irene incised | | | | | 8 | 1 | 4 | 11 | | |
| Irene cord marked | | | | | | | | | | |
| Irene plain | | | 1 | | 31 | 1 | 28 | 10 | | |
| Irene decorated | | | | | | | | | | |
| Grit tempered plain | | | | | 27 | | | | | |
| Grit tempered decorated | | | 1 | | 1 | 11 | 5 | 1 | | |
| Grit tempered misc. | | | 6 | | | 1 | | 1 | 5 | |
| Grit-shell plain | | | | | | | | | | |
| Grit-shell decorated | | | | | | | | | | |
| Savannah check stamped | | | | | | | | | | |
| Savannah complicated stamped | | | | | | | | | | |
| Savannah cord marked | | | | | | | | | | |
| Savannah plain | | | | | 1 | | 1 | 1 | 11 | |
| Savannah misc. | | | | | | | | | | |
| Sand tempered decorated | | | | | 2 | 5 | 1 | | | |
| Sand tempered plain | | | | | 21 | 3 | 4 | 1 | | |
| Sand tempered misc. | | | | | 4 | 2 | 1 | | | |
| St. Catherines decorated | | | | | | | | | | |
| St. Catherines cord marked | | | | 1 | 1 | | | | | |
| St. Catherines fine cord marked | | | | | | | | | | |
| St. Catherines net marked | | | | | | | | | | |
| St. Catherines plain | | | | | | | | | | |
| St. Catherines misc. | | | | | | | | | | |
| Clay tempered plain | | | | | | | | | | |
| Clay tempered decorated | | | | | | | | | | |
| Clay tempered misc. | | | 1 | | | | | | | |
| Clay/grit tempered plain | | | | | | | | | | |
| Clay/grit tempered misc. | | | | | | | | | | |
| Clay/grit tempered decorated | | | | | | | | | | |
| Clay/sand tempered plain | | | | 2 | | | | 2 | | |
| Clay/sand tempered decorated | | | | | | | | | | |
| Clay/sand tempered misc. | | | 3 | 5 | | | 1 | 5 | | |
| Clay/shell tempered plain | | | | | | | | | | |
| Late Swift Creek complicated stamped | | | | | | | | | | |
| Wilmington cord marked | | | | | | | | | | |
| Wilmington heavy cord marked | 2 | | | 8 | | | | | | |
| Wilmington plain | | 4 | | 5 | | | | 4 | | |
| Wilmington misc. | | 9 | | | | | | | | |
| Walthour check stamped | | | | | | | | | | |
| Walthour complicated stamped | | | | | | | | | | |
| Deptford check stamped | | 22 | 10 | | | | | | | |
| Deptford complicated stamped | | 3 | | | | | | | | |
| Deptford cord marked | | | 1 | | 2 | | | | | |
| Deptford linear check stamped | | | | | | | | | | |
| Deptford decorated | | | | | | | | | | |
| Deptford misc. | | 4 | 1 | | | | | | | |
| Refuge plain | | | 7 | | | | | | | 2 |
| Refuge decorated | | | | | | | | | | |
| Refuge dentate stamped | | | | | | | | | | |
| Refuge simple stamped | | | 1 | | | | 1 | | | 5 |
| Refuge punctated | | | | | | | | | | |
| Refuge incised | | | | | | | | | | |
| Refuge misc. | | | | | | | | | | 9 |
| Sand/grit tempered plain | | | | | 3 | 4 | | | | |
| Sand/grit tempered misc. | | | | | 1 | | | | | |
| Sand/grit tempered decorated | | | | | | 3 | | | | |
| Sand/shell tempered plain | | | | | | | | | | |
| Sand/shell tempered decorated | | | | | | | | | | |
| St. Simons incised | | | | | | | | | | |
| St. Simons punctated | | | | | | | | | | |
| St. Simons incised and punctated | | | | | | | | | | |
| St. Simons simple stamped | | | | | | | | | | |
| St. Simons plain | | | 4 | | | | | | | |
| St. Simons misc. | | | | | | | | | | 1 |
| Fiber/sand tempered decorated | | | | | | | | | | |
| Fiber/sand tempered misc. | | | | | | | | | | |
| St. Johns plain | | | | | | | | | | |
| St. Johns decorated | | | | | | | | | | |
| Misc. ceramic fragments | | | | 1 | | 1 | | | 2 | |
| Totals by site | 2 | 42 | 37 | 30 | 175 | 60 | 87 | 92 | 23 | 17 |

TABLE 14.1
(*Continued*)

| Ceramic type | 9Li247 | 9Li248 | 9Li249 | 9Li250 | 9Li251 | 9Li252 | 9Li253 | 9Li254 | 9Li255 | All |
|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha line block stamped | | | | 2 | | | | | | 3255 |
| Altamaha circ. in square | | | | | | | | | | 69 |
| Altamaha line block stamped CIC | | | | | | | | | | 2 |
| Altamaha incised | | | | | | | | | | 1 |
| Altamaha check stamped | | | | | | | | | | 19 |
| Altamaha red filmed | | | | | | | | | | 19 |
| Altamaha simple stamped | | | | | | | | | | 1 |
| Altamaha, decorated | | | | | | | | | | 7 |
| Irene complicated stamped | | | | | 32 | | | | 355 | 2671 |
| Irene incised | | | | | 3 | | | | 14 | 170 |
| Irene cord marked | | | | | | | | | | 1 |
| Irene plain | | | | | 10 | | | | 100 | 622 |
| Irene decorated | | | | | 1 | | | | 4 | 85 |
| Grit tempered plain | | | | | 5 | | | | 5 | 740 |
| Grit tempered decorated | | | | 1 | 17 | | | | 5 | 1876 |
| Grit tempered misc. | | | | 3 | 20 | | | | 40 | 782 |
| Grit-shell plain | | | | | | | | | | 1 |
| Grit-shell decorated | | | | | | | | | | 1 |
| Savannah check stamped | | | | | | | | | 4 | 126 |
| Savannah complicated stamped | | | | | | | | | | 4 |
| Savannah cord marked | | | | | | | | | | 56 |
| Savannah plain | | | | 5 | 30 | | | | 13 | 295 |
| Savannah misc. | | | | | 1 | | | | | 1 |
| Sand tempered decorated | | | 1 | | 6 | | | | 9 | 306 |
| Sand tempered plain | | | | | 2 | | | | | 210 |
| Sand tempered misc. | | | | | 2 | | | | 4 | 227 |
| St. Catherines decorated | | | | | | | | | | 3 |
| St. Catherines cord marked | | | | | | | | | | 121 |
| St. Catherines fine cord marked | | | | | | | | | | 186 |
| St. Catherines net marked | | | | | | | | | | 110 |
| St. Catherines plain | | | | | | | | | 2 | 297 |
| St. Catherines misc. | | | | | | | | | | 18 |
| Clay tempered plain | | | | 1 | | | | | | 46 |
| Clay tempered decorated | | | | | | | | | 1 | 80 |
| Clay tempered misc. | | | 1 | | 3 | | | | | 115 |
| Clay/grit tempered plain | | | | | | | | | | 23 |
| Clay/grit tempered misc. | | | | | | | | | 1 | 18 |
| Clay/grit tempered decorated | | | | | | | | | | 7 |
| Clay/sand tempered plain | | | | | | | | | | 74 |
| Clay/sand tempered decorated | | | | | | | | | 1 | 36 |
| Clay/sand tempered misc. | | | | | | | | | | 73 |
| Clay/shell tempered plain | | | | | | | | | | 5 |
| Late Swift Creek complicated stamped | | | | | | | | | | 6 |
| Wilmington cord marked | | | | | | | | | | 1 |
| Wilmington heavy cord marked | | | | 36 | | | | | | 161 |
| Wilmington plain | | | | 11 | | | | 1 | | 346 |
| Wilmington misc. | | | | | | | | | | 56 |
| Walthour check stamped | | | | | | | | | | 84 |
| Walthour complicated stamped | | | | | | | | | | 62 |
| Deptford check stamped | | | | | | 1 | | | | 222 |
| Deptford complicated stamped | | | | | | | | | | 10 |
| Deptford cord marked | | | | | | | | | | 33 |
| Deptford linear check stamped | | | | | | | | | | 43 |
| Deptford decorated | | | | | | | | | | 12 |
| Deptford misc. | | | | | | | | | | 28 |
| Refuge plain | 2 | | 6 | 3 | | | 23 | | | 252 |
| Refuge decorated | | | | | | | | | | 35 |
| Refuge dentate stamped | | | | | | | | | | 3 |
| Refuge simple stamped | | 1 | 3 | | | | 7 | | | 149 |
| Refuge punctated | | | | | | | | | | 2 |
| Refuge incised | | | | | | | | | | 6 |
| Refuge misc. | | | | | | | | | | 47 |
| Sand/grit tempered plain | | | | | | | | | | 89 |
| Sand/grit tempered misc. | | | 1 | 2 | | | | | | 76 |
| Sand/grit tempered decorated | | | | | | | | | 2 | 117 |
| Sand/shell tempered plain | | | | | | | | | | 2 |
| Sand/shell tempered decorated | | | | | | | | | | 3 |
| St. Simons incised | | | | | | | | | | 2 |
| St. Simons punctated | | | | | | | | | | 6 |
| St. Simons incised and punctated | | | | | | | | | | 2 |
| St. Simons simple stamped | | 3 | | | | | | | | 5 |
| St. Simons plain | 30 | 2 | 7 | | | 12 | | 1 | 5 | 309 |
| St. Simons misc. | | 1 | | | 1 | | | | | 219 |
| Fiber/sand tempered decorated | | 2 | | | | | | | | 2 |
| Fiber/sand tempered misc. | | | 3 | | | | | | | 9 |
| St. Johns plain | | | | | | | | | | 27 |
| St. Johns decorated | | | | | | | | | | 1 |
| Misc. ceramic fragments | | | | | 2 | 2 | 1 | 1 | 2 | 158 |
| Totals by site | 32 | 9 | 22 | 64 | 135 | 15 | 31 | 3 | 567 | 15,344 |

# CHAPTER 15. MELDING THE CERAMIC AND RADIOCARBON CHRONOLOGIES

David Hurst Thomas

This chapter compares the existing ceramic and $^{14}C$ chronologies for St. Catherines Island (table 15.1). Whereas 186 radiocarbon dates have been processed on "cultural" samples from St. Catherines Island, only 110 of these dates can be reasonably associated with a diagnostic aboriginal ceramic assemblage.[1] In conjunction with our excavations at South New Ground Mound and Cunningham Mounds A, B, and E, for instance, we processed 10 $^{14}C$ dates that helped anchor the stratigraphic and cultural sequences at these mortuary sites (Thomas and Larsen, 1979). But since we recovered a total of only five potsherds from all five sites, these 10 $^{14}C$ dates will not be useful in testing and revising the aboriginal ceramic chronology.

Subsequent chapters describe the archaeology of roughly 228 sites on St. Catherines Island: 122 of these were recorded and tested during the Island-wide systematic transect survey (chap. 20), 84 additional sites were mapped and surface collected during DePratter's shoreline survey (chap. 19), and the 19 known mortuary sites were excavated (chap. 20). Chapters 21 and 22 also describe the more intensive archaeological investigations at Meeting House Field and Fallen Tree.

## THE ABORIGINAL CERAMIC SEQUENCE

The taproot of the northern Georgia coastal ceramic chronology can be traced to the extensive W.P.A. excavations in Chatham County, as synthesized by Caldwell and Waring (1939a, 1939b; Caldwell and McCann, 1941; Caldwell, 1958; see also DePratter, 1991: 157; Williams, 2005: 181). Since this pioneering research, several investigators (including several students of Caldwell) have modified the ceramic sequence, including Waring (1968c, 1968d; Caldwell, 1970, 1971, Steed, 1970, DePratter, 1976, 1978, 1984, Pearson, 1977a, 1979a; DePratter and Howard, 1980; see also Sears and Griffin, 1950; Larson, 1958a, 1978; Milanich, 1973; 1977; South, 1973; Stoltman, 1974; Cook, 1975; Martinez, 1975; Braley, 1990; Williams and Thompson, 1999; Williams, 2005).

As noted in the previous chapter, all aboriginal ceramics recovered from St. Catherines Island have been classified according to northern Georgia coastal chronology, which is summarized in table 15.2 (after DePratter, 1979a: table 30, as updated in DePratter, 1991: table 1). The following discussion compares the results of this typological classification with the radiocarbon evidence currently available from St. Catherines Island, an exercise fully anticipated by DePratter himself (DePratter and Howard, 1980: 33; DePratter, 1991: 157).[2]

DePratter (1979a, 1991) grouped the various ceramic types (discussed in the previous chapter) into a chronological sequence of archaeological periods and phases for the northern Georgia coast (see figs. 14.1 and 14.2). Temper, surface decoration, rim form, and vessel form vary "asynchronously" (DePratter, 1979a: 122), meaning that whereas some types (such as Refuge Plain and Refuge Simple Stamped) survive for more than a millennium, other types (particularly those defined by fine-grained distinctions in surface decoration, such as incising or net-marking) are considerably more restricted in time. This overall variability has been synthesized into a chronological sequence of seven major cultural periods, subdivided into nearly two-dozen archaeological phases.

When putting these temporal criteria into practice on St. Catherines Island, we were particularly aware of DePratter's (1979a: 113) caution that "such phase designations will not be identifiable in small collections which lack sherds representative of the entire range of types in use during a single

TABLE 15.1
**Ceramic Sequence for the Northern Georgia Coast (after DePratter 1979: table 30, as modified by DePratter, 1991, table 1)**

| Periods | Phases | Ceramic types | Age (uncalibrated) | Age (calibrated) |
|---|---|---|---|---|
| | | | A.D. 1700 | |
| Altamaha | Altamaha | Altamaha Line Block<br>Altamaha Check Stamped<br>Altamaha Red Filmed<br>Irene Incised<br>Irene Burnished Plain<br>Irene Plain<br>Irene Complicated Stamped | | |
| | | | A.D. 1580 | |
| | Pine Harbor | Irene Incised<br>Irene Complicated Stamped<br>Irene Burnished Plain | | |
| | Irene Plain | | | |
| | | | A.D. 1425 | A.D. 1410 |
| Irene | Irene | Irene Complicated Stamped<br>Irene Burnished Plain<br>Irene Plain | | |
| | | | A.D. 1325 | A.D. 1310–1390 |
| | Savannah II | Savannah Complicated Stamped<br>Savannah Check Stamped<br>Savannah Cord Marked<br>Savannah Burnished Plain<br>Savannah Plain | | |
| | | | A.D. 1300 | A.D. 1300–1380 |
| Savannah | Savannah I | Savannah Cord Marked<br>Savannah Burnished Plain<br>Savannah Plain | | |
| | | | A.D. 1200 | A.D. 1280 |
| St. Catherines | St. Catherines | St. Catherines Net Marked<br>St. Catherines Cord Marked<br>St. Catherines Burnished Plain<br>St. Catherines Plain | | |
| | | | A.D. 1000 | A.D. 1050–1150 |
| | Wilmington | Wilmington Cord Marked<br>Wilmington Brushed<br>Wilmington Fabric Marked<br>Wilmington Plain | | |
| Wilmington | | | A.D. 600 | A.D. 660 |
| | Walthour | Wilmington Cord Marked<br>Walthour Check Stamped<br>Walthour Complicated Stamped<br>Wilmington Plain | | |
| | | | A.D. 500 | A.D. 630 |
| | Deptford II | Deptford Complicated Stamped<br>Deptford Cord Marked<br>Deptford Check Stamped<br>Refuge Simple Stamped<br>Refuge Plain | | |

TABLE 15.1
(*Continued*)

| Periods | Phases | Ceramic types | Age (uncalibrated) | Age (calibrated) |
|---|---|---|---|---|
| | | | A.D. 300 | A.D. 410 |
| Deptford | Deptford I | Deptford Linear Check Stamped<br>Deptford Cord Marked<br>Deptford Check Stamped<br>Refuge Simple Stamped<br>Refuge Plain | | |
| | | | 400 B.C. | 400 B.C. |
| | Refuge III | Deptford Linear Check Stamped<br>Deptford Check Stamped<br>Refuge Simple Stamped<br>Refuge Plain | | |
| | | | 900 B.C. | 1000 B.C. |
| Refuge | Refuge II | Refuge Dentate Stamped<br>Refuge Plain<br>Refuge Simple Stamped | | |
| | | | 1000 B.C. | 1130–1210 B.C. |
| | Refuge I | Refuge Simple Stamped<br>Refuge Punctated<br>Refuge Plain<br>Refuge Incised | | |
| | | | 1100 B.C. | 1360 B.C. |
| St. Simons | St. Simons II | St. Simons Incised and Punctated<br>St. Simons Incised<br>St. Simons Punctated<br>St. Simons Plain | | |
| | | | 1700 B.C. | 1980–2030 B.C. |
| | St. Simons I | St. Simons Plain | | |
| | | | 2200 B.C. | 2750–2860 B.C. |

time interval. In … smaller collections, identification will be possible only to the period level, whereas large collections will allow phase-level identification based on the frequency of minority types.'' The island-wide survey technique generates extensive, yet small-size ceramic samples; as DePratter notes, we commonly lack a sufficient representation of minority types, thereby precluding assessment of phase-level distinctions. For this reason, the temporal resolution achieved in this monograph proceeds only at DePratter's ''period'' level.

DePratter's Savannah I phase, for instance, is defined by the presence of the three ceramic types: Savannah Fine Cord-Marked, Savannah Burnished Plain, and the Savannah Plain. Each of these three types continues into the succeeding Savannah II phase, which is defined by the addition of two new ceramic types (Savannah Check Stamped and Savannah Complicated Stamped). This means that, in general, the Savannah period is defined by the presence of sand (and occasional fine grit temper); the distinction between the Savannah I and II phases depends on the *presence* of three ceramic types, and the *presence/absence* of two others. While this distinction may be apparent in large ceramic assemblages, for the relatively sparse collections resulting from the Island-wide survey excavations—and especially the extremely small surface collections recovered in DePratter's shoreline survey—we are uncomfortable relying on negative evidence. Suppose we have a collection of two dozen potsherds. If Savannah Plain and Savannah Cord Marked sherds dominate the assemblage we would feel inclined to define a Savannah

TABLE 15.2
**The 110 Radiocarbon Dates Clearly Associated with Aboriginal Ceramic Assemblages on St. Catherines Island**

| Site | Lab.no. | Material | Age ($^{14}$C years B.P.) | Calibrated age[a] |
|---|---|---|---|---|
| Altamaha ceramics | | | | |
| 9Li274 | Beta-20831 | *Crassostrea* | 540 ± 60 | A.D. 1490–1810 |
| 9Li13 | Beta-20802 | *Mercenaria* | 580 ± 60 | A.D. 1470–1700 |
| 9Li13 | Beta-20811 | Charcoal | 360 ± 60 | A.D. 1440–1650 |
| 9Li274 | Beta-20830 | *Crassostrea* | 710 ± 60 | A.D. 1390–1640 |
| 9Li13 | Beta-20804 | *Mercenaria* | 820 ± 70 | A.D. 1290–1500 |
| Irene ceramics | | | | |
| 9Li170 | Beta-20805 | *Crassostrea* | 530 ± 70 | A.D. 1480–1820 |
| 9Li170 | Beta-21395 | *Mercenaria* | 580 ± 60 | A.D. 1470–1700 |
| 9Li170 | Beta-20810 | Charcoal | 330 ± 60 | A.D. 1450–1660 |
| 9Li21 | Beta-30269 | Charcoal | 290 ± 60 | A.D. 1450–1950 |
| 9Li21 | Beta-21973 | Charcoal | 320 ± 60 | A.D. 1450–1790 |
| 9Li216 | Beta-217229 | *Mercenaria* | 670 ± 50 | A.D. 1440–1630 |
| 9Li21 | Beta-20808 | *Crassostrea* | 680 ± 60 | A.D. 1420–1630 |
| 9Li21 | Beta-20807 | *Crassostrea* | 690 ± 60 | A.D. 1410–1650 |
| 9Li21 | Beta-21972 | Charcoal | 440 ± 50. | A.D. 1400–1630 |
| 9Li21 | Beta-30268 | *Mercenaria* | 710 ± 80 | A.D. 1350–1650 |
| 9Li21 | Beta-30265 | *Crassostrea* | 730 ± 50 | A.D. 1370–1570 |
| 9Li21 | Beta-20806 | *Crassostrea* | 760 ± 60 | A.D. 1310–1550 |
| 9Li170 | Beta-21396 | *Mercenaria* | 740 ± 70 | A.D. 1280–1560 |
| 9Li21 | Beta-30266 | *Mercenaria* | 780 ± 60 | A.D. 1320–1520 |
| 9Li21 | Beta-30270 | *Crassostrea* | 790 ± 80 | A.D. 1290–1550 |
| 9Li194 | Beta-20817 | *Crassostrea* | 800 ± 60 | A.D. 1310–1500 |
| 9Li216 | Beta-217228 | *Mercenaria* | 830 ± 40 | A.D. 1310–1460 |
| 9Li21 | UGA-1009 | Charcoal | 580 ± 60 | A.D. 1290–1430 |
| 9Li21 | Beta-30264 | Charcoal | 540 ± 60 | A.D. 1300–1450 |
| 9Li21 | Beta-21974 | Charcoal | 590 ± 50 | A.D. 1290–1420 |
| 9Li21 | Beta-30262 | *Mercenaria* | 840 ± 60 | A.D. 1290–1470 |
| 9Li197 | Beta-20821 | *Mercenaria* | 860 ± 60 | A.D. 1280–1490 |
| 9Li21 | Beta-30263 | *Mercenaria* | 950 ± 60 | A.D. 1190–1420 |
| 9Li21 | UGA-1010 | Charcoal | 690 ± 60 | A.D. 1220–1400 |
| 9Li21 | Beta-30267 | *Mercenaria* | 990 ± 80 | A.D. 1090–1420 |
| Irene–Savannah ceramics | | | | |
| 9Li192 | Beta-20824 | *Mercenaria* | 790 ± 60 | A.D. 1310–1560 |
| 9Li192 | Beta-20825 | *Mercenaria* | 820 ± 60 | A.D. 1300–1490 |
| 9Li189 | Beta-215815 | *Mercenaria* | 830 ± 50 | A.D. 1300–1470 |
| Savannah ceramics | | | | |
| 9Li189 | Beta-215814 | *Mercenaria* | 580 ± 60 | A.D. 1470–1700 |
| 9Li169 | Beta-183628 | *Mercenaria* | 780 + 60 | A.D. 1310–1520 |
| 9Li169 | Beta-21397 | *Mercenaria* | 820 ± 70 | A.D. 1290–1500 |
| 9Li169 | Beta-215813 | *Mercenaria* | 840 ± 60 | A.D. 1290–1470 |
| 9Li169 | Beta-183627 | *Mercenaria* | 850 + 60 | A.D. 1280–1470 |
| 9Li211 | Beta-183633 | *Crassostrea* | 890 + 60 | A.D. 1260–1450 |
| 9Li211 | Beta-183634 | *Crassostrea* | 900 + 50 | A.D. 1260–1440 |
| 9Li169 | Beta-215812 | *Mercenaria* | 1040 ± 60 | A.D. 1070–1300 |
| 9Li230 | Beta-21399 | *Mercenaria* | 1140 ± 90 | A.D. 950–1300 |
| 9Li230 | Beta-215820 | *Crassostrea* | 1200 ± 50 | A.D. 950–1220 |
| 9Li230 | Beta-21398 | *Mercenaria* | 1310 ± 70 | A.D. 780–1130 |
| 9Li230 | Beta-215819 | *Crassostrea* | 1330 ± 70 | A.D. 740–1080 |

TABLE 15.2
(*Continued*)

| Site | Lab.no. | Material | Age ($^{14}$C years B.P.) | Calibrated age[a] |
|---|---|---|---|---|
| Savannah–St. Catherines ceramics | | | | |
| 9Li211 | Beta-20828 | *Mercenaria* | 880 ± 60 | A.D. 1270–1450 |
| 9Li171 | Beta-20809 | *Crassostrea* | 1090 ± 70 | A.D. 1040–1300 |
| St. Catherines ceramics | | | | |
| 9Li273 | UGA-3459 | *Crassostrea* | 1040 ± 70 | A.D. 1060–1340 |
| 9Li214 | Beta-183632 | *Mercenaria* | 1120 + 60 | A.D. 1030–1280 |
| 9Li200 | Beta-20815 | *Crassostrea* | 1110 ± 70 | A.D. 1020–1290 |
| 9Li18 | UGA-61 | Charcoal | 900 ± 60 | A.D. 1020–1250 |
| 9Li18 | UGA-64 | *Crassostrea* | 1190 ± 60 | A.D. 950–1230 |
| 9Li200 | Beta-20826 | *Crassostrea* | 1200 ± 60 | A.D. 930–1220 |
| 9Li200 | Beta-20819 | *Mercenaria* | 1190 ± 70 | A.D. 920–1240 |
| 9Li214 | Beta-183631 | *Mercenaria* | 1260 + 60 | A.D. 860–1170 |
| 9Li273 | UGA-3458 | *Crassostrea* | 1260 ± 80 | A.D. 810–1200 |
| 9Li200 | Beta-20816 | *Crassostrea* | 1280 ± 70 | A.D. 810–1160 |
| 9Li233 | Beta-217235 | *Mercenaria* | 1300 + 60 | A.D. 800–1120 |
| 9Li19 | UGA-58 | Charcoal | 1070 ± 60 | A.D. 780–1150 |
| 9Li165 | Beta-183630 | *Mercenaria* | 1350 + 60 | A.D. 760–1050 |
| 9Li233 | Beta-217236 | *Mercenaria* | 1360 + 50 | A.D. 780–1030 |
| 9Li165 | Beta-183629 | *Mercenaria* | 1390 + 50 | A.D. 730–1000 |
| 9Li200 | Beta-20820 | *Mercenaria* | 1420 ± 70 | A.D. 640–950 |
| Wilmington/St. Catherines Ceramics | | | | |
| 9Li200 | Beta-20826 | *Crassostrea* | 1200 ± 60 | A.D. 930–1220 |
| 9Li200 | Beta-20819 | *Mercenaria* | 1190 ± 70 | A.D. 920–1240 |
| 9Li194 | Beta-20818 | *Crassostrea* | 1260 ± 90 | A.D. 800–1220 |
| 9Li194 | Beta-218096 | *Mercenaria* | 1280 ± 90 | A.D. 780–1200 |
| 9Li194 | Beta-218095 | *Mercenaria* | 1340 ± 40 | A.D. 810–1030 |
| 9Li198 | Beta-20823 | *Mercenaria* | 1420 ± 50 | A.D. 710–980 |
| 9Li200 | Beta-20827 | *Crassostrea* | 1760 ± 70 | A.D. 340–670 |
| Wilmington ceramics | | | | |
| 9Li19 | UGA-60 | *Crassostrea* | 1570 ± 60 | A.D. 560–840 |
| 9Li238 | Beta-217240 | *Mercenaria* | 1610 ± 60 | A.D. 510–790 |
| 9Li225 | Beta-21405 | *Mercenaria* | 1630 ± 70 | A.D. 460–780 |
| 9Li79 | Beta-21403 | *Mercenaria* | 1630 ± 60 | A.D. 480–770 |
| 9Li225 | Beta-217230 | *Mercenaria* | 1650 ± 40 | A.D. 500–710 |
| 9Li225 | Beta-217231 | *Mercenaria* | 1660 ± 40 | A.D. 490–700 |
| 9Li196 | Beta-217225 | *Mercenaria* | 1670 ± 50 | A.D. 460–700 |
| 9Li220 | Beta-21401 | *Mercenaria* | 1680 ± 70 | A.D. 420–720 |
| 9Li179 | Beta-21404 | *Mercenaria* | 1700 ± 70 | A.D. 400–700 |
| 9Li196 | Beta-217226 | *Mercenaria* | 1760 ± 50 | A.D. 390–650 |
| 9Li196 | Beta-217227 | *Mercenaria* | 1830 ± 50 | A.D. 280–570 |
| 9Li220 | Beta-21400 | *Mercenaria* | 1810 ± 70 | A.D. 270–620 |
| 9Li217 | Beta-21402 | *Mercenaria* | 1880 ± 90 | A.D. 140–590 |
| Refuge-Deptford ceramics | | | | |
| 9Li15 | Beta-20813 | *Crassostrea* | 1970 ± 70 | A.D. 90–440 |
| 9Li228 | Beta-217232 | *Mercenaria* | 2040 ± 50 | A.D. 70–320 |
| 9Li173 | Beta-21407 | *Mercenaria* | 2010 ± 70 | A.D. 50–410 |
| 9Li15 | Beta-20814 | *Crassostrea* | 2030 ± 60 | A.D. 40–370 |
| 9Li47 | UGA-1256 | Charcoal | 1840 ± 70 | A.D. 20–390 |
| 9Li228 | Beta-217233 | *Mercenaria* | 2080 ± 50 | 10 B.C.–A.D. 270 |
| 9Li228 | Beta-217234 | *Mercenaria* | 2190 ± 50 | 150 B.C.–A.D. 140 |

TABLE 15.2
(*Continued*)

| Site | Lab.no. | Material | Age ($^{14}$C years B.P.) | Calibrated age[a] |
|---|---|---|---|---|
| 9Li15 | Beta-20812 | *Crassostrea* | 2230 ± 70 | 250 B.C.–A.D. 150 |
| 9Li47 | UGA-1555 | *Mercenaria* | 2290 ± 80 | 340 B.C.–A.D.80 |
| 9Li45 | UGA-1253 | Charcoal | 2380 ± 80 | 770–230 B.C. |
| 9Li26 | UGA-1552 | *Crassostrea* | 2730 ± 70 | 810–420 B.C. |
| 9Li47 | UGA-1554 | *Mercenaria* | 2760 ± 70 | 880–470 B.C. |
| 9Li47 | UGA-1557 | Charcoal | 2660 ± 60 | 970–560 B.C. |
| 9Li173 | Beta-21406 | *Mercenaria* | 2850 ± 80 | 9800–600 B.C. |
| 9Li46 | UGA-1255 | Charcoal | 2810 ± 60 | 1130–830 B.C. |
| 9Li26 | UGA-1553 | *Crassostrea* | 3040 ± 70 | 1240–830 B.C. |
| St. Simons ceramics | | | | |
| 9Li45 | UGA-1686 | Charcoal | 3010 ± 60 | 1410–1060 B.C. |
| 9Li197 | Beta-20822 | *Mercenaria* | 3340 ± 80 | 1480–1050 B.C. |
| 9Li137 | Beta-217218 | *Mercenaria* | 3380 ± 40 | 1590–1340 B.C. |
| 9Li137 | Beta-217219 | *Mercenaria* | 3410 ± 40 | 1690–1520 B.C. |
| 9Li231 | Beta-215822 | *Crassostrea* | 3800 ± 60 | 2160–1770 B.C. |
| 9Li231 | Beta-21408 | *Mercenaria* | 3860 ± 80 | 2300–1810 B.C. |
| 9Li137 | Beta-217217 | *Mercenaria* | 3930 ± 80 | 2400–1920 B.C. |
| 9Li231 | Beta-215824 | *Crassostrea* | 4120 ± 60 | 2580–2200 B.C. |
| 9Li231 | Beta-215821 | *Crassostrea* | 4140 ± 50 | 2600–2270 B.C. |
| 9Li231 | Beta-21409 | *Mercenaria* | 4370 ± 90 | 2950–2470 B.C. |

[a] For the purposes of this table, we have omitted the "cal" in the age designation throughout.

period component (and confirming $^{14}$C dates would greatly strengthen this conclusion).

If, however, Savannah Check Stamped and Savannah Complicated Stamped sherds are absent, should we conclude that the site dates to the Savannah I phase? By answering "yes", one makes the de facto assumption that a sample size of $n = 24$ sherds adequately represents the ceramic diversity on the site in question. On the other hand, if we believe that two dozen sherds might be an incomplete (and biased) sample of the potsherd population of this site, then we should refrain from relying on the *absence* of certain types to define our chronology.

In some of the St. Catherines Island assemblages, we do feel confident that such negative evidence is warranted: If we recover two-dozen sand-tempered Savannah potsherds from a given site, can we conclude that fiber-tempered (St. Simons period) ceramics are absent? Assuming that the sampling strategy adequately tested the range of contexts, and assuming that none of the "unidentifiable" sherds were fiber-tempered, we would probably conclude that St. Simons ceramics are likely absent and the site likely dates to the Savannah period.

This same confidence does not translate to phase-level distinctions. After all, the "unidentifiable" sherds within a single-phase site should have the same temper. We are not willing, on the basis of a sample of two dozen sherds, to conclude that Savannah Complicated Stamped and Savannah Check Stamped sherds are really absent from the overall assemblage at that site. For this reason, as we analyze the Island-wide survey results, we will generally refrain from making phase-level distinctions, such as St. Simons I–II and Deptford I–II, preferring to operate at the period level in DePratter's (1979a, 1991) scheme.

We must make a couple of exceptions to this rule. Even when working with relatively small ceramic assemblages, we believe that the presence of the Altamaha Line Block type is sufficient to define a historic-period aboriginal occupation on St. Catherines Island. In DePratter's terminology, we will be elevating the "Altamaha" time interval from the status equivalent of a phase within the Irene period to the level of an archaeological period (previously termed "Sutherland Bluff" by Larson 1978, 1980a). But we do not feel confident in separating the Pine Harbor and Irene phases from one another based on small ceramic samples involved (specifically because this distinction rests solely upon the presence/absence of the Irene Incised type); accordingly, in this monograph, the Pine Harbor and Irene phases will be merged into the Irene period (which, as denoted above, excludes Altamaha period materials).

A second exception involves the Refuge and Deptford intervals. Note that in table 15.1, two key types—Refuge Plain and Refuge Simple Stamped—range across two archaeological periods and five temporal phases (Refuge I–III and Deptford I–II); three additional types (Deptford Linear Check Stamped, Deptford Check Stamped, and Deptford Cord Marked) span at least a millennium. In fact, the period- and phase-level distinctions of the Refuge and Deptford intervals rest heavily on assessing the presence/absence of four minority types. Given the relatively small sample sizes involved in this study, we do not feel confident in making these distinctions. We will follow our previous practice (e.g., Thomas and Larsen, 1979) by combining materials from the Refuge and Deptford periods into a single, composite archaeological interval denoted as the Refuge-Deptford period.

One further caution is required here. DePratter's (1979a, 1991) estimates regarding the temporal duration of each relevant ceramic type and archaeological period/phase was expressed in uncorrected radiocarbon years. He clearly anticipated that these temporal estimates would be tested against the radiocarbon database becoming available from St. Catherines Island (DePratter, 1991: 157); throughout the rest of this chapter, we utilize the suite of available radiocarbon dates on archaeological samples from St. Catherines Island to evaluate the temporal limits of the ceramic chronology. A revised, $^{14}$C-calibrated ceramic sequence—the "St. Catherines Island Chronology"—will then be utilized throughout the rest of this volume.[3]

## ST. SIMONS PERIOD

The various excavations on St. Catherines Island generated 10 $^{14}$C determinations in direct association with St. Simons ceramics (table 15.1; fig. 15.1).

Six of these dates came from the St. Catherines Shell Ring (9Li231), recorded as part of the Island-wide systematic survey (see chap. 20). All sherds recovered at 9Li231 belong to the St. Simons series.

Another $^{14}$C date comes from 9Li197, a large site recorded during the Island-wide transect survey (chap. 20). Located in transect H-6, just east of Wamassee Road, 9Li197 consists of numerous shell mounds, surface scatters, and buried deposits, all circumscribed within a 100-m-diameter area. Beta-20822 was processed on a *Mercenaria* valve recovered from Test Pit I, in the 40–50 cm level that contained exclusively St. Simons Plain ceramics.

A single $^{14}$C date associated with St. Simons ceramics (UGA-1686) was processed on charcoal contained within Feature 2 at Cunningham Mound C, one of several mortuary sites located near the center of the island (Thomas and Larsen, 1979: 64; see also chap. 20). Feature 2 is a premound pit that contained strictly St. Simons Plain ceramics.

Three additional radiocarbon dates are available from 9Li137, a bluff-top site that has since eroded into the Atlantic Ocean. There is little shell of any kind present in this site, and a number of the sherds were recovered in what appeared to be sterile sand. We did, however, recover sufficient *Mercenaria* to attempt a limited estimate of seasonality at 9Li137; we have recently processed three hard clam shells (Beta-217217, Beta-217218, and Beta-217219), each unambiguously associated with St. Simons ceramics. Although most of the fiber-tempered ceramics from 9Li137 were undecorated, the assemblage did contain a few sherds of St. Simons Punctated ($n = 5$), St. Simons Incised and Punctated ($n = 1$), and St. Simons Simple Stamped ($n = 2$).

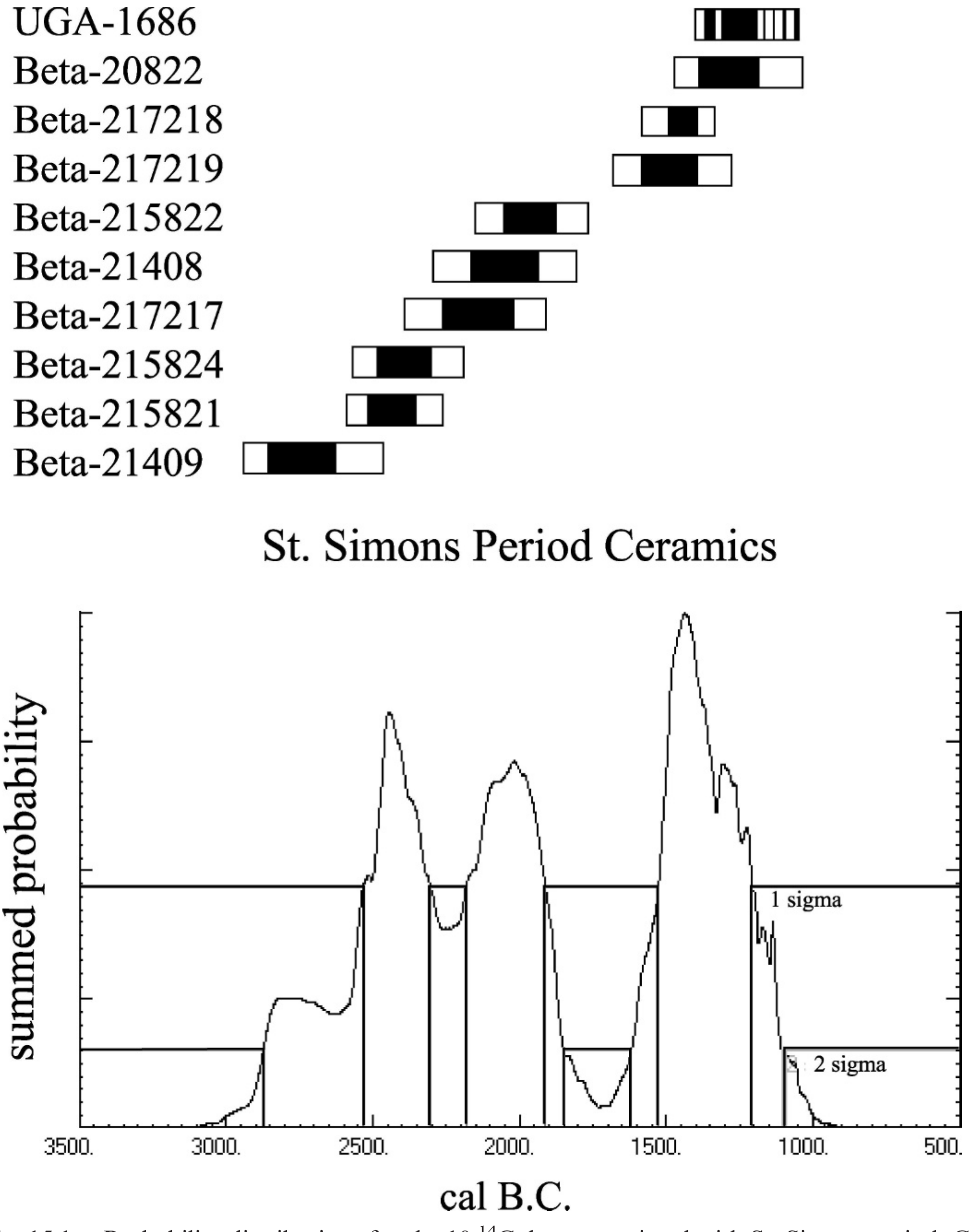


Fig. 15.1. Probability distributions for the 10 $^{14}C$ dates associated with St. Simons period. Ceramics on St. Catherines Island. In the upper graph, the horizontal black bars represent the one-sigma limits and the enclosing rectangles depict the two-sigma limits for each date. The curve at the bottom presents the summed probability distribution for these same $^{14}C$ dates.

Each of the 10 individual radiocarbon samples is plotted at the top of figure 15.1. Individual probability distributions are represented by the one-sigma limits (the black, interior bars) and the two-sigma ranges (the surrounding rectangular boxes).[4] The lower segment of figure 15.4 plots the pooled probability distribution of these same 10 dates, with the one-sigma and two-sigma limits superimposed. The one-sigma limits and relative areas are cal 2530 B.C.–2300 B.C. (26.1%), cal 2180 B.C.–1910 B.C. (30.4%), and cal 1530 B.C.–1210 B.C. (4.3%). The two-sigma limits are cal 2870 B.C.–1850 B.C. (60.5%), cal 1620 B.C.–1110 B.C. (39.4%), and cal 1100 B.C.–1090 B.C. (0.13%).

## REFUGE-DEPTFORD PERIOD

The St. Catherines Island research produced 16 radiocarbon determinations directly associated with Refuge-Deptford ceramics (table 15.1, fig. 15.2). As explained earlier in this chapter, we have combined these two temporally contiguous periods because of the difficulties in distinguishing between them in the relatively small ceramic assemblages available to us.

Two of these radiocarbon dates, Beta-21406 and Beta-21407, were processed on *Mercenaria* recovered from the Refuge-Deptford component at 9Li173, a large site located near Engineer's Marsh, on the northwestern margin of St. Catherines Island (transect B-6; see chap. 20).

Shell Field 2 (9Li15) is a large site containing several concentrations of subsurface shell, and we processed three radiocarbon dates on oyster shells recovered here: Beta-20812, Beta-20813, and Beta-20814. Each sample was associated with Deptford Check Stamped and Deptford Linear Checked Stamped ceramics.

Three radiocarbon dates are available from 9Li228, a large and dense site exposed along the marsh edge near the boundary of Long Field. Three *Mercenaria* samples (Beta-217232, Beta-217233, and Beta-217234) are unquestionably associated with Deptford ceramics.[5]

The premound surface at the Seaside II Mound contained a number of small pits and oyster shell middens (Thomas and Larsen, 1979: 99–109). Oyster shell from Feature 1 (a shell-filled pit 50 cm in diameter) was $^{14}C$ dated to the Refuge period (UGA-1552 and UGA-1553). The premound surface was subsequently burned, and several adults were interred into this surface, after which all of these features were covered by mound fill. The ceramic assemblage recovered at Seaside II ($n = 74$) contains almost exclusively Deptford and Refuge period sherds, and we feel comfortable in assigning UGA-1552 and UGA-1553 to the Refuge-Deptford interval.

McLeod Mound (9Li47), a mortuary site in the Cunningham Mound complex (Thomas and Larsen, 1979: 23–49), was erected atop a primary humus zone and we processed sample UGA-1557 on charcoal from this surface. The combined stratigraphic and ceramic evidence indicates that UGA-1557 predates the initial construction period at McLeod Mound. Several pits were subsequently dug into this primary humus, including a large Central Pit, which was then filled and covered with a ring of potsherds, oyster, and clam shells. Afterwards, the Central Pit at McLeod Mound was expanded to the north and five individuals (all adult females) were buried within. Two $^{14}C$ dates, UGA-1554 and UGA-1555, were processed on *Mercenaria* recovered from the shell feature within this Central Tomb.

A small sand mound was then erected over the Central Tomb at McLeod Mound, and UGA-1256 was processed on charcoal contained within the mound fill. Although this charcoal could possibly have resulted from another burning of the primary humus, we think it likely that the charcoal was associated with the additional debris integrated in McLeod Mound fill, which included nearly 500 potsherds. All of these sherds were found as inclusions within the mound fill; they were not deliberate grave goods. Virtually all (97%) of this ceramic assemblage can be attributed to the Refuge-Deptford I periods and we feel comfortable with including the various $^{14}C$ evidence on shell and charcoal contained in McLeod Mound, and we include these dates in table 15.1 as associated with the Refuge-Deptford period.

At nearby Cunningham Mound C, both the premound surface and fill also contained abundant sherds from the Refuge-Deptford period. This primary humus zone was then burned, and sample UGA-1253 was processed on charcoal recovered from

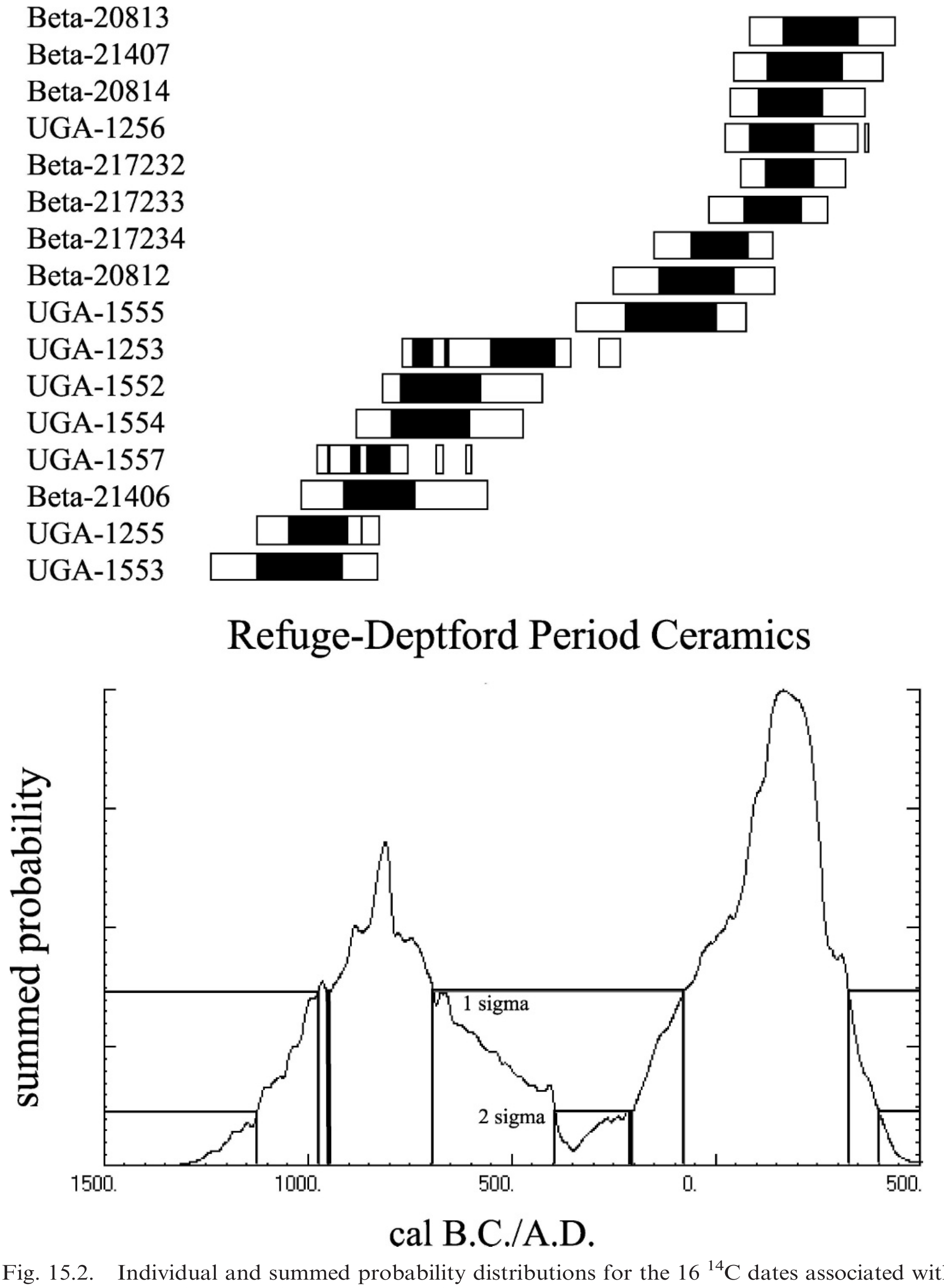


Fig. 15.2. Individual and summed probability distributions for the 16 $^{14}C$ dates associated with Refuge-Deptford period ceramics on St. Catherines Island.

this stratigraphic unit. We think that Cunningham Mound C was constructed shortly thereafter, and two-thirds of the potsherds recovered from the mound fill date to the Refuge-Deptford period.

Figure 15.2 plots the individual probability distributions of the 16 radiocarbon dates associated with Refuge-Deptford ceramics on St. Catherines Island, with their pooled probability distribution. Combining these results with the $^{14}$C data from the previous period, we conclude that the temporal boundary separating the St. Simons and Refuge-Deptford period lies at cal 1000 B.C.[6] The probability distribution in figure 15.2 has the following one-sigma limits: cal 980 B.C.–950 B.C. (2.1%), cal 940 B.C.–690 B.C. (31.0%), and 80 B.C.–A.D. 330 (66.9%). The two-sigma limits are cal 1120 B.C.–390 B.C. (43.5%), cal 212 B.C.–210 B.C. (0.04%), cal 200 B.C.–A.D. 400 (56.5%).

## WILMINGTON PERIOD

The various archaeological investigations on St. Catherines Island produced 13 radiocarbon determinations that we believe are firmly associated with Wilmington ceramics (fig. 15.3).[7]

The Duncan Field site (9Li225) was discovered in transect G-1 during the systematic Island-wide survey of St. Catherines Island (chap. 20). This medium-sized site contains a buried shell lens roughly 20 m $\times$ 15 m. A $^{14}$C determination, Beta-21405, was processed on a *Mercenaria* valve recovered from the 20–30-cm level of Test Pit III.

A small site, Greenseed Field (9Li179), produced two associated radiocarbon dates, Beta-21403 and Beta-21404. This site contained exclusively Wilmington period diagnostics.

Site 9Li217 (transect H-1) has a slight surface concentration of shell evident on the surface. A single radiocarbon date, Beta-21402, was associated with 41 potsherds recovered from a single Wilmington Plain vessel.

Sample UGA-60 was processed by the University of Georgia on oyster shells recovered in apparent association with Wilmington ceramics at King New Ground Field (9Li19).

Site 9Li220, located in transect H-1, is a large, irregular distribution of surface shell and some buried deposit as well. It extends the width of the 100-m-wide transect, straddling the eastern boundary ditch of South New Ground Field. We processed two $^{14}$C dates, Beta-21400 and Beta-21401, on *Mercenaria* from Test Pit II. A ceramic assemblage of 63 diagnostic sherds was recovered at 9Li220; 89 percent of these date to the Wilmington period (and Test Pit II contains exclusively Wilmington ceramics).[8]

At 9Li238, one of the four dates (Beta-217240) was associated exclusively with Wilmington ceramics and is included here. Three radiocarbon dates at 9Li196 were also associated with Wilmington ceramics (Beta-217225, Beta-917226, and Beta-217227). Three statistically identical $^{14}$C determinations are available from 9Li225, all associated with Wilmington ceramics (Beta-21405, Beta-217230, and Beta-217231).

Three additional sites have produced $^{14}$C data that are relevant to this discussion. Radiocarbon date Beta-20827 was processed on an oyster shell recovered from apparent Wilmington period contexts in a midden at 9Li200.[9] At 9Li238, one of the four dates (Beta-217240) was associated exclusively with Wilmington ceramics and is included here.

A small site in transect H-6 (9Li198) produced a single radiocarbon determination, Beta-20823, processed on *Mercenaria* recovered from Test Pit I (40–50 cm); the associated ceramic assemblage contains both Wilmington and St. Catherines period sherds. Beta-20818 was processed on oyster shells recovered from 9Li194. The radiocarbon sample, processed on materials recovered from the 20–30 cm level in Test Pit V, is associated with a mixed Wilmington/St. Catherines ceramic assemblage.

Three $^{14}$C determinations available from Test Pit V at 9Li194 were associated with a mixed assemblage of St. Catherines and Wilmington ceramics. Two $^{14}$C determinations from 9Li200 were processed from Midden I, Test Pit I, associated with a mixed assemblage of Wilmington and St. Catherines ceramics (Beta-20826 and Beta-20819). Because both Wilmington and St. Cather-

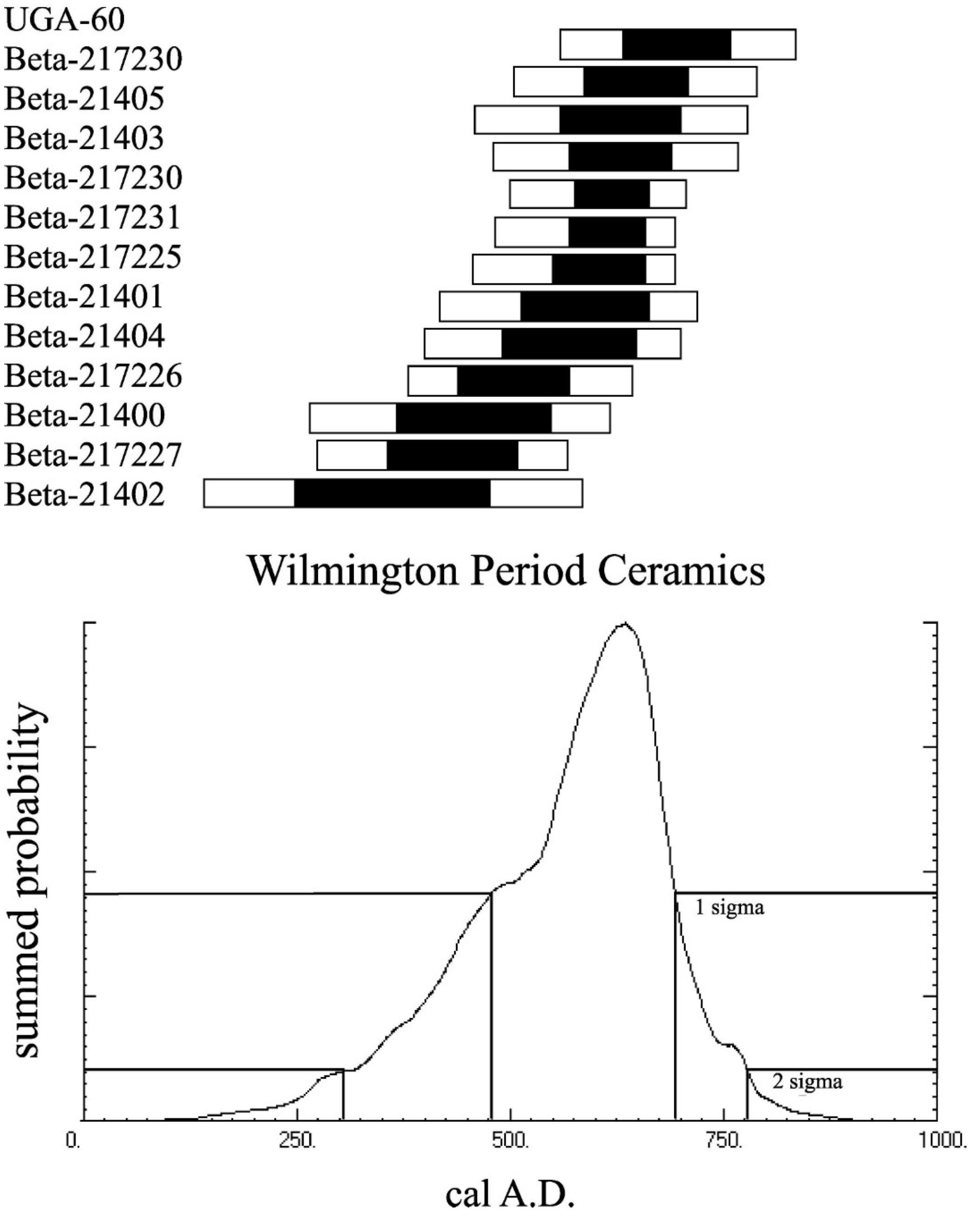


Fig. 15.3. Individual and summed probability distributions for the 13 $^{14}C$ dates associated with Wilmington period ceramics on St. Catherines Island.

ines ceramics were associated with the radiocarbon dates reported here, we will assign these dates to the Wilmington/St. Catherines periods in table 15.2, but these dates will be excluded from the subsequent calculations.

The individual probability distributions of these 13 dates are shown in figure 15.3

and the pooled probability distribution appears at the bottom of this diagram. The one-sigma limits of this unimodal distribution are cal A.D. 480–A.D. 690 and the two-sigma limits are cal A.D. 310–A.D. 780.

## ST. CATHERINES PERIOD

Sixteen $^{14}C$ dates from St. Catherines Island can be positively associated with St. Catherines ceramics (see fig. 15.4).

Two premound pits at Johns Mound (Larsen and Thomas, 1982: 293–324) contained strictly St. Catherines period potsherds. The log-lined Central Pit, excavated through this premound surface, contained a St. Catherines Burnished Plain vessel. Caldwell and the University of Georgia team processed a single $^{14}C$ date, UGA-61, on charcoal from one of these logs. A shell layer was subsequently constructed in the central portion of Johns Mound and another $^{14}C$ date, UGA-64, was processed on oyster shells from this shell cap. The stratigraphic, ceramic, and radiocarbon evidence all indicate that the premound surface, the Central Pit, and the shell cap at Johns Mound date to the St. Catherines period.

At South End Mound II (Larsen and Thomas, 1986: 21–39), the Central Pit was covered with an irregular, artificially raised platform made of recycled shell midden that contained exclusively St. Catherines ceramics. Two $^{14}C$ determinations, UGA-3458 and UGA-3459, were processed on shell contained in this stratum. The ceramic and radiocarbon evidence indicates that South End Mound II was constructed and utilized almost entirely during the St. Catherines period.

In 1969, Joseph Caldwell led the University of Georgia excavations at the King New Ground Field (9Li19) site, processing two $^{14}C$ determinations from samples recovered in Midden 2. One of these (UGA-58) was processed on charcoal recovered in apparent association with St. Catherines ceramics.

Five $^{14}C$ dates from 9Li200 are associated with St. Catherines ceramics. In Midden I, Test Pit I, dates Beta-20826 and Beta-20819 are clearly associated with St. Catherines ceramics, as are dates Beta-20815 and Beta-20820 in Midden II, Test Pit I. The lone date available from Midden III, Test Pit I (Beta-20816), is directly associated with St. Catherines Burnished Plain and St. Catherines Net Marked ceramics.

Two statistically indistinguishable radiocarbon dates are associated with St. Catherines Net Marked and Walthour Complicated sherds at 9Li233 (Beta-217235 and Beta-217236). DePratter (1991: table 1) has previously associated Walthour Complicated Stamped with an early Wilmington age, but if the dozen sherds of this type recovered in Test Pit II at 9Li233 are behaviorally associated with Beta-217236, then this age may be too early.

9Li214 is a large site located on the northeastern margin of Cracker Tom Hammock. Ninety percent of the ceramics recovered from six test pits, date to the St. Catherines period. Dates Beta-183631 and Beta-183632 (both from Test Pit IV) are directly associated with St. Catherines ceramics.

## SAVANNAH PERIOD

Archaeological investigations on St. Catherines Island produced 12 $^{14}C$ determinations associated with Savannah ceramics (table 15.1; fig. 15.5).

9Li230 is a medium-sized sized site (in transect E-1) extending about 250 m on the cut-bank along the inlet between Long and Meeting House fields (chap. 20). Only two test pits were excavated at 9Li230, producing the following ceramic assemblage: Savannah Cord Marked (6), Savannah Plain (1), grit tempered (1), sand tempered, misc. (2), clay tempered, decorated (1), clay/grit tempered, decorated (1), and clay/sand tempered, decorated (2). Initially, we processed two $^{14}C$ determinations from 9Li230 (Beta-21398 and Beta-21399). In March of 2006, Thomas returned to this site and removed two additional radiocarbon samples (Beta-215819 and 21520) from the standing sidewalls of Test Pit I. These four radiocarbon dates are statistically indistinguishable, with a pooled two-sigma age range of cal A.D. 910–1140. Whereas the ceramic asso-

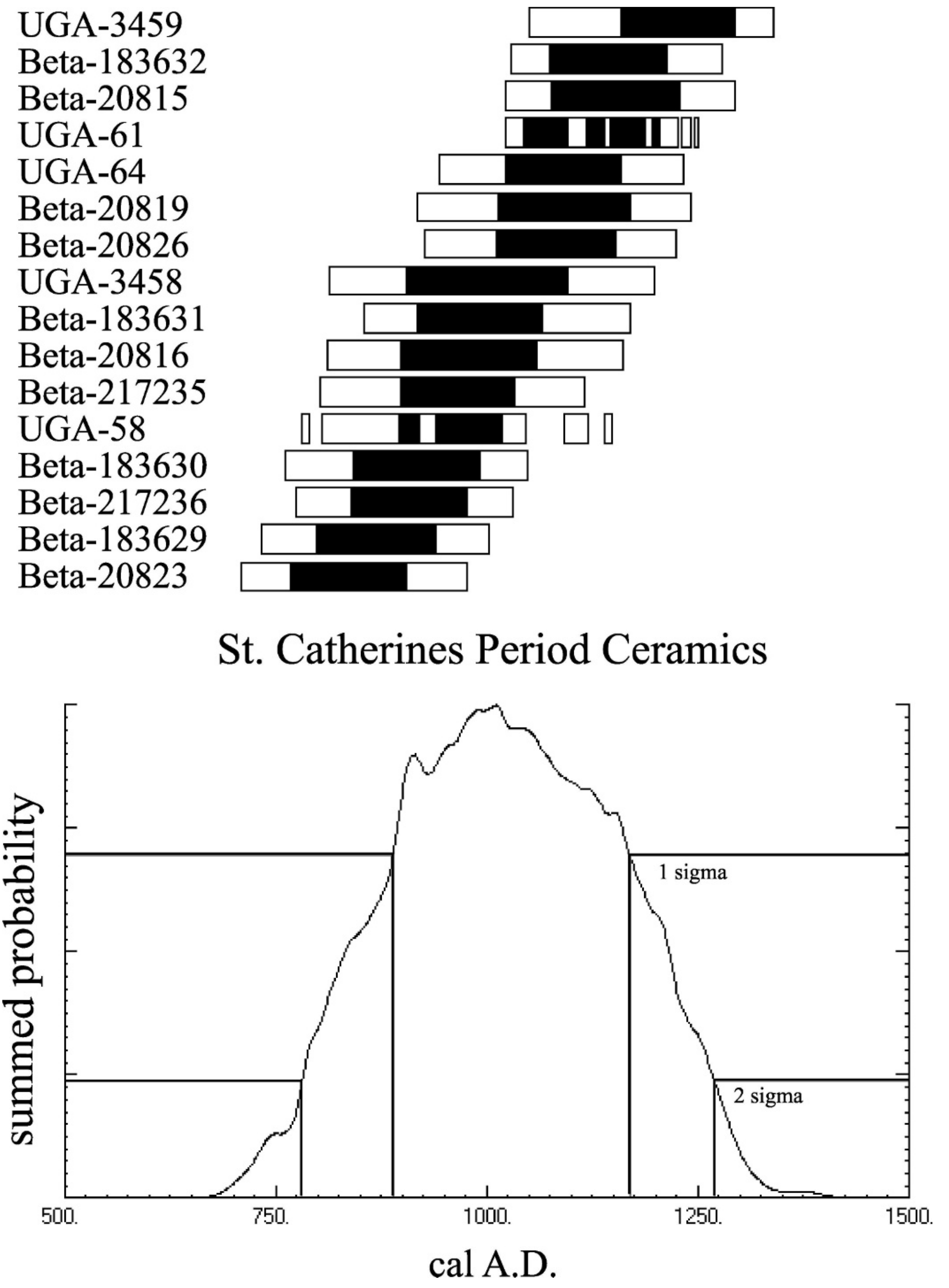


Fig. 15.4. Individual and summed probability distributions for the 16 $^{14}C$ dates associated with St. Catherines period ceramics on St. Catherines Island.

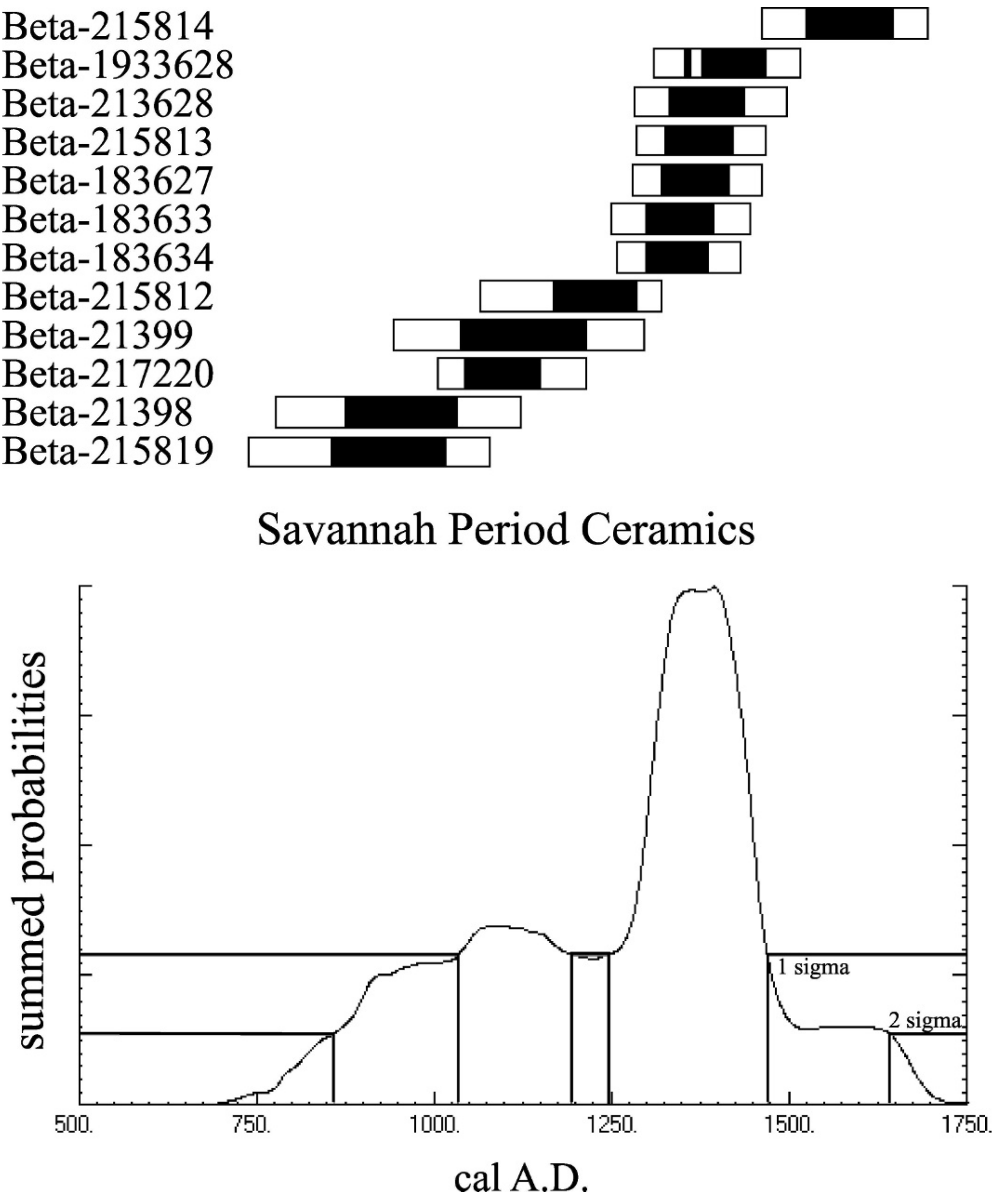


Fig. 15.5. Individual and summed probability distributions for the 12 $^{14}$C dates associated with Savannah period ceramics on St. Catherines Island.

ciations are clearly Savannah series, (as discussed below) the age estimates fall into the St. Catherines period.

Site 9Li211 is a medium-sized concentration of subsurface shell (in transect K-1), located on a dune crest about 40 m west of South Beach Road. The ceramic assemblage at 9Li211 contains a broad range of temporal types: grit tempered, decorated (20), Savannah Check Stamped (12), Savannah Cord Marked (1), Savannah Plain (16), St. Catherines Plain (2), and St. Johns Plain (17), plus a variety of various clay and grit-tempered sherds (see table 14.1).

Three $^{14}C$ determinations are available from 9Li211. Two dates (Beta-183633 and Beta-183634) are from Test Pit IV (0–10 cm), which contained the followed ceramics: 0–10 cm, Savannah Burnished Plain (5); Savannah burnished plain, fluted (2); 10–20 cm, Savannah Check Stamped (6), St. Catherines Burnished Plain (3), Savannah burnished plain, fluted (1), grit tempered (2); 20–30 cm, Savannah Cord Marked (2), grit tempered, decorated, and incised (2); 30–40 cm, Savannah Cord Marked (1), St. Catherines burnished plain, fluted (1). Because both $^{14}C$ came from the uppermost level of Test Pit IV, and because no St. Catherines ceramics were found in the 0–10 cm level, we associated these two dates with Savannah ceramics (see table 15.2). A third date (Beta-20828) was processed on a *Mercenaria* valve from Test Pit III (20–30 cm) at 9Li211. The following sherds were recovered from Test Pit III: 0–10 cm, none; 10–20 cm, none; 20–30 cm, Savannah Check Stamped (2), St. Catherines Burnished Plain (1), very gritty check stamped (2). The 20–30 cm level of Test Pit III includes a mixed Savannah–St. Catherines ceramic assemblage, and it is so listed in table 15.2 (and excluded from the calculations below).

Our four test excavations at the Seaside middens (9Li169) produced the following ceramic assemblage (table 14.1): various grit-tempered (5), Savannah Check Stamped (28), Savannah Cord Marked (26), Savannah Plain (13), various sand-tempered (16), clay-tempered, decorated (5), Deptford Check Stamped (8), Refuge Simple Stamped (6), and St. Simons Plain (1), plus a variety of sand/grit tempered sherds.

We processed sample Beta-21397 on a *Mercenaria* from Test Pit III (10–20 cm), which contained the following sherds: 0–10 cm, Savannah Cord Marked (3), Savannah (1), Savannah, complicated stamped (1); 10–20 cm, Savannah Check Stamped (4), Savannah Cord Marked (7), Savannah Plain (3), Savannah Complicated Stamped (1), grit-tempered plain (3), Savannah, decorated (1), sand-tempered with a little grit (2), Deptford Check Stamped (1); 20–30 cm, Savannah Check Stamped (5), Savannah Cord Marked (1), Savannah, possibly corncob impressed (1); 30–40 cm, Deptford Check Stamped (4), Refuge Simple Stamped abrader (1), Refuge (1). We believe that Beta-21397 is associated with a pure Savannah period assemblage.

Three additional dates come from the 10–20-cm level of Test Pit II at 9Li169. The following sherds were recovered from Test Pit II: 0–10 cm, Savannah Cord Marked (2), Savannah (4), Savannah Complicated Stamped (1); 10–20 cm, Savannah Check Stamped (10), Savannah Cord Marked (13), Savannah Plain (1), Savannah Burnished Plain (4), Savannah Complicated Stamped (1). This unit appears to represent a single-component Savannah period occupation.

We processed two radiocarbon dates (Beta-215815 and Beta-215814) on *Mercenaria* recovered from Davy Field 1 (9Li189), a site that produced the following ceramic assemblage: Irene Complicated Stamped (5), grit tempered, misc. (1), Savannah Check Stamped (5), clay/grit-tempered, misc. (1), and sand/grit-tempered, misc. (2).

Beta-215815 was processed on *Mercenaria* from the 0–10 cm level of Test Pit I at 9Li189, which contained the following ceramics: 0–10 cm, Irene Complicated Stamped (2), Savannah Check Stamped (1), Irene (1); 10–20 cm, Irene Complicated Stamped (1). As we have noted in table 15.2, we think this date seems to be associated with a mixed Savannah–Irene assemblage (and hence excluded from the calculations below).

The second date from 9Li189 (Beta-215814) was processed on a *Mercenaria* value from the 10–20 cm level of Test Pit II, which contained the following ceramics: 0–10 cm, Savannah Check Stamped (6); 10–20 cm, Savannah Check Stamped (1); 20–30 cm, Savannah Check Stamped (3). This date appears to be associated with a pure Savannah period assemblage.

The following ceramic assemblage was recovered at 9Li171 (table 14.1): grit tempered, misc. (1), Savannah Cord Marked (12), St. Catherines Fine Cord Marked (1), Refuge Incised (3), Refuge, misc. (1), St. Simons, misc. (3). Because we think that radiocarbon date Beta-20809 was associated with a mixed assemblage of Savannah Fine Check Marked and St. Catherines Fine Cord Marked at 9Li171, we list this date in table 15.2, but exclude Beta-20809 from the calculations below.

Figure 15.5 plots the individual probability distributions of the 12 available $^{14}C$ dates associated with Savannah ceramics, with the pooled probability distribution for these determinations. The one-sigma limits are cal A.D. 1030–A.D. 1200 (24.9%) and cal A.D. 1250–A.D. 1470 (75.1%); the two-sigma limits are cal A.D. 860–A.D. 1640.

## IRENE PERIOD

The St. Catherines Island research generated 24 radiocarbon dates directly associated with Irene ceramics. These dates have been compiled in table 15.1 and the individual probability distributions appear in figure 15.6.

Seventeen of the Irene-period dates derive from Meeting House Field (9Li21), a large, single-component Irene period site located inland from Cattle Pen Creek. Our excavations at Meeting House Field are described in chapter 25 (see also Saunders, 2000a). The $^{14}C$ samples were drawn from a broad range of proveniences, and, with a single exception, the suite of available dates accurately brackets the cultural occupation of Meeting House Field.[10]

Two statistically identical dates (Beta-20824 and Beta-20825) are available from Irene contexts at 9Li192, a medium-sized site located in South New Ground Field, about 150 m west of Back Creek Road. The available ceramic assemblage from this site consists almost entirely of Irene Complicated Stamped and Irene Plain ceramics, although a number of Savannah Plain sherds occur here as well (see table 14.1). Another radiocarbon date, from 9Li189 (Beta-215228), is associated with Irene Complicated Stamped and Savannah Check Stamped ceramics. All three dates fall into Irene period temporal span. In table 15.2, we group these dates as "Irene–Savannah Ceramics" and exclude them from the calculations to follow.

One relevant $^{14}C$ date (Beta-20821) comes from the upper level of Test Pit I at 9Li197. This large site (in transect H-6) is located approximately 80 m east of Wamassee Road. The ceramic assemblage from this level was dominated by Irene ceramics, with no Savannah sherds recovered. Beta-20821 readily falls into the conventional temporal range for the Irene period. Another Irene period radiocarbon date (Beta-20817) is available at 9Li194, associated with Irene Complicated Stamped ceramics.

Four additional $^{14}C$ determinations are associated with Irene ceramics in Test Pit I at 9Li170 (Beta-20805, Beta-20810, Beta-21395, and Beta-21396). This small, but very dense deposit of decomposing oyster shell is located in transect C-6, approximately 130 m east of Yankee Bridge road. The following sherds were recovered from this excavation unit: 0–10 cm, Irene, misc. (2); 10–20 cm, Irene Complicated Stamped (9), Irene, misc. (12), Altamaha, stamped (1), clay tempered (1); 20–30 cm, Altamaha, stamped (1); 20–30 cm, Deptford Check Stamped (17). Although two Altamaha sherds were recovered from Test Pit I, we attribute all four radiocarbon determinations date to the Irene period and the results are consistent with this finding (see table 15.2).

Two radiocarbon dates (Beta-217228 and Beta-217229) are available from 9Li216, both associated with Irene Burnished Plain ceramics.

The probability distributions of the individual Irene period radiocarbon dates are plotted at the bottom of figure 15.6. This pooled probability distribution, which roughly approximates a normal curve, spans the interval cal A.D. 1310–1530 (at the one-sigma level); the two-sigma intervals are cal A.D. 1220–A.D. 1680 (99.2%), cal A.D. 1780–A.D. 1800 (0.76%), and modern (0.03%).

## ALTAMAHA PERIOD

Relying on historical documentation, DePratter (1979a, 1991) began the Altamaha (Spanish Period) occupation at A.D. 1580 and ended this interval at A.D. 1700.

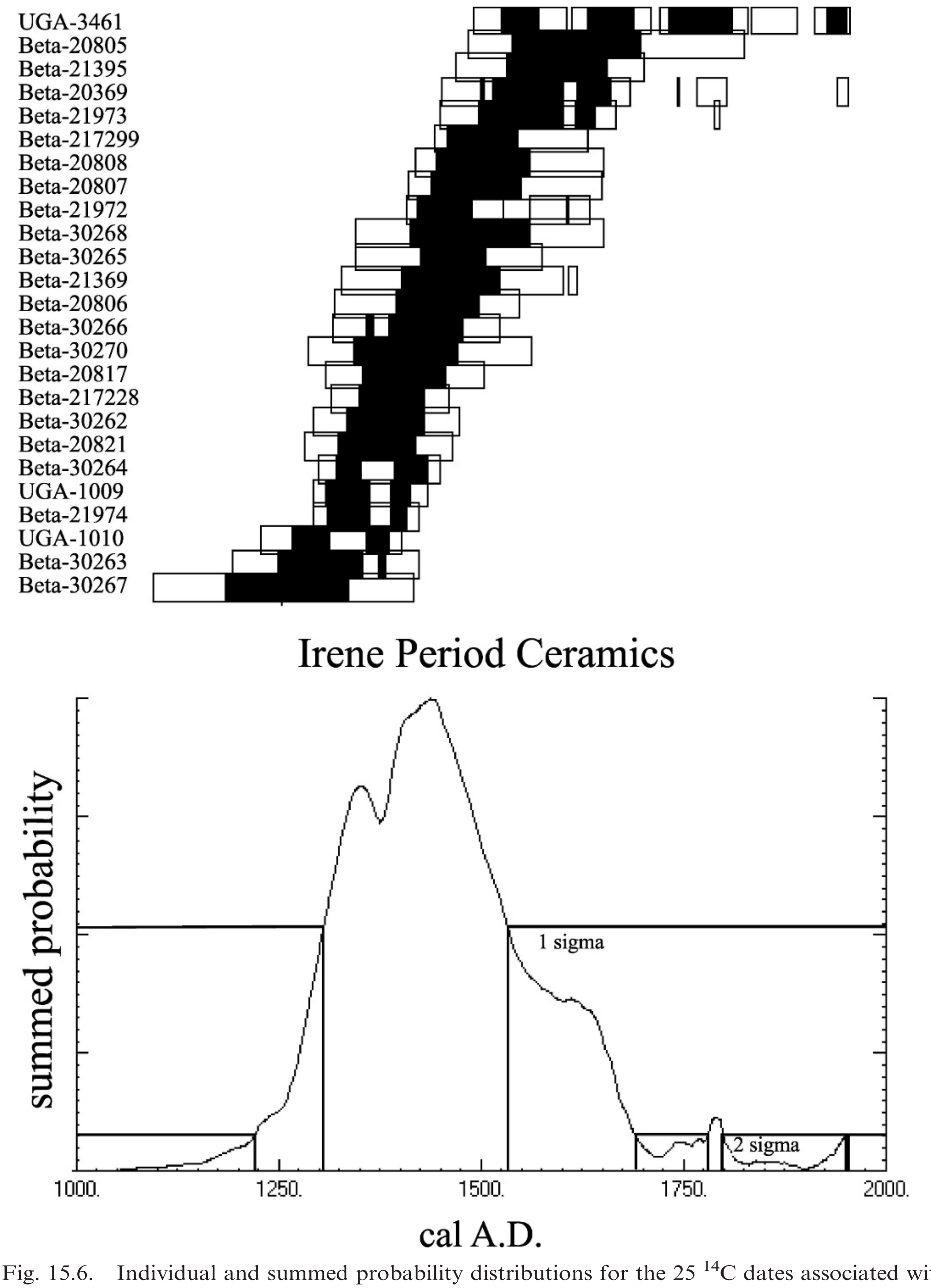


Fig. 15.6. Individual and summed probability distributions for the 25 $^{14}C$ dates associated with Irene period ceramics on St. Catherines Island.

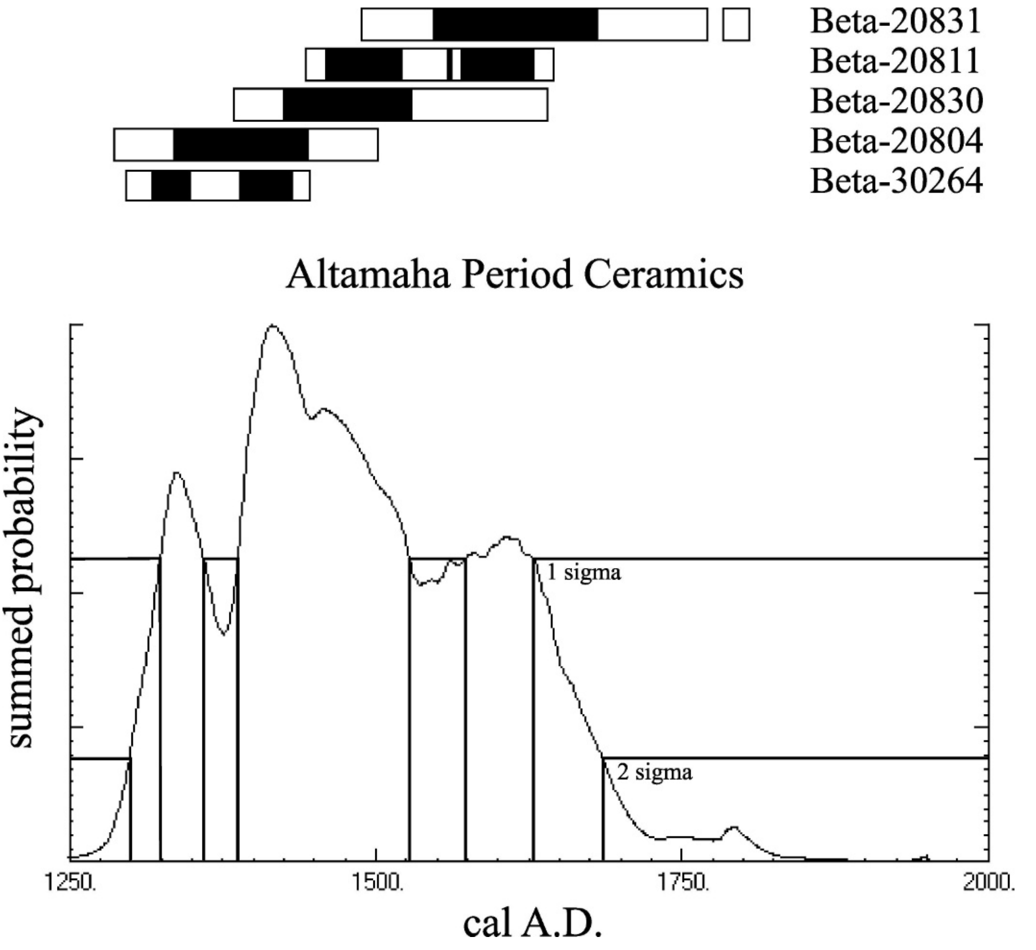


Fig. 15.7. Individual and summed probability distributions for the five $^{14}C$ dates associated with Altamaha period ceramics on St. Catherines Island.

Although postponing our detailed discussion of Mission Santa Catalina de Guale for a future monograph, we feel obliged to complete this consideration of the $^{14}C$ chronology for St. Catherines Island by discussing the five relevant dates on Altamaha ceramics (see table 15.3 and also fig. 15.7).

Two $^{14}C$ samples are available from Mission Santa Catalina de Guale (9Li274), both processed on oyster shells recovered from a mission-period refuse midden found outside the mission convento (Structure 4). Beta-20830 and Beta-20831 were associated with large samples of Altamaha Line Block Stamped and imported Hispanic ceramics.[11] Irene ceramics were entirely absent.

Three radiocarbon dates (Beta-20802, Beta-20804, and Beta-20811) were processed on marine shells recovered from historic period deposits at 9Li13, a midden developed in the pueblo village on the outskirts of Mission Santa Catalina. Altamaha ceramics were associated with all three samples, and numerous olive jar fragments were also recovered from these deposits (although not necessarily in direct contact with the radiocarbon samples).[12]

We have arrayed these five Altamaha period radiocarbon dates from St. Catherines Island as individual probabilities on figure 15.7, with the pooled probability distribution along the bottom of this figure. The

TABLE 15.3
**Comparison of the Northern Georgia Coast (DePratter 1979: table 30, as modified by DePratter 1991: table 1) and the St. Catherines Island Chronologies (as defined in this chapter)**

| Phases | Northern Georgia Coast Chronology Age (Uncalibrated) | Northern Georgia Coast Chronology Age (calibrated) | St. Catherines Island Chronology Age (calibrated) |
|---|---|---|---|
| | A.D. 1700[a] | — | A.D. 1700[b] |
| Altamaha | | | |
| | A.D. 1580 | — | A.D. 1580[b] |
| Irene | | | |
| | A.D. 1325 | A.D. 1310–1390 | A.D. 1300 |
| Savannah | | | Savannah phase deleted |
| | A.D. 1200 | A.D. 1280 | A.D. 1300 |
| St. Catherines | | | |
| | A.D. 1000 | A.D. 1050–1150 | A.D. 800 |
| Wilmington | | | |
| | A.D. 500 | A.D. 630 | A.D. 350 |
| Deptford | | | |
| | 400 B.C. | 400 B.C. | 350 B.C. |
| Refuge | | | |
| | 1100 B.C. | 1360 B.C. | 1000 B.C. |
| St. Simons | | | |
| | 2200 B.C. | 2750–2860 B.C. | 3000 B.C. |

[a] Beginning and ending age estimates for the Altamaha period in the Northern Georgia Coast Chronology are based on historical documentation, not $^{14}C$ dating.
[b] Uncalibrated.

one-sigma limits are complex: cal A.D. 1320–1360 (13.7%), cal A.D. 1390–1530 (70.0%), and cal A.D. 1570–1630 (19.3%); two-sigma limits are cal A.D. 1300–1686.[13]

## CONCLUSIONS AND IMPLICATIONS

This chapter has compared the ceramic and radiocarbon sequences from St. Catherines Island. Ceramic assemblages are available from more than 228 archaeological sites tested to date on St. Catherines Island; although most of these excavations were conducted by AMNH crews, we occasionally employed collections excavated by the University of Georgia. The ceramics were classified according to criteria specified in chapter 14.

A total of 186 radiocarbon dates have now been processed on archaeological samples from St. Catherines Island (table 13.4), and 116 of these dates—from 32 distinct mortuary and 80 midden sites—could be directly associated with datable ceramic assemblages from a single aboriginal period.[14] Sixteen of these dates were processed on charcoal recovered from archaeological contexts. The rest of the samples consisted of marine shells (either oyster or clam); all marine determinations were corrected for reservoir effects according to the protocols spelled out in chapter 13. We feel that this diverse sample of $^{14}C$ dates, which spans more than four millennia, provides a workable set of radiometric controls on the ceramic chronology currently available for St. Catherines Island.

During the first 4000 years of human occupation, the archaeological sequence is generally characterized by sequential and nonoverlap probability distributions (summarized in figure 15.8). The pooled $^{14}C$ evidence from St. Catherines Island indicates that the St. Simons period began about cal 3000 B.C. (or shortly thereafter) and we conclude that the St. Simons period ended about cal 1000 B.C. These parameters differ only slightly from DePratter's (1979a, 1991) estimate that St. Simons ceramics on the northern Georgia coast date from about

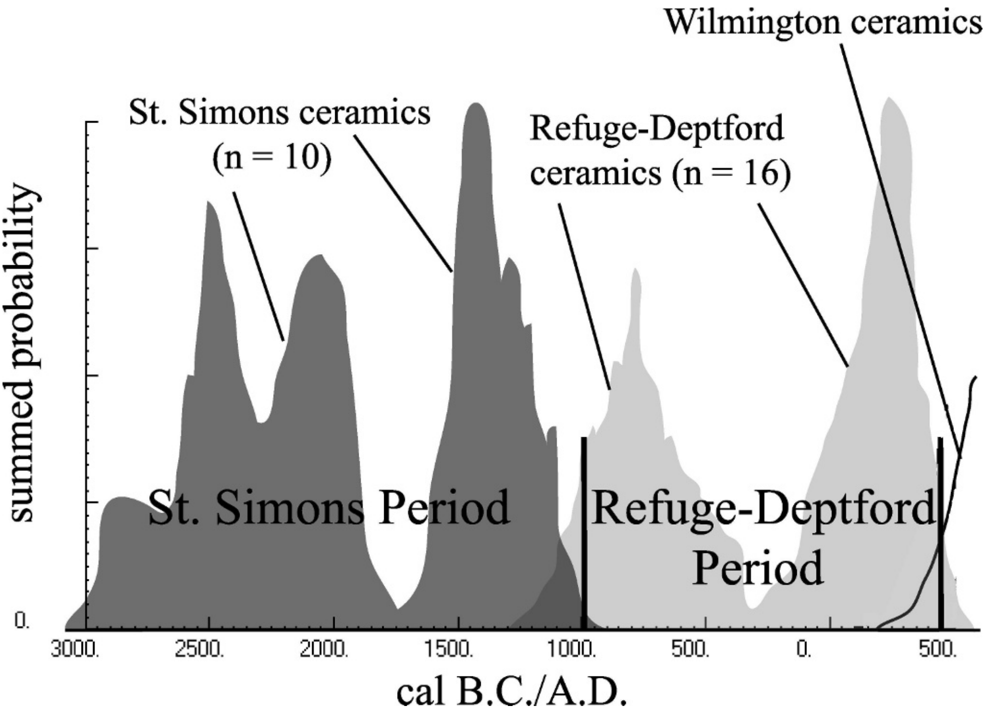


Fig. 15.8. Comparison of overall probability distributions for the St. Simons and Refuge-Deptford, and early Wilmington periods, with the between-period temporal cutoff points delimited.

2200 B.C. to 1100 B.C. When calibrated, these dates convert to cal 2850 B.C./2725 B.C. through cal 1360 B.C./1310 B.C., estimates that are quite close to the St. Catherines Island chronology derived here.

The probability distribution of radiocarbon dates for the Refuge-Deptford period is distinctly bimodal (figs. 15.2 and 15.8). The earlier cluster of dates (ranging between roughly cal 1000–700 B.C., at the one-sigma level), consists mostly of dates derived from mortuary contexts; the later cluster (between about cal A.D. 1–350) is comprised mostly of shell midden dates. The breakpoint between these two clusters (cal 370–260 B.C.) corresponds almost precisely with the boundary between the Refuge and Deptford periods, as defined by DePratter (1979a, 1991). Although the sample sizes of the ceramic assemblages from St. Catherines Island are insufficient to confirm a firm Refuge-Deptford boundary at this point, we certainly suspect this to be the case.

The patterning in figs. 15.2 and 15.8 provides clear-cut evidence that the Refuge-Deptford period on St. Catherines Island ended about cal A.D. 350. As before, the newly established St. Catherines Island chronology closely mirrors DePratter's (1979a, 1991) sequence for the northern Georgia coast. DePratter has previously estimated that the Refuge period ranges from 1100 B.C. to 400 B.C. (which translates to cal 1360 B.C./1310 B.C. through cal 400 B.C.); he also concluded that the Deptford period lasted from 400 B.C. to A.D. 500 (which calibrates to cal 400 B.C. through A.D. 620). We noted that the St. Simons/Refuge period boundary defined for the St. Catherines Island chronology corresponds closely with DePratter's earlier estimate. Similarly, the temporal breakpoint of cal A.D. 350 that characterizes the late Deptford early Wilmington transition on St. Catherines Island is about 280 years earlier than DePratter's previous estimate.

Similarly, the two-sigma limits for the pooled $^{14}C$ evidence (figs. 15.3 and 15.11, below) lead us to conclude that the terminal limit of the Wilmington period is cal A.D.

800 (which, as discussed below, corresponds neatly with the available evidence from the succeeding St. Catherines period). Overall, the St. Catherines chronology defines temporal limits for the Wilmington period that appear to be roughly three centuries earlier than DePratter's (1979a, 1991) original estimate.

Figures 15.4 and 15.11 plot the individual probabilities associated with the 16 available $^{14}C$ dates associated with St. Catherines ceramics. Specifically, figure 15.5 shows a unimodal probability ranging between one-sigma limits of cal A.D. 890–A.D. 1170; the two-sigma limits are cal A.D. 780–A.D. 1270. These data confirm the conclusion, derived above, that the Wilmington–St. Catherines period boundary is about cal A.D. 800.

In other words, this investigation suggests that the boundaries separating the St. Simons, Refuge-Deptford, Wilmington, and St. Catherines periods are relatively crisp, with the degree of overlap roughly corresponding to the two-sigma limits of the intersecting data sets. But refining the post-Wilmington chronology is more complicated because the cultural periods within the northern Georgia coast chronologies (as in most cultural chronologies) tend to become shorter through time. That is, whereas the earliest periods typically span several hundred years (and in the case of the St. Simons period, two millennia), the latest cultural periods last only a couple of centuries. While the fine-grained resolution of the late prehistoric era certainly provides superior chronological control, problems can arise when applying radiocarbon dating because the errors associated with $^{14}C$ dates can extend beyond the shorter duration of these later periods.

### The St. Catherines–Savannah Period Boundary

Defining the terminal boundary of the St. Catherines period is relatively straightforward. The one-sigma limit of the pooled probability distribution (based on the 16 available radiocarbon dates) is cal A.D. 1170, and the two-sigma limit is cal A.D. 1270 (figs. 15.4 and 15.11). Looking strictly at the St. Catherines period data, we will round off this terminal date to be about cal A.D. 1300 (which corresponds almost precisely to DePratter's, 1979a, 1991, previous estimate).

But the temporal limits of the Savannah period are problematic on St. Catherines Island. Investigators have long divided the Southern Appalachian Mississippian tradition into three major ceramic assemblages—Etowah, Savannah, and Lamar—which roughly corresponded with the Early Mississippian (ca. A.D. 1000–1200, uncalibrated), Middle Mississippian (ca. A.D. 1200–1400, uncalibrated), and Late Mississippian (ca. A.D. 1400–1600, uncalibrated; Caldwell and Waring, 1939a, 1939b; Fairbanks, 1950; Wauchope, 1948, 1950). The Savannah period witnessed a dramatic increase in construction of earthen platform mounds in the interior and near the mouth of the Savannah River, most notable at the Irene site (Caldwell and McCann, 1941) and the Haven Home burial mound (also known as the "Indian King's Tomb", 9Ch15; Waring, 1968b).

Considerable debate exists regarding the age of Savannah ceramics on the Georgia coast (Pearson and Cook, 2003: 32). Several investigators have argued that along the northern Georgia coast, Savannah ceramics ended sometime prior to A.D. 1350 (uncalibrated), followed by Irene ceramics (A.D. 1350–1550, uncalibrated; Braley, 1990: 95; DePratter, 1984; Pearson, 1979a, 1984a: 38; Saunders, 2000a: 62–66). Crook (1978b, 1986: 38) contends that the cord-marked, Savannah style ceramics persist on the central Georgia coast until A.D. 1450 (uncalibrated), when Irene ceramics came into widespread use (making the Irene period almost entirely a postcontact phenomenon). Other investigators (e.g., Cook, 1977: 11–13) suggest that cord-marking may have ceased on the central Georgia coast by A.D. 1250 (uncalibrated).

The probability distribution of $^{14}C$ dates associated with Savannah ceramics on St. Catherines Island (figs. 15.5 and 15.9) is bimodal at the one-sigma level, with an early cluster of five radiocarbon dates ranging

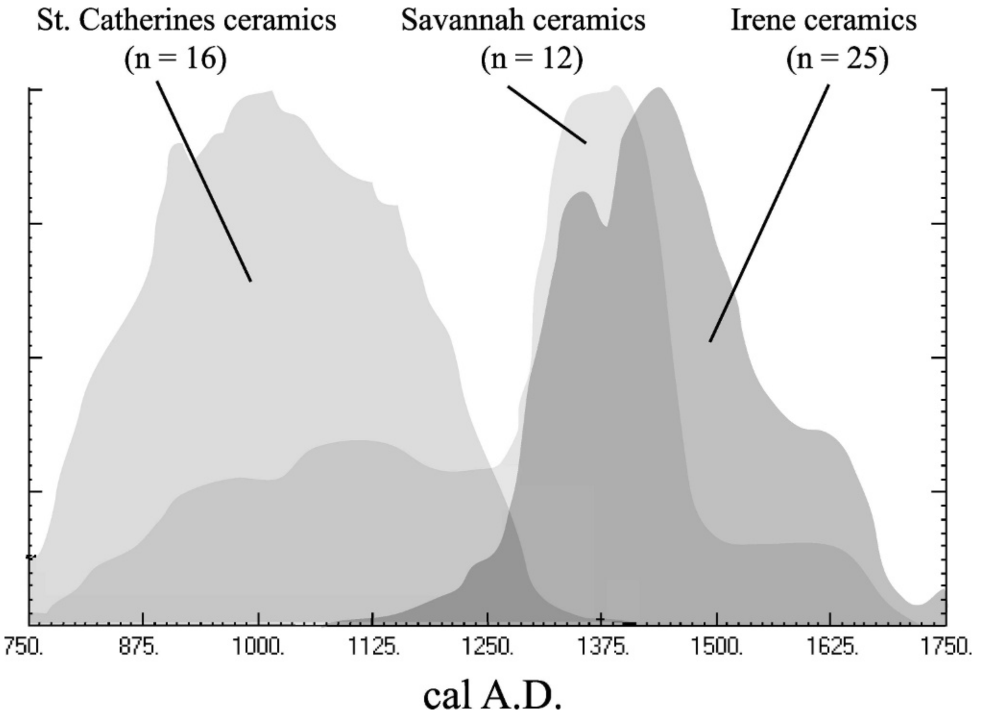


Fig. 15.9. Summed probability distributions of the 53 radiocarbon dates associated with St. Catherines, Savannah, and Irene period ceramic assemblages on St. Catherines Island.

from about cal A.D. 800 through cal A.D. 1300 (and accounting for about 25% of the variability within the Savannah period). Six dates define a secondary peak between about cal A.D. 1300 and cal A.D. 1500; the latest date (Beta-215814) is a late (mostly historic period) outlier.

These results are surprising: The available $^{14}C$ evidence suggests that Savannah ceramics appear on St. Catherines Island about cal A.D. 800 and last until sometime after cal A.D. 1450. These results differ significantly from DePratter's (1979a, 1991) chronology, which estimated the age of the Savannah period to be cal A.D. 1270–A.D. 1300/1380.

More critical than the absolute age estimates, however, is the apparent temporal overlap between St. Catherines and Savannah ceramic assemblages (fig. 15.9). We estimated (above) that cal A.D. 1300 is the terminal boundary of the St. Catherines period—yet nearly one-third of the pooled probability distribution for the Savannah period predate this boundary (see figs. 15.5 and 15.9).[15]

Because of this unexpected overlap, we think it worthwhile to revisit the specifics of the "left-hand" tail for Savannah ceramics on St. Catherines Island (figs. 15.9, 15.10, and 15.11; table 15.2). The four oldest $^{14}C$ dates in this cluster come from a single site, 9Li230. These radiocarbon dates were associated with seven Savannah period potsherds, and the most probable interpretation (expressed above) is that the mollusks dated as Beta-215819, Beta-21398, Beta-215820, and Beta-21399) are coeval with Savannah ceramics.

But given the early age of these $^{14}C$ dates (and the resulting temporal overlap with St. Catherines ceramic assemblages), we must explore an alternative explanation: Suppose that these four mollusk-based radiocarbon dates are actually associated at 9Li230 with an earlier (presumably St. Catherines period) component, as reflected by the four untypable sherds found here—one clay-tem-

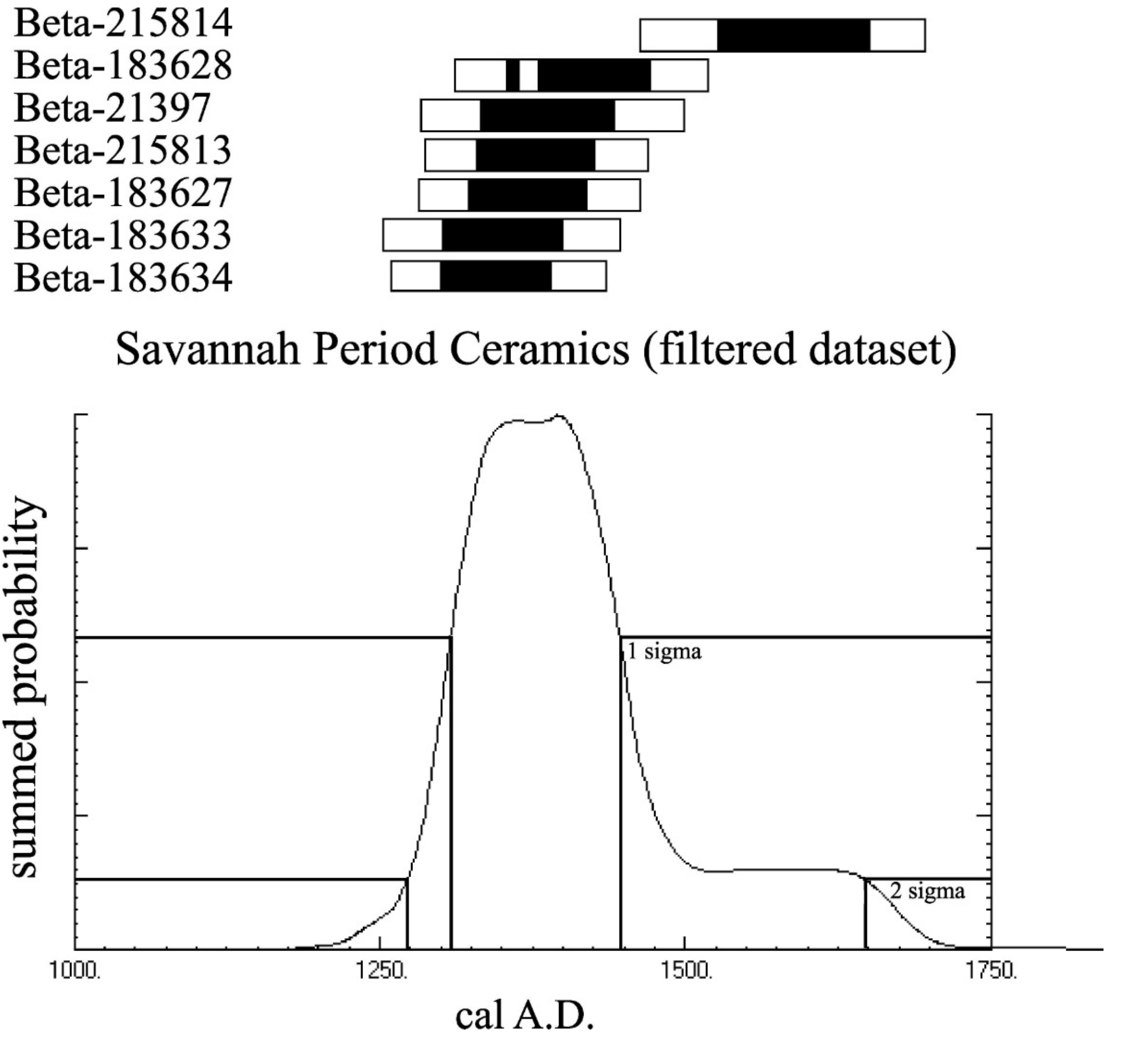


Fig. 15.10. Individual and summed probability distributions for the "filtered" subset of seven $^{14}C$ dates associated with Savannah period ceramics on St. Catherines Island.

pered sherd, another clay/grid-tempered (decorated) potsherd, and the two clay/sand-tempered, decorated sherds. By this alternative view, the seven Savannah Cord-Marked and Savannah Plain sherds actually postdate the four radiocarbon dates (despite their physical association in the midden).

The other "early" $^{14}C$ date for the Savannah period is Beta-215812, from the Seaside midden (9Li169). The *Mercenaria* in question was recovered from a 10 cm level that contained *only* Savannah period sherds ($n = 29$ from three distinctive types); but an alternative perspective might argue instead the five clay-tempered decorated sherds recovered in other test units at this same site suggest that Beta-215812 was actually associated with an earlier (presumably St. Catherines period) occupation, thus accounting for the anomalous early date on Savannah ceramics.[16]

While neither of these "alternative" explanations is particularly parsimonious, it is possible to argue that the five $^{14}C$ dates from 9Li230 and 9Li169 must all be rejected as valid associations with Savannah ceramics. If so, then the "early", left-hand tail

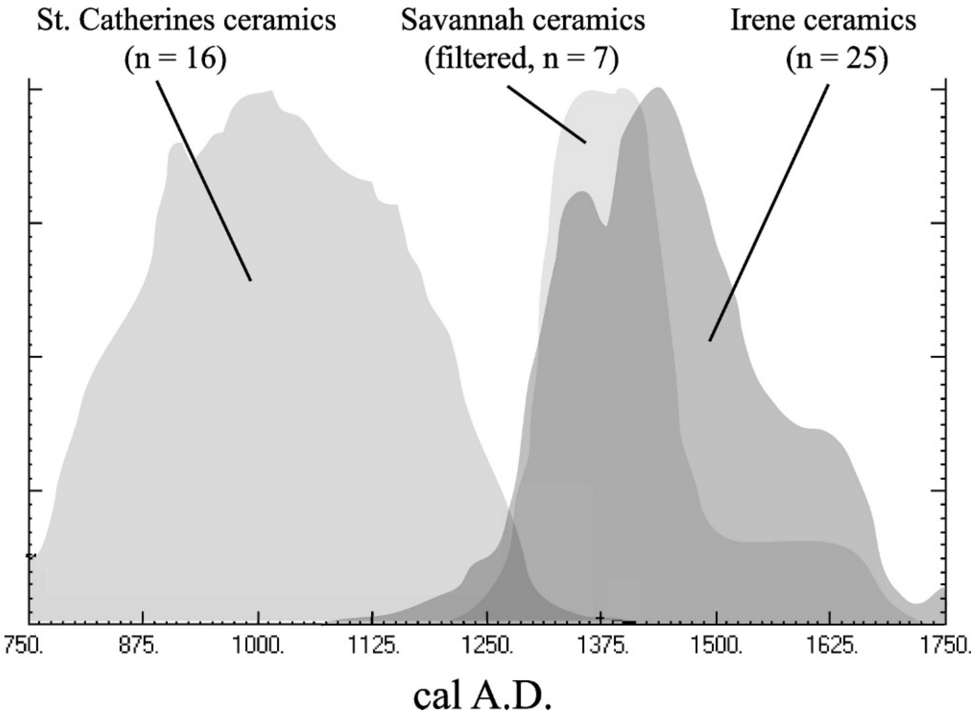


Fig. 15.11. Summed probability distributions for the 48 radiocarbon dates associated with St. Catherines, Savannah, and Irene period ceramic assemblages on St. Catherines Island. Note that the Savannah suite of $^{14}C$ dates has been "filtered" according to criteria discussed in the text.

dates from the Savannah period probability distribution (fig. 15.5) would disappear, as would any overlap with the preceding St. Catherines period.

This alternative, "filtered" interpretation appears as figure 15.11, a unimodal distribution with one-sigma limits of cal A.D. 1310–A.D. 1450; the two-sigma limits are cal A.D. 1270–A.D. 1650. These results square quite nicely with DePratter's (1979a, 1991) estimate for the beginning of the Savannah period (cal A.D. 1270) and, more perhaps importantly, avoid the difficult temporal overlap with the preceding St. Catherines period (thereby preserving the cal A.D. 1300 boundary between the St. Catherines and Savannah periods).

Personally, I am uncomfortable with this "filtered" distribution because it privileges a few, untypable potsherds over the vastly more numerous (typable) Savannah period sherds found at 9Li169 and 9Li230; this is why I prefer the probability distribution of figure 15.9 over figure 15.11. But for now, we will move beyond the apparent temporal overlap of Savannah/St. Catherines ceramics to examine the terminal boundary of the Savannah period (and we return to "The Savannah Problem" later in this chapter).

### The Savannah–Irene Period Boundary

Based on the pooled probability distribution of the 12 available $^{14}C$ dates associated with Savannah ceramics on St. Catherines Island (fig. 15.5), one must conclude that the terminal boundary of the Savannah period lies between cal A.D. 1470 (one-sigma) and cal A.D. 1640 (two-sigma). These results are considerably more recent than DePratter's (1979a, 1991) estimate of A.D. 1325 (cal A.D. 1300–1380).

Figure 15.6 indicates that Irene ceramics first appeared on St. Catherines Island about cal A.D. 1300, a figure that corresponds closely to DePratter's (1979a, 1991) estimate of A.D. 1325 (cited above)

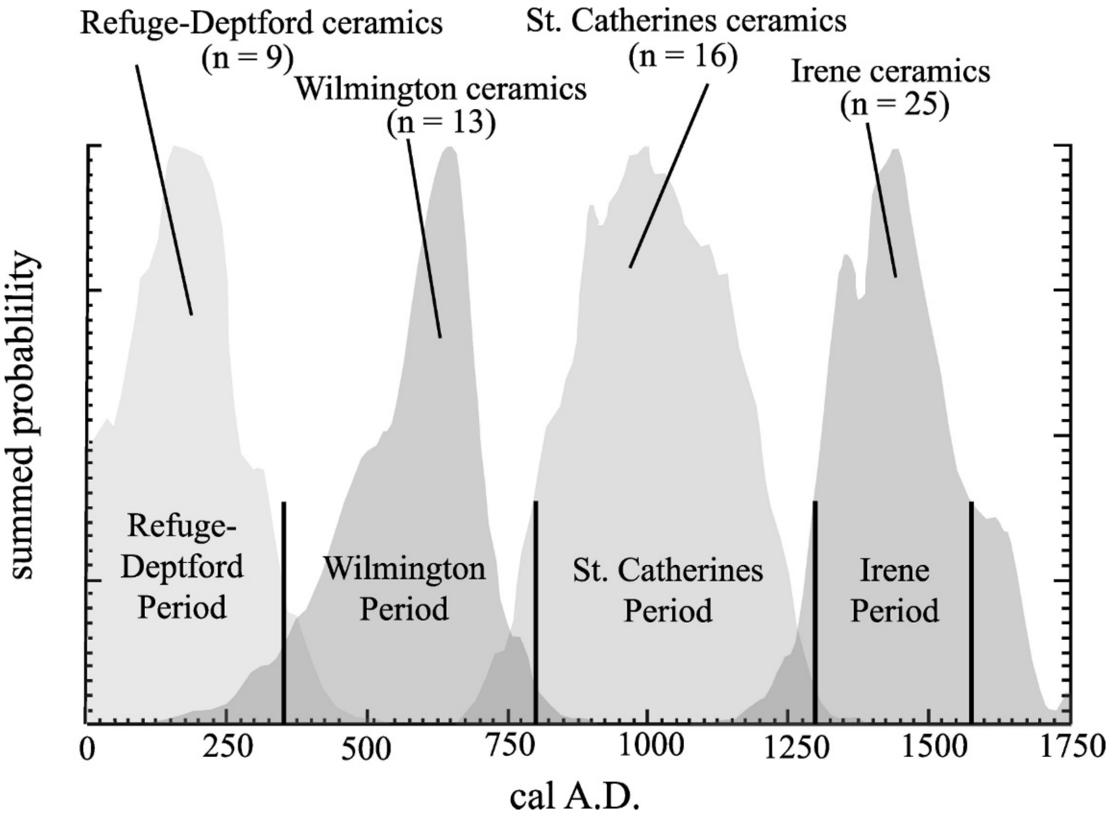


Fig. 15.12. Comparison of overall probability distributions for the late Deptford, Wilmington, St. Catherines, and Irene periods, with the between-period temporal cutoff points delimited.

for the Savannah/Irene boundary (see also figs. 15.9, 15.11, and 15.12). Figure 15.6 also clearly documents how the overall probability distributions of the St. Catherines and Irene period $^{14}C$ dates likewise intersect at cal A.D. 1300.

Above, we entertained a more "conservative" interpretation for the Savannah chronology by rejecting all five $^{14}C$ dates that defined the "left-hand" tail of the Savannah temporal distribution (thereby eliminating the apparent overlap with the St. Catherines period). Even if one favors this "filtered" data set, which I do not, the Savannah–Irene overlap is also significant and remains to be explained (fig. 15.11).

So let us examine the specific context of these distributions. The distinctive cluster of seven dates on Savannah ceramics (from 9Li211 and 9Li169; see table 15.2 and fig. 15.5) fall precisely within the temporal limits previously hypothesized in DePratter's northern Georgia Coast chronology (1979a: table 30, 1991: table 1), in which DePratter defined the Savannah period as lasting only 125 years (A.D. 1200–1325, uncalibrated), which compresses somewhat when calibrated dates are employed (cal A.D. 1270–cal A.D. 1300/1380). Only Beta-215814 (from 9Li189) seems to fall outside this range, although the associations would seem to indicate that it is a "pure" Savannah period assemblage. In other words, by reviewing the post-cal A.D. 1250 dates for Savannah ceramics, we can find no "alternative" explanation. With a single exception, each available $^{14}C$ dated seems to be a valid age estimate for the associated Savannah ceramics.

But what about the contemporary and overlapping dates associated with Irene ceramics? Five, or perhaps 10, of the $^{14}C$

dates associated with Irene potsherds seem to predate DePratter's estimate of A.D. 1325 (cal A.D. 1300/1380) for the earliest Irene occurrence (table 15.2; figs. 15.9 and 15.11). Most of these early Irene dates come from Meeting House Field (9Li21), a carefully excavated, unquestionably "pure" Irene occupation—totally lacking Savannah ceramics and providing radiocarbon dates processed on both charcoal and marine shell (see chap. 21; Saunders, 2000a: chap. 5). Beta-20821 (from 9Li197), Beta-217228 (9Li216), and Beta-20817 (9Li194) likewise derive from solid Irene contexts, without trace of Savannah ceramics present. Each of these radiocarbon dates seems to provide valid age estimates for Irene ceramics.

This suite of more than four-dozen $^{14}C$ dates reflects a serious difficulty within the Savannah period chronology on St. Catherines Island, and the next section discusses the "Savannah Problem" in some detail.

### The Savannah Problem

Simply stated, the Savannah Problem is this: *If the St. Catherines period ends at cal A.D. 1300, and the Irene period begins at the same date, what becomes of the "intervening" Savannah period?* Even if one might wish to discount the overlapping radiocarbon dates that characterize the St. Catherines and Savannah periods (ca. cal A.D. 800–1300), there is no alternative explanation to account for the temporal overlap between Savannah and Irene ceramics (ca. cal A.D. 1250–A.D. 1450).

DePratter (1991: 183–189) previously anticipated this difficulty, at least in part. Writing about the Savannah ceramic assemblage, DePratter (1991: 183–189) observed that three of the pottery types—namely, Savannah Burnished, Savannah Plain, and Savannah Complicated Stamped—seem to be clearly restricted to the Savannah period. In addition, he noted that for two additional types (Savannah Cord Marked and Savannah Check Stamped) "some evidence [exists] from [the] Irene site that this type extends into [the] Irene period" (see also Williams, 2005: 186–187, for additional difficulties attending the "Savannah period" ceramic types, particularly as reflected on the Georgia Piedmont).

We now must question whether *any* of Savannah ceramic types actually define a unique, discrete time interval on St. Catherines Island. Because roughly 50 radiocarbon dates were utilized to define the temporal distributions of the St. Catherines, Savannah, and Irene periods, we feel a certain degree of confidence in the results. Whereas the St. Catherines and Irene ceramic complexes exist within clear-cut, distinct, and definable temporal intervals, the Savannah ceramic types apparently bleed into the earlier and later periods, failing to define any unique temporal segment that can properly be called "Savannah" (at least on St. Catherines Island).

The Savannah Problem transcends the details of ceramic chronology because these temporal limits directly condition the way in which we define archaeological *components* within the various sites encountered during the Island-wide survey strategy on St. Catherines Island, and accurate assignment of archaeological components is critical because such determinations directly condition the specific temporal assignment of bioarchaeological and zooarchaeological assemblages (especially seasonality estimates) for each archaeological site.

One problem, of course, is the nature of the archaeological research design employed here. Above, we cited DePratter's (1979a: 113) cautions about attempting fine-grained temporal designations employing small ceramic samples (because the minority types will often be poorly represented). This is simply a limitation that accompanies our regional sampling research design. We know, for instance, how the extensive, Island-wide approach hampers our ability to distinguish Refuge from Deptford period occupations (resulting in the awkward "Refuge-Deptford period"). This does not mean that "pure" Deptford and "pure" Refuge components do not exist on St. Catherines Island (we know that they do). But we cannot employ the "Refuge" and "Deptford" periods as distinctly "time-sensitive" intervals because, given the coarse-grained nature of the Island-wide research strategy, we cannot make that distinction.

A parallel problem seems to exist with respect to the Savannah period on St. Catherines Island. Do pure Savannah components exist on St. Catherines Island? Yes, they do (just as they exist on other barrier islands and at the Irene site where the occupation is primarily Savannah period over multiple mound stages; Caldwell and McCann, 1941). Pure St. Catherines period sites also exist, as do pure Irene period sites. With larger sample sizes, we might well be able to isolate specific time periods during which only St. Catherines, only Savannah, and only Irene ceramic assemblages were being produced.

Thus we must ask: *Are "Savannah period ceramics" time-sensitive on St. Catherines?* Yes, they are. But given the radiocarbon and ceramic samples at hand, this demonstrable temporal range of Savannah ceramics is so large (from roughly cal A.D. 800 through cal A.D. 1300) that they significantly overlap with the previous (St. Catherines) and succeeding (Irene) ceramic complexes. Because we are using ceramic evidence to define, unambiguously, the various archaeological components, we cannot employ the "Savannah period" in the St. Catherines Island chronology.[17]

Let us be quite clear on this point. Our results are specific to St. Catherines Island and we make no claims for elsewhere—along the northern Georgia coast or anyplace else. We have previously cited the caution of Joseph Caldwell when he mused whether each of Georgia's barrier islands might actually have a different ceramic sequence. We suspect that as finer grained archaeological data become available from the Georgia Bight, Caldwell's prescient suggestion will prove to be correct—perhaps in dramatic fashion.

So to sum up, given the available radiocarbon evidence, the extremely short duration of the Savannah period (likely less than a century), the temporal overlap with the St. Catherines and Irene periods, and the relatively small ceramic assemblages generated in the Island-wide survey, we cannot adequately define "Savannah" period components on St. Catherines Island.

## The Irene–Altamaha Period Boundary

Defining the terminal date for the Irene period is likewise problematic. DePratter (1984: 53) suggested that the Irene period ended at A.D. 1550 "due to intensive European contact", with the Altamaha Period beginning at that date. Since that time, further research at Santa Elena (South Carolina) has convinced DePratter (pers. commun.) that the Irene/Altamaha shift did not occur until somewhat later. Because virtually no Altamaha ceramic materials appear at Santa Elena, DePratter (1991) now argues that A.D. 1580 is the best estimate for the Irene–Altamaha transition (based on the occupational span at Santa Elena and its abandonment in 1587). Because this estimate is based on historical evidence (rather than radiocarbon dating), it is not subject to calendrical calibration.

With respect to the available radiocarbon data from St. Catherines Island, figure 15.6 indicates that the one- and two-sigma limits bracket the *uncorrected*, historically derived age of A.D. 1580. Using a one-sigma cutoff point, the maximum age of Irene ceramics becomes cal A.D. 1530; conversely, employing the more conservative, two-sigma breakpoint leads to an estimate of cal A.D. 1680 as the maximum age for Irene ceramics on St. Catherines. In other words, depending on the statistical criteria employed, the probability distribution of $^{14}C$ dates for the Irene period either does or does not extend into the historic period. While recognizing these disparities, we will follow DePratter (1979a, 1991) in utilizing the historically derived estimate of A.D. 1580 as the terminal date of the Irene period in the St. Catherines Island chronology.

Figures 15.7, 15.9, 15.11, and 15.12 demonstrate the degree of temporal overlap between St. Catherines, Savannah, Irene, and Altamaha period ceramic assemblages. The available $^{14}C$ data from 9Li13 and 9Li274 (two mission-related sites at Wamassee Head on St. Catherines Island) suggest that Altamaha ceramics date as early as cal A.D. 1310 and 1450—at least a century prior to Spanish contact. This surprising result conflicts with (1) the prevailing opinion that

Altamaha Line Block Stamped ceramics are the hallmark of the Spanish mission period on the Georgia coast and (2) the compelling evidence that Altamaha ceramics are absent from the Spanish settlement at Santa Elena (South Carolina), occupied between A.D. 1566 and A.D. 1587 (DePratter, pers. commun.). We suspect that the St. Catherines Island results may well highlight the shortcomings of attempting to apply radiocarbon methods to historic-period contexts; but given the significant degree of island-to-island variability along the Georgia Bight, we still think it worthwhile to explore all potential avenues of chronological information.

The terminal dates for Altamaha series ceramics fall between cal A.D. 1660 and cal A.D. 1800 (depending on whether one employs the one- or two-sigma cutoff points). If we round off the results to cal A.D. 1700, the radiocarbon evidence roughly corresponds with the abandonment of Mission Santa Catalina de Guale and signals the end of the Spanish period on St. Catherines Island.

## THE ST. CATHERINES ISLAND CHRONOLOGY: A SUMMARY

Table 15.3 compares the newly derived St. Catherines Island chronology with DePratter's (1979a, 1991) northern Georgia coast chronology. To the left is DePratter's original chronology (expressed in uncalibrated years A.D./B.C.). The middle column converts DePratter's initial estimates into "calibrated" years A.D./B.C. (using the CALIB conversion program, as discussed in chap. 13). The right-hand column summarizes the St. Catherines Island chronology (also expressed in calibrated years A.D./B.C.). Figures 15.8 and 15.11 translate the statistically based probability distributions into concrete temporal ranges, employing the evidence and criteria presented previously in this chapter.

The St. Catherines Island chronology can be summarized as follows:

**St. Simons period** (cal 3000 B.C.–1000 B.C.): begins about 200 years earlier than DePratter's (1979a, 1991) estimate for the Northern Georgia coast and lasts 360 years later. In the St. Catherines Island chronology, the St. Simons period expands from 14 to 20 centuries in duration.

**Refuge-Deptford period** (cal 1000 B.C.–A.D. 350): begins 350 years later than previous estimates and lasts almost 300 years later; the Refuge-Deptford period contracts from 20 to 13.5 centuries in duration. The break between Refuge and Deptford periods probably occurs at cal 350 B.C.

**Wilmington period** (cal A.D. 350–A.D. 800): begins and ends about three centuries earlier than DePratter's (1979a, 1991) previous estimate. Both chronologies estimate that the Wilmington period lasted about four centuries.

**St. Catherines period** (cal A.D. 800–A.D. 1300): begins 300 years earlier than the previous estimate and ends about the same time. In the transition from the Northern Georgia coast chronology to the St. Catherines Island chronology, the St. Catherines period expands from <200 years to 5 centuries in duration.

**Savannah period:** DePratter (1979a, 1991) previously estimated that the Savannah period ranged between A.D. 1200 to A.D. 1325 (in uncalibrated $^{14}C$ years), which translates to cal A.D. 1280–1310/1390. The available $^{14}C$ evidence from St. Catherines Island indicates that whereas Savannah ceramics do define a unique temporal span (estimated to be roughly cal A.D. 1000–1500), this interval overlaps completely with the St. Catherines and Irene periods. So, for the purposes of the St. Catherines Island chronology, we will not employ the "Savannah period" as a distinct archaeological interval. Instead, we now recognize that the Savannah ceramic complex spans the late St. Catherines and early Irene periods.

**Irene period** (cal A.D. 1300–A.D. 1580 [uncalibrated]): begins less than a century earlier and ends at the historically derived age of A.D. 1580. Although these dates correspond closely to DePratter's (1979a, 1991) previous estimates, the duration of the Irene period in the St. Catherines Island chronology shrinks from about 2.5 centuries (in the Northern Georgia coast chronology) to about 150 years, from cal A.D. 1300 through A.D. 1580 (calibrated to cal A.D. 1450).

**Altamaha period** (A.D. 1580–A.D. 1700 [uncalibrated]): Although the available $^{14}C$ suggests that production of Altamaha Line Block Stamped ceramics may have begun a century or two prior to the Spanish mission era, we will follow DePratter's (1979a, 1991) procedure of employing historically derived estimates.

To conclude, we feel that our St. Catherines Island results stand as an overwhelming confirmation of the previous research on the ceramic chronology for Georgia's north coast. Despite the rarity of absolute dating available at the time, DePratter's (1979a, 1991) chronological estimates fully anticipated the $^{14}C$ dates now available from research conducted on St. Catherines Island. Most of the proposed revisions involve a temporal shift of a century or two and the maximum discrepancy is less than 400 years. Considering that the chronologies cover a temporal span of nearly 5000 years, this comprises less than a 10 percent change. The only major change—the difficulty of observing the Savannah period using radiocarbon methods—was also partially anticipated by DePratter (1991: 183–189).

We view these results as a tribute to those who have worked to evolve the ceramic chronology of the northern Georgia coast—particularly Joseph Caldwell, Antonio Waring, and Chester DePratter. We feel privileged to follow in their footsteps and fully anticipate that additional revisions to the research reported here will be necessary.

## NOTES

1. In chapter 16, we consider some of the important site formation processes involved in the deposition of ceramic samples in the shell middens of St. Catherines Island.

2. Unless otherwise indicated, all $^{14}C$ evidence discussed in this and subsequent chapters will be (1) expressed in terms of two-sigma confidence limits and (2) calibrated according to their probability distribution (formerly known as Method B); for reasons discussed in chapter 13, the so-called intercept approach (Method A) will not be employed.

3. As explained in chapter 12, the St. Catherines Island chronology follows DePratter (1979a, 1991) in using the term "period" to characterize each of these temporal intervals.

4. These conventions and their derivations were discussed in detail in the previous chapter.

5. Additional $^{14}C$ evidence is available from the Seaside I Mound (Thomas and Larsen, 1979: 84–99), one of two mortuary mounds located immediately to the north of transect D-6 (see chap. 20). Feature 2 at Seaside I is one of several pits dug into the premound surface at Seaside I; Joseph Caldwell and the University of Georgia team processed two $^{14}C$ dates (UGA-SC3 and UGA-104) from this feature. Although UGA-SC3 overlaps slightly with the latest $^{14}C$ dates available for the St. Simons period (at the two-sigma level; fig. 15.1), we think that the large standard error associated with UGA-SC3 probably accounts for the overlap. Because of the lack of clear-cut ceramic associations, we have not included the Seaside I Mound dates on table 15.2.

6. The observed boundary is actually cal 1100 B.C., but given the small samples available for the St. Catherines periods, we have rounded off the intersection of the two probability curves to cal 1000 B.C.

7. As discussed above, the University of Georgia processed three radiocarbon dates from the Seaside middens (9Li169), associated with Seaside Mounds I and II (discussed above): UGA-105, UGA-SC2, and UGA-SC1. Although the available fieldnotes indicate that the associated middens contain mostly Wilmington ceramics, the resulting $^{14}C$ dates are more consistent with St. Catherines period dates. Because of this typological uncertainty, and the large standard errors associated with these three dates, the 9Li169 results are not included in this chronological analysis.

8. The following sherds were associated with Beta-21400 and Beta-21401 at 9Li220: Test Pit II, 0–10 cm, Wilmington Heavy Cord Marked (7), Wilmington, shell scraped (2); 10–20 cm, Wilmington Cord marked (2), Wilmington, sandy (1).

9. The following sherds were associated with Beta-20827 at 9Li200: Test Pit I, 0–10 cm, Wilmington Plain (2), St. Catherines Plain (4), 10–20 cm, Wilmington Plain (6), 20–30 cm, Wilmington Cord Marked (1), Wilmington Plain (2), St. Catherines Plain (2); 30–40 cm, St. Catherines Fine Cord Marked (1), St. Catherines Burnished Plain (5), Wilmington Plain (12), St. Catherines Plain (1); 40–50 cm, Wilmington Plain (4), Irene (1), clay + sand tempered, burnished plain (2), clay tempered incised (2).

10. We omit Beta-30271, from a relic *Mercenaria* valve that obviously predates the archaeological deposits.

11. Two additional samples, Beta-21975 and Beta-21976, were taken from the dripline shell concentration on the eastern convento margin; this deliberate architecture feature was added sometime during the construction and/or occupation of the convento, to retard erosion due to runoff from the thatched roof. Both of these architectural dates are clearly too ancient, likely oyster shells salvaged from nearby midden deposits. We will not use these dates in the following discussion.

12. The University of Georgia also processed a radiocarbon date (UGA-120) from their excavations at Wamassee Head, 9Li13, but we are uncertain about the precise ceramic associations and will exclude this date from consideration here.

13. We exclude the small blip at cal A.D. 1790–1800, which accounts for only 0.007% of the overall distribution.

14. We are discounting the radiocarbon dates associated with "transition" assemblages, such as the "Irene–Savannah" and the "Wilmington–St. Catherines" periods.

15. Figures 15.8 and 15.11 compare the probability distributions for the St. Catherines, Savannah, and Irene periods, computed in two different ways.

16. This view ignores, of course, the possibility of a "later" contamination from the five (untypable) grit-tempered sherds found at 9Li169.

17. When asked to comment on these results, Chester DePratter (pers. commun.) commented that "I think that you do have a Savannah Period occupation on the island, but it is brief and hard to delineate with radiocarbon dating. … I never thought that Savannah lasted more than 100 years or a little more, and on St. Catherines it may be as little as 50 years. Could it be that you are just not picking it up with radiocarbon dating using samples from mixed contexts?" This suggestion makes sense to me: We may well have a "Savannah Period" occupation on St. Catherines Island, but the available radiocarbon record might lack the resolution to detect that occupation. Perhaps this issue could be resolved by additional, more fine-grained AMS dating of soot-encrusted sherds, per the excellent example of Stephenson and Snow (2004); see also chapter 16.

# CHAPTER 16. ADDRESSING VARIABILITY IN THE POOLED RADIOCARBON RECORD OF ST. CATHERINES ISLAND

David Hurst Thomas

During our 1970s excavations at the Seaside and Cunningham mound groups on St. Catherines Island, we were surprised by the "periodicity" that seemed to characterize the distribution of radiocarbon dates from these sites: "The unexpected has occurred: six mean dates account for 90 percent of the radiocarbon dates. The individual dates within any cluster are statistically identical—that is, they seem to estimate a single parametric age—and the clusters are distinct from one another. This is an unusual situation in radiocarbon dating" (Thomas and Larsen, 1979: 139). Why would the 29 available radiocarbon dates—from nine separate burial mounds and ranging across two millennia—fall into six temporally distinct clusters?

A quarter-century later, while pulling together the first draft of this monograph, I was still puzzling over the same "periodicity" evident in the new suite of $^{14}C$ dates available from St. Catherines Island. Figure 16.1 plots the summed probability distribution of this dataset, as it existed as of December 2005. Although the sample of $^{14}C$ dates had grown markedly (to 116 "cultural" dates available from aboriginal contexts on St. Catherines Island), the same periodicity, noted earlier, seemed to persist.[1] In particular, figure 16.1 shows several obvious peaks that characterize the middle age-range of the Deptford, Wilmington, St. Catherines, and Irene periods, separated by equally obvious valleys that seemed to define the boundaries of these temporal intervals.

Given the persistence of such "periodicities"—across a broad range of archaeological operations and strategies—it seemed appropriate to examine the meaning of this patterning: *If the summed probability distribution of radiocarbon dates can somehow be taken as a proxy reflecting the intensity of human population density*—and this is a huge "*if*"—then the aboriginal occupation on St. Catherines Island was characterized by massive cycles of boom and bust, periods of dense human populations followed by lengthy episodes of virtual abandonment.

How do we address this potential significant issue?

## RADIOCARBON DATES AS DATA[2]

John Rick (1987) has posed an important question: Why do archaeologists have such a surprisingly limited vision about the greater potential of radiocarbon dating and its relevance to our understanding of the human past? To be sure, $^{14}C$ dates have been invaluable for anyone wishing to assign a meaningful age to specific archaeological remains. But why, Rick wondered, have archaeologists so commonly overlooked the implications of larger scale distributions of $^{14}C$ dates to frame reasoned conclusions about the past?

Exploring the complex linkages between $^{14}C$ dates and human occupational patterns, Rick (1987: 55–58) likened an individual $^{14}C$ date to a "self-dated artifact," meaning that each "cultural" radiocarbon date "presumably represents human activity at that point in time [and] they can be directly compared to each other" (see fig. 16.2). He argued that analyzing very large samples of culturally relevant $^{14}C$ dates can pinpoint gaps in our knowledge, serve to focus additional research, and provide a potentially effective way to assess macro-temporal and regional patterning. Why not, Rick succinctly suggested, view "dates as data?"

### The $^{14}C$ Histogram

Why indeed?

Literally tens of thousands of $^{14}C$ dates are available today to document the archae-

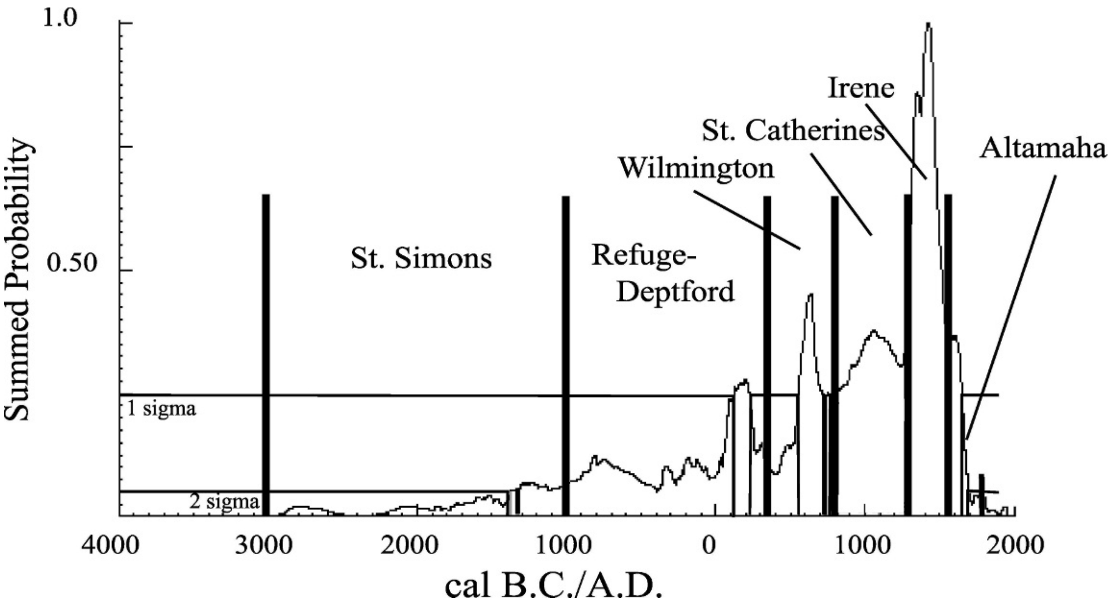


Fig. 16.1. The probability distribution of the 2005 Dataset, comprised of 116 radiocarbon dates available from St. Catherines Island; only $^{14}C$ dates processed *prior* to December 2005 are included in this histogram.

ological record around the globe. But, to underscore Rick's central point, archaeologists are only beginning to explore the empirical theoretical implications of tracking radiocarbon dates on a grand scale.

The term *histogram* now seems firmly embedded in the radiocarbon literature to describe a rather broad range of graphic displays, each depicting the probability distribution of a suite of $^{14}C$ dates over time (Dye, 1995: 851); a few of these $^{14}C$ histograms employ archaeological dates, but this method is also extensively applied to global climatic change, including the study of Holocene sea levels (Geyh, 1980) and solar cycles (Fairbridge and Hillaire-Marcel, 1977).

With respect to archaeological histograms, the number of $^{14}C$ dates can never be translated directly into human population figures. But a growing number of investigators feel that large samples of appropriately selected radiocarbon samples have the potential to provide proxy measures reflecting past human population size and density; that is, charting the variations in the peaks and valleys within a radiocarbon histogram can be interpreted as reflecting the "relative magnitude of occupation" or another cultural trait of interest (such as the introduction and spread of agriculture; see Berry, 1982: 120; Rick, 1987: 56; Dye and Komori, 1992; McFagden et al., 1994).

In an early application of this approach, Haynes (1969: 710–711) used the frequency of radiocarbon dated sites across time to illustrate increasing occupation evidence for the Late Paleoindian period. Berry (1982: 120, figs. 3 and 20) employed histograms of radiocarbon dated cultural remains from the southern Colorado Plateau and southern Basin and Range to track the "relative probability of occupation through time", changing human population densities, and the probable introduction of maize in these two regions (see fig. 16.3). Frison (1991: fig. 2.5) has plotted a histogram showing the age distribution of several hundred $^{14}C$ dates from Wyoming, noting that "the radiocarbon date record suggests significant ecological and cultural developments that coincide with the increase in the numbers of radiocarbon dates" (1991: 26). Ames (1991) and Maschner (1991) constructed "population growth curves" plotting calibrated radiocarbon dates from the southern Northwest coast; Chatters (1995)

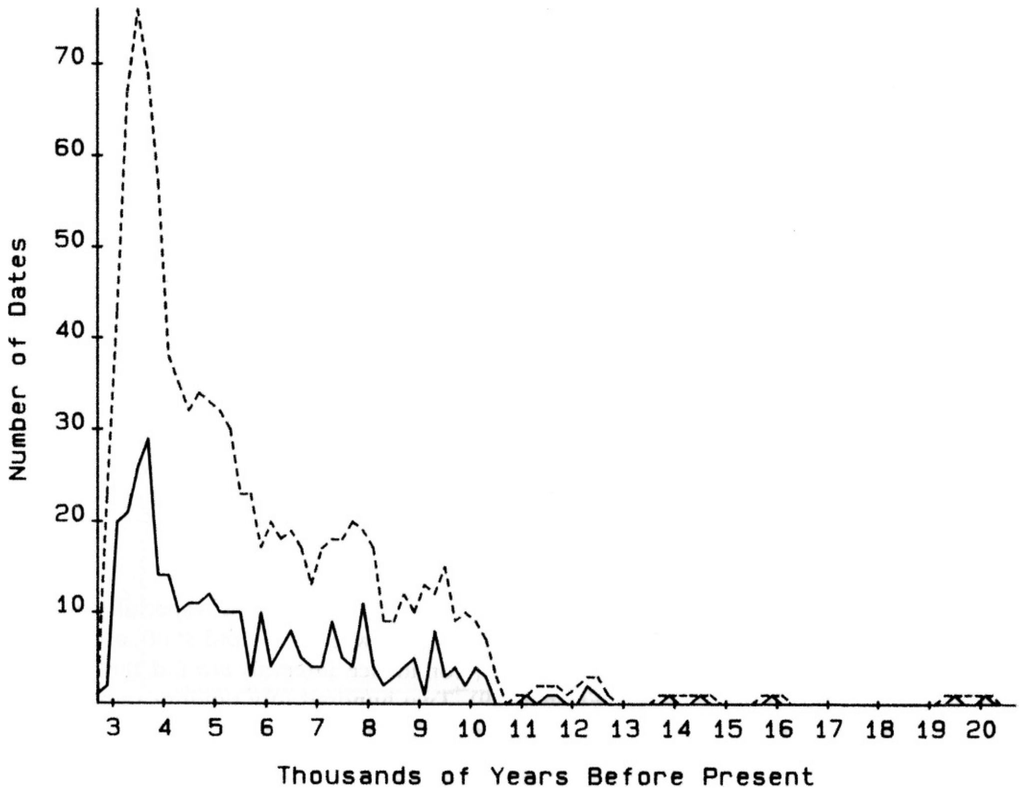


Fig. 16.2. The distribution of (uncorrected) radiocarbon dates ($n = 328$) from the Peruvian coastal preceramic (solid line), with 95% confidence intervals indicated by the dashed line (after Rick, 1987: fig. 3).

assembled a similar histogram using $^{14}C$ dates from pithouse floors and floor feature contexts on the Columbia Plateau (see fig. 16.4). Radiocarbon histograms, many of them incorporating hundreds of $^{14}C$ dates, have also been used to investigate a broad range of natural and cultural phenomena, including population change in Peru and Polynesia (Rick, 1987; Dye and Komori, 1992; McFadgen et al., 1994), the spread of agriculture and changes in habitation intensity in Hawai'i (Allen, 1992; Dye, 1995), and changes in settlement patterning and land use in New Zealand (Streck, 1992; McFadgen et al., 1994).

## Stochastic Distortion Effects in the Calibration Curves

The earliest applications of $^{14}C$ histograms in archaeology simply plotted the mean tendency (generally expressed as uncalibrated radiocarbon years B.P.) in a large series of $^{14}C$ dates, disregarding the associated error terms (e.g., Berry, 1982: figs. 3 and 21; Rick, 1987: figs. 2–9, Frison, 1991: fig. 2.5; Chatters, 1995: fig. 3). But as the magnitude of the de Vries effect became evident (e.g., De Vries, 1958; Stuiver and Reimer, 1993), raw radiocarbon dates were more commonly "calibrated" according to the various, evolving tree-ring chronologies; these "corrected" central tendencies (expressed as cal A.D./B.C.) were often subsumed into histogram bars, without concern for variability measures (e.g., Maschner, 1991: fig. 3; Ames, 1991: fig. 2). Today, we have a powerful array of statistical tools that allow the investigator to sum the calibrated probability distribution by year across samples numbering in the hundreds. As noted in previous chapters,

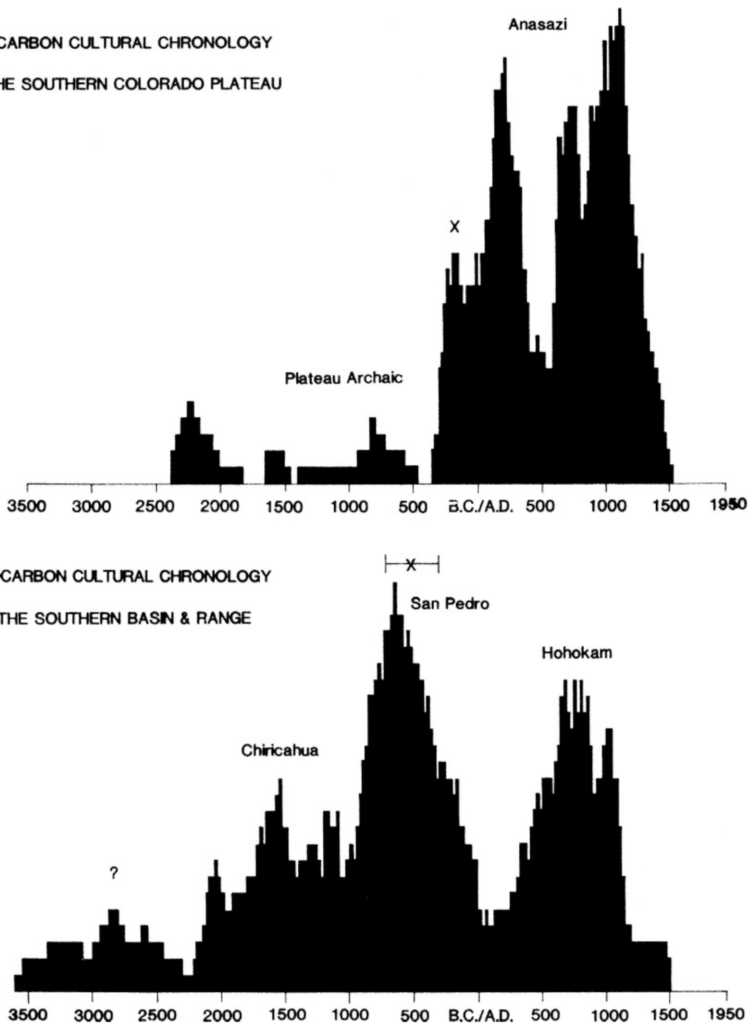


Fig. 16.3. Histograms showing the probability distributions of (uncorrected) radiocarbon dates from the southern Colorado Plateau ($n$ = 151) and the southern Basin and Range ($n$ = 133). The small x's indicate the probable introduction of maize into both provinces (after Berry, 1982: fig. 3).

all $^{14}$C data employed in the present monograph have been calibrated and analyzed according to the protocols set out in CALIB 5.0 (Stuiver and Reimer, 1993; Stuiver et al., 2005).

We now understand that the very process of calibrating $^{14}$C dates itself creates a potential problem because the radiocarbon timescale is not actually linear (see fig. 16.5). In fact, the slope of the distribution of calibrated $^{14}$C dates can become quite irregular due to the interaction of the changing slope of the calibration curve and the stochastic distribution of counting errors (McFagden et al., 1994: 221). The so-called *calibration stochastic distortion* (CSD) effect tends to *deplete* the number of $^{14}$C dates/calendar year on those parts of the calendrical timescale corresponding to gentle slopes of the calibration curve and *increase* the numbers of dates where the slopes are steep (e.g., Geyh, 1980; Stock et al., 1989; Stuiver and Reimer, 1989). That is, because some time spans are represented by flat spots on the curve, the conversion of the B.P. date to calendrical years leads to

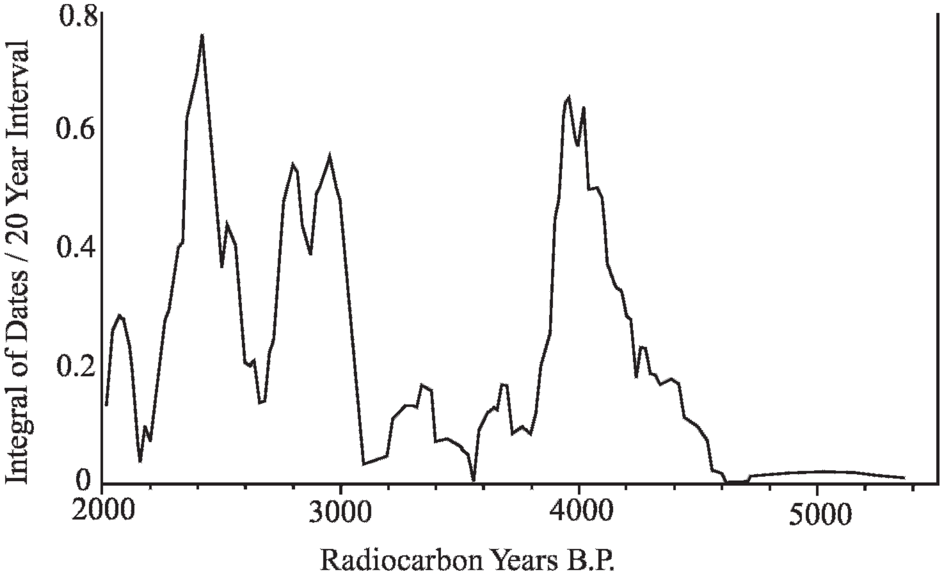


Fig. 16.4. The probability distribution of radiocarbon dates ($n$ = 52) from excavated housepit floors from the Columbia Plateau (after Chatters, 1995: fig. 3).

a wide age range, even if the B.P. date has a small sigma (Stuiver and Reimer, 1989: 823). But for those time periods characterized by a steep gradient in the calibration curve, even B.P. dates with a medium sigma may generate a more precise date in sidereal years.

In other words, there are "good" and "bad" time spans for calibrating $^{14}C$ dates (Evin et al., 1995; Aurenche et al., 2001: 1999–1201, fig. 9). In figure 16.5, we have denoted the various "good" and "bad" intervals during the time span from cal 1000 B.C. to cal A.D. 1 for terrestrial $^{14}C$ samples. The time intervals at cal 900 B.C.–750 B.C., cal 400–300 B.C., and cal 200 B.C.–A.D. 1 provide especially precise calibration of terrestrial samples, but the intervals at cal 750 B.C.–600 B.C. and cal 300 B.C.–200 B.C. provide relatively imprecise calibration for terrestrial dates.

This means that even in a uniformly distributed series of terrestrial B.P. dates, the resulting calibration curve can contain a series of spurious peaks and troughs—creating a stastistical topography that could readily be confused with behavioral patterning in a histogram comprised of calibrated cultural radiocarbon dates. McFagden et al. (1994: 221), for instance, have commented on the "strange results" created by the CSD effect on $^{14}C$ histograms arraying the chronology of New Zealand prehistory, particularly in datasets comprised of both terrestrial and marine dates. Stuiver and Reimer (1989: 823) conclude that such distortion within $^{14}C$ histograms is "unavoidable, even with the most precise mathematical procedure and high-precision $^{14}C$ dating." For this reason, we will attempt to monitor the calibration stochastic distortions in the comparisons below.

CSD effects, it turns out, are considerably more extreme in the terrestrial calibration curves than for the marine calibrations (McFagden et al., 1994: 226). Figure 16.6 demonstrates this relationship by comparing the calibration curves for marine and terrestrial $^{14}C$ samples over the past 5000 years (Hughen et al., 2004; Reimer et al., 2004). Two important points emerge. The most obvious difference between the two curves is the disparity in calibrated age between samples processed on marine shell and terrestrial carbon samples; marine samples consistently produce more ancient calibrated results than their terrestrial counterparts. This result is, of course, due

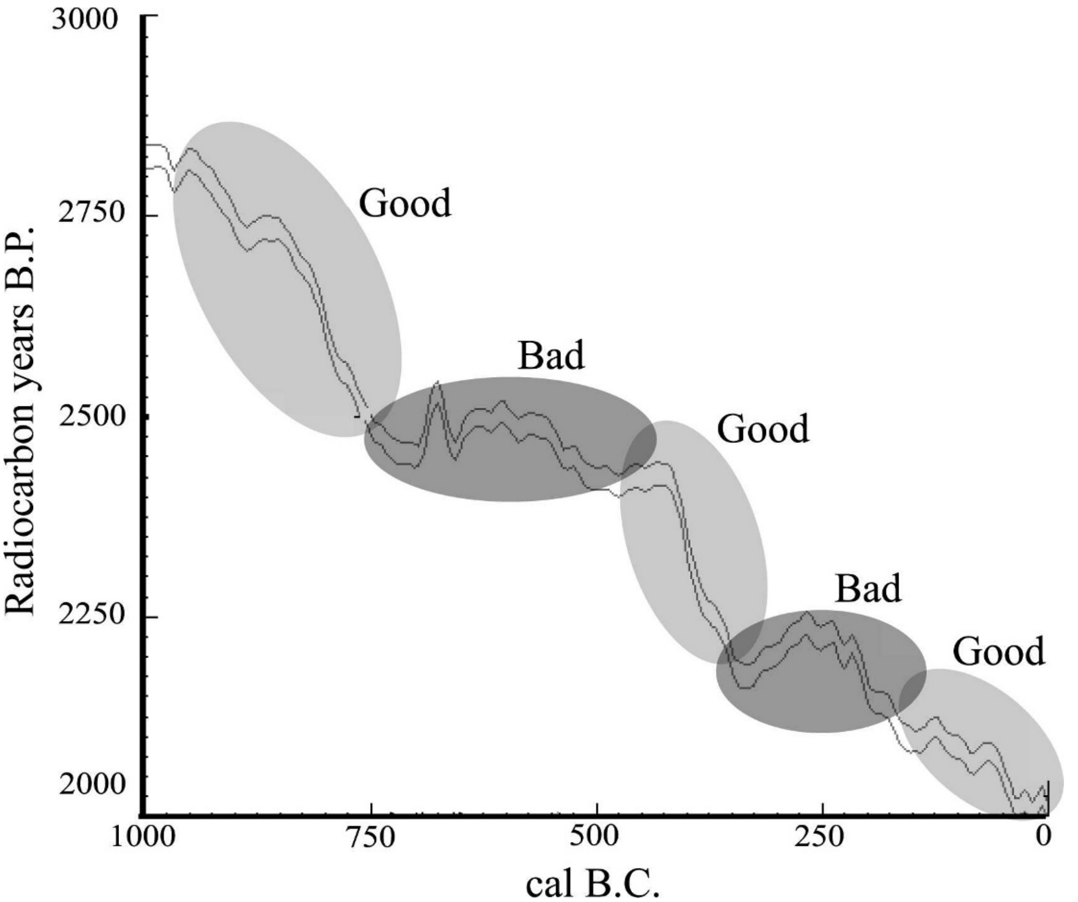


Fig. 16.5. Curve of calibration between cal 1000 B.C. and cal A.D. 1, showing good and bad periods for precise calibrated radiocarbon dating.

to the "reservoir effect" caused by ancient carbonates in the marine ecosystem (as discussed in detail in chap. 13).

Figure 16.6 also demonstrates the differences in shape between the respective calibrations curves: Whereas the terrestrial curve has a jagged outline, the marine calibration curve is relatively smooth, approaching linearity in places. The more jagged the curve, the more pronounced will be the calibration stochastic distortion effects. In simple terms, then, we expect that whereas the calibration of marine samples should produce only minimum calibration distortions, calibrating terrestrial samples can be expected to involve numerous good and bad results, amplifying the degree of stochastic distortion (and hence creating spurious peaks and troughs in the resulting probability distributions).

In the following discussion, we will attempt to consider the degree of distortion involved in the various marine and terrestrial samples available from St. Catherines Island.

## Sampling Biases in $^{14}C$ Histograms

"All things being equal, more occupation produces more carbon dates."

*John Rick (1987: 56)*

"The assumption that the distribution of radiocarbon dates accurately measures 'the rel-

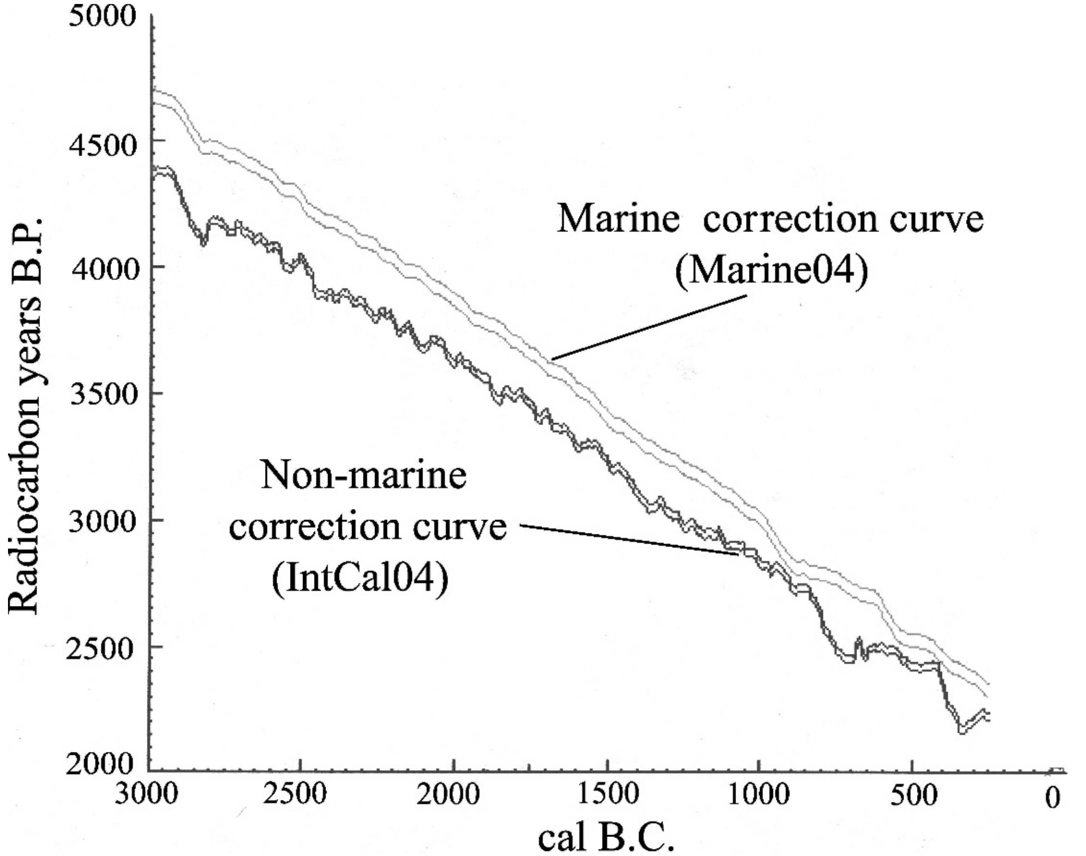


Fig. 16.6. Comparison of the terrestrial and marine calibration curves over the last 5000 years.

ative intensity of cultural activity'… is so implausible as to require no specific refutation."
*Jeffrey S. Dean (1985: 704)*

The use of $^{14}C$ histograms has received decidedly mixed reviews in the archaeological literature, and even proponents stress the importance of maintaining quality controls and standards of consistency in such large-scale chronometric research (e.g., Plog, 1985: 127–128; Rick, 1987: 57–58).

Numerous formation processes cloud the relationship between the human occupational intensity and the number of potential $^{14}C$ samples. Longer burning fires and the intentional burning of vacant structures, for instance, can systematically skew the amount of charcoal available for dating (Dean, 1985: 704–705). Long-distance transport and field processing can reduce the number of datable marine shells within a midden (Bird et al., 2002, 2004b). Changing sea levels can dramatically reduce the number of potentially datable samples at lower elevations (Rick, 1987: 56). Differential preservation can discriminate against sites constructed during different periods and against older dates in general (e.g., bones disappearing from deposits and hence unavailable for dating).

There is also the issue of so-called aberrant dates, age estimates that differ significantly from archaeological expectations or conflict with other available age determinations. Some investigators simply ignore such dates, and others present arguments explaining why certain dates are aberrant. Still others propose and pursue specific research programs to explain how such aberrant dates arise, and what should be done about them; Schiffer's (1982) approach to the "old wood problem" in radiocarbon and dendrochronological dating is particularly noteworthy. The prehistoric events and processes that generate datable materials are numerous, but knowable. But it requires a thoughtful appraisal of circumstances governing the distribution and abundance of potentially datable materials.

Investigator bias remains a huge issue in large-scale chronometric projects, and radiocarbon histograms will always reflect the activities of the archaeologists who generated the samples. Some temporal periods and some regional will always have been more thoroughly investigated than others, and sites of some time periods are more easily identified than others. Stock et al. (1989: 169) have warned of the dangers involved in selecting $^{14}$C dates that accord with "preconceptions" of the geological or archaeological past, especially when dealing with large samples of $^{14}$C dates. As Plog (1985: 129) put it, unless this potentially serious distortion bias can be effectively addressed, the radiocarbon record "becomes one of [modern] archaeological activity as much as that of prehistoric peoples."

We also agree with Dean (1985: 704), who correctly cautions that "the equation of peaks and valleys in the dated sites' curve with occupation and abandonment remains an untested hypothesis." Sometimes, the peaks can result from an archaeological emphasis on large, well-preserved ruins. Similarly, when compiling his database of pithouse features on the Southern Plateau, Chatters complained that a "fascination with the inception of sedentism has led [the] researcher to emphasize earlier pithouses" (1995: 355). Troughs in radiocarbon histograms can easily result from a "lack of archaeological interest", "systematic archaeological neglect", and the presence of undated sites containing poorly understood or intermediate ceramic types (Dean, 1985).

Despite the recognition of the potential skewing effects of various temporal, geographical, and geomorphological biases, we think that John Rick (1987) was basically correct when he argued that "despite intervening biases, I assume that the number of dates is related to the magnitude of occupation, or the total number of person-years of human existence in a given area" (Rick, 1987: 55). This is why, throughout the rest of this chapter, we explore the implications of $^{14}$C histograms drawn from the archaeological record of St. Catherines Island.

## $^{14}$C DATING AND QUALITY CONTROL ON ST. CATHERINES ISLAND

We now return to consider the peaks and troughs evident in the original dataset of 116 radiocarbon dates available from cultural contexts on St. Catherines Island (the so-called 2005 Dataset; see fig. 16.1). As a first step in addressing this variability, we have partitioned the overall $^{14}$C dataset (in fig. 16.1) by context, dividing the available radiocarbon determinations into "mortuary" and "midden" subsamples.

By *mortuary contexts*, we mean those $^{14}$C dates processed on charcoal or shell samples recovered from excavations in the various burial mounds on St. Catherines Island. Figure 16.7 (upper) plots the summed probability distribution from the 36 radiocarbon determinations from 11 burial mounds on St. Catherines Island (South New Ground Mound, Johns Mound, Marys Mound, Cunningham Mounds A, B, C, D, and E, Seaside Mounds I and II, and McLeod Mound; see table 13.4 and chap. 20). Nearly 70 percent (25 of 36) of these $^{14}$C dates are based on charcoal samples of chronostratigraphic significance (the primary humus level, a central log tomb, an intrusive burial, etc); the shell dates derive primarily from shell "caps" and shell-filled pits located beneath (or within) the burial mound proper. The probability distribution plotted in figure 16.7 (upper) is a jagged, basin-and-range configuration that reflects a remarkable periodicity and contemporaneity between events that took place in numerous and widespread mortuary features (see Thomas and Larsen, 1979: 138–143).

The curve at the bottom of figure 16.7 is strikingly different, reflecting the pooled probability distribution from *midden con-*

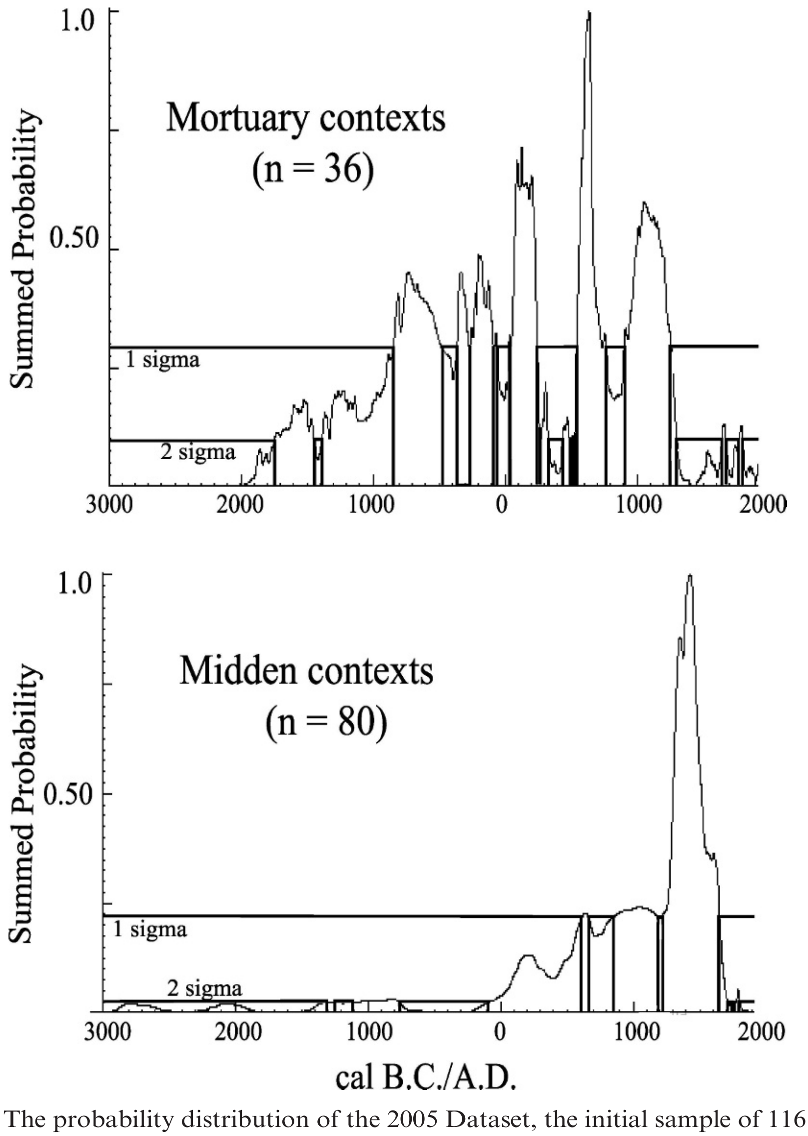


Fig. 16.7. The probability distribution of the 2005 Dataset, the initial sample of 116 radiocarbon dates available from St. Catherines Island, partitioned into mortuary and midden subsamples; only $^{14}C$ dates processed *prior* to December 2005 are included in these histograms.

*texts*—a total of 80 radiocarbon samples collected from refuse deposits in 28 distinct sites on St. Catherines Island (table 13.4); keep in mind that our original sample of $^{14}C$ determinations (the 2005 Dataset) includes *only* radiocarbon dates processed prior to December 2005. Each nonmortuary site consists of one or more aboriginal shell middens, all likely associated with residential base and task group accumulations (see chap. 20).

The probability distribution defined by these shell midden dates differs from mortuary curve in several ways. Unlike the burial mound data, which was heavily skewed towrd the St. Catherines period and older contexts, the midden sample is dominated by Irene period occupations. As a result, the shell midden curve is also considerably smoother than the mortuary profile, reflecting (1) an increased sample size (more than double), (2) a more "continuous'' distribution of the midden dates, and (3) the fact that nearly 90 percent (70 of 80) of the ''midden'' dates are processed on marine shell samples (which, as discussed above, generate a much smoother marine calibration curve than its terrestrial counterpart).

Despite this trend, the composite distribution of $^{14}$C dates from midden contexts contains some very significant gaps (especially prior to cal A.D. 1 and during discrete gaps at cal A.D. 400, cal A.D. 800, and cal A.D. 1300). These intriguing patterns beg two significant (and conflicting) questions:

- Do the ''peaks'' and ''valley'' in the pooled probability profile of the available sample of these 116 radiocarbon dates accurately represent the population of potential $^{14}$C dates on St. Catherines Island or
- Do these statistical distributions merely reflecting our capricious sampling of the radiocarbon record?

Given the differing implications of these two questions, we have decided to deconstruct our own motives in sampling the radiometric record of St. Catherines Island. Why did we elect to run certain samples and to bypass others? Was there an underlying strategy that guided our selection of radiocarbon samples for dating? Or did we just submit $^{14}$C samples on a haphazard basis?

The answer likely lies somewhere between the extremes of deliberate strategy and haphazard choice. In reflecting across our three decades of archaeological research, I can isolate two rather different sampling strategies that conditioned our selection of radiocarbon dates from the aboriginal sites on St. Catherines Island:

- We attempted to pinpoint chronostratigraphic central tendencies
- We also tried to define the temporal range of ceramic variability.

In the next two sections, we will consider these alternative approaches to radiocarbon dating and explore the implications for conditioning (and biasing) the overall probabilistic distribution of the available $^{14}$C dates.[3]

## Seeking Central Tendencies in Chronostratigraphy

The first project by the American Museum of Natural History on St. Catherines Island focused on mortuary archaeology, pursuing four interrelated objectives:

- To discover and map the surviving aboriginal burial mounds on St. Catherines Island
- To define the chronostratigraphic sequences within each mound
- To reconstruct the mortuary behaviors that played out within each mound
- To obtain significant samples of ancient aboriginal human remains for bioarchaeological analysis.

We discuss three of these objectives—the archaeological survey, the reconstruction of ancient mortuary patterning, and the results of bioarchaeological analysis—elsewhere in this volume (and the reader is referred to chaps. 24 and 32). For present purposes, let us focus on the *chronostratigraphic objective*, which directly conditioned how we selected samples for radiocarbon dating.

Throughout our earliest archaeological research program on St. Catherines Island, we attempted to define the chronology and stratigraphy in the various mound sites of the Refuge-Deptford mortuary complex (Thomas and Larsen, 1979; Larsen, 1982). We did this by applying a relatively straightforward field strategy: dig a couple of strata-pits to expose the stratigraphic sequence, define the chronostratigraphic units involved, and estimate their respective ages (using absolute dating techniques and/or assemblages of associated time-markers, generally projectile points and/or potsherds). Once a workable stratigraphic sequence had been established, we expanded outward from the initial test pit(s) to explore the laterally variability within each stratigraphic unit.

Our investigations at Cunningham Mound E (9Li28) show how this strategy played out in practice (see fig. 16.8). We began by excavating two chronostratigraphic units, positioned slightly off center; we hoped that these two test pits would allow us to develop an understanding of the basic mound stra-

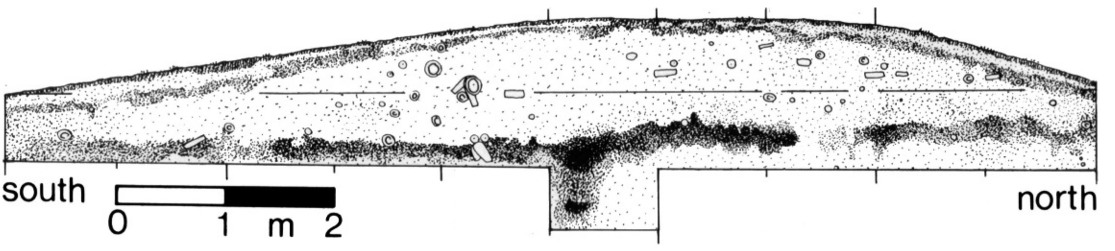


Fig. 16.8. The primary stratigraphic profile at Cunningham Mound E (after Thomas and Larsen, 1979: fig. 44).

tigraphy without destroying the central feature, if present. These initial soundings exposed the basal (sterile) substratum (Unit I) beneath the primary humus (Unit II), which was cut by several barrow pits. The mound fill (Unit III) was subsequently added, and a secondary humus layer (Unit IV) developed across the mound surface. Covering the entire mound surface was Unit V, backdirt from a University of Georgia text pit dug in the early 1970s (Thomas and Larsen, 1979: 75–78).

Because potsherds were absent from the fill at Cunningham Mound E, we had little guidance about the age of the mound deposits. This is why, on the basis of this initial exposure, we processed two charcoal samples recovered from Unit II, the primary humus, which was burned sometime prior to construction of Cunningham Mound E:

(UGA-1559) 1440 ± 60 B.P.
cal A.D. 440–680
(UGA-1561) 1430 ± 60 B.P.
cal A.D. 440–760

These two determinations are statistically the same (at the 95% level, $t = 0.014$), and the mean pooled age of UGA-1559 and UGA-1561 is 1435 ± 42 radiocarbon years, which corrects to a two-sigma age of cal A.D. 550–660. The mean pooled $^{14}C$ age is a better measure of central tendency because (1) the averaged date more accurately estimates the central tendency of the event being investigated and (2) the range of variability is reduced (from two-sigma estimates of 240 and 250 radiocarbon years to a new estimate spanning only 110 radiocarbon years, at the two-sigma level). The pooled $^{14}C$ age effectively estimates the maximum age of the mound, and with this knowledge in hand, we decided to expand the excavation to expose the major east–west stratigraphic profile (Thomas and Larsen, 1979: 75–78).

As it turns out, these two radiocarbon determinations (UGA-1559 and UGA-1561) from Cunningham Mound E belong to a cluster of six statistically identical $^{14}C$ dates from five different mound sites, and the pooled age estimate for all of these Wilmington period mortuary events is cal A.D. 540–640. Subsequent mortuary activity then drops off sharply until about cal A.D. 1000 (the middle of the subsequent St. Catherines period). Looking more closely at the mortuary data, we see that two of these dates come from Seaside Mound I: UGA-112 was processed on charcoal from a log associated with an intrusive ovoid burial pit; UGA-1826 dates marine shell recovered from Feature 15 (a postmound midden). The Cunningham Mound C date (UCLA-1997A) was processed on charcoal contained within Feature 1 (a hearth associated with intrusive Burial 1). The Cunningham Mound D date (UCLA-1997D) and the two dates from Cunningham Mound E (UGA-1559 and UGA-1561) come from charcoal contained in the primary humus. These six dates are statistically indistinguishable, with a mean pooled age of cal A.D. 540–640. This spike is clearly evident in the plot of mortuary dates in figure 16.11, below, comprising 16 percent (6 of 38) of the available mortuary dates from St. Catherines Island.

We employed similar procedures when assessing central tendency during the excavation and analysis of the 122 midden sites tested during the island-wide survey. Site 9Li170, for instance, is a small (but very dense) concentration of decomposing oyster shell. We processed two $^{14}C$ determinations on *Mercenaria* recovered in association with Irene Complicated Stamped sherds:

(Beta-21396, *Mercenaria*) 740 ± 70 B.P.
cal A.D. 1330–1620

(Beta-21395, *Mercenaria*) 580 ± 60 B.P.
cal A.D. 1470–1700

These two radiocarbon dates are statistically the same (at the 95% level, $t = 2.60$), and their mean pooled radiocarbon age is 649 ± 49 radiocarbon years B.P. The calibrated age of this pooled sample (cal A.D. 1450–1650) provides a superior estimate—meaning more accurate and less variable—than the individual dates taken individually. Coupled with the time-compatible ceramic associations, these two $^{14}C$ dates allowed us to define an Irene period component at 9Li170. This was a critical analytical step because we now know the relative age of the seasonality results from *Mercenaria* thin section (chap. 17) and also how to group the zooarchaeological identifications (chap. 22).

We discuss our field strategy at Cunningham Mound E and 9Li170 in some detail, because this procedure typified the selection of most $^{14}C$ dates that comprise the 2005 Dataset (figs. 16.1 and 16.7). In this sampling strategy of seeking out statistically identical $^{14}C$ determinations as chronostratigraphic keys to understanding the mortuary and midden sites, we often processed multiple dates on synchronous clusters of cultural events in the past. Working site by site, we gradually built up an understanding of the chronology and cultural sequence of St. Catherines Island.

By concentrating on these central tendencies, we also (inadvertently) created a radiocarbon record heavily skewed toward multiple, redundant, and tightly clustered $^{14}C$ dates. This sampling design certainly facilitated our understanding of the island chronostratigraphy, but it also contributed to the distinctive peak-and-trough structure evident in the resulting $^{14}C$ histogram. In other words, this sampling strategy (under repeated sampling) should result in summed probability distributions characterized by numerous peaks (defined by statistically indistinguishable samples), separated from one another by large gaps (valleys).

### Defining Temporal Ranges of Ceramic Time-markers

We used radiocarbon dating in a very different way in chapter 15, where our objective was to compare the available ceramic and $^{14}C$ chronologies of St. Catherines Island. To do this, we processed a large number of radiocarbon dates to fine-tune the age ranges of the major temporal types involved in the northern Georgia coastal chronology (DePratter, 1979a, 1991).

For each temporal period, we selected several relatively unmixed ceramic assemblages, then processed one or more associated charcoal or shell $^{14}C$ samples to determine the absolute age. Several dozen radiocarbon dates were processed in this fashion, and chapter 15 summarizes the chronological implications of this testing.

To understand whether the sample selection process has biased the overall pool of available $^{14}C$ dates from St. Catherines Island, we must look more closely at the theory of stylistic change in ceramic assemblages. For decades, archeologists have relied on the *seriation* model to place stylistically defined assemblages into a relatively chronological sequence and, although the term "seriation" is not commonly heard in the contexts of coastal Georgia archaeology, the northern Georgia coastal ceramic sequence was clearly developed within in this framework. Antonio Waring (1968a: figs. 70 and 71), for instance, plotted employed seriation-style diagrams in his analysis of St. Simons and Deptford period ceramics at the Bilbo site, plotting the excavation-unit ceramic frequencies for fiber-tempered and sand-tempered (Deptford) wares. Although DePratter (1979a, 1991) does not explicitly discuss seriation as a chronological tool, it is clear that the underlying logic is critical in the definition of the northern Georgia coastal chronology.

At its most basic level, seriation is a scaling technique designed to produce a formal arrangement of units, the significance of which must be inferred (Dunnell, 1970: 305): "Can we order this set of objects or places according to their relative ages, based on their physical characteristics?" (Braun, 1985: 509). When employing the basic seriation model, the analyst must decide (1) the dimension along which the units are to be arranged (usually time) and (2) define some unambiguous way to rank the units so they can be ordered along that dimension (Marquardt, 1978: 258). When several temporal types are involved, these distributions are conventionally expressed graphically with the groups (such as provenience units) in horizontal rows and the classes (such as ceramic types) as vertical axes. For decades, such seriation diagrams have helped archaeologists develop local ceramic sequences by archaeological samples from the same cultural tradition in the order that produces the most consistent patterning (Rouse, 1967: 157).

Seriation curves typically assume a characteristic form, termed by James A. Ford (1962) as basically "battleship-shaped" (see fig. 16.9). By arranging the temporal types into lozenge-shaped curves, one can define a relative chronological sequence, based on the following key assumption: "A sharply defined type will first appear in small frequencies; with the passage of time it will achieve a peak of popularity and then fade away. … The popularity cycle is a most useful phenomenon, for it serves as a rather sensitive measure of the passage of time" (Ford, 1962: 39; see also Rouse, 1939: 14; Ford, 1949: 407; Phillips et al., 1951: 220). Here, we are not concerned with the methods through which the various temporal types have been defined or the way in which these groups have been ordered. In figure 16.9, we illustrate the old-fashioned method of ranking ceramic frequencies on simple paper strips (after Ford, 1962); a number of more sophisticated quantitative approaches to seriation diagrams are likewise available (e.g., Kuzara et al., 1966; Marquardt, 1978; Lyman et al., 1998).

In general, seriation studies work best when all ceramic groupings tend to be of comparable duration, when all ceramic groups belong to the same cultural tradition, and when all ceramic groups must come from the same local area (Phillips et al., 1951: 223; Rouse, 1967: 162; see also Dunnell, 1970: 311). But at the heart of all seriation studies is the attempt to eliminate every source of variability except variation in time, and Ford (1962: 38) is quick to emphasize that all "we are trying to do is to construct a chronology that will accurately serve as an accurate dating device."

But an important point emerges here: The seriation diagram is not itself a chronology—ceramic chronologies must be inferred from seriations, generally with the assistance of stratigraphic and/or radiocarbon comparisons (Ford, 1949; Dunnell, 1970: 317; Braun, 1985: 509). In the present context, we are interested primarily in the process of assigning *an absolute temporal scale* (in this case, derived through radiocarbon dating) to the relative timescale derived by seriational and typological analysis of archaeological ceramics.

Figure 16.10 illustrates the basic sampling strategy employed when trying to match ceramic and radiocarbon chronologies: To assign an absolute age to a ceramic type, one generally processes appropriate $^{14}C$ samples that are associated with relatively pure ceramic assemblages (i.e., those representing the midships of the projected battleship-shaped curve). By sampling the "belly" of the relative frequency distribution, one maximizes the chances of obtaining $^{14}C$ dates that reflect "the peak of popularity" for a given type (Ford, 1962: 39). When selecting radiocarbon samples, one generally "avoids the tails" that overlap between temporally contiguous ceramic complexes. Figure 16.10 (upper) plots the "ideal" and "suboptimal" temporal ranges on a hypothetical seriation model.

Viewed another way, it is clear that the characteristic battleship-shaped curve that typifies seriation diagrams is effectively a *normal* (*Gaussian*) *curve*, expressed as mirror-image normal curves set vertically (see Thomas, 1986a: 193–196; Zar, 1999: 76,

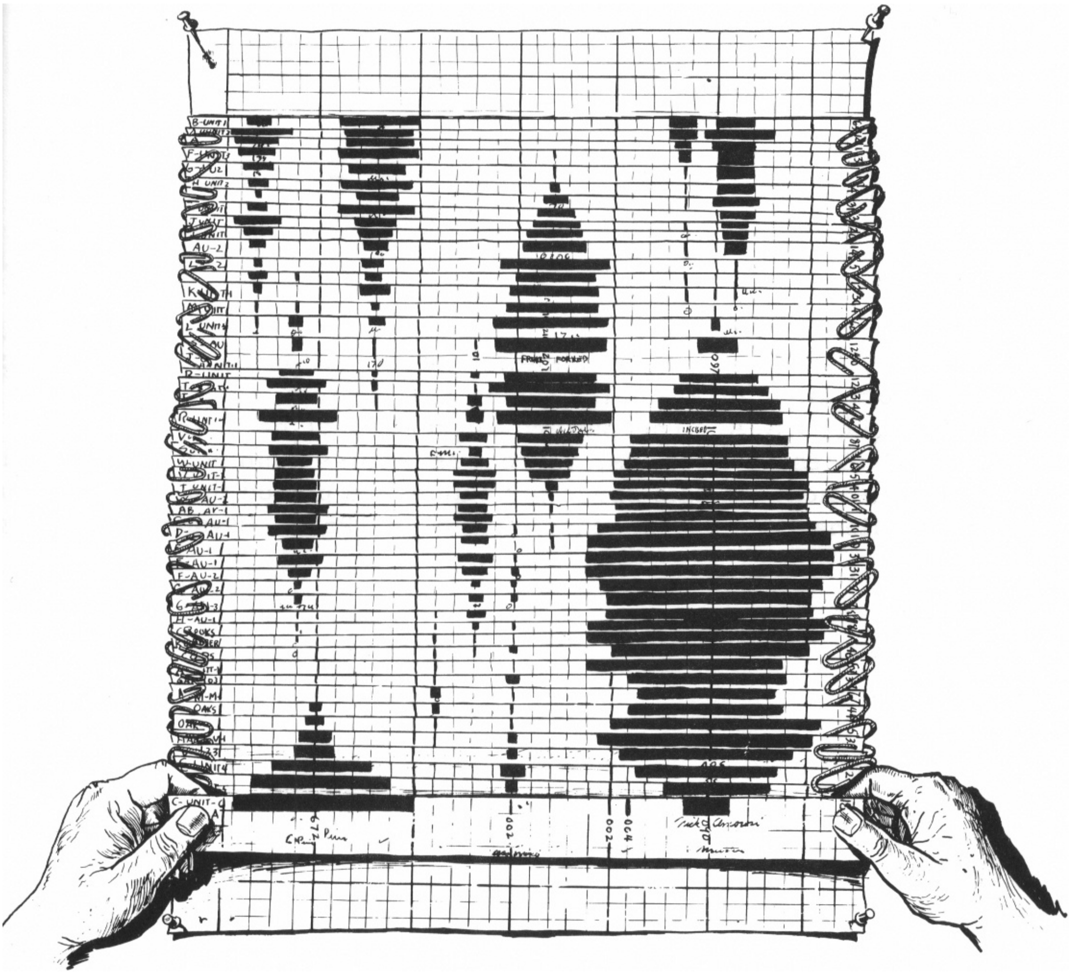

Fig. 16.9. Seriation diagrams were once constructed by hand (literally). Frequencies of temporal types were converted to percentages, then drawn on individual strips, which were then moved up or down until they approximated a series of battleship-shaped curves (Ford, 1962: fig.8). This tedious and subjective procedure has since been replaced by computer programs.

320). At the bottom of figure 16.10, we array the same hypothetical seriation diagram in terms of partially overlapping bell-shaped curves. Because each normal distribution has a disproportionate number of variates clustering toward the midpoint, we can visually express the sampling strategy for associating radiocarbon dates with ceramic types.

Regardless of the graphic model employed, it is clear that under repeated sampling, the suite of radiocarbon samples processed will result in numerous broad plateaus (each corresponding to the temporal span of each major ceramic complex), separated by statistically significant gaps in the distribution. Under repeated sampling, we expect that the summed probability distribution of processed $^{14}C$ determinations should result in numerous broad plateaus (each corresponding to the "peak of popularity" reflecting the primary temporal span of each major ceramic complex. Each such peak (or plateau) is separated from another by statistical valleys, each represented by potential (but less desirable) $^{14}C$ samples associated with "transitional" or "mixed" ceramic assemblages.

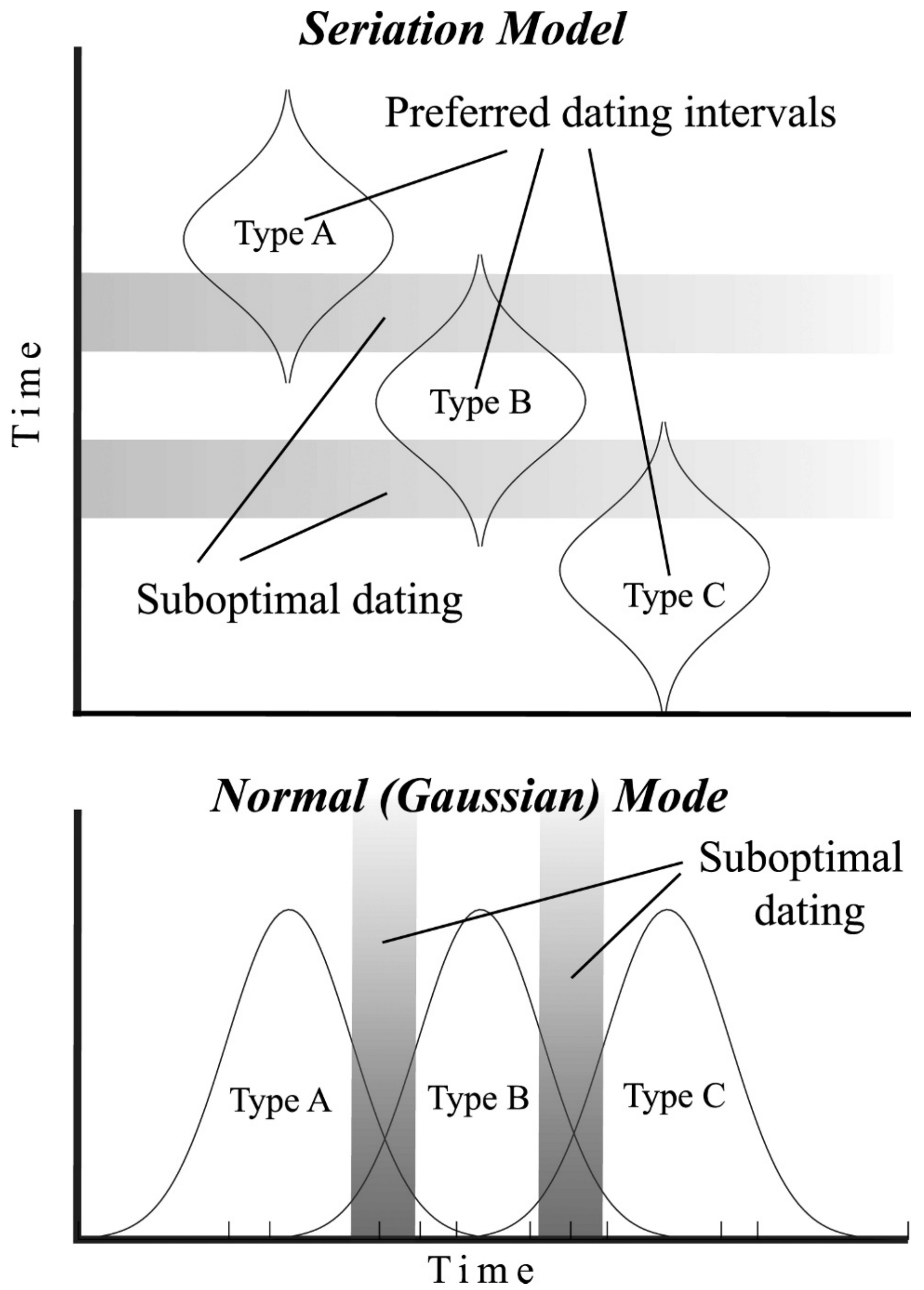


Fig. 16.10. Two models for assigning $^{14}C$ dates to changing artifact frequencies. In the seriation model, artifact types were converted into percentage frequencies, then arrayed as battleship-shaped curves. The preferred dating intervals cluster toward the belly of the seriation curves, avoiding intervals with significant overlap between types. These same tendencies are also reflected in the normal (Gaussian) model, in which artifact abundances are expressed as probabilistic frequency distributions.

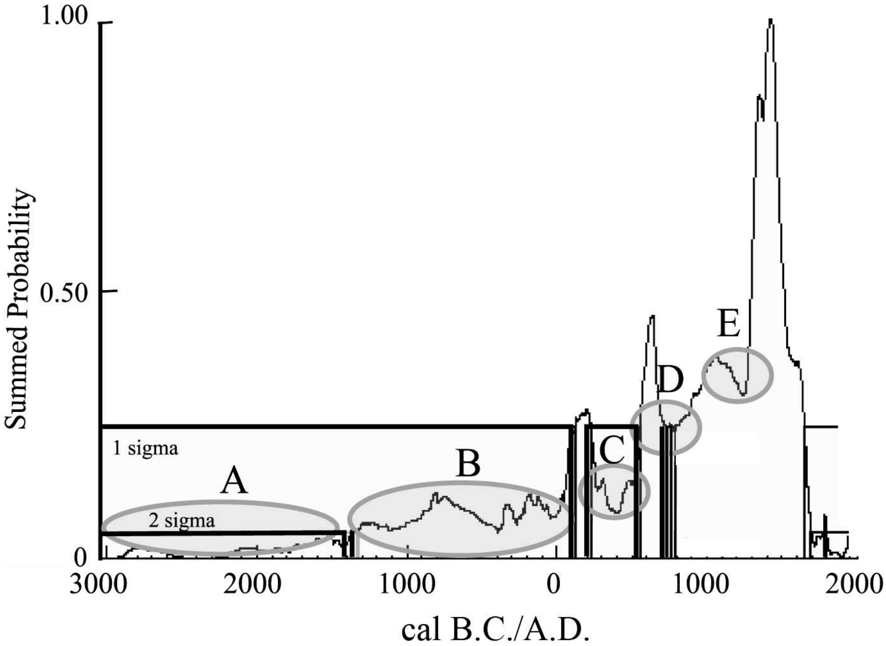


Fig. 16.11. The probability distribution of the 2005 Dataset, the 116 radiocarbon dates available from St. Catherines Island; only $^{14}C$ dates processed *prior* to December 2005 are included in this histogram. To facilitate discussion of this patterning in the text, the key gaps have been highlighted and lettered.

To sum up, we believe that the very process of selecting appropriate radiocarbon samples to define the temporal range of ceramic time-markers can introduce a significant, nonrandom bias into the cumulative $^{14}C$ histogram of all available radiocarbon dates. This bias could readily result in peaks that correspond to the middle range of a ceramic type and a gap separating temporally contiguous ceramic types.

## GAP HUNTING: COPING WITH THE PEAKS AND VALLEYS IN $^{14}C$ HISTOGRAMS[4]

Given the now obvious biases resulting from the two complementary sampling strategies employed in processing radiocarbon dating during our archaeological research on St. Catherines Island, I was wary about assigning behavior meaning to the peaks-and-valleys configuration of the probability distribution evident in the 2005 Database, the suite of dates available in early 2005 (figs. 16.1, 16.7, and 16.11). Without doubt, the sample of 116 cultural radiocarbon dates available to us in 2005 was heavily biased toward (1) selected behavioral events (including mortuary activities and deposition of individual shell middens) and (2) the central temporal span of key ceramic complexes.

*Although we agree with Rick (1987) that radiocarbon peaks have cultural significance, the question becomes whether the radiocarbon valleys mean anything.* This is a classic problem revolving around the meaning of so-called negative evidence, whether the obvious $^{14}C$ gap results from diminished human activities or sampling bias.

### THE 2005 DATASET: DEFINING THE GAPS

To clarify these relationships, we have highlighted each of the distinctive valleys (or gaps) evident in the summed probability distributions for the then available 116 radiocarbon dates (fig. 16.11).

GAP A. THE ST. SIMONS PERIOD (cal 3000–1000 B.C.): Figure 16.11 shows an obvious lack of St. Simons period radiocarbon dates (significantly below the one-sigma level of the overall probabilistic distribution), with gaps especially evident at cal 2500 B.C. and cal 1500 B.C.

GAP B. THE REFUGE–EARLY DEPTFORD PERIOD (cal 1000 B.C.–200 B.C.): Although a number of cultural dates appear during this interval, a disproportionate number of samples were run on charcoal (which could have resulted from forest fires rather than deliberate mortuary activities); midden dates are extremely rare during the Refuge and early Deptford periods.

GAP C. THE DEPTFORD–WILMINGTON BOUNDARY (cal A.D. 400): A major gap in the distribution of radiocarbon dates marks the boundary between the Deptford and Wilmington periods; this break is statistically significant at the two-sigma level.

GAP D. THE WILMINGTON–ST. CATHERINES BOUNDARY (cal A.D. 800): A major gap separates the distribution of radiocarbon evidence spanning the transition between the Wilmington and St. Catherines periods; this break is statistically significant at the two-sigma level.

GAP E. THE ST. CATHERINES–IRENE BOUNDARY (cal A.D. 1200–1300): A distinctive (but not statistically significant) gap defines the boundary between the St. Catherines and Irene periods.

## THE 2006 DATASET: CLOSING THE GAPS?

Recognizing the potentially significant implications of these observed probability distributions, we decided (in March of 2006) to revisit the issue of $^{14}C$ dating on St. Catherines Island. Looking over the sample of 122 archaeological sites tested during the island-wide survey, we asked whether it was possible to generate radiocarbon dates that would span the five target gaps isolated above.

By this time, we had completed our comparison of the northern Georgia coastal ceramic chronology against the 2005 Dataset, the sample of 116 cultural radiocarbon dates, and we observed that the distribution of radiocarbon dates from St. Catherines Island was heavily biased toward the central temporal range of each ceramic period (such as mid-Wilmington period dates, mid-St. Catherines period dates, mid-Irene period dates, and so forth). Knowing this, we worked through the corpus of data generated during the Island-wide survey, examining the site-by-site, unit-by-unit sherd frequencies to find proveniences that might balance out the biases introduced by previous radiocarbon dating exercises.

As clearly evident in figure 16.11, the earliest occupational periods were dramatically underrepresented in the existing radiocarbon database, so we targeted the St. Simons and Refuge ceramic assemblages for potential dating. But we also took note of the yawning gaps that characterized the radiocarbon profiles of the Deptford, Wilmington, and St. Catherines periods. Rather than seeking out pure ceramic assemblages—those located amidships in the classic battleship-shaped curves—we decided to isolate those transitional assemblages that might span the gaps. So, despite the introduction of such obvious biases into the 2005 Dataset (those cultural $^{14}C$ dates processed prior to December, 2005), we still believe that ceramic time-markers provide the best clues for estimating the age of a radiocarbon sample. In constructing the 2006 Dataset, we deliberately sought out the apparent *transitions between ceramic periods*, rather than the *modal tendencies within each period* (as before).

After isolating a number of appropriate ceramic assemblages, we then considered how best to generate the new suite of radiocarbon samples. During the 1980s, we frequently returned to previously excavated sites to obtain additional $^{14}C$ samples from the exposed sidewalls. We tried this strategy during the 2006 resampling, but with only mixed success. Because these test pits had been excavated a quarter century before, the sidewalls were generally slumped and badly overgrown, and we worried about the lack of precision involved with sidewall sampling. Although we did recover a few potential $^{14}C$ samples from standing sidewalls (as at 9Li230), we decided that a better overall approach was to retrieve potentially

TABLE 16.1
**The 2006 Dataset, 49 Radiocarbon Determinations Submitted to Clarify the Gaps Evident in the 2005 Dataset (*n* = 116)**

| Target age[a] | Lab no. | Site no. | Material | Radiocarbon age | Comments |
|---|---|---|---|---|---|
| St. Simons/Refuge | Beta-218094 | 9Li171 | Charcoal | cal A.D. 1670–1940 | modern contamination |
| Savannah/Irene | Beta-215814 | 9Li189 | *Mercenaria* | cal A.D. 1470–1700 | OK, slightly late |
| St. Simons or Irene | Beta-217229 | 9Li216 | *Mercenaria* | cal A.D. 1440–1630 | OK |
| Refuge | Beta-218101 | 9Li49 | *Mercenaria* | cal A.D. 1430–1620 | early sherds, later midden |
| St. Simons or Irene | Beta-217228 | 9Li216 | *Mercenaria* | cal A.D. 1310–1460 | OK |
| **Gap E. The St. Catherines–Irene Boundary (cal A.D. 1200–1300)** | | | | | |
| Savannah/Irene | Beta-215815 | 9Li189 | *Mercenaria* | cal A.D. 1300–1470 | OK |
| Savannah | Beta-215813 | 9Li169 | *Mercenaria* | cal A.D. 1290–1470 | OK |
| Savannah | Beta-215812 | 9Li169 | *Mercenaria* | cal A.D. 1060–1300 | OK |
| Refuge | Beta-217237 | 9Li235 | *Mercenaria* | cal A.D. 1010–1220 | early sherds, later midden |
| Refuge | Beta-217220 | 9Li180 | *Mercenaria* | cal A.D. 1010–1220 | early sherds, later midden |
| Wilmington/St. Catherines | Beta-218100 | 9Li198 | *Mercenaria* | cal A.D. 1000–1260 | OK, pure St. Catherines |
| Unknown | Beta-215817 | 9Li1620 | *Mercenaria* | cal A.D. 970–1220 | OK |
| Savannah/Irene | Beta-215820 | 9Li230 | *Crassostrea* | cal A.D. 950–1220 | OK |
| Deptford/Wilmington | Beta-217239 | 9Li238 | *Mercenaria* | cal A.D. 940–1180 | early sherds, later midden |
| Refuge | Beta-217238 | 9Li235 | *Mercenaria* | cal A.D. 940–1180 | early sherds, later midden |
| Refuge | Beta-217221 | 9Li180 | *Mercenaria* | cal A.D. 890–1230 | early sherds, later midden |
| Wilmington/St. Catherines | Beta-218095 | 9Li194 | *Crassostrea* | cal A.D. 810–1030 | OK, slightly later |
| **Gap D. The Wilmington–St. Catherines Boundary (cal A.D. 800)** | | | | | |
| St. Catherines | Beta-217235 | 9Li233 | *Mercenaria* | cal A.D. 800–1120 | OK |
| St. Simons | Beta-217243 | 9Li252 | *Mercenaria* | cal A.D. 780–1030 | early sherds, later midden |
| Wilmington | Beta-217236 | 9Li233 | *Mercenaria* | cal A.D. 780–1030 | somewhat later than expected |
| Wilmington/St. Catherines | Beta-218096 | 9Li194 | *Crassostrea* | cal A.D. 780–1200 | OK |
| Wilmington/St. Catherines | Beta-218099 | 9Li198 | *Mercenaria* | cal A.D. 770–1010 | OK |
| St. Catherines/Savannah | Beta-215819 | 9Li230 | *Crassostrea* | cal A.D. 740–1080 | OK |
| St. Simons | Beta-217244 | 9Li252 | *Mercenaria* | cal A.D. 700–940 | early sherds, late midden |
| Deptford/Wilmington | Beta-217224 | 9Li194 | *Mercenaria* | cal A.D. 700–940 | OK |
| Deptford/Wilmington | Beta-217223 | 9Li194 | *Mercenaria* | cal A.D. 690–920 | OK |
| Deptford | Beta-217241 | 9Li238 | *Mercenaria* | cal A.D. 690–920 | early sherds, later midden |
| Deptford/Wilmington | Beta-217222 | 9Li184 | *Mercenaria* | cal A.D. 660–900 | OK |
| Unknown | Beta-215816 | 9Li1620 | *Mercenaria* | cal A.D. 650–990 | OK |
| Deptford | Beta-217242 | 9Li238 | *Mercenaria* | cal A.D. 610–920 | earlier sherds, later midden |
| Deptford/Wilmington | Beta-217240 | 9Li238 | *Mercenaria* | cal A.D. 510–790 | OK |
| Refuge or Wilmington | Beta-217230 | 9Li225 | *Mercenaria* | cal A.D. 500–710 | earlier sherds, later midden |
| Refuge or Wilmington | Beta-217231 | 9Li225 | *Mercenaria* | cal A.D. 490–700 | earlier sherds, later midden |
| Wilmington | Beta-217225 | 9Li196 | *Mercenaria* | cal A.D. 460–700 | OK |

TABLE 16.1
(*Continued*)

| Target age[a] | Lab no. | Site no. | Material | Radiocarbon age | Comments |
|---|---|---|---|---|---|
| **Gap C. The Deptford–Wilmington Boundary (cal A.D. 400)** | | | | | |
| St. Simons | Beta-218098 | 9Li197 | *Mercenaria* | cal A.D. 400–700 | earlier sherds, later midden |
| Wilmington | Beta-217226 | 9Li196 | *Mercenaria* | cal A.D. 390–650 | OK |
| Wilmington | Beta-217227 | 9Li196 | *Mercenaria* | cal A.D. 280–570 | OK |
| Refuge-Deptford | Beta-217232 | 9Li228 | *Mercenaria* | cal A.D. 70–320 | OK |
| St. Simons or Irene | Beta-218097 | 9Li197 | *Mercenaria* | cal A.D. 50–450 | OK |
| Refuge-Deptford | Beta-217233 | 9Li228 | *Mercenaria* | cal 10 B.C.–A.D. 270 | OK |
| Refuge-Deptford | Beta-217234 | 9Li228 | *Mercenaria* | cal 150 B.C.–A.D. 140 | OK |
| **Gap B. The Refuge–Early Deptford Period (cal 1000–200 B.C.)** | | | | | |
| Unknown | Beta-215818 | 9Li1620 | *Mercenaria* | cal 400–80 B.C. | OK |
| **Gap A. The St. Simons Period (cal 3000–1000 B.C.)** | | | | | |
| St. Simons/Refuge | Beta-217219 | 9Li137 | *Mercenaria* | cal 1590–1340 B.C. | OK |
| St. Simons/Refuge | Beta-217218 | 9Li137 | *Mercenaria* | cal 1590–1340 B.C. | OK |
| St. Simons | Beta-215822 | 9Li231 | *Crassostrea* | cal 2260–1770 B.C. | OK |
| St. Simons | Beta-215823 | 9Li231 | *Crassostrea* | cal 2260–1920 B.C. | OK |
| St. Simons/Refuge | Beta-217217 | 9Li137 | *Mercenaria* | cal 2400–1920 B.C. | OK |
| St. Simons | Beta-215824 | 9Li231 | *Crassostrea* | cal 2580–2200 B.C. | OK |
| St. Simons | Beta-215821 | 9Li231 | *Crassostrea* | cal 2600–2270 B.C. | OK |

[a] Based on ceramic association.

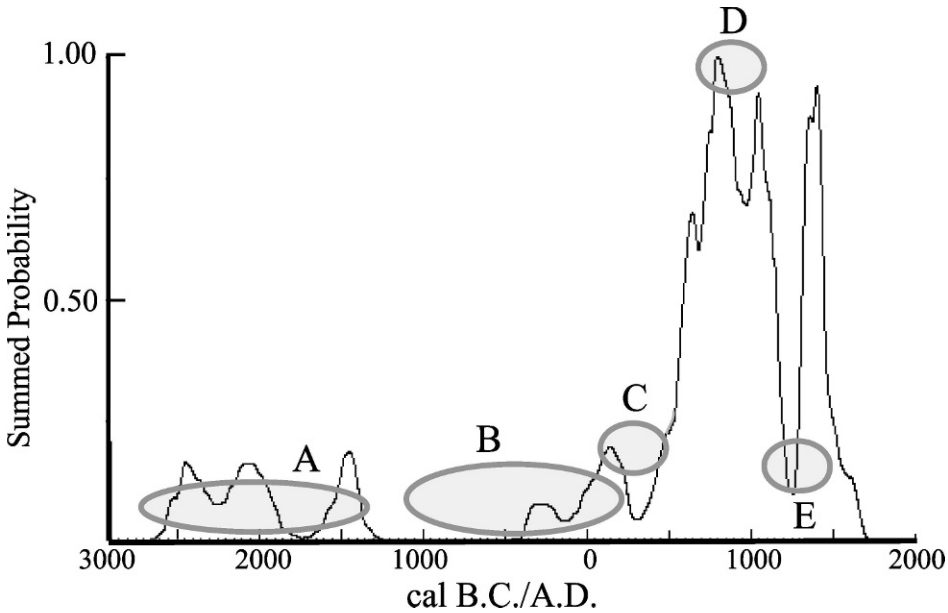


Fig. 16.12. The probability distribution of the 2006 Dataset, the 49 additional radiocarbon dates from St. Catherines Island; processed in the attempt to close the gaps noted in the 2005 Dataset (see figs. 16.1 and 16.7).

datable samples previously taken during the island-wide survey testing.

A number of radiocarbon samples had been collected during the 1977–1979 excavations, and these samples are presently curated at the Fernbank Museum of Natural History (Atlanta). Through the good offices of Mr. Dennis Blanton (Curator of Native American Archaeology at Fernbank), we obtained a number of charcoal and marine shell samples for radiocarbon dating. During the island-wide survey, we had likewise saved all *Mercenaria* encountered during the site-testing period (in order to conduct the seasonality study reported in chaps. 17 and 18). These samples, along with the rest of the paleoenvironmental collection from St. Catherines Island, are now curated at the Florida State Museum of Natural History (Gainesville). Working with Ms. Donna Ruhl (Archaeologist and Ethnobotanist in the Environmental Archaeology Program), we selected a number of *Mercenaria* recovered from the target proveniences within the island-wide survey.[5]

The 2006 Dataset consists of an additional 49 radiocarbon dates, sampled from 15 aboriginal midden sites on St. Catherines Island (see table 16.1 and fig. 16.12). In chapter 20, we discuss the specific sherd counts associated with each radiocarbon sample; for present purposes, we concentrate on the general strategy and rationale for selecting each sample.

### Gap A. The St. Simons Period (cal 3000–1000 B.C.)

To address the paucity of radiocarbon dates spanning the interval between cal 3000 and 1000 B.C., the 2006 Dataset contains 15 additional samples from six archaeological sites, each sample apparently associated with St. Simons period ceramic assemblages.

***St. Catherines Shell Ring (9Li231):*** As part of the island-wide survey, we processed two radiocarbon dates from Test Pit I at 9Li231 (then known as "Long Field Crescent," and now termed the "St. Catherines Shell Ring"). In March 2006, we returned to 9Li231 to conduct much more intensive archaeological investigations; with the gap-hunting project in mind, we recovered and processed four additional radiocarbon samples on oyster shells clearly associated with fiber-tempered ceramics (Beta-215821, Beta-215822, Beta-215823, and Beta-215824).

***9Li137:*** Previously located on the rapidly eroding bluff at North Beach, 9Li137 has since completely disappeared. The ceramic assemblage is dominated by St. Simons and Refuge period sherds (with a subsequent St. Catherines presence). No radiocarbon dates were previously processed on samples from 9Li137. In May 2006, we selected four *Mercenaria* valves from those saved during the previous excavations, emphasizing contexts that would seem to span the St. Simons/ Refuge transition (Beta-217217, Beta-217218, and Beta-217219).

***Seaside Field (9Li252):*** This shallow shell lens is probably the "fiber-tempered site" mentioned in the University of Georgia's fieldnotes from 1969. Except for a single Deptford sherd, the ceramic assemblage is exclusively St. Simons Plain. Given the scarcity of St. Simons period dates, we processed two *Mercenaria* valves recovered during our previous excavations (Beta-217243 and Beta-217244).

***9Li216:*** Three-quarters of the ceramic assemblage recovered from 9Li216 date to the Irene period. But the basal levels of Test Pit I contained a St. Simons ceramic assemblage and we processed two *Mercenaria* samples from these contexts, in hopes of dating the Late Archaic occupation at 9Li216. Based on associated sherd counts, Beta-217228 and Beta-127229 could date to either the Irene or St. Simons periods.

***9Li197:*** This large site contains numerous small shell mounds and surface scatters, accumulating mostly during the Irene period. We previously processed two radiocarbon dates from 9Li197, one associated with Irene ceramics and the other from a level containing only St. Simons ceramics at 9Li197. We decided to run two additional samples (Beta-218097 and Beta-218098), in hopes of further pinpointing the age of this St. Simons period occupation.

***North Pasture 3 (9Li171):*** This site, located on the northern end of St. Catherines Island, contained a broad range of aboriginal ceramics. As part of the island-wide survey, we had processed one radiocarbon date associated with Savannah Cord Marked ceramics. In May 2006, we submitted a second sample (Beta-218094), a charcoal sample apparently associated with Refuge and St. Simons period diagnostics.

### Gap B. The Refuge-Early Deptford Period (cal 1000 B.C.–200 B.C.)

Whereas the Cunningham and Seaside mound groups are spatially separated and constructed in rather different habitats, the 2005 Dataset demonstrates a remarkable contemporaneity in construction stages of the two mortuary complexes. That is, although the Refuge period spans about 6.5 centuries, virtually all of the demonstrable cultural activities transpired during a very brief interval (cal 600–750 B.C.), a cluster defined by eight mortuary radiocarbon dates from six different burial mounds. But a disproportionate number of samples were run on charcoal (raising the possibility that such contemporaneity could perhaps reflect widespread forest fires instead of deliberate mortuary activities).

Because midden dates are extremely rare during the Refuge and early Deptford periods in the 2005 Dataset, we submitted ten additional $^{14}C$ samples to explore the nature of this gap.

***9Li228:*** This large site contains a ceramic assemblage dominated by Refuge-Deptford period diagnostics, with some Irene sherds present as well. In the attempt to derive chronometric age estimates from late Refuge/early Deptford contexts we submitted three *Mercenaria* for radiocarbon analysis (Beta-217232, Beta-217233, and Beta-217234).

***Duncan Field (9Li225):*** This buried shell lens produced a ceramic assemblage ranging from the Refuge through the Irene periods. Previously, we processed a radiocarbon date (Beta-21405, cal A.D. 460–780) on *Mercenaria* associated with Wilmington Cord Marked ceramics. In the gap-hunting exercise, we submitted two additional *Mercenaria* valves for radiocarbon dating (Beta-217230 and Beta-217231), each clearly associated with Refuge period ceramics.

***9Li235:*** This small site has limited surface scatter, with a greater quantity of buried materials. In May 2006, we dated two hard clams recovered in apparent association with Refuge period ceramics (Beta-217237 and Beta-217238).

***9Li49:*** This site consists of several shell scatters and concentrations exposed along the eroding blank of a Holocene dune ridge. The relatively sparse ceramic assemblage consisted of six Refuge period diagnostics, but a lone $^{14}C$ determination from this site (Beta-20829, *Mercenaria*) yielded a date of cal A.D. 430–680 (much too late for the Refuge Punctated and Refuge Incised sherds recovered here). In an attempt to date the Refuge occupation of 9Li49, we submitted another *Mercenaria* valve.

***Long Field 3 (9Li180):*** This small shell concentration, tested in three excavation units, produced only a single diagnostic sherd (Refuge Plain). We processed two AMS determinations on *Mercenaria* associated with this sherd (Beta-217220 and Beta-217221), in the attempt to date the midden context.

### Gap C. The Deptford–Wilmington Boundary (cal A.D. 400)

The 2005 Dataset indicates that statistically simultaneous burning and marine shell harvesting took place throughout the various mortuary contexts within the Cunningham Mound group during the early Deptford period (cal 360–120 B.C.); this same sample of 116 $^{14}C$ dates shows that contemporary midden samples are entirely absent (although subsequent survey and testing might produce such determinations). Then, following a hiatus of perhaps 2 or 3 centuries, the 2005 Dataset contains a cluster of 11 radiocarbon dates from late Deptford period contexts (cal A.D. 80–230), involving five charcoal dates from five burial mounds and six marine shell dates from four midden sites.

The 2005 Dataset also indicates that a distinct valley separates the probability distribution of $^{14}C$ determinations associated with these Deptford period events from subsequent Wilmington-age components on St. Catherines Island. During the Wilmington period, all detectable mortuary-related activities transpired within a single century (cal A.D. 540–640), and the available $^{14}C$ dates from midden proveniences likewise clustered around cal A.D. 600.

With these distributions in mind, the 2006 Dataset contains the following radiocarbon samples, deliberately selected in the attempt to fill the Deptford–Wilmington gap.

***North Pasture 1 (9Li238):*** This small shell midden, located just north of Marys Mound, contains mostly Refuge-Deptford period sherds, with some Wilmington period ceramics present as well. We processed four *Mercenaria* valves, two associated strictly with Deptford period sherds and two others associated with Deptford and Wilmington sherds, in hopes of dating that transition.

***9Li196:*** This large site is located just north of Cunningham Mound A, and the ceramic assemblage is dominated by Wilmington sherds. We selected three samples from the top, middle, and bottom of Test Pit II (Beta-217225, Beta-217226, and Beta-217227), attempting to define a stratigraphic sequence and explore the internal variability of an apparently pure Wilmington-age midden.

***South End Field (9Li194):*** This site produced a ceramic assemblage dating mostly to the Wilmington period, with a minority Deptford component also present. We had previously processed two $^{14}C$ determinations from 9Li194 (an oyster shell associated with an Irene period occupation and another oyster sample associated with Wilmington period ceramics, but producing a St. Catherines period age, cal A.D. 810–1210). In 2006, we submitted two *Mercenaria* valves for AMS dating (Beta-217223 and Beta-217224), each in apparent association with Deptford and Wilmington age ceramics.

***Rice Field 1 (9Li184):*** This small site produced Wilmington and Deptford period diagnostics. We submitted a single *Mercenaria* for radiocarbon analysis (Beta-21722), attempting to date the Deptford–Wilmington transition.

Gap D. The Wilmington–St. Catherines Boundary (cal A.D. 800)

As noted above, all detectable Wilmington period mortuary-related activities in the 2005 Dataset transpired within a single century (cal A.D. 540–640), and the available $^{14}$C dates from midden proveniences likewise clustered around cal A.D. 600. A significant gap in radiocarbon dates also separates the terminal Wilmington from initial St. Catherines period occupations; specifically, the radiocarbon evidence suggests a 4-century hiatus prior to the construction of three St. Catherines period burial mounds.

In an attempt to fill this gap, we processed seven additional dates in the 2006 Dataset, drawn from four different archaeological sites.

***9Li233:*** This site produced primarily Wilmington period ceramics, including a number of Walthour Complicated Stamped sherds; five additional sherds date to the St. Catherines period. We processed one *Mercenaria* sample (Beta-217235) in association with St. Catherines ceramics and another (Beta-217236), apparently associated with Walthour Complicated Stamped (early Wilmington) ceramics.

***9Li230:*** The two excavation units at this medium-sized site produced only 14 potsherds, including seven Savannah Cord Marked and Savannah Plain ceramics. Attempting to understand the temporal positioning of Savannah ceramics, we had previously processed two radiocarbon dates (Beta-21398 and Beta-213399). In March 2006, Thomas returned to 9Li230 and collected two additional $^{14}$C samples (Beta-215819 and Beta-21520) from the standing sidewalls of Test Pit I.

***South End Field (9Li194):*** This site, discussed above with respect to Deptford and Wilmington age ceramics, also contained St. Catherines period sherds. We submitted two additional *Mercenaria* valves (Beta-218095 and Beta-218096), attempting to date the Wilmington/St. Catherines transition.

***9Li198:*** This small shell mound contained mostly Wilmington ceramics, with some St. Catherines sherds present as well. One radiocarbon determination was previously processed from 9Li198 (Beta-20823), which appears to straddle the Wilmington/St. Catherines transition. We processed two additional *Mercenaria* samples from 9Li198 (Beta-218099 and Beta-218100), both associated with Wilmington/St. Catherines ceramics.

Gap E. The St. Catherines–Irene Boundary (cal A.D. 1200–1300)

In the 2005 Dataset, a distinctive (but not statistically significant) gap defines the boundary between the St. Catherines and the Irene periods.

***9Li169:*** This large site is located adjacent to Seaside Mound II. The University of Georgia tested several shell middens in this area during the summer of 1970 (and we have three radiocarbon dates from those excavations, each dating to the Wilmington and St. Catherines periods). As part of the island-wide survey, we excavated six test units in 9Li169, running three radiocarbon dates (attempting to clarify the relationship between St. Catherines and Savannah period ceramics). In 2006, we processed two additional $^{14}$C samples (Beta-215812 and Beta-215813) to further clarify the age of Savannah ceramics on St. Catherines Island.

***Davy Field 1 (9Li189):*** This large site consists of several concentrated subsurface shell deposits in a rough linear alignment running parallel to the marsh edge. The seven test pits contained diagnostic Irene period sherds, in addition to a number of Savannah Check Stamped sherds. To examine the relationship of late St. Catherines, Savannah, and Irene ceramic complexes, we processed two *Mercenaria* values for $^{14}$C analysis (Beta-215814 and Beta-215815).

***Hayes Island (9Li1620):*** We will include this additional excavation because of its potential relevance to the probability distribution of radiocarbon dates on St. Catherines and the potential role of sea-level changes in addressing these gaps. Our excavations at Hayes Island are briefly summarized in Appendix D. We submitted three radiocarbon dates (Beta-215816, Beta-215817, and Beta-215818) from this site, but the ceramic associations were insufficiently clear to project expected age ranges.

## THE POOLED RADIOCARBON RECORD: DO THE GAPS PERSIST?

We can now return to the fundamental research questions posed in this chapter. The summed probability distribution of the first 116 cultural radiocarbon dates from St. Catherines (the 2005 Dataset) displays a distinctive peak-and-valley configuration.

- The radiocarbon "peaks" certainly have cultural significance, but the question arises of whether the five major $^{14}C$ gaps mean anything.
- Does each gap represent an actual break (or hiatus) in the radiocarbon record of St. Catherines Island?
- Or do the gaps result from sampling bias?

As noted above, we pursued this question by creating the 2006 Dataset, comprised of an additional 49 $^{14}C$ samples (fig. 16.12), each deliberately targeted to bridge a gap in the radiocarbon record of St. Catherines Island. To explore the larger implications of these trends, we have also pooled the two $^{14}C$ samples from St. Catherines Island. The "Pooled Sample" ($n$ = 165) combines both the 2005 Dataset ($n$ = 116) with the newly generated 2006 Dataset ($n$ = 49).

### The Radiocarbon Record: cal 3000 B.C.–A.D. 1

For the time span representing the first 3000 years of human occupation on St. Catherines Island, we recognized two intervals for which radiocarbon evidence was rare or altogether lacking: Gap A, The St. Simons Period (cal 3000–1000 B.C.) and Gap B, The Refuge-Early Deptford Period (cal 1000 B.C.–200 B.C.). We can now discuss the new $^{14}C$ evidence relating to both gaps.

#### St. Simons Period

The 2005 Dataset contains only a smattering of $^{14}C$ dates falling into the interval spanning cal 3000–1000 B.C. During the redating exercise, we located an additional 15 samples (from six archaeological sites) that contained associated fiber-tempered ceramics. When submitting each sample for radiocarbon analysis, we were quite confident that the ceramic evidence adequately predicted a $^{14}C$ age falling within the projected temporal span of the St. Simons period. Here are the results on a site-by-site basis (see table 16.1).

***St. Catherines Shell Ring (9Li231):*** Each of the four samples submitted during the 2006 reanalysis produced $^{14}C$ ages from the early and middle St. Simons period, as predicted (ranging between about cal 2500 B.C. and cal 1800 B.C.). These new dates are fully consistent with the two radiocarbon dates processed previously in conjunction with the systematic transect survey.

***9Li137:*** The ceramic associations projected a St. Simons–Refuge period temporal span and all three dates falling into the mid- to late St. Simons period (roughly cal 2200 B.C.–1500 B.C.).

***9Li252:*** Although the two additional radiocarbon samples were clearly associated with St. Simons ceramics (plus a single Deptford Check Stamped sherd), both produced age estimates falling into the St. Catherines period. This is a surprising result because no clay-tempered sherds were recovered at 9Li252, meaning that early sherds were found deposited in a later shell midden.

***9Li216:*** Based on ceramics associations of mixed fiber-tempered and Irene period ceramics, we projected that the two new radiocarbon samples from 9Li216 could date to either the Irene or St. Simons periods; both *Mercenaria* clearly date to the Irene period.

***9Li197:*** Based on the associated ceramics, we predicted a St. Simons age for Beta-218098, but the results date to the Wilmington period. Although Beta-218097 was associated with both St. Simons and Irene period ceramics, the resulting date points to the late Deptford/early Wilmington transition. In both cases, the $^{14}C$ on *Mercenaria* significantly postdated the apparently associated ceramics.

***9Li171:*** We submitted a single charcoal sample associated with St. Simons/Refuge period ceramics. But the resulting $^{14}C$ results date to the modern period, obviously pointing to root contamination (an ever present problem with charcoal sample dates on St. Catherines Island).

To summarize the results of the 2006 redating of St. Simons period ceramics, we submitted 15 additional $^{14}$C samples, each one apparently associated with fiber-tempered ceramics.

- Only 40 percent (6 of 15) of these determinations fell into the expected age range.
- More than half of the marine shell samples produced significantly later ages than the St. Simons period ceramics from the same apparent context.
- As documented below, *none* of the additional 34 samples associated with later ceramic types produced St. Simons-age dates.

Clearly, there is a tendency for St. Simons sherds to be commingled with marine shell from a later time period.

### Gap B. The Refuge–Early Deptford Period (cal 1000 B.C.–200 B.C.)

As noted above, shell midden dates are extremely rare for this period. During the 2006 reanalysis, we submitted 10 *Mercenaria* samples, each associated with Refuge-Deptford period, hoping to close this gap in the $^{14}$C record.

***9Li228:*** The three new radiocarbon samples, each from the same excavation unit, fell in perfect stratigraphic order, each dating mid-/late Deptford period (roughly cal 100 B.C.–cal A.D. 300).

***Duncan Field (9Li225):*** We submitted two additional *Mercenaria* valves for radiocarbon dating (Beta-217230 and Beta-217231), each clearly associated with Refuge period ceramics. The results indicate that both clams derive from a later Wilmington-age context (roughly cal A.D. 500–700), which is well represented in other parts of the site (with the earlier sherds intrusive into the later shell midden).

***9Li235:*** We submitted two hard clams recovered in apparent association with Refuge period ceramics (Beta-217237 and Beta-217238); but both *Mercenaria* dated to the much later St. Catherines period (roughly cal A.D. 1000–1200), confirming the previous results (that the ceramic assemblage is a poor predictor of $^{14}$C dates at 9Li235).

***9Li49:*** The recently submitted *Mercenaria* sample (Beta-218101) is clearly associated with Refuge punctated and Refuge incised sherds); but it dates to the Irene period (cal A.D. 1430–1620).

***Long Field 3 (9Li180):*** The two new AMS determinations on *Mercenaria* associated with a Refuge plain sherd (Beta-217220 and Beta-217221) make it clear that the midden accumulated during the St. Catherines period (roughly cal A.D. 900–1200). A single clay-tempered sherd was recovered, as were three sand-tempered, check stamped sherds (which might belong to Savannah series ceramics).

To summarize, we processed 10 additional $^{14}$C determinations, attempting to fill the cal 1000 B.C.–200 B.C. gap in the radiocarbon record.

- Three of these samples did indeed fall within the middle and late Deptford period (cal 100 B.C.–cal A.D. 300).
- The other samples dated to significantly later time periods.
- One radiocarbon date (Beta-215818), unassociated with diagnostic ceramics, dates to cal 400–80 B.C.
- None of the additional 38 radiocarbon dates associated with later ceramic groups fell into this target range.

In other words, despite our best efforts, Gap B, The Refuge-Early Deptford Period (cal 1000 B.C.–200 B.C.), remains a significant hiatus in the cultural radiocarbon record of St. Catherines Island. Except for the samples from 9Li228, all of the dated marine shells apparently associated with Refuge/Early Deptford period sherds accumulated at a much later age. This apparently systematic error would seem to reflect the lack of Refuge and early Deptford-age shell deposits (even in the presence of Refuge and Deptford period ceramics).

Figure 16.13 plots the distribution of the pooled sample of all cultural radiocarbon dates that span Gaps A and B. Obviously, the proportional number (roughly 33 of 165) for this interval is much smaller than for later periods; this is why the probabilistic topography falls well below the one-sig-

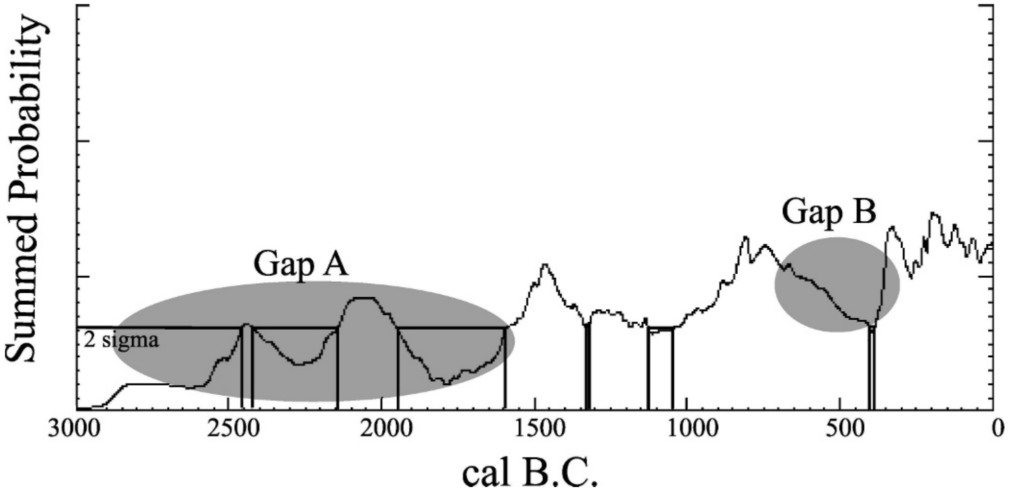


Fig. 16.13. The pooled distribution of all cultural radiocarbon dates ($n$ = 33) falling into the interval cal 3000 B.C.–A.D. 1.

ma level (for the total, 5000-year sequence). For the pre-cal A.D. 1 interval, figure 16.13 demonstrates that significant gaps persist (at the two-sigma level): prior to cal 2460 B.C., cal 2420–2140 B.C., cal 1950–1590 B.C., cal 1330–1320 B.C., cal 1130–1050 B.C., and cal 400–396 B.C. The issue now becomes to account for this irregular probability distribution of radiocarbon evidence.

### Could These Gaps in the Distribution of $^{14}$C Dates Result from Calibration Stochastic Distortion (CSD) Effects?

To answer this question, we partitioned the early dates in the Pooled Dataset according to material being dated (because of the two different calibration curves involved). Figure 16.14 projects the (roughly $n$ = 20) pre-cal A.D. 1 marine $^{14}$C dates against the master global marine calibration curve (Marine04) for this period, plotted without correction for reservoir effect (Hughen et al., 2004). As discussed earlier in this chapter, the marine calibration curve for this interval is characteristically smooth. Although numerous (statistically significant) peaks and troughs characterize the pre-cal A.D. 1 marine shell $^{14}$C dates from St. Catherines Island, figure 16.14 clearly demonstrates that CSD effects are not responsible for this patterning.

Figure 16.15 arrays the comparable patterning for the (roughly estimated $n$ = 13) pre-cal A.D. 1 nonmarine radiocarbon dates against the master terrestrial calibration curve (IntCal04) for this time period (Reimer et al., 2004). Despite the sawtooth appearance of this curve, the terrestrial calibration curve for this time span has a relatively constant slope, punctuated by short-term intervals of alternating intervals of steeper and gentler slope. With one exception, we can probably discount the impact of significant CSD effects. But as noted previously (fig. 16.6), the terrestrial calibration curve has an uncharacteristically flat distribution between cal 800 B.C. and 600 B.C., denoting a particularly bad temporal span for calibrating $^{14}$C dates. Note that a similar flat spot is evident in the probability distribution of archaeological dates at the same time period; we suspect that calibration stochastic distortions are likely operating here, blurring the calendrical age conversations during this interval. A second anomalous portion of the terrestrial calibration curve (at cal 300 B.C.–200 B.C.) might be influencing the erratic probability curve of archaeological $^{14}$C dates, but this relationship is less clear.

Thus, while we can detect some degree of stochastic distortions in the later terrestrial dates, we judge the impact of CSD effects to be

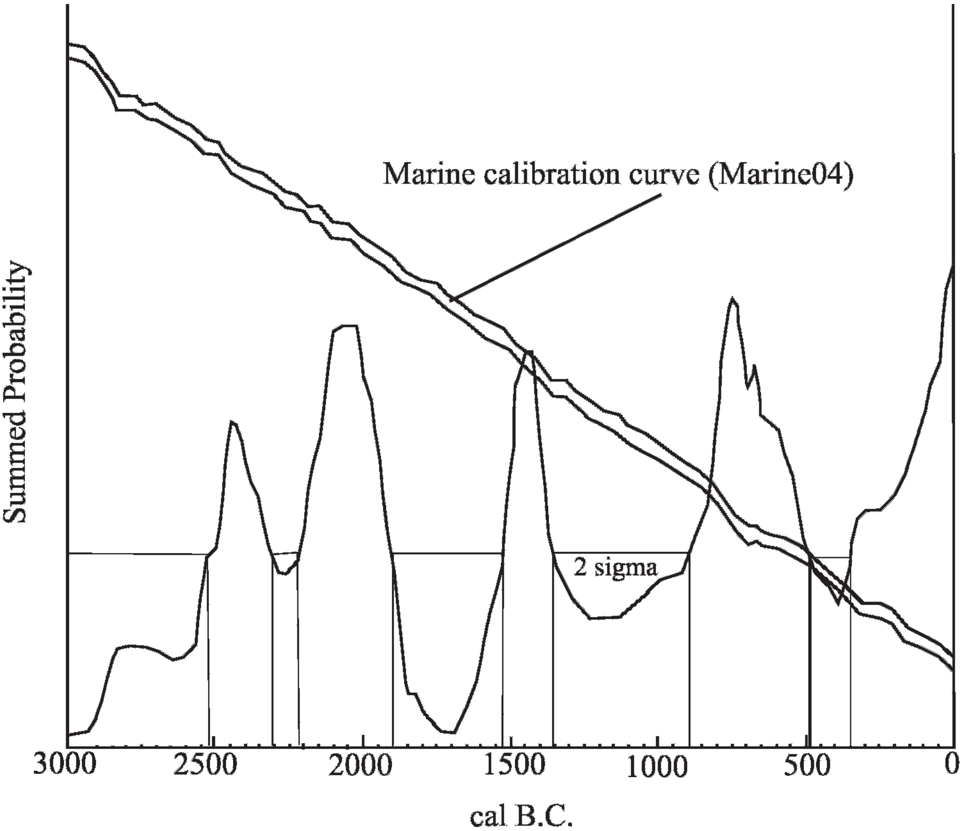


Fig. 16.14. The pooled frequency distribution of all marine $^{14}C$ dates ($n = 20$) for the temporal span cal 3000 B.C.–A.D. 1. The diagonal line is the global marine calibration curve for the same period, plotted without correction for reservoir effect (Hughen et al., 2004).

relatively minor during the cal 3000 B.C.–A.D. 1 interval. Without doubt, then, we must seek additional factors to account for the overall peak-and-trough topography evident during this time span.

### Could the Gaps in the Distribution of $^{14}C$ Dates Result from Changes in Patterns of Human Behavior between cal 3000 B.C. and A.D. 1?

Previously (in fig. 16.7) we partitioned the overall 2005 Dataset into mortuary and midden subsamples. Now, adopting a more fine-grained approach to the issues at hand, we do the same for the target time span covered by Gaps A and B.

In the upper half of figure 16.16, we plot the probability distribution of the radiocarbon dates recovered from midden contents for the cal 3000 B.C.–A.D. 1 temporal interval. Because each of the roughly 14 $^{14}C$ dates was processed on marine shell, we can discount all CSD effects from the shape of this curve (per the above discussion). Figure 16.16 (upper) also identifies the specific archaeological sites from which these dates were processed.

Three major peaks (at the two-sigma level) characterize the distribution of midden marine shell dates during the target interval. The first peak, cal 2540 B.C.–cal 1900 B.C., includes all radiocarbon dates from the St. Catherines Shell Ring (9Li231) and a single $^{14}C$ date from 9Li137.[6] After a gap of roughly 4 centuries, a second spike (cal 1530 B.C.–1350 B.C.) is comprised of two additional dates from 9Li137. Then the radiocarbon record is characterized by a length gap in midden shell dates (cal 1350 B.C.–120

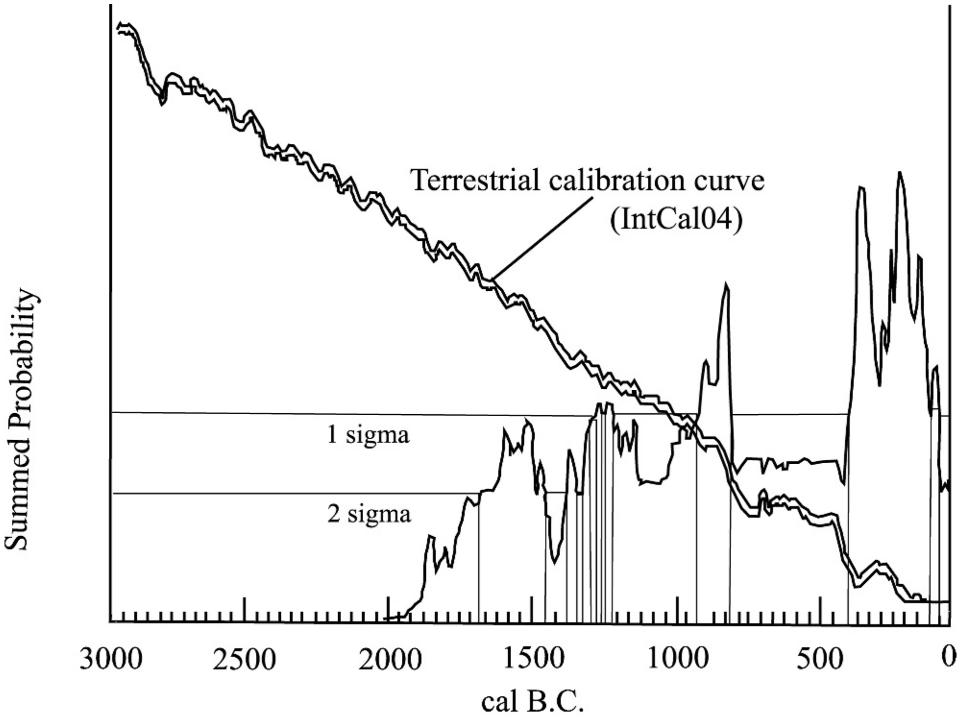


Fig. 16.15. The pooled frequency distribution of all terrestrial $^{14}C$ dates ($n = 13$) for the temporal span cal 3000 B.C.–A.D. 1. The diagonal line is the global marine calibration curve for the same period (Reimer et al., 2004).

B.C.), including only the two dates from 9Li197. The final peak, which begins at cal 120 B.C., includes the earliest date from Hayes Island (9Li1620) and develops into a large peak during the middle Deptford period.

The bottom half of figure 16.16 presents the probably distribution of roughly 19 radiocarbon dates processed from mortuary contexts on St. Catherines Island, which stand in almost inverse relationship to the midden dates discussed above. At the two-sigma level, we see a single peak in mortuary activity, ranging from cal 1740 B.C. to A.D. 260 (with one-sigma peaks at cal 850 B.C.–450 B.C. and cal 360 B.C.–50 B.C.).[7]

It is clear that whereas the major of mortuary determinations are terrestrial (charcoal) dates, the six marine shell dates from mortuary contexts cluster at the late end of this dating spectrum—ranging from cal 800 B.C.–470 B.C. (UGA-1554) through cal 340 B.C.–A.D. 80 (UGA-1555).

On the basis of these $^{14}C$ data, we can make the following observations:

- Significant middens accumulated on St. Catherines Island between roughly cal 2500 B.C. and 1350 B.C.
- Mortuary activities may have begun on St. Catherines Island as early as cal 1740 B.C. and a statistically significant cluster of mortuary-related dates persists throughout the prehistoric period.
- Only 8 (of 123) marine shell radiocarbon dates from St. Catherines fall into the interval cal 1350 B.C.–120 B.C. Of these, only two marine dates (Beta-20822 and Beta-21406) derive from primary midden contexts. The remaining six marine shell dates derive from mortuary features, which apparently contain secondary deposits and perhaps reflect long-distance transport.
- With respect to the late St. Simons and early Refuge-Deptford periods, we find that roughly two-thirds of the $^{14}C$ in the 2006 Dataset produce age estimates significantly later than the apparently associated ceramic assemblages.

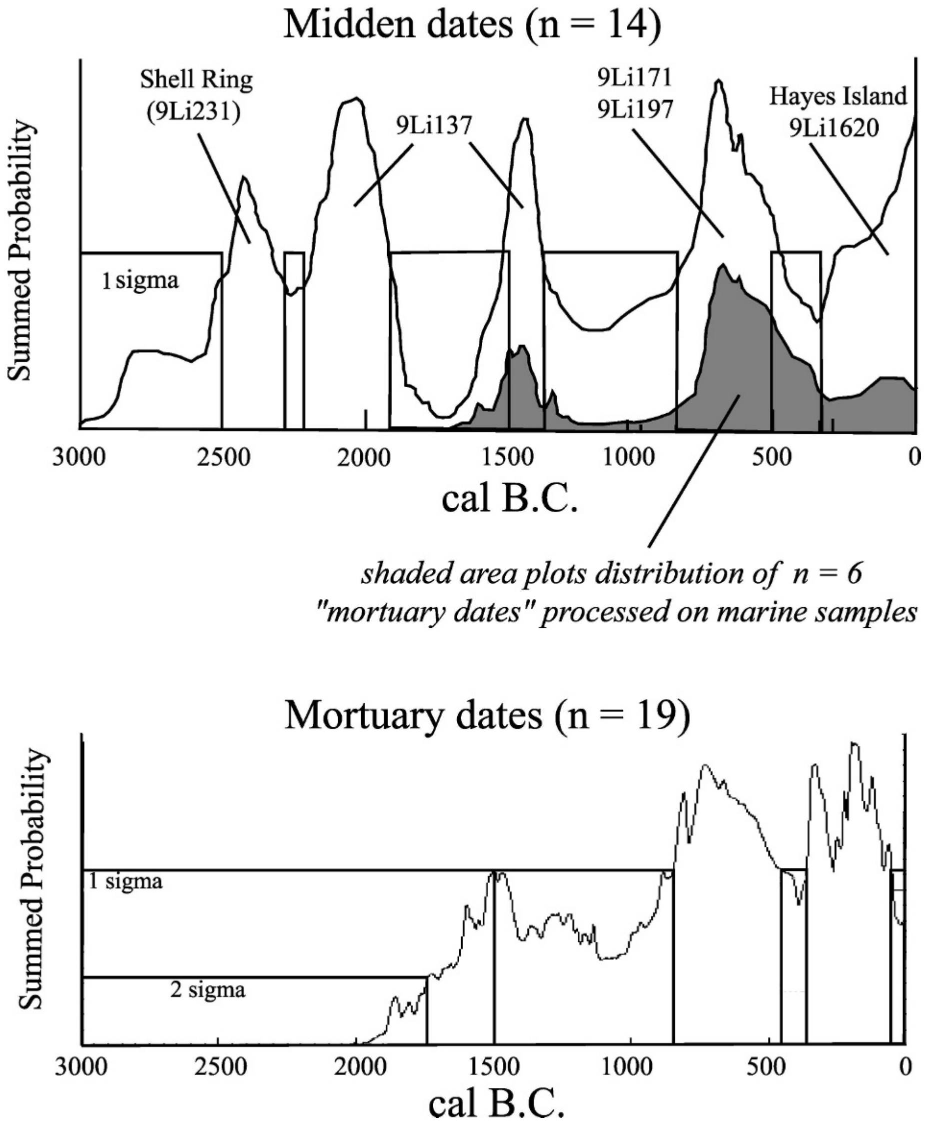


Fig. 16.16. The upper curve represents the probability distribution of $^{14}$C dates ($n$ = 14) recovered from midden contexts for the temporal span cal 3000 B.C.–A.D. 1. The lower curve shows the comparable distribution of radiocarbon dates generated from mortuary contexts on St. Catherines Island; the shaded inset represents the probability distribution of the six mortuary dates processed on marine shells for this time frame.

- Conversely, none of the radiocarbon dates associated with later ceramic periods produced $^{14}$C dates from the late St. Simons/early Refuge-Deptford periods.

With respect to Gap A, The St. Simons Period (cal 3000 B.C.–1000 B.C.), we concluded that despite our best efforts to fill the gap, $^{14}$C dates can only be consistently generated across the first two-third of the St. Simons interval (ca. cal 2500 B.C.–1350 B.C.), and part of this distribution is uneven (esp. cal 1900 B.C.–1530 B.C.). After about cal 1350 B.C., we find a 1000-year-long interval during which marine radiocarbon dates are

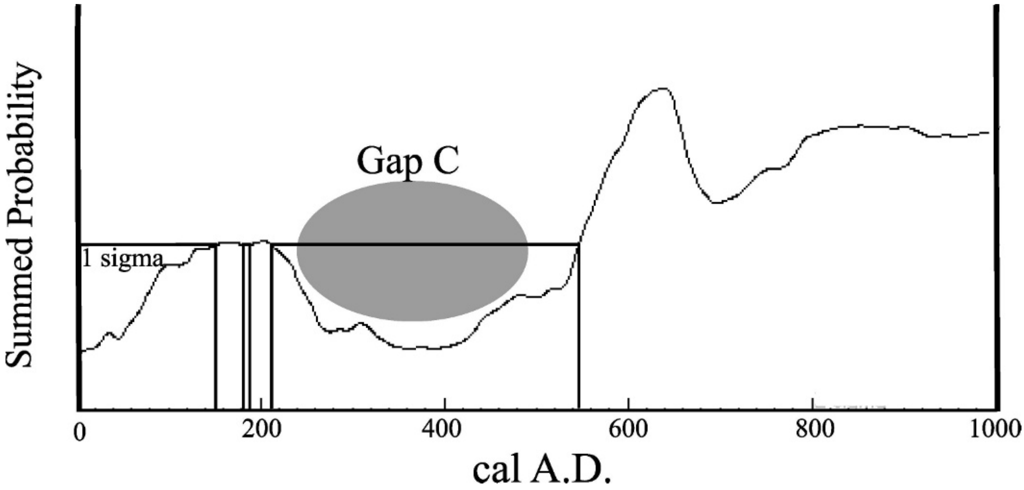


Fig. 16.17. The pooled distribution of all cultural radiocarbon dates ($n = 61$) falling into interval cal A.D. 1–A.D. 1000.

conspicuously lacking in our pooled sample of radiocarbon dates (fig.16.13). This hiatus continues through Gap B, The Refuge-Early Deptford Period (cal 1000 B.C.–200 B.C. Only with the initial occupation of site 9Li1620 (ca. cal 400 B.C.–80 B.C.) do shell middens begin to accumulate on St. Catherines Island again.

A second factor is operating here as well. Many of the marine shell samples apparently associated with St. Simons and early Refuge-Deptford ceramics actually produce $^{14}C$ age estimates for much later periods. This is a systematic error that seems to reflect a general lack of shell deposits dating to the time span from cal 1350 B.C. through about cal 200 B.C. (despite the presence of fiber-tempered and Refuge-Deptford period ceramics).

We believe that this hiatus in shell midden deposition (an amalgam of Gaps A and B, as defined above) is perhaps the major archaeological anomaly identified during our 3 decades of archaeological fieldwork on St. Catherines Island. In Part III, we will correlate these chronometric findings with independent evidence regarding archaeological site distributions and projected sea-level change.

## The Radiocarbon Record: cal A.D. 1–A.D. 1000

In the 2005 Dataset, radiocarbon evidence was conspicuously lacking for the transitions between major ceramic periods: Gap C, the Deptford–Wilmington Boundary (cal A.D. 400), and Gap D, the Wilmington–St. Catherines Boundary (cal A.D. 800). Figure 16.12 has already presented the probability distribution resulting from the 2006 Dataset, and in this section, we explore the implications of these additional $^{14}C$ determinations (see fig. 16.17).

### Gap C. The Deptford–Wilmington Boundary (cal A.D. 400)

In the attempt to close this gap in the radiocarbon record, we submitted 10 additional $^{14}C$ samples from contexts associated with Deptford–Wilmington period ceramics (roughly cal A.D. 250–550).

***North Pasture I (9Li238):*** None of the four samples submitted falls into the target temporal range. Three of the dates fall into the later Wilmington period (cal A.D. 600–800), and the fourth date (Beta-217239) indicates a St. Catherines period context. This is another case of older potsherds being deposited with shell midden of a more recent age.

***9Li196:*** The three *Mercenaria* submitted for dating—each associated with Deptford–Wilmington period ceramics—occur in well-defined stratigraphic context and fall precisely within the target range of cal A.D. 300–650.

***South End Field (9Li194):*** Although they were also apparently associated with a mixed assemblage of Deptford–Wilmington ceramics, the two *Mercenaria* from 9Li194 date from the late Wilmington period (cal A.D. 700–900).

***Rice Field 1 (9Li184):*** Beta-217222 dated a *Mercenaria* found in association with Deptford and Wilmington ceramics. The resulting age determination, cal A.D. 660–900, is consistent with the late Wilmington period.

To summarize, we submitted 10 additional $^{14}$C samples, each selected to produce a radiocarbon date spanning the transition between the Deptford and Wilmington periods (roughly cal A.D. 400).

- Only two of these dates (both from 9Li196) fell into the target interval.
- With only a single exception, the additional dates consistently indicated a later Wilmington period age (the exception, Beta-217239, dated even later, to the St. Catherines period).
- Beta-218098, associated with St. Simons ceramics, produced a marine shell date falling on the extreme margin of Gap C (cal A.D. 400–700).

Clearly, Gap C, the Deptford–Wilmington Boundary (cal A.D. 400), persists despite the redating reflected in the 2006 Dataset (figs. 16.12 and 16.17). Below, we explore possible reasons for this hiatus.

### Gap D. The Wilmington–St. Catherines Boundary (cal A.D. 800)

Attempting to close the cal A.D. 800 gap, we processed eight additional *Mercenaria* and *Crassostrea* samples for $^{14}$C dating, each mollusk associated with Wilmington and St. Catherines period ceramics.

***9Li233:*** The two *Mercenaria* samples from this site provided age estimates within the target range.

***9Li230:*** Both oyster shell samples from 9Li230 produced acceptable $^{14}$C dates from the Wilmington–St. Catherines period transition (Beta-215820 is slightly later).

***South End Field (9Li194):*** Both oyster shell samples from South End Field produced $^{14}$C dates spanning the Wilmington–St. Catherines period transition (although Beta-218095 is slightly later).

***9Li198:*** One *Mercenaria* sample (Beta-218099) provides an acceptable radiocarbon estimate from the Wilmington–St. Catherines period transition; Beta-218100 derives from a purely St. Catherines period context.

To summarize, all eight of the newly submitted $^{14}$C dates provided age estimates falling reasonably close to the Wilmington–St. Catherines transition. Moreover, five *Mercenaria* samples (Beta-217239, Beta-217238, Beta-217221, Beta-217243, and Beta-217244), each found in association with earlier sherds—mostly from the St. Simons and Refuge periods—provide acceptable $^{14}$C dates falling into the range of Gap D. One of the Hayes Island dates, without adequate ceramic associations, likewise fell into the Gap D interval. We now conclude that Gap D, the Wilmington–St. Catherines Boundary (cal A.D. 800), is effectively closed (figs. 16.12 and 16.17).

We will now explore both Gaps C and D in more contextual detail. Figure 16.17 presents the pooled distribution of all available radiocarbon evidence for the cal A.D. 1–A.D. 1000 interval on St. Catherines Island; approximately 49 $^{14}$C samples are represented in this distribution. Specifically, figure 16.17 displays a distinct cluster of $^{14}$C samples for the late Deptford period (ranging between cal A.D. 190 and A.D. 210, at the one-sigma level), separated by Gap C from the larger date cluster that marks the Deptford–Wilmington transition (with the one-sigma break point at cal A.D. 550). This is why Gap C, the Deptford–Wilmington Boundary (cal A.D. 400), remains a significant hiatus in the cultural radiocarbon record of St. Catherines Island.

### Could This Gap in the Distribution of $^{14}$C Dates (cal A.D. 210–A.D. 550) Result from Calibration Stochastic Distortion (CSD) Effects?

To explore this question, we have partitioned the relevant dates in the Pooled Dataset according to material being dated, to contrast the two different calibration curves employed. Figure 16.18 projects the (roughly $n$ = 36) marine $^{14}$C dates for the cal A.D.

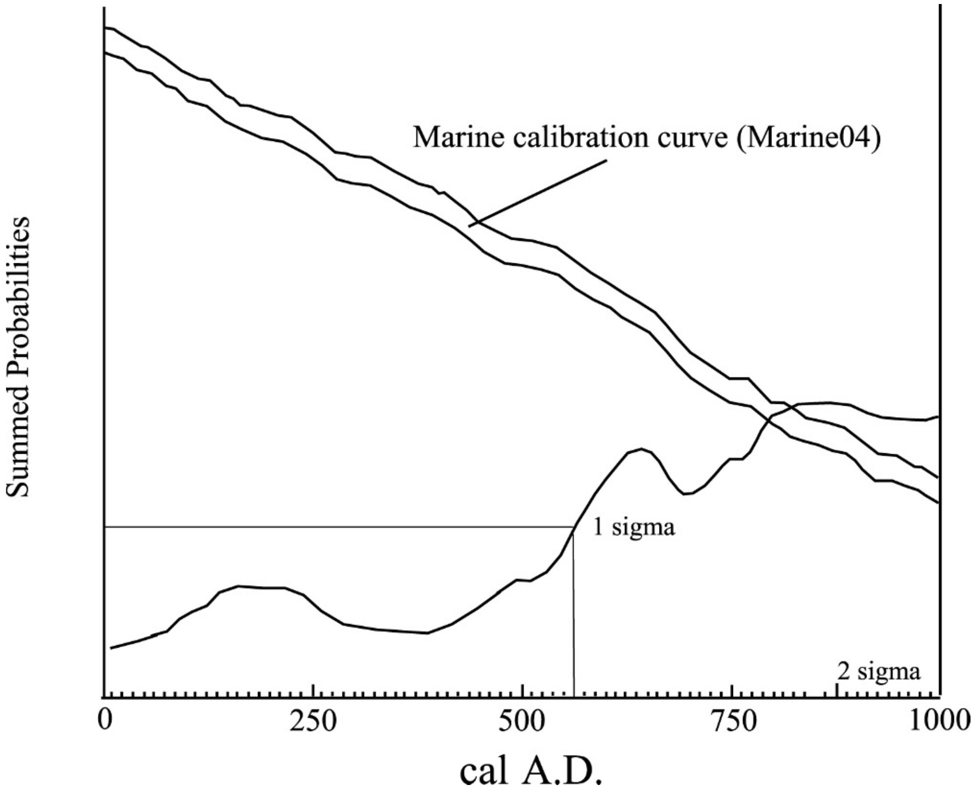


Fig. 16.18. The pooled frequency distribution of all marine $^{14}C$ dates ($n = 50$) for the temporal span cal A.D. 1–A.D. 1000. The diagonal line is the global marine calibration curve, plotted without correction for reservoir effect (Hughen et al., 2004).

1–A.D. 1000 interval against the master global marine calibration curve (Marine04) for this period, plotted without correction for reservoir effect (Hughen et al., 2004). The marine calibration curve for this interval is characteristically smooth and regular, and figure 16.18 clearly demonstrates that CSD effects are not responsible for the gap at cal A.D. 400.

Figure 16.19 arrays the complex patterning evident in the (roughly $n = 11$) terrestrial dates from the cal A.D. 1–A.D. 1000 interval, arrayed against the master terrestrial calibration curve (IntCal04) for this time period (Reimer et al., 2004). The available terrestrial dates form two distinct clusters (ca. cal A.D. 1–A.D. 280 and cal A.D. 530–A.D. 760 at the one-sigma level[8]), clearly leaving Gaps C and D intact. Although we can clearly see some calibration stochastic distortion at work (especially at the peak of the late Deptford curve and also ca. cal A.D. 750), the CSD effects are clearly minor and cannot account for the overall peak-and-valley distribution of terrestrial $^{14}C$ dates during this interval.

### Could the Gaps in the Distribution of $^{14}C$ Dates Result from Changes in Patterns of Human Behavior between cal A.D. 1 and cal A.D. 1000?

We have partitioned the Pooled Dataset into mortuary and midden subsamples and will employ this more fine-grained, contextual approach to explore the nature of the Gap C hiatus.

In the upper half of figure 16.20, we plot the probability distribution of the radiocarbon dates recovered from midden contents for cal A.D. 1–A.D. 1000. Because each of the roughly 48 midden dates was processed on

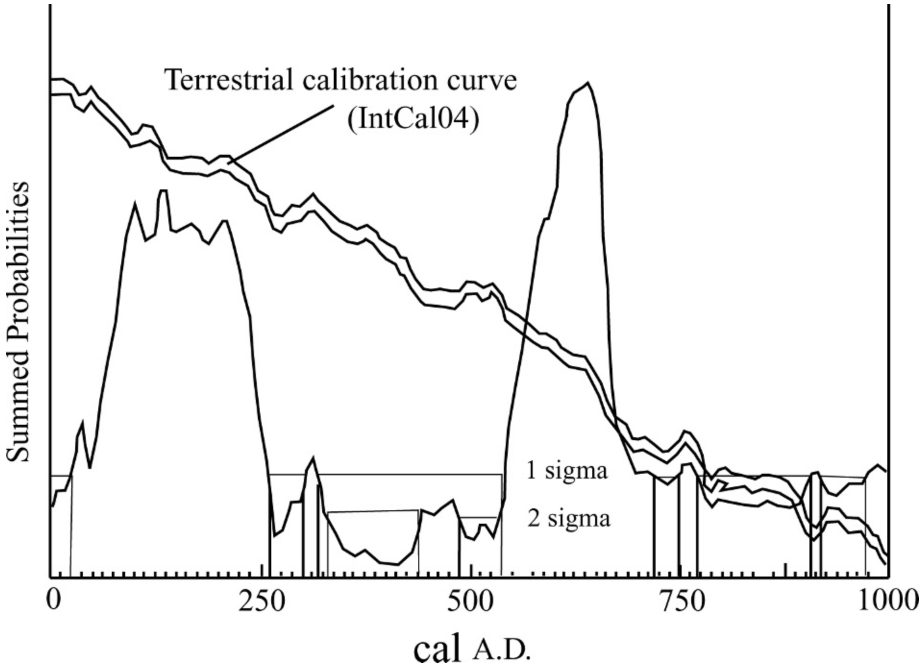


Fig. 16.19. The pooled frequency distribution of all terrestrial $^{14}C$ dates ($n = 11$) for the temporal span cal A.D. 1–A.D. 1000. The diagonal line is the global marine calibration curve for the same period (Reimer et al., 2004).

marine shell, we can discount all CSD effects from the shape of this curve (per the above discussion). The distribution of marine dates increases gradually during this interval, with no gaps evident at the two-sigma level (and only a very minor gap appearing at cal A.D. 680–A.D. 710). With respect to only midden contexts, then, Gaps C and D appear to have been filled by the new dates in the 2006 Dataset.

A very different story is evident in the bottom half of figure 16.20, which presents the probably distribution of roughly 17 radiocarbon dates processed from mortuary contexts on St. Catherines Island. Because only three of these dates were processed on marine shell (the remainder being charcoal samples) the resulting mortuary curve closely resembles the terrestrial distribution depicted in figure 16.19.

Two flurries of mortuary activity are evident here, the first taking place during the late Deptford period (ca. cal A.D. 50–cal A.D. 250), separated by a significant and persistent gap in the radiocarbon record. In chapter 24, we discuss the mortuary evidence in some detail, but for now, we simply note that burial mounds constructed during the Refuge-Deptford period are quite different from those constructed during the Wilmington–St. Catherines period. The persistence of Gap C underscores this difference.

We see a second peak in mortuary $^{14}C$ activity during the late Wilmington period (ca. cal A.D. 490–A.D. 770), separate by a slight gap (formerly called "Gap D") prior to resumption of burial mound building during the St. Catherines phase. Although this cal A.D. 770–A.D. 900 gap is "swamped" by the prevalence of radiocarbon dates from midden contexts in the pooled distribution (fig. 16.20), the Wilmington–St. Catherines period transition in mortuary behavior would seem to have cultural significance (which is explored in subsequent chapters).

On the basis of these $^{14}C$ data, we can make the following observations:

- The radiocarbon record indicates that midden debris accumulated almost continuously throughout the interval cal A.D. 1–A.D.1000.

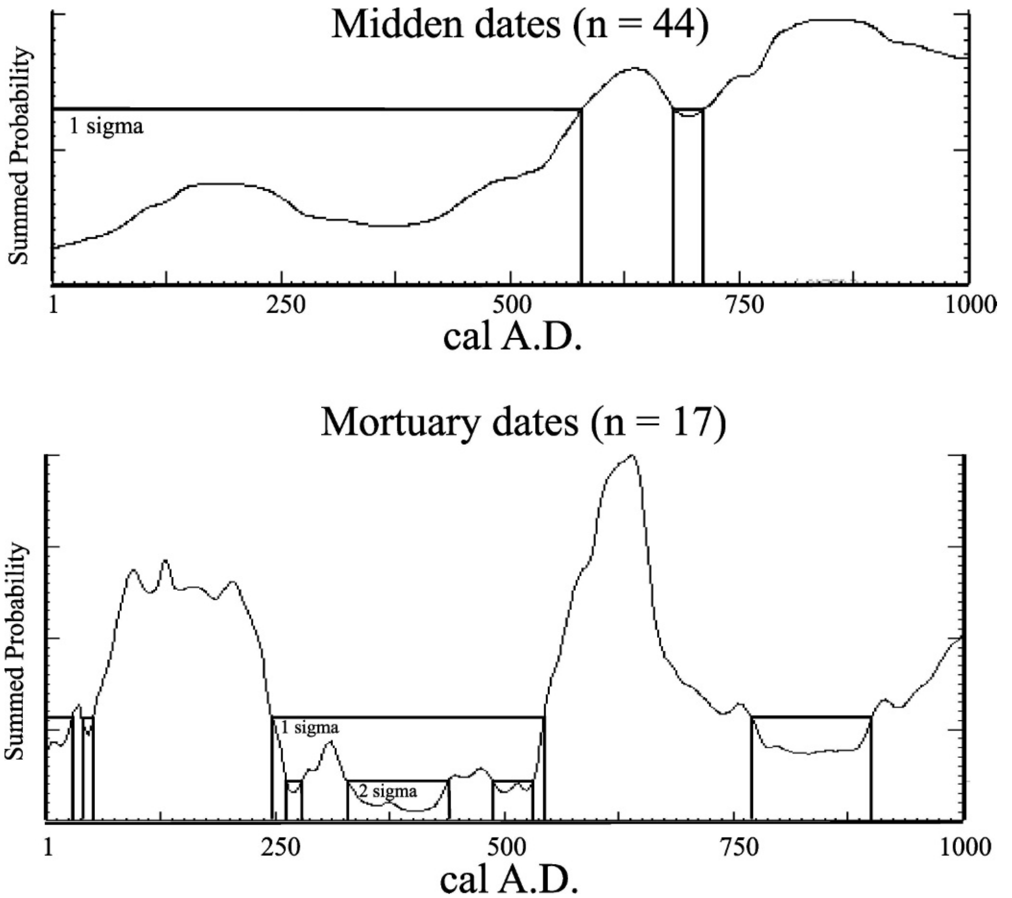


Fig. 16.20. The upper curve represents the probability distribution of $^{14}$C dates ($n$ = 17) recovered from midden contexts dating to cal A.D. 1–A.D. 1000; all of these samples were processed on marine shell. The lower curve shows the comparable distribution of radiocarbon dates generated from mortuary contexts on St. Catherines Island; three of these mortuary dates were processed on marine shells.

- Gap C, the Deptford–Wilmington Boundary (cal A.D.400), persists despite the redating effort in the 2006 Dataset, due to two, apparently unrelated factors: (1) the persistence of a site formation trend note earlier, namely, the tendency of some marine shell samples, apparently associated with Refuge-Deptford ceramics, to produce $^{14}$C age estimates for later periods (in this case, mostly the late Wilmington period). This systematic error seems to reflect a general lack of shell midden deposits shortly after cal A.D.1 (as reflected in figure 16.20, upper) and (2) the clear-cut break in mortuary activities between late Deptford and mid-Wilmington times.
- We conclude that Gap D, the Wilmington–St. Catherines Boundary (cal A.D. 800), is effectively closed (due to additional marine shell dates available in the 2006 Dataset. But we still can see an apparent break in the radiocarbon record separating mortuary activities during the Wilmington period from those during the subsequent St. Catherines period. While Gap D no longer exists in the pooled $^{14}$C record, it remains behaviorally significant and will be addressed in subsequent chapters.

## THE RADIOCARBON RECORD: POST-cal A.D. 1000

In the 2005 Dataset, radiocarbon dates were quite rare for Gap E: the St. Catherines–Irene Boundary (cal A.D. 1200–1300). Figure 16.12 presented the probability distribution of the 2006 Dataset, and in this

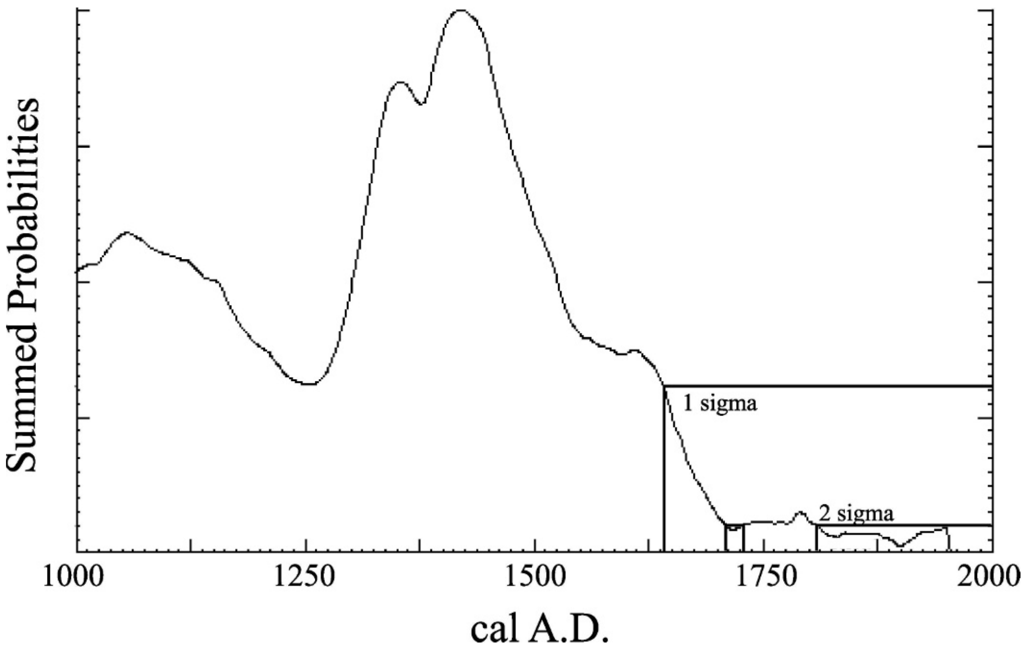


Fig. 16.21. The pooled distribution of all cultural radiocarbon dates (roughly $n = 71$) for the post-cal A.D. 1000 interval.

section, we explore the implications of these additional $^{14}C$ determinations.

GAP E. THE ST. CATHERINES–IRENE BOUNDARY (cal A.D. 1200–1300)

Attempting to bridge the distinctive gap separating the boundary between the St. Catherines and Irene periods, we processed four additional *Mercenaria* samples, each associated with St. Catherines, Savannah, and/or Irene period ceramics.

***9Li169:*** Both $^{14}C$ samples, found with Savannah ceramics, produced dates spanning the St. Catherines–Irene period transition.

***Davy Field 1 (9Li189):*** Both $^{14}C$ samples, found with Savannah and Irene period ceramic assemblages, date to the St. Catherines–Irene period transition (although Beta-215814 is slightly later).

***Hayes Island (9Li1620):*** Without adequate ceramic associations, we could not anticipate the age of Hayes Island radiocarbon dates. Only one of the three radiocarbon samples from Hayes Island dates to the estimated interval. Whereas Beta-215817 does indeed span the St. Catherines–Irene transition, Beta-215816 falls into Gap D, the Wilmington–St. Catherines boundary, and the third (Beta-215818) falls into Gap B, the Refuge-Deptford Boundary.

To summarize, all four of the targeted $^{14}C$ samples produced radiocarbon dates spanning the transition between the St. Catherines and Irene periods. Three additional dates (from 9Li216 and 9Li49), although associated with St. Simons and Refuge periods, likewise produced dates of this interval. One additional date from Hayes Island (Beta-215817) also fell into the Gap E interval. Considering the complete absence of mortuary dates (reflecting our failure to find bridging $^{14}C$ dates during this interval), we conclude that Gap E, the St. Catherines–Irene Boundary (cal A.D. 1200–1300), persists in the radiocarbon record of St. Catherines Island.

Figure 16.21 sets out the pooled distribution of the roughly 91 cultural radiocarbon dates for the post-cal A.D. 1000 interval. No significant gaps exist in this distribution, until the one-sigma limits trail off shortly after cal A.D. 1630. But the probability curve

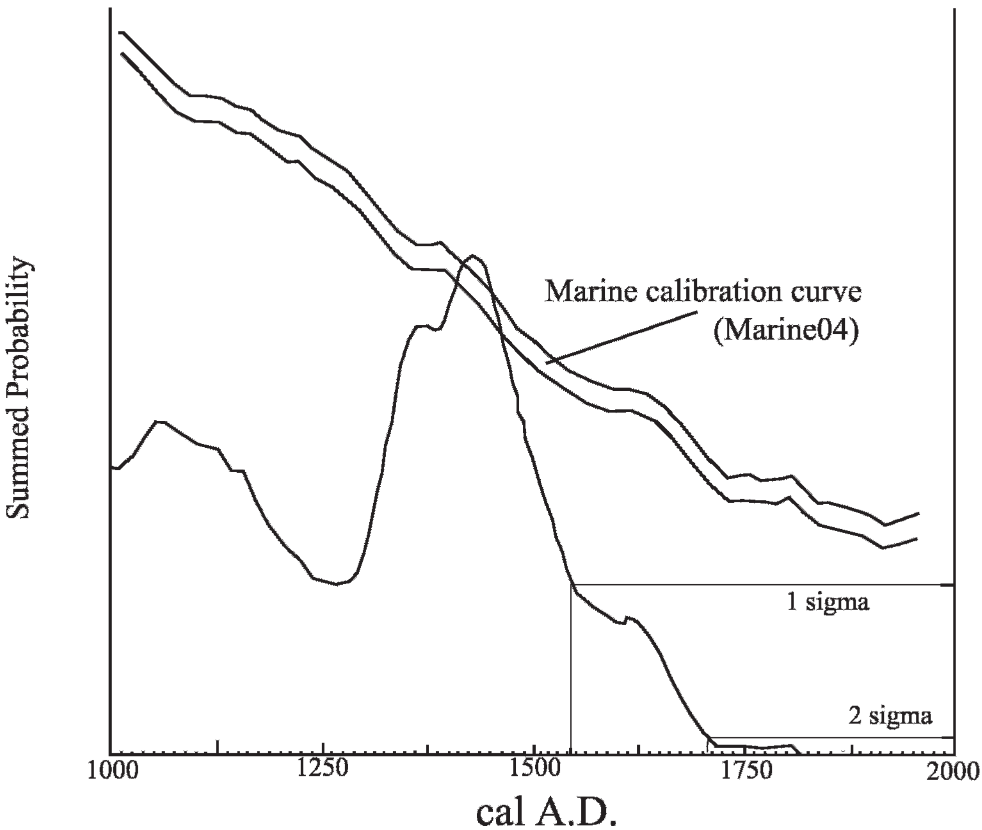


Fig. 16.22. The pooled frequency distribution of all marine $^{14}C$ dates (roughly $n = 58$) for the post-cal A.D. 1000 interval. The diagonal line is the global marine calibration curve, plotted without correction for reservoir effect (Hughen et al., 2004).

has a number of peaks and troughs, and we will examine the structure of this distribution using methods developed above.

### Do Calibration Stochastic Distortion (CSD) Effects Impact the Probability Distribution of $^{14}C$ Dates during the Post-cal A.D. 1000 Interval?

We have partitioned the early dates in the Pooled Dataset into marine and terrestrial subsets. Figure 16.22 projects the (roughly $n = 66$) post-cal A.D. 1000 marine $^{14}C$ dates against the global marine calibration curve (Marine04) for this period (Hughen et al., 2004). Although the marine calibration curve for this interval is characteristically smooth, we think that calibration distortions influence the precise configuration of the three peaks evident in this distribution (at ca. cal A.D. 1050, cal A.D. 1400, and cal A.D. 1550). Although none of these blips significantly influences the overall shape of the probability distribution, we do think that CSD effects are at work here.

Figure 16.23 arrays the comparable patterning for the (roughly $n = 13$) post-cal A.D. 1000 nonmarine radiocarbon dates against the terrestrial calibration curve (IntCal04) for this time period (Reimer et al., 2004). After about cal A.D. 1300, it is clear that the observed, archaeological distribution tracks the terrestrial calibration curve in several places, most notably at about cal A.D. 1380.

We believe that the calibration stochastic distortion (CSD) effect quite likely accounts for the observed trough in the frequency distribution at the St. Catherines–Irene period transition.

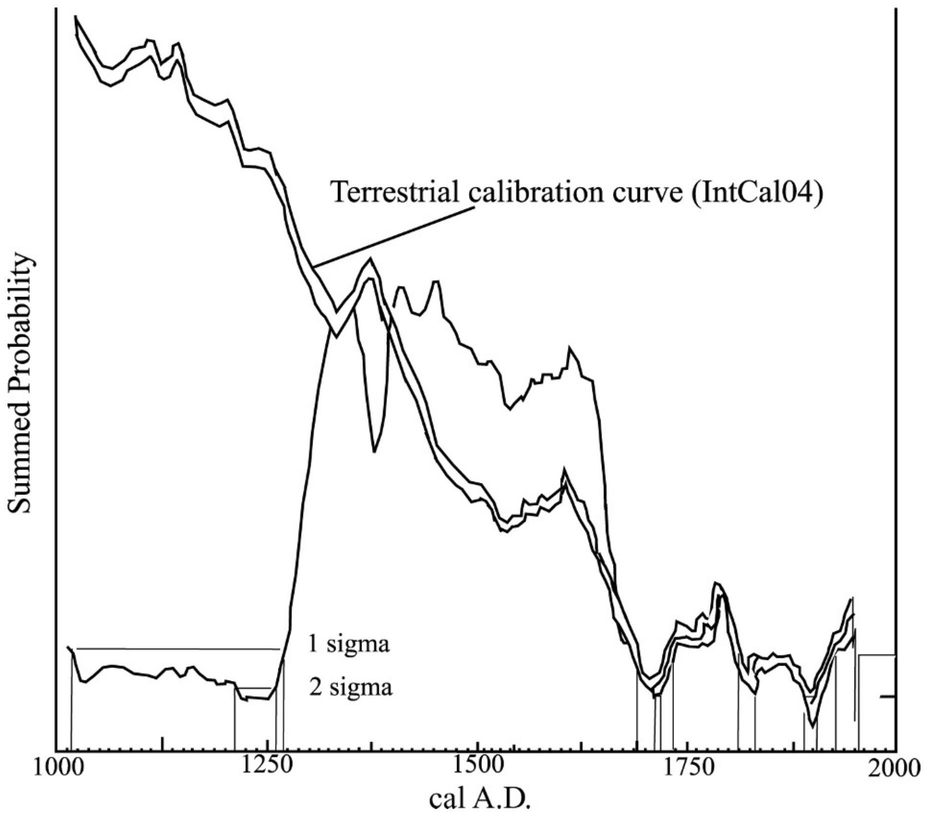


Fig. 16.23. The pooled frequency distribution of all terrestrial $^{14}C$ dates ($n = 13$) for the post-cal A.D. 1000 interval. The diagonal line is the global marine calibration curve for the same period (Reimer et al., 2004).

## Could the Post-cal A.D. 1000 Distribution of $^{14}C$ Dates Reflect Changing Patterns of Human Behavior?

In figure 16.24, we have partitioned the pooled $^{14}C$ dataset into mortuary and midden subsamples. In the upper half of this figure, we have plotted the probability distribution of all post-cal A.D. 1000 radiocarbon dates recovered from midden contents (roughly 67 individual $^{14}C$ dates). Although we have previously noted the probability that CSD effects condition the overall configuration of marine shell dates during the post-A.D. 1000 interval, there is minimal impact on Gap E, the persistent, one-sigma trough centered at cal A.D. 1180–1280 (near the boundary between the St. Catherines and Irene periods).

This trough occurs at almost precisely the projected interval for the Savannah period in the northern Georgia chronology, which DePratter (1979a, 1991) estimates to have ranged between A.D. 1200 and A.D. 1325 (in uncalibrated $^{14}C$ years) and converts to cal A.D. 1280–1310/1390. As noted in chapter 15, the available $^{14}C$ evidence from St. Catherines Island indicates that although Savannah ceramics define a unique temporal span (estimated to be roughly cal A.D. 1000–1500), they overlap temporally with both St. Catherines and Irene ceramics and fail to define a time period unique to the Savannah "period."

The bottom half of figure 16.24 presents the probably distribution of roughly seven radiocarbon dates available from mortuary contexts on St. Catherines Island, which par-

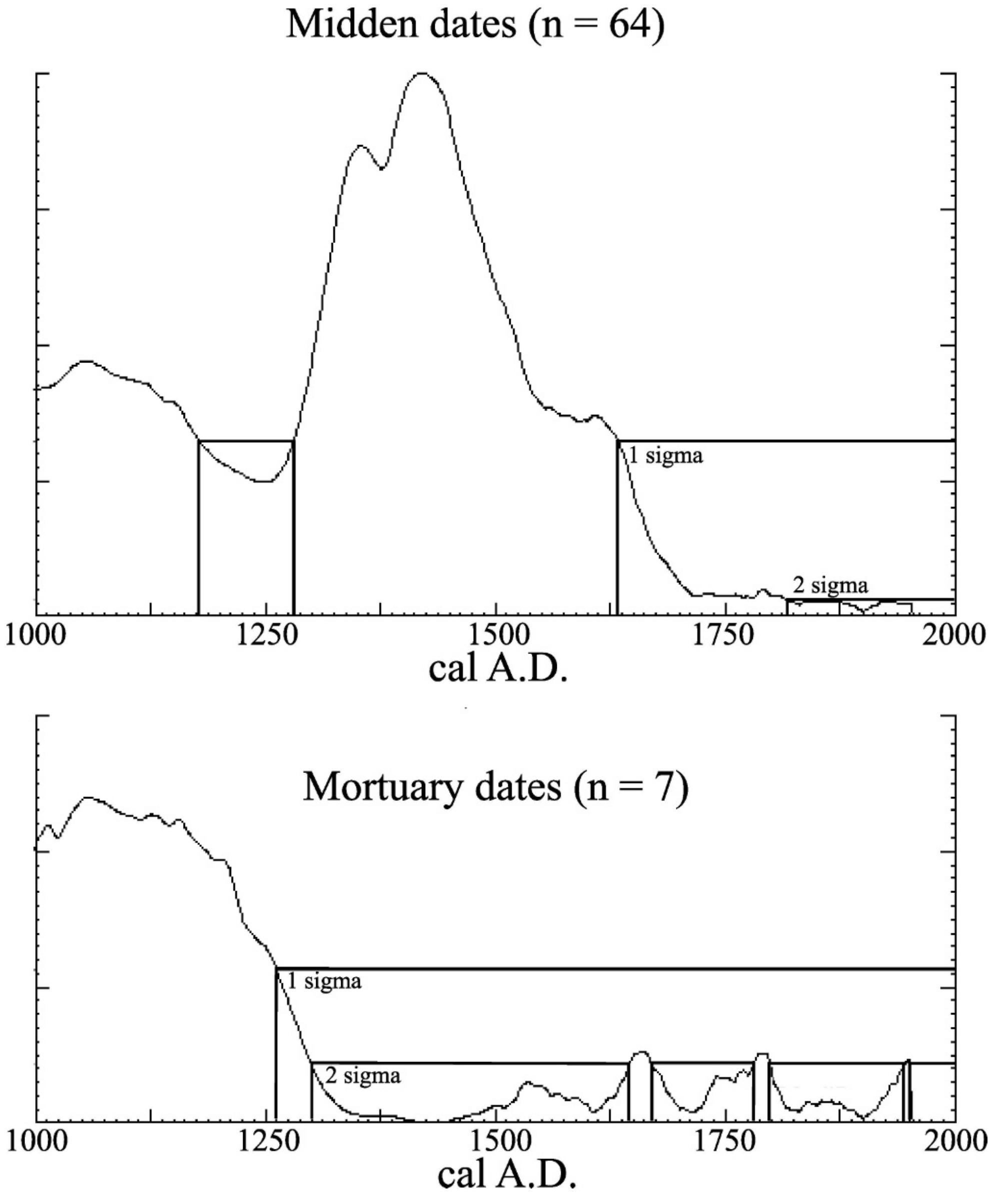


Fig. 16.24. The upper curve represents the probability distribution of $^{14}C$ dates ($n$ = 64) recovered from post-cal A.D. 1000 midden contexts; all of these samples were processed on marine shell. The lower curve shows the comparable distribution of radiocarbon dates generated from mortuary contexts on St. Catherines Island (roughly $n$ = 7).

allel (to some degree) the distribution of midden dates discussed above. At the two-sigma level, we see a single peak in mortuary activity, beginning during the pre-cal A.D. 1000 era and extending to about cal A.D. 1300 (at both the one- and two-sigma levels). Without doubt, part of the reason that Gap E persists after the 2006 retesting is due to the steep falloff of documented mortuary activity after cal A.D. 1300 (although we certainly know that aboriginal mortuary activities persisted into the late prehistoric era); this is clearly a sampling problem, since we lack Irene period radiocarbon dates (see chap. 24).

## SUMMARY

We can sum up the present chapter this way: During a quarter century of archaeological investigations on St. Catherines Island, we generated a database of 116 cultural radiocarbon dates. Plotting the cumulative probabilities of these $^{14}$C samples, we were struck by the nonrandom distribution of the radiocarbon record across the 5000 years of aboriginal occupation. Whereas some time periods had abundant peaks of multiple radiocarbon dates, other gaps denoted time spans for which $^{14}$C dates were rare (or even absent). Further, several of these gaps seemed to correspond with transitions between major cultural periods. We wondered whether this cumulative radiocarbon record could provide a proxy of long-term aboriginal dynamics.

Although this sample size was certainly respectable, we were concerned about the sampling biases involved in assembling the radiocarbon database. In deconstructing our motivations for processing $^{14}$C dates, we isolated two major strategies accounting for our reliance on radiocarbon dating: (1) establishing chronostratigraphy during mortuary and midden excavations or (2) providing absolute chronological controls of the northern Georgia ceramic chronology. Clearly, with these twin objectives in mind, all potential radiocarbon dates did not have an equal probability of selection (a hallmark of unbiased, randomized sampling), and we worried that we might have seriously biased the long-term radiocarbon record for St. Catherines Island.

We were also concerned about so-called stochastic distortions in the commonly employed marine and terrestrial calibrations curves commonly employed. Because the radiocarbon timescale is not strictly linear, the very process of calibrating a suite of radiocarbon dates can introduce its own peak-and-valley configuration (even within a continuous, uniformly sampled date series). Given the existence of various good and bad time spans, we wondered how much the calibration stochastic distortion effects might be influencing the peak-and-valley radiocarbon profiles on St. Catherines Island.

For these reasons, we decided in 2006 to process an additional 49 radiocarbon determinations, specifically targeted to fill the gaps evident in the radiocarbon record of St. Catherines Island. This chapter reports the results of this retesting, which we believe to be quite significant:

- Despite the extensive resampling exercise, we were able to close (decisively) only one of the five major gaps in the radiocarbon record (Gap D, the Wilmington–St. Catherines Boundary [cal A.D. 800]). The four additional gaps remain, in one form or another, and cannot be dismissed as the product of sampling error.
- The two earliest gaps merge into a 1000-year hiatus (from ca. cal 1350 B.C. through cal 350 B.C.) during which virtually no marine shell middens were created on St. Catherines Island. In several subsequent chapters, we will explore the causes of this anomalous gap in the $^{14}$C record.
- Consequently, many of the marine shell samples apparently associated with St. Simons and early Refuge-Deptford ceramics actually produce much later $^{14}$C age estimates, reflecting the general lack of datable shell from midden deposits during the cal 1350 B.C.–350 B.C. interval. Clearly, the direct AMS of sooted sherds from these periods would clarify our understanding of the ceramic chronology during this period (per the pioneering example of Stephenson and Snow, 2004).
- After about cal 350 B.C., marine shells began to accumulate in tens of thousands of midden deposits across St. Catherines Island. But a significant gap in the radiocarbon record persists during the transition between the Deptford and Wilmington transition (cal. A.D. 400). We believe that this hiatus is due (1) a continuation of systematic errors introduced by the general scarcity of shell midden deposits during this interval and (2) the clear-cut temporal break in mortuary activities between late Deptford and mid-Wilmington times.
- A final gap is evident in the radiocarbon record at cal A.D. 1180–1280 (near the common boundaries of the St. Catherines, Savannah, and Irene periods). Although CSD effects appear to operate here, they do not explain this apparent hiatus. Similarly, there is a steep fall-off in *documented* mortuary activities during the Irene period (but this is clearly a sampling problem, since we know that burial mounds persist into the Irene period [see chap. 20]; we simply have not processed appropriate $^{14}$C

dates on these deposits). In several subsequent chapters, we will explore possible explanations for the anomalous gap in the $^{14}C$ record at cal A.D. 1180–1280.

## NOTES

1. As listed in table 13.4, we actually had a total of 118 "cultural" dates as of January 1, 2006. But for present purposes, we are excluding one obviously aberrant date from Meeting House Field (Beta-30271) and the essential "modern" date (Beta-183638) from the anomalous wooden structure in the marsh immediately north of Long Field (as discussed in chap. 20 Excluding these two dates from the present analysis, the sample size of the so-called 2005 Dataset is 116 radiocarbon dates.

2. The title of this section is a deliberate bow to John Rick's seminal article of 1987 (of the same title).

3. We should also mention that we "inherited" a suite of 12 radiocarbon dates already processed during the the previous University of Georgia investigations on St. Catherines Island; all of these dates have been included in these calculations.

4. Our term "gap hunting" is a tribute to the pioneering research of A. E. Douglas and his colleagues in tree-ring dating of the American Southwest. Establishing a valid year-by-year Southwestern chronology in the Southwest was significantly delayed for decades by a persistent "gap", an unknown span of time separating the ancient, prehistoric sequence from the known, historically grounded chronology. The problem was that Ancestral Pueblo peoples had built their substantial sites at Mesa Verde, Chaco Canyon, and elsewhere during the relative part of the sequence. After these sites were abandoned, the tree-ring trail evaporated. Some (unknown) time later, the "postgap" sites were occupied—after the Spanish arrived in the Southwest.

During the 1920s, a number of major research institutions, including the National Geographic Society, the American Museum of Natural History, and the Carnegie Institution of Washington, launched a series of "gap hunting" expeditions to locate logs from the pesky undated interval. The "Gap Hunters," as they were known, experienced little initial success. Each sequence was occasionally extended a year or two, but the void persisted. Finally, in 1929, the Third National Geographic Society Beam Expedition came across the ruins at Showlow, a modern town in east-central Arizona and an unappetizing place to dig, amidst a disarray of pigpens and corrals. Morale sagged; the laborers were offered a bonus of $5 for anybody finding a specimen with 100 rings or more. The Gap Hunters eventually happened on a charred log fragment, routinely preserved in paraffin and labeled HH-39, which neatly bridged the gap.

This was a breakthrough in American archaeology. The last year of the relative sequence was A.D. 1284, meaning that the relative and recent sequences could be united. Almost overnight, Douglass could tell Southwestern archaeologists when their most important sites had been built: Mesa Verde was erected between A.D. 1073 and 1262, Pueblo Bonito in Chaco Canyon between A.D. 919 and 1130, and the Aztec Ruin between A.D. 1110 and 1121, among dozens of others.

Ironically, with HH-39 available, the Gap Hunters discovered that the former absolute and relative sequences actually overlapped by 49 years. Apparently a drought during the 13th century had fostered tree rings so minute that they had been previously overlooked. As it turned out, there had been no gap at all. But it took the deliberate search and a specimen like HH-39 to solve the problem.

5. As discussed below, we also ran several $^{14}C$ dates from samples recovered during the 2006 archaeological investigations at 9Li231 and Hayes Island.

6. We are ignoring the minor blip between cal 2290 and 2230 B.C., which accounts for a minor fraction of the probability profile.

7. For the purposes of this discussion, we are ignoring the minor blip between cal 1499 B.C. and 1496 B.C., which accounts for only 0.165 percent of the total variability in mortuary dates on St. Catherines Island.

8. We are ignoring two minor probability blips evident in figure 16.19, which account for a negligible proportion of the frequency distribution.

# CHAPTER 17. THE MOLLUSCAN INCREMENTAL SEQUENCE

DEBORAH MAYER O'BRIEN AND DAVID HURST THOMAS

The three previous chapters stressed the importance of macrochronology—the ordering of events in relatively large time segments such as years, centuries, and even millennia—relative to the distribution of archaeological sites on St. Catherines Island. But given the overarching research objectives, we need a much finer control on time—certainly on the order of seasons, perhaps even months or weeks (although the timing of fine-scale skeletal growth in aquatic organisms is known to vary considerably from year to year). This chapter establishes appropriate "microchronological" controls for the St. Catherines Island survey (see also chap. 18).

Accurately determining the season of occupation is a critical step in the analysis of aboriginal sites. Excavations on St. Catherines Island recovered thousands of potential "seasonal indicators", and although it would be relatively easy to provide a series of hasty judgments based on the presence or absence of these alleged "diagnostic" plants and animals, we believe that matters are not nearly so simple—on St. Catherines Island or elsewhere. Evidence indicates that the issues involved in determining seasonal occupation of aboriginal sites deserve more detailed consideration.

Most attempts to infer the season or seasons during which a set of ancient deposits accumulated depend largely on the kinds of organisms present in those deposits, and on the state of maturity of these organisms. Following Aten (1981), we can identify five commonly employed methods for determining seasonality from the skeletons of aquatic organisms:[1]

1. Presence or absence of skeletal elements (such as duck bones)
2. Demography (changes in the sizes of estuarine fishes as they mature through the annual cycle)
3. Morphology (changes in shell contour through the annual cycle, e.g., *Rangia cuneata*)
4. Structure (changes in shell microstructure correlated with the seasons of the year, e.g., growth phases in *Mercenaria* as evidenced in racial cross section of the shell)
5. Chemistry (changes in shell composition, e.g., shifting oxygen and carbon isotopes in *Mercenaria*).

Considerable caution is required to infer that modern patterns of seasonal availability and abundance can extend into the prehistoric past as a baseline for interpreting seasonal data. Because a number of seasonal indicators were recovered from the vertebrate faunal remains on St. Catherines Island, including unshed deer antlers, juvenile deer dentition, and shark and sea catfish remains, the analysis of these finds follows the first approach listed above (see chaps. 18 and 23 for discussions of these finds). This chapter focuses on developing the fourth approach by examining changes in seasonal increments in *Mercenaria*. The following chapter will focus on strategy number five to examine oxygen isotope data in *Mercenaria* from St. Catherines Island.[2]

Regardless of which approach is applied, analysts must be continually aware that any technique reveals only when one or more organisms died. The analyst must likewise base this determination on sound biological data, which generally requires a background study that correlates skeletal growth or seasonal abundance with the annual cycle. The fact that a particular clam died on St. Catherines Island in November/December is, by itself, archaeologically irrelevant. Archaeologists must always be aware of the arguments of relevance involved with demonstrating that the death of a mollusk or a fish is somehow contemporaneous with (and relevant to) a specific behavioral event of interest, such as the quest for food. Without such a demonstration, seasonal estimates might tell us something about the zooarchaeology of clam or fish, but nothing about people (Grayson and Thomas, 1983).

## DEVELOPING SEASONALITY STUDIES ON ST. CATHERINES ISLAND

When we began planning a long-term program of archaeological research on St. Catherines Island, one of our first goals was to develop a means for determining the seasonality of occupation by analyzing growth increments in mollusk shells. At the time, such studies were less than a decade old in archaeology, and rendered only a small amount of literature available for guidance. We were particularly impressed with Margaret Weide's (1969) study of seasonality in Pismo clam populations of southern California (see also Coutts, 1970, 1975; Coutts and Higham, 1971; Ham and Irvine, 1975; Koike, 1975) and we hoped to pursue analogous research on St. Catherines Island using the shell of the hard clam (*Mercenaria mercenaria*).

Each of these pioneering studies underscored the importance of maintaining adequate modern controls, with particular emphasis on understanding the variability introduced by changing water temperatures and salinity, tides, predation, spawning, and other environmental factors (esp. Clark, 1968, 1974; Kennish and Olsson, 1975). We began collecting a modern control sample of *Mercenaria mercenaria* in 1975, a process that continued for 9 years. An independent sample of modern *Mercenaria* was collected between April 1994 and March 1995, in support of the oxygen isotope study discussed in the next chapter.

Aware that George R. Clark II (1968, 1974) was conducting important and relevant research, we contacted Clark to discuss a possible collaboration to study incremental growth on mollusks from St. Catherines Island. In a letter dated January 14, 1976, Clark cautioned that "'Annual' lines are tricky" and warned that any such archaeology-based project "may have some real problems … the shells may have been diagenetically altered, and the winters may not have been severe enough to leave strong annual lines … the best approach is to collect living specimens over a year's time from the same locality and compare results." By this time, we were already collecting modern clams and oysters, and archaeological crews had begun saving zooarcaeological mollusks from the St. Catherines Island excavations. In the spring of 1976, we began sending Clark samples of modern and zooarchaeological mollusks for analysis.[3]

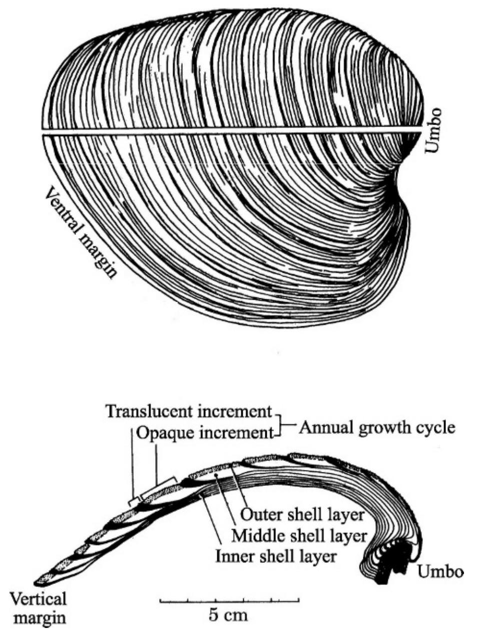


Fig. 17.1. Drawings and photographs of *Mercenaria* showing (top) the exterior appearance of the left valve and the standardized position of the radial cut made to expose the internal growth increments; (bottom) schematic rendering of internal growth increments and shell layers in racial cross section. (Reproduced with permission from Quitmyer et al., 1997: fig. 1.).

## MICROMORPHOLOGY IN *MERCENARIA*

The studies described in this chapter span a quarter century and, consequently, the discussion of our research must unfold chronologically. In the interest of clarity, however, we will summarize and define the terminology that best describes our findings (although some of these specific terms were not applied until near the end of the research phase).

Figure 17.1 defines the key components of visible growth increments in the hard clam, *Mercenaria mercenaria*. These shells, which are common components of the aboriginal middens of St. Catherines Island, grow by accretion to form annual incremental patterns of light and dark. Whenever possible, we follow the terminological conventions of Quitmyer et al. (1997: 826–827) to describe those growth increments. When thin sections of *Mercenaria* specimens are studied under transmitted light, the lightly colored increments appear are *opaque* (commonly abbreviated in this presentation as simply "O"). Opaque increments were deposited during phases of relatively rapid growth. Conversely, the dark increments appear *translucent* ("T") in thin section, and represent slower phases of shell formation. When these same shells are observed under ambient light, the opaque (O) increments appear white and the translucent (T) increments become gray. This terminology is sometimes confusing in the literature, and the following discussion will employ the conventions listed above (spelled out in fig. 17.1).

## THE MODERN CONTROL POPULATION

We collected the *Mercenaria* control samples from two widely separated locales on St. Catherines Island (see table 17.1). In 1975, we began collecting hard clams from a mud-bottomed feeder creek off McQueen Inlet, along the eastern side of St. Catherines Island (roughly 250 m north of the King New Ground dock). We collected clams during each of our trips to the island, and in early 1978, we added a second collection station at Persimmon Point, located along another feeder creek, off the westernmost extension of St. Catherines Island (at a place denoted as "English Cut" on many maps). All samples were collected by hand at low tide, by wading in the intertidal creeks located at the two collection localities. Each clam was killed immediately by steaming and after most of the soft tissue was removed by hand, the shells were washed and dried, then catalogued and stored for subsequent analysis

TABLE 17.1
**The Modern *Mercenaria* Control Sample from St. Catherines Island**

| | Location | |
|---|---|---|
| Collection date | McQueen Inlet | Persimmon Point |
| October 22, 1975 | XX | — |
| November 28, 1975 | XX | — |
| March 25, 1976 | XX | — |
| May 15, 1976 | XX | — |
| January 21, 1977 | XX | — |
| March 23, 1977 | XX | — |
| July 25, 1978 | XX | — |
| November 17, 1977 | XX | — |
| February 24, 1978 | XX | — |
| February 25, 1978 | — | XX |
| May 20, 1978 | XX | — |
| May 22, 1978 | — | XX |
| November 12, 1978 | XX | — |
| March 15, 1979 | XX | — |
| March 22, 1979 | — | XX |
| April 10, 1979 | XX | — |
| May 12, 1979 | XX | — |
| May 23, 1979 | — | XX |
| June 3, 1979 | XX | — |
| June 19, 1979 | XX | — |
| August 20, 1979 | XX | — |
| August 21, 1979 | — | XX |
| November, 1979 | XX | — |
| October 31, 1983 | — | XX |
| September 7, 1984 | — | XX |

In November of 1976, Clark reported the results of a preliminary analysis, based on 18 thin sections of the modern *Mercenaria mercenaria* from St. Catherines Island (Clark, 1976a). He concluded that "the growth patterns exhibit distinctive seasonal features and seem well suited for a study of this type. The position of the most recently formed shell layers established that the shells grow best in the winter, with disturbance lines forming in late summer." This was unexpected because existing studies on *M. mercenaria* populations, conducted well to the north, commonly displayed winter growth interruption (e.g., Panella and MacClintock, 1968; Rhodes and Pannella, 1970).

Clark also analyzed several clams (and oysters) recovered from our excavations of five sites on St. Catherines Island (King

New Ground Field, Fallen Tree, Meeting House Field, McLeod Mound, and Johns Mound), noting that most of the zooarchaeological specimens had been altered from "original shell material into chalky materials … producing an 'alteration rim'" that was difficult to distinguish from the seasonal growth increments. Despite such diagenic changes, Clark felt comfortable in estimating seasons of harvest for the archaeological specimens, although the sample sizes at that point were too small for statistical confidence.

Later that year, Clark applied for and received support from the Edward John Noble Foundation to continue the study of the modern St. Catherines Island control samples and to analyze *Mercenaria* shells recovered from ongoing excavations at McLeod Mound, Seaside Mound, and various shell middens on St. Catherines Island (Clark, 1976b). We continued building the modern control samples, sending Clark a portion of the specimens collected. Initially, Clark supervised his own students in the preparation of *Mercenaria* samples. Early in 1978, however, after accepting a professorship at Kansas State University, Clark trained Ann Marie Lunsford (then working in the Archaeology Laboratory at the American Museum of Natural History) to prepare the *Mercenaria* specimens in New York.

As part of our report on the Refuge-Deptford period burial mounds (Thomas and Larsen, 1979), George Clark presented the results of his seasonality research based on the hard clam shells. Relying on thin-section analysis from the *Mercenaria* control sample, Clark (1979a: 165) confirmed the conclusions of his previous pilot study on St. Catherines Island. A generalized growth pattern was indeed apparent, with phases of annual growth appearing as alternating bands and reflecting underlying degrees of transparency within the middle level of the shell. Furthermore, the modern control sample demonstrated that the white increment is indicative of the rapid growth occurring between November and April. Slower growth, denoted by the gray increment that formed in the warmer seasons, occurred between May and October. Clark found that in *Mercenaria* collected in late November, the gray (slow growing) zone was "essentially completed", but formation of the opaque (fast growing) increment had not yet begun. This conclusion demonstrated that shell growth slowed (and presumably halted) during the summer and early fall. The most rapid growth (reflected in the opaque shell increment) occurred during the winter and spring. Whether or not growth ever came to a complete halt for an extended phase is uncertain, but the deep notches and "discontinuities" may indicate such events. Notches sometimes appear on the external section of the valves because the mantle does not reflex (or extend) as far under stressful intervals. Modern control samples indicated that such notches accumulate on St. Catherines Island samples during the summer months, although caution is required to distinguish such notches from growth standstills due to nonseasonal environmental stresses, and this is why it became necessary to cross-section the shells.[4]

These findings strongly contrasted with the pattern discussed in most of the published studies available at the time. In general, these studies reported mollusks growing more rapidly in warmer waters, with shell growth retarding during colder months, as illustrated by the gray increment. Clark recognized that the St. Catherines Island pattern was "contrary to the usual idea of an 'annual' line, [but] there is nothing fundamentally wrong with the concept" (Clark, 1979b: 165). Emphasizing that incremental growth is conditioned by limits at *both* temperature extremes, Clark cited parallel findings elsewhere along the Atlantic Coast. Ansell (1968), for instance, emphasized the degree to which deviation in mollusk growth rate occurs along the Atlantic coast, in response to differential water temperature (see also Kennish and Olsson, 1975). In the northern latitudes, *Mercenaria* growth is retarded by extremely cold water in the *winter*. In the lower latitudes, however, it is the extremely high temperatures that transgress the mollusk limiting factors, thereby interrupting shell growth in the summer. North Carolina would likely lie somewhere along the dividing line between the two climatic zones. Fritz and Haven (1983) have observed a small, dark shell growth line that divided the fast growth increment during the warmest time of the year.

Simply put, the major growth increments in higher latitudes form during the winter, but in southern waters, this increment is added during the summer and early autumn (Pearson, 1979b, 1984b; Clark and Lutz, 1982; Kerber, 1985; Quitmyer et al., 1985, 1997; Jones et al., 1989; Lightfoot and Cerrato, 1989; Rollins et al., 1990: 467–470). Clark has subsequently collected and analyzed a number of modern samples from Georgia, South Carolina, North Carolina, New Jersey, and Maine, and his results support our findings. According to Clark, *Mercenaria* from Georgia demonstrate "the sharpest, clearest, most precise seasonal changes along the Atlantic coast" (personal commun.). More recent investigations by Irvy Quitmyer (personal commun.) and his colleagues reinforce this assessment.

While Clark prepared his results for publication, we continued to build the modern *Mercenaria* control sample (table 17.1) from both the McQueen and Persimmon Point marshes. As we planned to analyze these additional control samples and the archaeological specimens collected during the site survey, we became concerned about the large number of specimens involved. To lessen our concerns, Professor Clark offered to train two laboratory supervisors from the American Museum of Natural History (Deborah Mayer [O'Brien] and Debra Peter [Guerrero]). This training phase took place in mid-February 1979 in Clark's laboratory at Kansas State University. Thereafter, Mayer and Peter prepared all the specimens reported in the remainder of this chapter, while Clark continued to provide general guidance to the project (Mayer and Peter, 1979; O'Brien and Peter, 1983).

## PROTOCOLS

Rollins et al. (1990: 468) have stressed the importance of clearly specifying the methods and terminologies used to estimate season of harvest in mollusks. The following sections address the methodologies and protocols employed in the St. Catherines Island study.

### Recording Seasonal Increments

Clark's initial analysis of thin sections from St. Catherines Island showed considerable seasonal variability in transparency, particularly in the middle layer of the mature region (fig. 17.2). Here, the complete cycle (from one notch or discontinuity to the next) was normally characterized by a nearly opaque zone tapering into a translucent or nearly transparent zone. By carefully examining shell growth at the ventral (growing) shell margin, it is possible to estimate the season of harvest. As noted earlier, this opaque increment appears white on polished sections but dark in thin sections; the translucent zone appears dark on polished sections but light in thin sections. Variations in transparency in the outer layer are less regular, and fine growth lines, known to occur in all specimens, vary greatly in intensity (and are further confused by the presence of subsidiary lines, thought to be approximately daily in frequency). Only in the mature region could we readily distinguish the fine growth lines in the outer shell layer. Clark's control sample suggested a division of the annual growth cycle into phases observable through thin-section microscopy: winter (mid-December through mid-March), spring (mid-March through mid-June), summer (mid-June through mid-September), and fall (mid-September through mid-December).

Since Clark advanced his suggestions, we have considerably expanded this initial sample of modern *Mercenaria*, and all observations on this control sample ($n = 130$), excluding "senile" (sensu Clark, 1979b: 162) and otherwise unreadable individuals, are summarized in table 17.2. As discussed above, these samples were collected from two locales on St. Catherines Island between October 22, 1975, and September 7, 1984. Following collection, each specimen was thin-sectioned and interpreted according to the criteria discussed in this chapter.

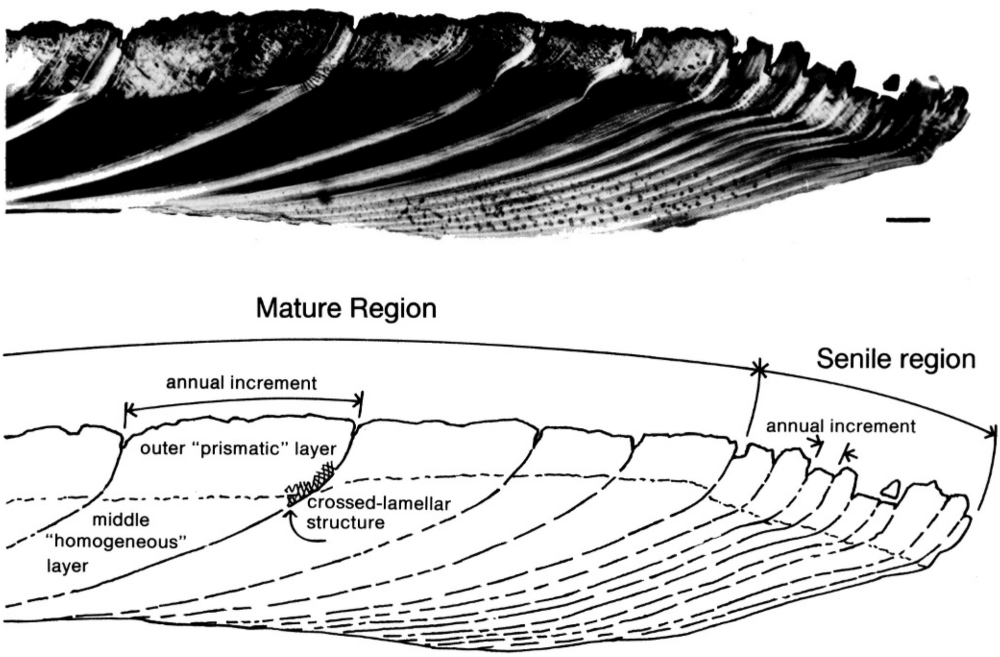


Fig. 17.2. Thin section of the left valve of specimen SCR-01, a *Mercenaria mercenaria* collected alive on October 22, 1975. Note that under tungsten illumination, the dark and the light areas are due to differences in transparency rather than color. Scale bar is 1 mm (after Clark, 1979: fig. 81).

Our laboratory observations of growth increments along the ventral margins, compiled mostly between the late 1970s and mid-1980s, were expressed in Clark's descriptive terminology (e.g., "early gray", "early-mid white", "probably end of white", and so forth).

Since this time, considerable progress has been made on the seasonal analysis of mollusks. In fact, a decade ago, Rollins et al. (1990: 467) suggested that "over the last 20 years, mollusks have been elevated to a rather elite position in the dating, interpretation, and reconstruction of environments and activities at coastal archaeological sites." Subsequent analysis of incremental growth in *Mercenaria* (at least along the coastal area of the Southeastern United States) is now commonly described in terms of the following standardized, six-part subdivision of annual shell growth (e.g., Jones, 1980; Quitmyer et al., 1985, 1997: 830; see also fig. 17.3):

- $T_1$: Translucent increment beginning to form on the marginal edges
- $T_2$: Translucent increment one-half complete
- $T_3$: Translucent increment complete
- $O_1$: Opaque increment beginning to form on the marginal edges
- $O_2$: Opaque increment one-half complete
- $O_3$: Opaque increment complete

Although ontogenic and microenvironmental factors undoubtedly condition the relative proportions of the terminal growth stages, we believe that these ordinal categories provide a useful, standardized method for reporting the results of incremental shell growth in hard clams. Accordingly, we have converted our previous laboratory designations into the T–O subdivisions (as defined above). For phases of fast growth, our gradations of the "white" zone were translated to stages of "opaque" growth (scaled from $O_{1-3}$); for episodes of slow growth, our observations on the "gray" increments were expressed as increments of "translucent" zonation.

Table 17.2 and figure 17.4 summarize the $n = 211$ modern hard clams, pooled from both St. Catherines Island collection

TABLE 17.2
**Relationship of Growth Increments to Known Season of Harvest for *Mercenaria mercenaria* (collected on St. Catherines Island between October 22, 1975 and September 7, 1984)**

| | Date of collection | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Growth phase | Dec–Jan | Jan–Feb | Feb–Mar | Mar–Apr | Apr–May | May–June | June–July | July–Aug | Aug–Sept | Sept–Oct | Oct–Nov | Nov–Dec | Total |
| $T_{1-3}$ | — | — | — | — | — | 4 | — | — | — | — | — | — | 4 |
| $T_1$ | — | — | — | — | 8 | 22 | 1 | — | 2 | — | — | — | 33 |
| $T_2$ | — | — | — | — | — | — | — | 6 | 3 | — | 6 | 5 | 20 |
| $T_3$ | — | — | — | — | — | — | — | 1 | 1 | — | 5 | 3 | 10 |
| $O_1$ | — | 2 | 7 | — | — | — | — | — | — | — | — | — | 9 |
| $O_2$ | 3 | — | 9 | 5 | — | 1 | — | — | — | — | — | — | 18 |
| $O_3$ | — | — | — | 44 | 2 | 5 | — | — | — | — | — | — | 51 |
| $O_{1-3}$ | — | — | — | 3 | — | 5 | — | — | — | — | — | — | 8 |
| Senile | — | — | 9 | 6 | — | 25 | 4 | — | 9 | — | 1 | 4 | 58 |
| Total | 3 | 2 | 25 | 58 | 10 | 62 | 5 | 7 | 15 | — | 12 | 12 | 211 |

sites. This control sample is characterized by some obvious strengths and weaknesses. One strength is the fact that the *Mercenaria* specimens were collected over an interval of 9 years. We hope that this longitudinal aspect might help buffer the skewing effects of unique seasonal events, such as phases of exceptionally cold or warm temperatures, spawning, or storms. The control sample is particularly strong for the late winter and spring months because this is when we generally conducted the Island-wide archaeological survey (reported in this volume) and excavated the Refuge-Deptford burial mounds (Thomas and Larsen, 1979). Quite obviously, our sampling strategy was sporadic and somewhat seasonally biased. Our sampling was especially limited during the summer months, when our archaeological field crew was generally deployed elsewhere for fieldwork, and also during the middle winter months, when we rarely excavated on St. Catherines Island.

More recent investigators have demonstrated the value of collecting larger, more systematic samples. Quitmyer et al. (1997) reported one modern control sample (from Indian River, Florida) that consisted of 1100 analyzed specimens. In addition, these investigators presented data from Kings Bay (Georgia), where they collected systematic monthly samples over two intervals (1981–1982 and 1983–1984); the resulting sample ($n = 451$) provided impressive results that can only be approximated in our more limited sampling from St. Catherines Island.

We would point out that Andrus and Crowe (chap. 18) present an independent and vastly more systematic sampling of hard clams from St. Catherines Island (collected monthly, the day after each full moon from April 1994 through March 1995). This sample was harvested from the mouth of a small creek entering a tributary of McQueen's Inlet, on the seaward side of the island. The Andrus and Crowe sample was used strictly as a control in the oxygen isotope study reported in the next chapter; it was unavailable for the seasonality analysis discussed in the present chapter.

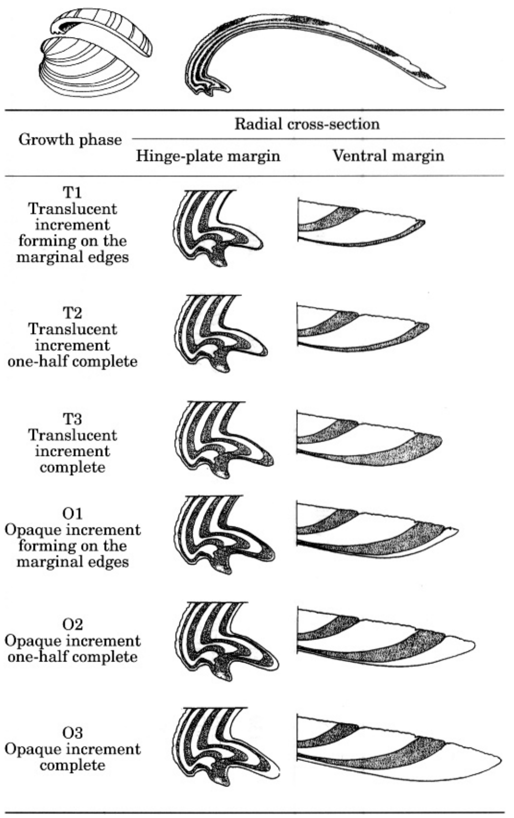


Fig. 17.3. The six-part subdivision use for temporal assessment of annual incremental shell growth (reproduced with permission from Quitmyer et al., 1997: fig. 3).

## Calibrating the *Mercenaria* Clock on St. Catherines Island

As discussed above, Clark's (1979a, 1979b) research suggested that the annual growth cycle of hard clams from St. Catherines Island could be divided into phases visible through microscopic observation of thin sections: rapid addition within the opaque zone during the winter (mid-December through mid-March) and spring (mid-March through mid-June), which shifts toward slower growth during the summer (mid-June through mid-September) and fall (mid-September through mid-December). The more complete control sample (presented in tables 17.1 and 17.2) is consistent with these seasonal divisions, although considerable blurring exists between the various incremental growth phases.

As mentioned, similar patterns are evident in the data from Kings Bay (Georgia), located approximately 75 km south of St. Catherines Island (Quitmyer et al., 1985: 63–65, 1997: fig. 4). The hard clams from Kings Bay form opaque shell increments between November and May, although most of this growth seems have taken place between December and March. Our control sample from St. Catherines Island reflects a similar fast-growth interval (from mid-December through mid-June), but the inadequacies of our sample make it difficult to define a shorter phase of concentrated growth within this range. Clams growing at Kings Bay add translucent increments throughout the entire year, but slow growth increments are particularly evident between April and November. The St. Catherines Island sample is more circumscribed, with slow-growth increments entirely absent between mid-December and mid-April. While this disparity might be due to sampling vagaries, it is also possible that real differences exist in microhabitat (such as height within a tidal zone and length of time exposed on a sun-baked tidal flat).

To frame the temporal parameters of St. Catherines Island, we generally follow Clark's (1979b) seasonal estimates. Taking into account the expanded modern *Mercenaria* sample and the six-stage growth incremental criteria of Quitmyer et al. (1985), however, we feel it necessary to slightly regroup and reconfigure the temporal boundaries. Specifically with reference to the St. Catherines Island control sample (table 17.2), we found that growth stages $T_2$ and $T_3$ were almost entirely coterminous. This means that $T_2$ and $T_3$ specimens significantly overlapped in samples collected between mid-August and mid-December. Because of this overlap, we felt it appropriate to group these two incremental stages into a single analytical category (denoted as $T_{2-3}$). Similarly, because we found almost complete temporal overlap in growth stages $O_1$ and $O_2$, we decided to group these readings into a single category, denoted as $O_{1-2}$.

To summarize, we will employ the following four-part subdivision of annual shell

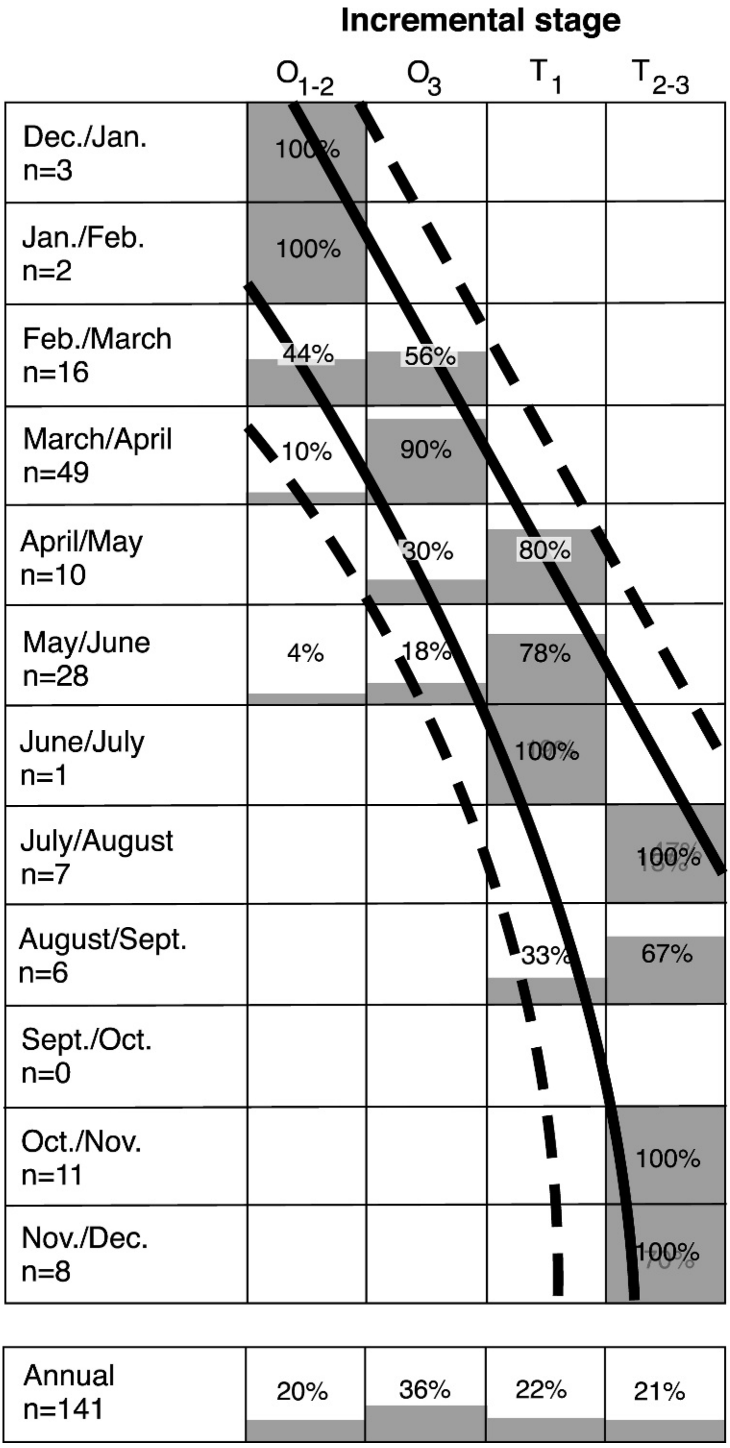


Fig. 17.4. Interpolated estimates of incremental growth stages for the modern control sample of *Mercenaria* collected from St. Catherines Island.

growth in *Mercenaria* from St. Catherines Island, which can be correlated with approximate season of harvest:

| | |
|---|---|
| $O_{1-2}$ (initial to intermediate opaque increment) | Winter (mid-December–mid-March) |
| $O_3$ (terminal opaque increment) | Early spring (mid-March–mid-April) |
| $T_1$ (initial translucent increment) | Spring (mid-April–mid-June) |
| $T_{2-3}$ (intermediate to terminal translucent increment) | Summer and fall (mid-June–mid-December) |

### Laboratory Procedures

The initial studies of seasonal variability in *Mercenaria* recognized the importance of standardized preparation and analysis. Ham and Irvine (1975) experimented with a number of techniques—surface examination, candling, polished transverse sections, and thin sections—and concluded that thin-section analysis provided the most reliable results (particularly because thin sections provided the clearest distinction between systematic zones of seasonal stress and stress due to random events such as storms).

Clark (1976a, 1979b) established the protocols we followed in the initial studies of *Mercenaria* specimens from St. Catherines Island:

1. The shell (or shell fragment) was examined to determine the most promising position and orientation of the thin section.
2. The shell was mounted on a diamond saw and the first section was cut. We employed a Buehler IsoMet 11–1180 Low Speed Saw, a gravity-fed diamond saw of exceptional stability when operated at very low speeds. This process generally took 2–3 hr for a modern specimen, and 4–6 hr for zooarchaeological samples (more time was employed to avoid breaking the shell).
3. The cut surface was ground smooth on a glass plate, then cleaned and dried.
4. The specimen was cemented to a frosted glass slide with epoxy and allowed to cure 24 hr.
5. The glass slide was mounted on the diamond saw, and all but a thin slice of the shell cut away from the glass slide. This step took at least as long as the initial cut.
6. The section was ground by hand on a glass plate until the desired thickness was reached. This took 10–30 min.
7. The ground section was cleaned, dried, and fitted with a coverslip.
8. The thin section was examined under a petrographic microscope to resolve fine details. Particular emphasis was placed on the shell margin, which represents the season of harvest. In some cases, a photographic enlargement was created to facilitate study.
9. Observations were compared with the pattern of variations in calcification observed in shells from living populations with known dates of collection.

Although such thin-section analysis provided a reasonably accurate method for determining season of death in zooarchaeological specimens of *Mercenaria*, we were dismayed at the inordinate amount of time, equipment, money, and workspace required to process thin sections in such quantity. After we had successfully analyzed more than 700 specimens, more than 1100 unanalyzed *Mercenaria* specimens remained in our St. Catherines Island sample, which prompted us to seek a faster way to complete the study without sacrificing accuracy.

We were gratified to learn of Cheryl Claassen's (1982, 1983) successful experiment with ways to decrease processing time while sacrificing only a small degree of accuracy. Based on her study of *Mercenaria mercenaria* from 19 sites in North Carolina, she was able to greatly streamline her analysis by concentrating on the most obvious visual differences in clam growth. Using this method, Claassen needed to simply cross-section and polish the shell, then examine the exposed face under low power magnification with reflected light (see also Claassen 1986a, 1986b). Quitmyer and his associates arrived at a similar conclusion, utilizing a blade that polishes as it cuts (Quitmyer, personal commun.). In thin-section research, the "color" of the terminal band was sufficient to define the growth phase in which the individual was harvested. However, because light is not transmitted through these thick sections, the band "colors" appeared to the analyst as the opposite of those evident in the thin sections. In such thick-section analysis, a white zone results from fast growth, and a gray zone indicates slow growth.

To provide a further control on these results, we conducted a blind experiment on the modern *Mercenaria* sample from St. Catherines Island. Table 17.1 lists the 211 hard clams that comprise our control sample. For comparative analysis, a subsample of 51 specimens was arbitrarily selected. This arbitrary subsampling was based on the control specimens then available in the Archaeology Laboratory in New York; the remaining control specimens were stored at the time on St. Catherines Island. Using the subsample of $n = 51$ specimens, we conducted a two-part blind experiment, comparing (1) the results of thin-section analysis with the known harvest date for each specimen and (2) the results from polished thick sections. These results are summarized in table 17.3.

COMPARING THIN-SECTION RESULTS WITH KNOWN AGE OF HARVEST: We began by testing to see how well our thin-section estimates predicted (retrodicted) the known date of harvest. As documented in table 17.3, the fit was exact for 90.1 percent (46 of 51) of the thin-section estimates (meaning that the known collecting date fell within the estimated date range of the cross section).

We must temper our enthusiasm for these highly positive results because, after all, the subsample of $n = 51$ thin-sectioned clams was drawn from the larger control sample ($n = 211$) used to derive the St. Catherines Island seasonal chronology in the first place. A truly independent control sample would be required to test the chronology in a rigorous sense; however, this check on the ability of thin-sectioned *Mercenaria* to retrodict the known age of harvest provides a necessary first step in evaluating the effectiveness of thick-section analysis.

EFFICACY OF THICK-SECTION ANALYSIS: We then reanalyzed the control subsample ($n = 51$) by analyzing and assessing growth increments on thick sections from the same individuals (table 17.3).

Thick-section analysis correctly retrodicted known harvest ages in 38 of the 51 test cases, for an overall accuracy of 74.5 percent. While this drop in accuracy from thin-section analysis is disturbing, examining the actual cases involved shows that the thick-section estimates were fairly close to the known age of harvest. Eleven of the "near misses" involved a disparity of less than 25 days from the known collection time. In seven of these cases (all specimens were collected on April 10, 1979), the difference was only 5 days. Three additional samples were off by a single month, while the greatest disparity observed was 2 months. This sample, specimen SCR929, was collected on August 21, 1979, a time of particularly slow incremental growth. With regard to absolute chronology, thick-sectioned analysis was somewhat less accurate than the more time-consuming thin-sectioning, but the errors involved were relatively minor (and reflected the arbitrary cutoff points employed in the St. Catherines Island *Mercenaria* chronology). In other words, at a fine level of inspection thick-section analysis might be slightly less accurate, but it still preserves the overall trend of annual shell growth.

We can likewise compare the agreement between thin-section and thick-section analysis, without regard to actual time of harvest. The two techniques agreed with one another in 35 (of 51) cases, for an overall agreement of 68.6 percent. In all but one case, this difference was a single growth stage; another five cases had just a half-stage disparity. The only extreme difference took place on specimen SCR11, which was judged by thin-section analysis to have been harvested in the $T_2$ stage, whereas thick section analysis determined that the specimen was in the $O_1$ stage.

SUMMARY: This blind testing experiment shows that both preparation methods retrodict the known season of capture with considerable accuracy. Thin-section analysis had a success rate of 90 percent, while the thick sections of identical specimens were nearly 75 percent accurate and still preserved the overall trend of incremental shell growth through the annual cycle. Considering the sampling problems and observed variability in the control sample, as well as the arbitrary temporal limits

TABLE 17.3
**Comparison of Thin-Section and Thick-Section Techniques on Known-Age *Mercenaria* from St. Catherines Island**

| | | | | Observed stage | |
|---|---|---|---|---|---|
| Specimen no. | Date of harvest | Locality | Expected stage | Thin section | Thick section |
| SCR11 | November 28, 1975 | McQueen | $T_{2–3}$ | $T_2$ | $O_1$ |
| SCR812 | March 22, 1979 | Persimmon | $O_3$ | $O_2$ | $O_2$ |
| SCR815 | March 22, 1979 | Persimmon | $O_3$ | $O_3$ | $O_3$ |
| SCR819 | April 10, 1979 | McQueen | $O_3$ | $O_3$ | $T_1$ |
| SCR 821 | April 10, 1979 | McQueen | $O_3$ | $O_3$ | $T_1$ |
| SCR822 | April 10, 1979 | McQueen | $O_3$ | $O_3$ | $T_1$ |
| SCR830 | April 10, 1979 | Persimmon | $O_3$ | $O_3$ | $T_1$ |
| SCR838 | May 23, 1979 | Persimmon | $T_1$ | $T_1$ | $T_1$ |
| SCR841 | May 23, 1979 | Persimmon | $T_1$ | $T_1$ | $T_2$ |
| SCR848 | May 23, 1979 | Persimmon | $T_1$ | $T_1$ | $T_1$ |
| SCR851 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR852 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR856 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR867 | February 24, 1978 | McQueen | $O_{2–3}$ | $O_2$ | $O_3$ |
| SCR877 | February 24, 1978 | McQueen | $O_{2–3}$ | $O_2$ | $O_2$ |
| SCR882 | February 25, 1978 | McQueen | $O_{2–3}$ | $O_2$ | $O_2$ |
| SCR890 | May 20, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR897 | May 20, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR899 | May 22, 1978 | Persimmon | $T_1$ | $T_1$ | $T_1$ |
| SCR900 | May 22, 1978 | Persimmon | $T_1$ | $T_1$–$T_3$ | $T_1$–$T_3$ |
| SCR917 | August 20, 1979 | McQueen | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR918 | August 20, 1979 | McQueen | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR920 | August 20, 1979 | McQueen | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR928 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR929 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_1$ |
| SCR930 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR931 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR932 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR933 | August 21, 1979 | Persimmon | $T_{2–3}$ | $T_2$ | $T_2$ |
| SCR953 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR954 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR955 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR956 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR957 | May 12, 1979 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR958 | April 10, 1979 | McQueen | $O_3$ | $O_3$ | $O_2$ |
| SCR961 | April 10, 1979 | Persimmon | $O_3$ | $O_3$ | $O_2$ |
| SCR962 | April 10, 1979 | Persimmon | $O_3$ | $O_3$ | $O_3$ |
| SCR963 | April 10, 1979 | Persimmon | $O_3$ | $O_3$ | $T_1$ |
| SCR965 | May 20, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR966 | May 20, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR967 | May 20, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR969 | May 22, 1978 | McQueen | $T_1$ | $T_1$–$T_3$ | $T_1$–$T_3$ |
| SCR970 | May 22, 1978 | McQueen | $T_1$ | $T_1$–$T_3$ | $T_1$–$T_3$ |
| SCR971 | May 22, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR972 | May 22, 1978 | McQueen | $T_1$ | $T_1$ | $T_1$ |
| SCR973 | March 22, 1978 | McQueen | $O_3$ | $O_2$ | $O_3$ |
| SCR975 | November, 1979 | McQueen | $T_{2–3}$ | $T_1$ | $T_3$ |
| SCR976 | November, 1979 | McQueen | $T_{2–3}$ | $T_1$ | $T_3$ |
| SCR977 | November, 1979 | McQueen | $T_{2–3}$ | $T_1$ | $T_1$ |
| SCR978 | March 15, 1978 | McQueen | $O_{1–3}$ | $O_2$ | $T_1$ |
| SCR979 | March 15, 1978 | McQueen | $O_{1–3}$ | $O_3$ | $O_3$ |

necessary for seasonality analysis, we feel that both methods produce acceptable results (while extracting different costs). Whereas thin-section analysis provides a higher degree of precision, its high cost reduces sample sizes. Thick sections are produced much more quickly, thereby generating larger samples sizes but less precise results. In the following analysis of archaeological *Mercenaria*, we report the result of ca. $n = 700$ thin sections with the remainder analyzed by thick-sectioning. In all apparently ''deviant'' clams, and also for senile individuals (bands are extremely compressed and difficult to read), we employed the more time-consuming thin-sectioning technique.

### Additional Quality Controls

To summarize our seasonal *Mercenaria* research, we worked from a control sample of hard clams to derive a model of incremental growth. We defined a phase of rapid growth (an opaque increment that accumulates between mid-December and mid-April) and phase of slower growth (a translucent increment representing the phase between mid-April and mid-December). We began with thin-section analysis, but found that thick sections provided nearly comparable data in a more efficient manner (noting that a number of other researchers reached similar conclusions). We then applied these techniques to analyze seasonality in approximately 2000 archaeological specimens recovered from St. Catherines Island.

Turning to the result of the Island-wide seasonal analysis, however, we must candidly admit the potential hazards and shortcoming of our methods. We know, for instance, that the growth and season of incremental shell formation—the so-called *sclerochronology* (Hudson et al., 1976; Quitmyer et al., 1997)—varies, especially in response to ambient water temperature, although other factors such as spawning and seasonal storms may be factors (Ansell, 1968; Clark, 1974, 1979b; Clark and Lutz, 1982; Grizzle and Lutz, 1988; Jones et al., 1990; Quitmyer et al., 1997). Clearly, our seasonality analysis is subject to multiple cautions and stipulations.

Several investigators have urged use of oxygen isotope (paleotemperature) analysis as an independent control for growth increment studies (e.g., Claassen, 1986a; Rollins et al., 1990: 468; Jones and Quitmyer, 1996; Quitmyer et al., 1997). Such oxygen isotope analysis has been used to distinguish winter growth increments from summer growth intervals (Epstein and Lowenstam, 1953), and this technique had been employed to reconstruct paleotemperatures in various zooarchaeological materials (e.g., Shackleton, 1973; Killingley and Berger, 1979; Shackleton and van Andel, 1986). Specifically with respect to the *Mercenaria* populations of St. Catherines Island, we hope to establish the following: *If the opaque zone truly accumulates during the December–April phase, then oxygen isotope analysis of these same growth bands should reflect relatively cool water temperatures. Similarly, if the translucent zone was truly deposited between May and November, then isotopic analysis should document a significantly warmer seawater temperature.*

In chapter 18, Andrus and Crowe test this proposition. Growth increment and oxygen isotopic analysis of a modern control collection of 195 *Mercenaria* collected from St. Catherines Island was used to determine seasonality patterns in excavated clam shells and to define the seasons of increment formation. Lifetime $\delta^{18}O$ values recorded in these clam increments are shown to be proxies of relative seasonal changes in water temperature, following a sinusoidal annual curve in tandem with water temperature variation. Absolute $\delta^{18}O$ varied between clams and through ontogeny of individual clams, but statistical methods helped to control this variability based on the control population.

Andrus and Crowe then analyzed oxygen isotope levels on a sample of 25 *Mercenaria* from six sites, arbitrarily selected from the Island-wide survey collection:

**9Li200:** a large site located 300 m east of Wamassee Road. Combined $^{14}C$ and ceramic evidence demonstrate that the occupation dates to the St. Catherines and Wilmington periods.

TABLE 17.4
**Comparison of Seasonality Indicators for 25 Archaeological Clams from St. Catherines Island**

| | | Estimated season of capture | | |
|---|---|---|---|---|
| Specimen no. | Site | Oxygen isotope analysis | Visual incremental analysis | Concordance |
| A1050 | 9Li200 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1052 | 9Li200 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1489A | 9Li200 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1493A | 9Li200 | Cold (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1186D | 9Li201 | Cold (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1265A | 9Li203 | Warm (probably summer) | Spring ($T_1$) | One season offset |
| A1266B | 9Li203 | Cool (probably winter) | Spring ($T_1$) | One season offset |
| A1266D | 9Li203 | Warm (edge only) | Winter ($O_{1-2}$) | Two seasons offset |
| A1267A | 9Li203 | Cool (probably winter) | Spring ($T_1$) | One season offset |
| A1267E | 9Li203 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1042H | 9Li205 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1043A | 9Li205 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1042K | 9Li205 | Cool (probably winter) | Spring ($T_1$) | One season offset |
| A1044C | 9Li205 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1044D | 9Li205 | Warm (probably summer) | Summer/Fall ($T_{2-3}$) | Exact |
| A1442F | 9Li207 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1442D | 9Li207 | Cool (probably fall) | Winter ($O_{1-2}$) | One season offset |
| A1442E | 9Li207 | Cool (probably fall) | Summer/Fall ($T_{2-3}$) | Exact |
| A1442I | 9Li207 | Cool (edge only) | Winter ($O_{1-2}$) | Exact |
| A1444 | 9Li207 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1477C | 9Li214 | Cool (possibly fall) | Summer/Fall ($T_{2-3}$) | Exact |
| A1478B | 9Li214 | Cool (probably winter) | Summer/Fall ($T_{2-3}$) | One season offset |
| A1478E | 9Li214 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1478H | 9Li214 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |
| A1478J | 9Li214 | Cool (probably winter) | Winter ($O_{1-2}$) | Exact |

**9Li201:** a small site roughly 100 m west of the 9Li200. The limited ceramic evidence suggests that the primary component dates from the Wilmington period, with a minor Irene period component also present.

**9Li203:** a medium-sized site from the St. Catherines period, located immediately south of Little Camel New Ground Field.

**9Li205:** a medium-sized site located in Camel New Ground Field. The major component dates to the Irene period, with a minor St. Catherines period occupation evident as well.

**9Li207:** Back Creek Village is a large site near the southeastern margin of the Island Core. The ceramic evidence demonstrates that the major component dates from the Irene period, but a few Savannah period diagnostics were also recovered.

**9Li214:** a large St. Catherines period site located on Cracker Tom hammock. A large sample of vertebrate faunal remains was recovered here, and the presence of sea catfish remains further indicates occupation sometime between April and October. The presence of deciduous lower third premolars suggests that juvenile deer were harvested in late summer or early spring.

Since these six sites were part of the Island-wide seasonal study of *Mercenaria*, Andrus and Crowe compared the results of our incremental with their own oxygen isotope analysis. Table 17.4 summarizes the results of these dual seasonality assessments.

In nearly three-quarters (18 of 25) of the *Mercenaria* studied, the seasonal estimates derived from visual and oxygen isotope analysis agreed precisely, a positive result that reinforces the efficacy of our model for incremental analysis. As for the exceptions, in six cases the offset was a full season and the differences appear to be largely random (in four cases, the incremental analyses estimated a season "too early", while in the other two cases the estimated season of harvest was "too late").

In only one case (A1266D) did thin-section and oxygen analysis offset by a full half year. While we do not know the reason for this disparity, it is useful to point out that unless the microdrilled carbonate sample is taken from the very edge of the shell, it may indicate a different season (especially if there is only the slightest suggestion of opaque growth). In such a case, thin-section analysis would correctly point to a midwinter season, such as December/January, while the isotopic analysis would mostly include the previous summer's shell deposit.

Although additional research is certainly warranted, we take these results as an overwhelming confirmation that these two very different methodologies produce equivalent results. While oxygen isotope analysis is considered to be a more accurate technique, the relatively rare differences observed do not appear to be skewed in either direction. As a result, we have confidence that the seasonal estimates derived from visual analysis of *Mercenaria* quite accurately reflect the season of capture.

## SEASONAL ANALYSIS OF *MERCENARIA* RECOVERED FROM THE ISLAND-WIDE SURVEY SITES

Clark (1979b) initiated the analysis of zooarchaeological mollusks from St. Catherines Island, concluding that 82 percent of the *Mercenaria* from Johns Mound and 69 percent of those from Marys Mound were harvested during winter months (see also Larsen and Thomas, 1982: 338). He also analyzed *Mercenaria* samples from McLeod Mound, concluding that these mollusks were likewise harvested during the winter (probably December or January). All of these samples were recovered from secondary context, having been used as construction materials in burial mounds, and the complex formation processes involved precluded actual dating of the mortuary activities. Encouraged by this successful analysis of seasonality, though, we were anxious to move from the middens located during the Island-wide survey to the considerably better suited materials recovered in primary contexts.

### Some Sampling Considerations

*Mercenaria* suitable for seasonal analysis were recovered from nearly 85 percent (110 of 130) of the sites identified and sampled in the Island-wide survey. In addition, we saved every single undamaged clam ventral margin for potential seasonal analysis. Because such analysis is so time-consuming and labor intensive, we needed to devise an appropriate sampling scheme that would narrow down the number of clams to be analyzed and would simultaneously avoid the introduction of bias in the winnowing process.

As noted elsewhere, the ceramics from all survey sites were analyzed according to a strict protocol, and once these data were available, we could classify most sites according to archaeological period(s). With these ceramic data available, we applied the following sampling conventions to select the appropriate *Mercenaria* for seasonal analysis:[5]

**Single-component sites:** If fewer than 25 readable clams were available from such single-component sites, then all clams were analyzed. If more than 25 suitable clams were recovered, then the available clam shells (or fragments) were numbered sequentially, and a sample of 25 was selected for analysis using a table of random numbers. Some of the "single component" sites actually contained evidence of minor occupations during other ceramic periods. When this happened, *Mercenaria* samples were taken whenever possible from "temporally discrete" test pits and/or excavation levels (from those units and levels containing only one ceramic complex) by randomly selecting from within these relatively homogeneous intrasite areas.

**Double-component sites:** Each component was sampled independently. We targeted the relatively homogeneous test pits (and/or specific levels) from each major temporal component. We then selected up to 25 clams from each component (randomly sampling in the case of $n > 25$).

**Multiple-component sites:** Ideally, we would have analyzed 25 clams from each of the identified components. Unfortunately, in practice we never recovered sufficient *Mercenaria* to do this. The result was that we analyzed whatever clams were recovered and attempted to determine the archaeological age of each specimen by charting associated potsherds.

**Undated components:** Several sites contained sufficient *Mercenaria* for seasonal analysis, but too few potsherds to assign a probable period of occupation. The seasonal estimates have been included in the overall, Island-wide total, but not in the period-by-period tallies.

Although this sampling procedure may seem a bit mechanistic, it assured a relatively uniform distribution of hard-shelled clams selected for analysis and reduced the overall number of analyzed specimens to approximately 2000 individual *Mercenaria* shells (or fragments). Of these, 1771 individual specimens (or fragments) provided usable growth increment estimates (712 were analyzed in thin section, and the remainder were examined using the thick-section technique discussed above). We present these data in two ways.

Table 17.5 provides the raw data of this analysis, presenting the site numbers, temporal periods, and terminal growth increments observed. We also include a column for "Confidence", reflecting the fact that the *Mercenaria* shells recovered from archaeological contexts were often fragmentary, and some were chemically altered by groundwater. In such specimens, the shell margin—critical for analysis of this type—is fragile and often missing in weathered archaeological samples. Even when the margin is present, it may be too abraded for satisfactory study. Alteration processes commonly affect the marginal and inner surface of the shell, producing an "alteration rim" that obscures the record of the last few days (in juvenile and mature shells) or the last few months or years (in senile shells). Some shell fragments include the margin, but are too small to include a full year's growth, especially in fast-growing mature or juvenile shells. Because of these difficulties, we assigned a "confidence rating" to each seasonal assessment: A (high confidence), B (medium confidence), and C (low confidence). The overall degree of confidence listed in table 17.5 reflects the overall degree of confidence in seasonal assignment and is the average confidence rating for all individual *Mercenaria* in that provenience unit.

The following codes were used under "Comments":

**$O_{1-3}$ and $T_{1-3}$:** In a few cases, when we were uncomfortable with assigning an zooarchaeological specimen to one of the remaining five subdivisions, we simply assigned the specimen as "fast growth" ("$O_{1-3}$") or "slow growth" ("$T_{1-3}$").

**TS:** The number of specimens analyzed by thin section are denoted by "TS;" the remainder were analyzed by thick-section analysis.

## Results

In chapter 20, we combine the specific, site-by-site *Mercenaria* counts with additional season-specific indicators to construct patterns of seasonal utilization for individual sites. Chapter 32 further synthesizes these seasonal indicators in a consideration of Island-wide settlement patterns. Table 17.6 analyzes these same data, pooling the various seasonal estimates by archaeological period.

Before we can discuss the implications of the zooarchaeological data, it is necessary to revisit the modern *Mercenaria* control sample (discussed above). Figure 17.4 documents the known seasonal growth in *Mercenaria* collected from 1975 to 1984 on St. Catherines Island, arrayed as changing proportions of incremental growth on a month-by-month basis. There is undoubtedly considerable variability that exists between individuals, but the overall trend is quite apparent. For the January–August phase, there is a consistent shift in the control population (not matched on every individual) from the earliest traces of the opaque increment to the full development of the transparent increment. We also find lit-

TABLE 17.5

**Season of Capture for *Mercenaria* Recovered from $n = 98$ Archaeological Sites on St Catherines Island**

| Major component | Minor component | Site | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ | Confidence | Comments |
|---|---|---|---|---|---|---|---|---|
| Altamaha | — | 9Li8 | 6 | — | — | 13 | A | $O_{1-3} = 6$ |
| Altamaha | — | 9Li13 | 18 | 6 | 6 | 10 | B | TS = 1 |
| Altamaha | — | 9Li210 | 5 | 2 | 1 | 3 | A | $O_{1-3} = 2$ |
| Altamaha | Irene | 9Li242 | 4 | 2 | — | — | B+ | $O_{1-3} = 5$; TS = 13 |
| Irene | St. Catherines | 9Li19 | 1 | 5 | 19 | — | A | — |
| Irene | — | 9Li51 | 18 | — | — | 1 | A− | $O_{1-3} = 4$; $T_{1-3} = 2$; TS = 25 |
| Irene | — | 9Li52 | 16 | 7 | — | — | A+ | $O_{1-3} = 2$; TS = 25 |
| Irene | — | 9Li55 | 9 | 4 | — | 1 | B+ | $O_{1-3} = 2$; TS = 19 |
| Irene | — | 9Li84 | 8 | 1 | 4 | 8 | B+ | $O_{1-3} = 1$ |
| Irene | — | 9Li87 | 16 | 3 | — | 3 | B | $O_{1-3} = 1$ |
| Irene | — | 9Li118 | 14 | 4 | 1 | 2 | B | $O_{1-3} = 3$; TS = 18 |
| Irene | St. Catherines | 9Li128 | 13 | — | — | 7 | B+ | $O_{1-3} = 3$ |
| Irene | — | 9Li163 | 13 | 5 | — | 4 | B | $O_{1-3} = 2$ |
| Irene | — | 9Li169 | 12 | 3 | — | 3 | B+ | $O_{1-3} = 7$ |
| Irene | — | 9Li170 | 6 | 6 | — | 10 | B | $O_{1-3} = 2$; TS = 25; $T_{1-3} = 1$ |
| Irene | Refuge-Deptford | 9Li173 | 17 | 5 | 1 | 1 | A | TS = 4 |
| Irene | — | 9Li175 | — | 2 | — | 9 | B | TS = 11 |
| Irene | Wilmington | 9Li176 | 14 | — | — | 5 | B | TS = 17 |
| Irene | — | 9Li177 | 3 | — | — | 1 | A | TS = 5 |
| Irene | — | 9Li182 | 9 | — | — | 1 | A− | $O_{1-3} = 4$ |
| Irene | Refuge-Deptford | 9Li186 | 18 | 6 | — | 1 | A | — |
| Irene | — | 9Li189 | 3 | — | — | 1 | A | $T_{1-3} = 3$ |
| Irene | — | 9Li190 | 30 | 4 | 5 | 2 | A− | $O_{1-3} = 3$; $T_{1-3} = 3$; TS = 25 |
| Irene | — | 9Li191 | 15 | 7 | 1 | — | A− | — |
| Irene | — | 9Li192 | 19 | 4 | — | — | A+ | $O_{1-3} = 1$ |
| Irene | — | 9Li193 | 6 | 1 | 1 | — | A− | — |
| Irene | — | 9Li197 | 30 | 7 | — | 14 | B+ | TS = 6 |
| Irene | — | 9Li202 | 5 | 1 | 2 | — | B− | $O_{1-3} = 8$; TS = 23 |
| Irene | — | 9Li204 | 13 | 5 | 3 | 3 | A | — |
| Irene | St. Catherines | 9Li205 | 6 | 1 | — | 14 | A | — |
| Irene | St. Catherines | 9Li206 | 8 | — | 3 | 8 | A+ | — |
| Irene | — | 9Li207 | 16 | — | 6 | 3 | A | — |
| Irene | — | 9Li208 | 21 | — | 1 | 1 | A+ | TS = 2 |
| Irene | — | 9Li211 | 6 | 1 | 2 | 4 | B | $O_{1-3} = 1$; $T_{1-3} = 1$; TS = 21 |
| Irene | — | 9Li212 | 5 | — | — | 1 | A | $O_{1-3} = 2$ |
| Irene | — | 9Li213 | 15 | 2 | — | 1 | A− | $O_{1-3} = 2$; TS = 2 |
| Irene | — | 9Li216 | 19 | 1 | 1 | 3 | A | — |
| Irene | — | 9Li218 | 10 | 2 | — | — | A | $O_{1-3} = 3$; TS = 7 |
| Irene | — | 9Li222 | 13 | — | — | — | A− | $O_{1-3} = 2$; $T_{1-3} = 1$ |
| Irene | — | 9Li226 | 17 | 4 | — | 2 | B+ | — |
| Irene | — | 9Li227 | — | 23 | 2 | — | A | — |
| Irene | — | 9Li229 | 8 | 6 | — | — | B+ | $O_{1-3} = 1$ |
| Irene | — | 9Li241 | 23 | 2 | — | — | A− | TS = 25 |
| Irene | — | 9Li243 | 16 | 2 | — | — | B+ | $O_{1-3} = 4$; TS = 2 |
| Irene | — | 9Li244 | 17 | 2 | — | 1 | A− | $O_{1-3} = 4$ |
| Irene | — | 9Li245 | 20 | — | 1 | — | A | — |
| Irene | — | 9Li251 | — | 2 | — | 2 | A− | $O_{1-3} = 3$; TS = 3 |

TABLE 17.5
(*Continued*)

| Major component | Minor component | Site | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ | Confidence | Comments |
|---|---|---|---|---|---|---|---|---|
| Irene | — | 9Li255 | 28 | 7 | 2 | 1 | A− | $O_{1-3}$ = 6; $T_{1-3}$ = 2 |
| St. Catherines/ Wilmington | — | 9Li19 | 14 | 3 | — | 4 | A | — |
| St. Catherines | — | 9Li22 | 3 | — | — | — | A | $O_{1-3}$ = 1 |
| St. Catherines | — | 9Li165 | 20 | — | 1 | 2 | A | $O_{1-3}$ = 1 |
| St. Catherines | — | 9Li171 | 2 | 1 | — | — | A | TS = 1 |
| St. Catherines | — | 9Li183 | 13 | — | — | 1 | A− | $O_{1-3}$ = 2; TS = 11 |
| St. Catherines | — | 9Li185 | 24 | — | — | 1 | A+ | — |
| St. Catherines | — | 9Li203 | 9 | 10 | — | 1 | A+ | — |
| St. Catherines | — | 9Li214 | 20 | 2 | — | — | A | — |
| St. Catherines | — | 9Li230 | 4 | 4 | — | — | A | $O_{1-3}$ = 1 |
| St. Catherines | — | 9Li237 | 9 | 2 | — | 1 | B | $O_{1-3}$ = 5; $T_{1-3}$ = 8 |
| St. Catherines/ Wilmington | — | 9Li198 | 6 | 1 | — | 1 | B+ | TS = 6 |
| St. Catherines/ Wilmington | — | 9Li200 | 17 | 1 | 6 | — | A+ | — |
| St. Catherines/ Wilmington | — | 9Li209 | 18 | 2 | 1 | 2 | A | $T_{1-3}$ = 2 |
| St. Catherines/ Refuge/Deptford | — | 9Li178 | 6 | 2 | — | — | A | $T_{1-3}$ = 1; TS = 3 |
| St. Catherines/ Wilmington | — | 9Li233 | 17 | 5 | — | — | B+ | $O_{1-3}$ = 2; TS = 25 |
| Wilmington | — | 9Li57 | 3 | — | — | — | B | $O_{1-3}$ = 2; TS = 5 |
| Wilmington | — | 9Li97 | 16 | — | 1 | 4 | A− | — |
| Wilmington | — | 9Li162 | 10 | — | — | 12 | B | TS = 23 |
| Wilmington | — | 9Li164 | 1 | — | 1 | 1 | C+ | $O_{1-3}$ = 1; TS = 3 |
| Wilmington | — | 9Li179 | 8 | 5 | — | — | A | $O_{1-3}$ = 3; TS = 7 |
| Wilmington | — | 9Li187 | 19 | 1 | — | 1 | A− | $T_{1-3}$ = 1; TS = 23 |
| Wilmington | — | 9Li184 | 1 | — | — | — | A+ | — |
| Wilmington | — | 9Li194 | 4 | 2 | — | 4 | A− | $O_{1-3}$ = 6 |
| Wilmington | — | 9Li196 | 6 | 10 | — | 9 | A | — |
| Wilmington | — | 9Li215 | 6 | 5 | 1 | — | A− | — |
| Wilmington | — | 9Li217 | 17 | 5 | — | — | B | TS = 25 |
| Wilmington | — | 9Li220 | 16 | 5 | — | 2 | B | $O_{1-3}$ = 2 |
| Wilmington | — | 9Li221 | 15 | 6 | — | 3 | A− | $O_{1-3}$ = 1 |
| Wilmington | — | 9Li232 | 10 | — | — | — | B | $O_{1-3}$ = 1; TS = 13 |
| Wilmington | Altamaha | 9Li166 | 2 | — | — | 2 | B+ | TS = 4 |
| Wilmington | Deptford | 9Li238 | 7 | — | — | — | B+ | TS = 9 |
| Wilmington | Irene | 9Li201 | 8 | 1 | — | — | A+ | $O_{1-3}$ = 1 |
| Wilmington | Irene | 9Li240 | 15 | 1 | — | — | B | $O_{1-3}$ = 1; $T_{1-3}$ = 1 |
| Refuge-Deptford | — | 9Li15 | 6 | — | — | — | A | — |
| Refuge-Deptford | — | 9Li49 | 12 | 4 | 2 | 4 | B | $O_{1-3}$ = 2; $T_{1-3}$ = 2; TS = 25 |
| Refuge-Deptford | — | 9Li223 | 8 | 8 | — | 1 | A− | $O_{1-3}$ = 1; $T_{1-3}$ = 1 |
| Refuge-Deptford | — | 9Li225 | 15 | — | — | — | B+ | — |
| Refuge-Deptford | — | 9Li239 | 2 | — | — | — | B+ | $O_{1-3}$ = 2 |
| Deptford | — | 9Li172 | 5 | 4 | — | 3 | B | $T_{1-3}$ = 1; TS = 14 |
| Refuge | — | 9Li180 | 7 | — | — | 2 | A | — |
| Refuge | — | 9Li235 | 12 | 8 | — | — | A− | $O_{1-3}$ = 1 |
| Refuge/St. Simons | St. Catherines | 9Li137 | 19 | — | — | 4 | B | — |

TABLE 17.5
(*Continued*)

| Major component | Minor component | Site | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ | Confidence | Comments |
|---|---|---|---|---|---|---|---|---|
| St. Simons | — | 9Li231 | 12 | 13 | — | — | A− | — |
| St. Simons | — | 9Li252 | 3 | 3 | — | 1 | B+ | $O_{1-3}$ = 1; TS = 4 |
| – | — | 9Li56 | 1 | 2 | — | — | B | TS = 3 |
| – | — | 9Li114 | 2 | 1 | — | — | B | $O_{1-3}$ = 3 |
| – | — | 9Li116 | 13 | — | — | 9 | B | TS = 16 |
| – | — | 9Li117 | 3 | 21 | 1 | — | A | TS = 19 |
| – | — | 9Li174 | 2 | — | — | — | A+ | TS = 2 |
| – | — | 9Li188 | 3 | 3 | — | — | A− | $O_{1-3}$ = 4; TS = 3 |
| – | — | 9Li219 | — | 7 | — | — | A | $O_{1-3}$ = 1 |
| – | — | 9Li236 | 2 | 2 | — | 1 | C | — |
| Totals | — | — | 61 | 37 | 2 | 15 | (Total 115) | — |
| Totals | — | — | 53% | 32% | 2% | 13% | (100%) | — |

tle, if any, progress beyond this stage during the final four months of the year.

While we would certainly welcome larger samples for mid-summer and the dead of winter, the trends in figure 17.5 seem too well established to expect any significant surprises from additional data. These results fit our general impression of how *Mercenaria* react to changes in temperature. In addition, consistency of the data (considered for the population as a whole) provides the necessary baseline against which to compare the archaeological materials.

Table 17.6 summarizes the evidence from incremental analysis of *Mercenaria* recovered from $n$ = 98 of the sites in the Islandwide survey. The detailed analysis of these results is embedded and integrated with additional archaeological and zooarchaeological data in subsequent chapters (esp. chaps. 25–28). To demonstrate how the modern control sample (fig. 17.4) facilitates our estimates of seasonal clam procurement, we return to the six selected sites discussed with respect to the oxygen isotope analysis. The seasonal diversity evident in these sites clearly illustrates the processes through which the seasonal evidence must be evaluated on a site-by-site basis.

9Li200 (AMNH-452; TRANSECT H-6): The ceramic assemblage from this large site dates to the St. Catherines/Wilmington periods. Because all four test pits contained a mixture of both ceramic complexes, it was impossible to separate the two components on stratigraphic grounds. This temporal assignment is confirmed by six radiocarbon determinations, which roughly span

TABLE 17.6
**Seasonality of *Mercenaria* Capture by Archaeological Period**

| Phase | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ | $O_{1-3}$ | $T_{1-3}$ | Total |
|---|---|---|---|---|---|---|---|
| Altamaha | 43 | 10 | 7 | 26 | 13 | — | 99 |
| Irene | 556 | 135 | 55 | 118 | 65 | 13 | 942 |
| St. Catherines | 95 | 17 | 1 | 5 | 5 | 1 | 124 |
| St. Catherines/Wilmington | 78 | 14 | 7 | 7 | 2 | 2 | 110 |
| Wilmington | 173 | 43 | 3 | 39 | 21 | 10 | 289 |
| Refuge-Deptford | 86 | 24 | 2 | 14 | 5 | 3 | 134 |
| St. Simons | 15 | 36 | — | 1 | 1 | — | 33 |
| Period unknown | 26 | 36 | 1 | 10 | 8 | — | 91 |
| Total | 1072 | 295 | 76 | 220 | 120 | 29 | 1812 |

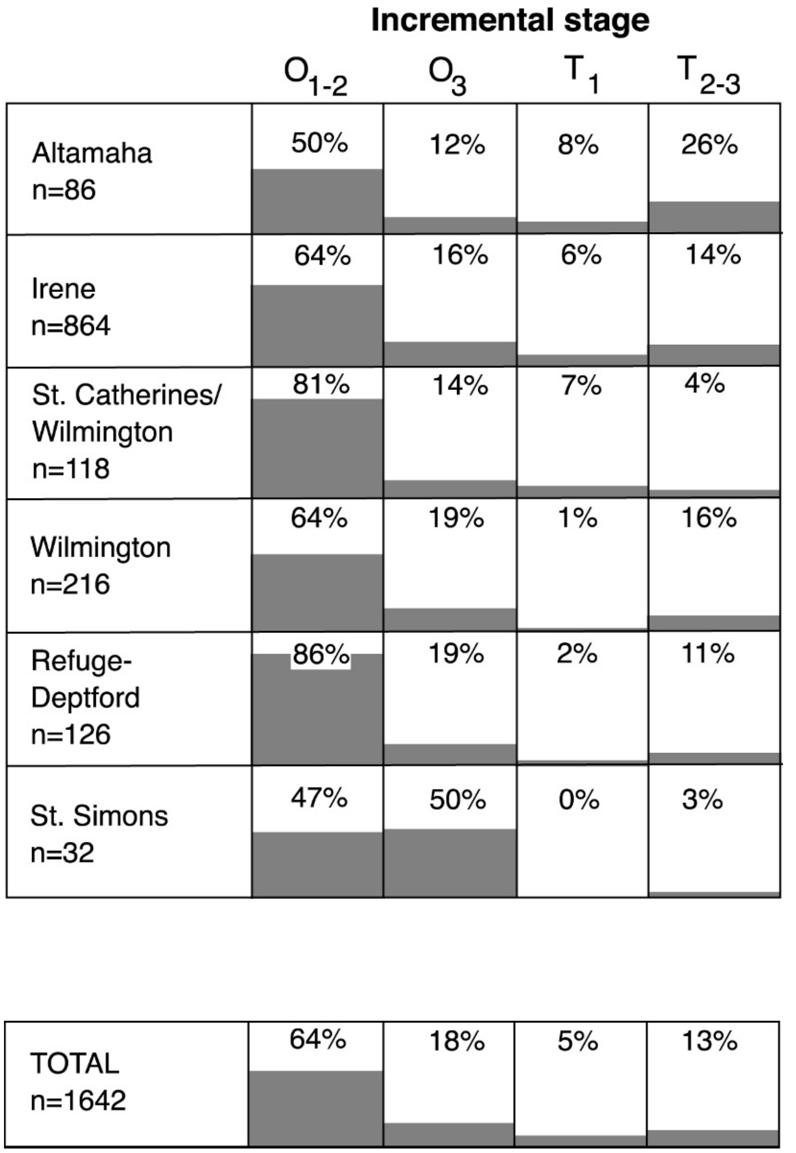


Fig. 17.5. Position of growth surface within major increments at time of harvest: modern control sample of *Mercenaria* collected between 1975 and 1984 on St. Catherines Island.

the interval of cal A.D. 400–1250 (see chap. 16).

We began the seasonal analysis by selecting a random sample of $n = 25$ *Mercenaria* from 9Li200. Each valve was sectioned and analyzed by the previously discussed thick-section technique. We successfully determined the growth stage at time of harvest for 24 of the specimens, assigning a confidence level of A+ to these assessments (see table 17.5). Seventy-one percent (17 of 24) specimens were harvested in the $O_{1-2}$ stage, 4 percent (1 of 24) in the $T_{2-3}$ stage, and 25 percent (6 of 24) *Mercenaria* valves were harvested during the $T_1$ growth incremental stage.

Figure 17.6 depicts these results in graphic form comparable to the modern control sample. No single month in the control sample corresponds to the frequencies

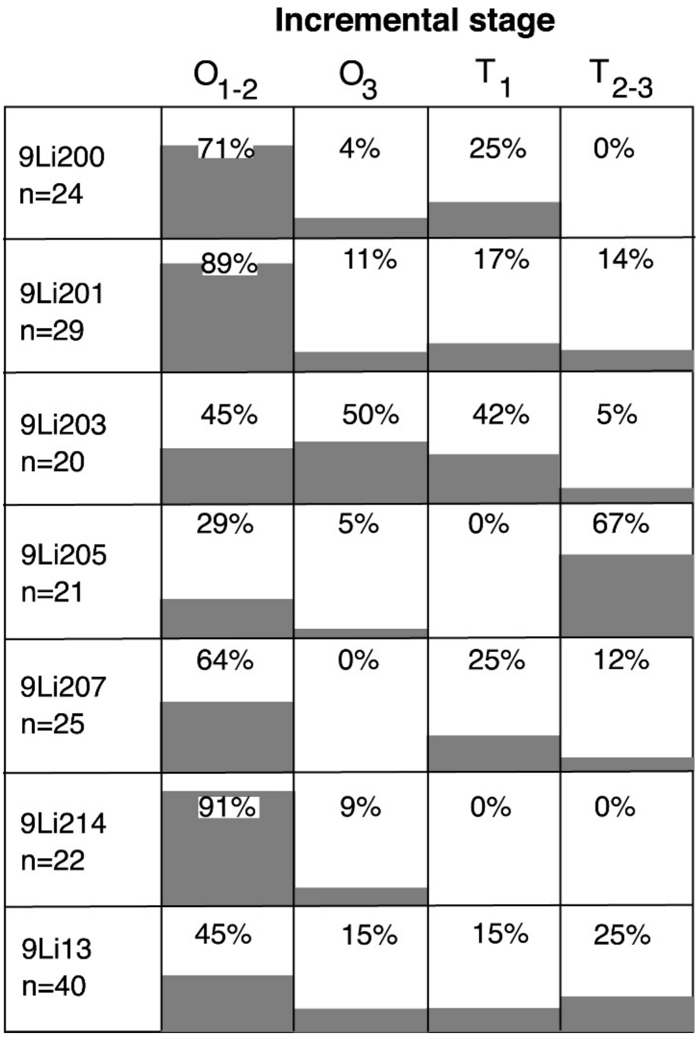


Fig. 17.6. Growth surface position at time of harvest: zooarchaeological specimens, St. Catherines Island.

observed in the zooarchaeological sample, meaning that the results at 9Li200 could not have been obtained from hard clams collected in a single harvesting episode. The 9Li200 sample also differs markedly from the "annual" profile for modern *Mercenaria* on St. Catherines Island, especially with regard to low frequencies of $O_3$ and $T_1$. Consequently, we lack evidence for a "year-round" harvest of hard clams.

Specifically, we can conclude that the zooarchaeological data from 9Li200 documents that *Mercenaria* were harvested during the winter (the $O_{1-2}$ growth stage, which dates from mid-December through about mid-March) and during the late spring–early summer interval (as reflected by the $T_1$ growth stage that dates from mid-May through mid-July).

A number of cautions accompany these conclusions. These data do not justify the inference that site 9Li200 was "continuously occupied" during any particular interval (for example, between mid-December and mid-March or between mid-May and mid-July). The observed distribution of growth intervals requires as few as two discrete harvests: on January 15 and on June 15, for instance. Given the temporal span of the site, it is likely that many more harvests took place, but the available evidence from *Mercenaria* do not offer any further clues.

9LI201 (AMNH-453; TRANSECT H-6): We analyzed all available *Mercenaria* recovered from our excavations at this small Irene period site. Eighty-nine percent (8 of 9) of the hard clams were harvested during the $O_{1-2}$ growth stage, while one was harvested during the $T_1$ interval. An additional specimen, which could only be assigned to the $O_{1-3}$ growth stage, is listed in table 17.4, but not tabulated in the overall site profile. We assigned a confidence level of A+ to this analysis (meaning that the growth increments were easily readable), but the small sample size requires considerable caution. Comparing the zooarchaeological results with the modern control sample, we conclude that the hard clams we analyzed were harvested mostly during the winter.

We can add this evidence to findings made in the analysis of vertebrate faunal remains recovered at 9Li201 (as reported in chap. 22). Reitz noted that "vertebrates are not the best seasonal indicators" (chap. 18, this volume), because most coastal species are available throughout the year. Furthermore, even when certain species can be taken as cold- or warm-weather indicators, the mere absence of that species cannot be taken as evidence that a particular site was unoccupied at a particular time (Reitz and Wing, 1999: 259–261).

Sea catfish (*Ariidae*) remains were recovered at 9Li201. While perhaps present in inshore areas throughout the year, members of the sea catfish family are most abundant in warm weather and are rare in cold weather. Based on this evidence, we can conclude that sea catfish procurement at 9Li201 took place sometime between April and October. This finding correlates, in part, with the finding of a lone *Mercenaria* valve that was harvested during the $T_1$ growth increment.

9LI203 (AMNH-461; TRANSECT J-1): Little Camel New Ground Field No. 2 is a medium-sized, St. Catherines period site. Analysis of the $n$ = 20 available *Mercenaria* identified the presence of three incremental growth stages. About 45 percent of the specimens were harvested in the $O_{1-2}$ growth stage (probably mid-December through mid-March), and 50 percent were harvested during the $O_3$ increment (probably between mid-March and mid-May).

9LI205 (AMNH-465; TRANSECT J-1): A random sample of $n$ = 25 *Mercenaria* from this medium-sized Irene site demonstrates summer–fall ($T_{2-3}$) harvesting, with the wintertime ($O_{1-2}$) growth stage also represented. The available sample does not confirm harvesting of hard clams during the springtime ($O_3$ and $T_1$).

BACK CREEK VILLAGE (9LI207; AMNH-467; TRANSECT I-1): A random sample of $n$ = 25 *Mercenaria* from this large Irene period site provides ample evidence of hard clam procurement during the winter and the late spring. Three specimens suggest that *Mercenaria* were also harvested sometime between mid-July and mid-November, represented by the $T_{2-3}$ growth increment. Although Back Creek Village produced no evidence of an early springtime harvest of *Mercenaria*, the vertebrate remains demonstrate that sea catfish were procured at 9Li207 sometime between April and October.

9LI214 (AMNH-483; TRANSECT J-6): The random sample of $n$ = 25 *Mercenaria* from the St. Catherines component at 9Li214 duplicates the patterning evident for 9Li201 (discussed above). Both sites produced ample evidence of wintertime clam procurement, with early springtime only slightly represented. Evidence for the remaining growth seasons is entirely absent.

A large sample of vertebrate faunal remains was recovered from 9Li214. Sea catfish were procured sometime between April and October, and the presence of deciduous lower third premolars suggests that juvenile deer were harvested in late summer or early spring (see chap. 18).

WAMASSEE HEAD (9Li13; AMNH-208; TRANSECT I-6): To round out this introductory section, it is important to introduce one more archaeological site, 9Li13, a large mission-period site located just north of the freshwater creek at Wamassee Head. Joseph Caldwell and his University of Georgia team excavated here in 1969 and 1970, and we also dug here as part of our Island-wide survey.

We sectioned and analyzed a total of $n$ = 40 *Mercenaria* from the upper (historic-period) component of this important site. A total of 45 percent (18 of 40) of the analyzed clams were harvested in the winter in the $O_{1-2}$ growth stage (probably mid-December through mid-March), 15 percent were harvested in the $O_3$ increment (early spring), 15 percent in the $T_1$ increment (late spring), and 25 percent during the $T_{2-3}$ increment (between mid-March and mid-May).

In conclusion, all four of the major incremental stages are represented in the Wamassee Head assemblage, so, in a sense, it is true that *Mercenaria* were harvested "year-round" at 9Li13. It is also true that four discrete harvesting episodes (one during each season, but decades apart) could also account for the observed distribution of incremental evidence. Contextual and ceramic evidence coupled with the available radiocarbon dates suggest that 9Li13 was occupied for a least a century.

In the next chapter, Andrus and Crowe present the results of their oxygen isotope analysis, which substantiates the results of the incremental analysis presented here. In subsequent chapters, we will consider the implications of the *Mercenaria* study in considerably more detail.

## NOTES

1. We are indebted to Irvy Quitmyer for bringing the Aten (1981) reference to our attention.
2. Throughout this chapter, we will follow the terminology of Quitmyer et al. (1997: 826) to distinguish between seasonal site occupation and seasonal patterns of resource procurement (such as shellfish collection), which reflect two different kinds of human behavior.
3. About this same time, Charles Pearson (1979b, 1984b) was exploring the potential of *Mercenaria* as a seasonal indicator in conjunction with his own archaeological explorations on Ossabaw Island.
4. We now understand that the shell notches are actual annual growth checks, which are stochastic events and hence not appropriate to defining seasonal growth increments.
5. Because we chose both left and right values for analysis, we run the risk of analyzing shell from the same individual (Quitmyer, personal commun.).

# CHAPTER 18. ISOTOPE ANALYSIS AS A MEANS FOR DETERMINING SEASON OF CAPTURE FOR *MERCENARIA*

C. Fred T. Andrus and Douglas E. Crowe

Determining the season of capture for fauna excavated from archaeological sites gives insight into the seasonal behavior of prehistoric cultures. However, the season of capture and season of occupation of a given archaeological site cannot be directly equated. The presence of season-specific fauna can confirm periods of occupation, assuming the resource was captured on site, but the absence of season-specific fauna does not necessarily indicate site abandonment. Absence of seasonal indicators may reflect dietary preferences and/or prohibitions, taphonomic factors, or any number of other variables invisible in the material culture.

Season of capture data is nonetheless useful in that confirmation of presence at a locality defines at least portions of the overall occupation pattern. Furthermore, year-round season of capture demonstrates year-round occupation, which is a valuable observation in areas and times in which little is known concerning resource economies and seasonal round subsistence patterns. The prehistoric coastal Southeast United States is an example of such an area and time.

A principal difficulty in determining season of occupation in the coastal Southeast is a dearth of seasonally dependent fauna preserved in sites. Most fauna identified from coastal middens are present locally 12 months per year. Therefore, investigational focus must shift to seasonal markers within the remains of individual organisms, such as stage of antler development in white-tailed deer. Because such indicators are not commonly present in sites, less obvious yet more reliable faunal calendars must be studied. Among these are seasonal growth increments in hard tissues. These structures are present in a variety of common artifacts, such as in deer teeth cementum (e.g., Weinand, 1998), oyster shells (e.g., Herbert and Steponaitis, 1998; Andrus and Crowe, 2000), and clam shells (e.g., Quitmyer et al., 1997). Of these artifacts, oysters are generally the most common at coastal sites (see Quitmyer et al., 1985, for examples from the Georgia coast), but clam incremental growth has been studied in greater detail (for review, see Rhoads and Lutz, 1980; Quitmyer et al., 1997).

Incremental growth in hard clams (*Mercenaria mercenaria* and *Mercenaria campechiensis*) is relatively simple when compared to oysters and other bivalved mollusks. The rate of growth, and thus the size of increment, follows a statistically predictable pattern, albeit one that varies greatly by latitude and habitat (Jones et al., 1989). The increments in hard clams are often larger than in most other mollusks, and are therefore amenable to analysis using simple techniques such as examination of bisected valves in reflected light. Furthermore, the $\delta^{18}O$ values of the aragonite ($CaCO_3$) shell can be used to determine seasonal water temperature variation (Jones and Quitmyer, 1996). Water temperature, which varies seasonally, can therefore be determined through the ontogeny of the clam. These characteristics make clam shells well suited to season of capture studies.

Visual analysis of clam shells excavated from sites on St. Catherines Island have been conducted previously (Clark, 1979b) and remain a critical part of the present monograph (see chap. 17). This chapter will report results of visual and stable oxygen isotope analysis of clam shell increments from six sites selected from the large sample of sites investigated during the Island-wide survey of St. Catherines Island. Sites in this targeted subsample range in age from the Wilmington through the Irene periods. This research thus expands upon earlier work through extensive modern control collections and geochemical analyses of both modern and archaeological shells.

## CLAM BIOLOGY AND SHELL GROWTH

Hard clams (Mollusca: Bivalvia: Veneridae), or quahogs, on the Atlantic coast are divided into two species within the same genus of *Mercenaria*. This division into the species *Mercenaria campechiensis* and *Mercenaria mercenaria* is based on geographic and genetic variation, with the former species being the southern form and the latter the northern form (Morris, 1975). There is no defined geographic barrier between the species' ranges. Specimens taken from the absolute extremes of the genus' range are separated based on relative morphological differences (Rehder, 1981). Georgia lies near the center of the range. Therefore, both species may be found on St. Catherines Island, and differentiation between them is largely subjective (short of genetic analysis). In terms of significance to this project, species identification is of little importance, as both have essentially identical biology and life history, as was argued in a study of Georgia clams in comparison to other clams on the Atlantic seaboard (Humphrey, 1981). Both species, and hybrids between them, have been studied as seasonal indicators as a group (Quitmyer et al., 1997).

The basic life cycle of *Mercenaria* is outlined as follows, based largely on Rhoads and Lutz (1980; see fig. 18.1 for basic clam shell anatomy). During the first year, all individuals are male. Upon completing their planktonic/pelagic stage, they settle into a suitable environment, often a soft mud or sand substrate, as is common in the estuaries of the Georgia Bight. Individuals do not move from that general area for the rest of their life. In the second year approximately 50 percent of the population becomes female. The age at sexual maturity and season of spawning reflects nutrition and geography, but even a 1-year-old individual may spawn under the right conditions. Initiation of spawning is controlled by a combination of factors, including marked seasonal temperature change, available nutrients, lunar or solar cycles, and/or continuous release of spermatozoa and eggs. Fertilization takes place in the water surrounding the beds. The larvae are free swimming, but depend upon currents for extensive movement. Vertical movement of larvae may allow the microscopic organisms to explore bedding areas for suitability (Carriker, 1961). Once settled, the reproductive cycle continues.

Adults are not completely sessile. Although movement is generally vertical within the substrate, clams were tracked in this study moving horizontally within the beds. This movement is usually small enough to be measured in meters and may be in response to stress such as overcrowding of the bed.

Shell growth is largely controlled by the mantle and the extrapallial fluid, and growth rate follows a Von Bertalanffy or other statistical curve, though there is marked variation due to particulars of geography and environment (Seed, 1980; Jones et al., 1989). The larvae have a type of shell known as prodisoconchs, incorporated into the adult shell in the umbo, which is located in the hinge area of the outer valves (Jablonski and Lutz, 1980). Young specimens grow rapidly; Jones et al. (1989) found that in Narraganset Bay, Rhode Island, specimens attained 50 percent of their total size in the first 5 years of life, and 75 percent in the first 10. Studies in other areas indicate that this rate varies (e.g., Peterson and Fegley, 1986, in North Carolina); however in all cases most rapid growth occurs during the first years of life. Young clams precipitate biannual increments of up to several centimeters in width along the axis of growth. In extremely old specimens (often referred to as senile), growth slows dramatically. These increments can be as small as fractions of a millimeter. The age of this occurrence varies (Kennish, 1980). Figure 18.2 illustrates both young and senile growth patterns as seen in cross section.

Growth rate is a function of several variables. Water temperature, nutrition, dissolved oxygen levels, substrate type, and water current speed affect shell growth to varying degrees (Eversole, 1987). Temperature, however, is likely the principal con-

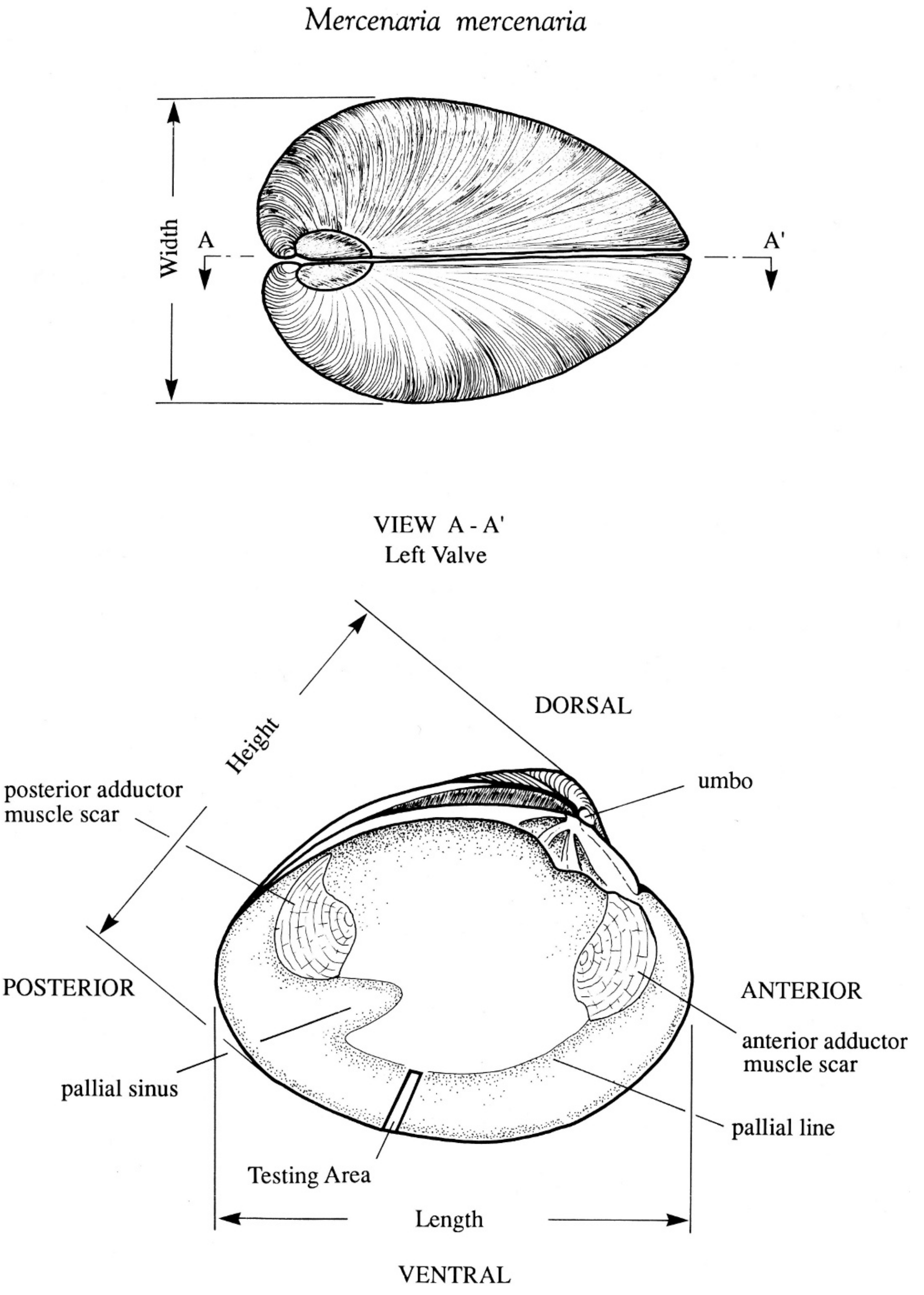


Fig. 18.1. Diagram of clam valves showing measured dimensions, relevant shell structures, and sample area for visual analysis.

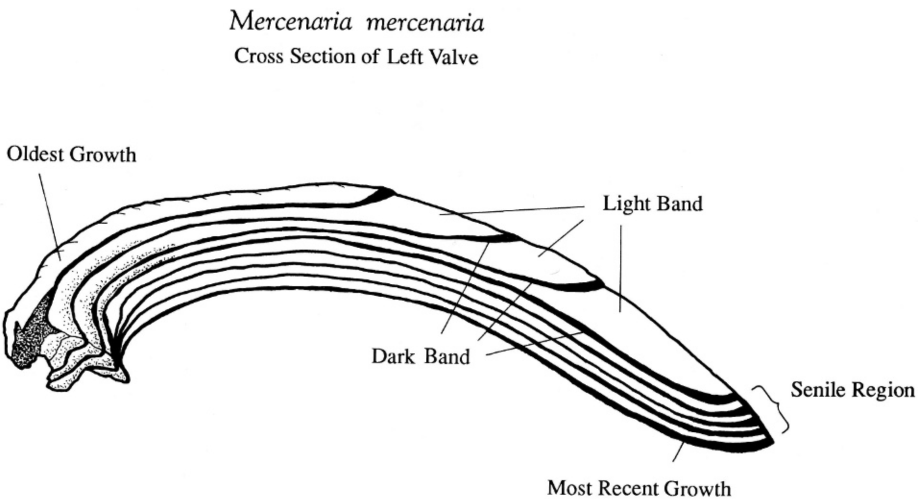


Fig. 18.2. Diagram of cross section of left valve showing acretionary growth bands. Senile increment width is exaggerated for clarity.

trolling variable in shell growth (Jones et al., 1989). Shell material is precipitated most rapidly between 10°C and 23°–25°C. Maximum shell growth occurs at 20°C, and ceases below 9°C and above 31°C, creating growth breaks on the shell surface (Ansell, 1968).

Carbonate precipitation is greatest on the outer edge of the valves in the region beyond the pallial line (fig. 18.1), but new shell material is formed less regularly throughout the interior of the valves as well (Seed, 1980). Materials to be incorporated into the shell are collected in the extrapallial fluid from the soft tissue and the water surrounding the organism. Calcium is transferred from the mantle epithelium to the extrapallial fluid along with bicarbonate, with the remainder of the extrapallial fluid bicarbonate being derived directly from the surrounding seawater (Crenshaw, 1980). It is from this reservoir that the mantle assembles the shell components. Prior studies of isotope distribution in clams and other mollusks indicate that the shell material precipitated from the extrapallial fluid is in oxygen isotope equilibrium with seawater surrounding the organism (Epstein et al., 1953; Jones and Quitmyer, 1996).

Most shell carbonate precipitated in the adult stages is aragonite (Carter, 1980). Initially, all carbonate material is precipitated in a matrix of conchiolin. Crystal formation is controlled within this matrix, although the conchiolin matrix later dissolves. Therefore, shell material within the pallial line has a well-defined and complete crystal formation; the shell beyond this line is less well organized (Crenshaw, 1980).

Periodically, clams respire anaerobically and sometimes resorb shell material (Dugal, 1939; Crenshaw and Neff, 1969; Gordon and Carriker, 1978; Crenshaw, 1980). Recognition of resorption is of great importance to isotopic studies of shell increment since the isotopic record in the shell material may be altered by this process. Dissolution during anaerobic conditions seems to be caused by succinic acid and alanine in *Mercenaria* (Dugal, 1939). This process takes place very quickly when the organism is either removed from oxygen or when the shell is voluntarily closed tightly as is done periodically, implying that an anaerobic phase of respiration is sometimes necessary and is not stress dependent (Crenshaw and Neff, 1969; Gordon and Carriker, 1978). Crenshaw and Neff (1969) and Gordon and Carriker (1978) note that even under voluntary anaerobisis, growth breaks occur in the shell. Dissolution seems to be the use of the alkali reserve of the shell to counter the acid buildup created by anaerobisis

(Crenshaw, 1980). The well-formed crystals within the pallial line may be better suited for resorption than the less organized recent growth (Crenshaw, 1980). Redeposition between periods of anaerobic growth may or may not occur.

Growth occurs in intervals defined as either structural or microstructural groups. The crystal microstructure of clams is described by Carter (1980), and is not of direct importance to this study. The structural groups related to seasonal growth and therefore season of capture determination are, as outlined by Lutz and Rhoads (1980), semidiurnal and diurnal, fortnightly (full and new moons), monthly, annual, and semiperiodic events. Kennish (1980) takes these distinctions further and includes subdaily, daily, bidaily, lunar, annual, freeze shock, heat shock, thermal shock, abrasion, spawning, neap tide, and storm breaks. Due to the spatial resolution of the microdrill employed in this study, this chapter focuses on annual growth, which is manifested as alternating dark and light increment pairs as seen in reflected light in valve cross sections. This corresponds to translucent and opaque zones, respectively, as seen in thin section with transmitted light.

Precipitation of light or dark increments is a function of stress on the organism. This stress can be caused by spawning stage, nutrition, low dissolved oxygen levels, extreme salinity, and temperature (Clark, 1979b; Lutz and Rhoads, 1980). However, in most instances increment development is most strongly correlated with temperature (e.g., Jones and Quitmyer, 1996). The annual timing of light and dark increment precipitation varies with latitude (Quitmyer et al., 1997). Light increments are usually precipitated during phases of rapid growth when water temperatures are optimum. This usually occurs in late spring and summer in the Northeast United States (Jones et al., 1989) or in late fall and winter in Florida and Georgia (Quitmyer et al., 1997). Clark (1979b) studied a small 5-month control collection of modern clams from St. Catherines Island and found dark shell material precipitated in summer and light shell material in winter. He also reported that, based on this growth pattern, St. Catherines Island shells from Seaside Mound I were estimated to have been collected in December or January and shells from McLeod Mound were collected in January. This research formed the baseline for the seasonality study presented in the previous chapter.

Quitmyer et al. (1997) captured large monthly samples from several locations, including King's Bay, Georgia, near the Florida border. This population was found to precipitate light increments most often in cool months and dark increments in warm months, much like the St. Catherines sample that was studied by Clark (1979b). However, in all sampling locations, dark shell material was being precipitated in a few of the shells collected each month (Quitmyer et al., 1997: 832, fig. 18.4).

This uncertainty makes the following isotopic analysis an important test of the overall seasonal analysis of *Mercenaria* cited throughout this monograph.

## OXYGEN ISOTOPE–TEMPERATURE RELATIONSHIP

Mollusk shells are well studied with regard to the relationship between oxygen isotope composition and temperature at the time of precipitation. Urey (1947) first proposed the theoretical relationship, and it was subsequently tested on a variety of marine mollusks (Epstein et al., 1951, 1953; Epstein and Lowenstam, 1953). Since this pioneering work, oxygen isotope profiles in mollusks are frequently studied as paleotemperature proxies (see Rhoads and Lutz, 1980, for more history).

The relationship between the measured isotope value and water temperature is expressed by the following equations:

$$T(^{\circ}C) = 16.9 - 4.2(\delta_c - \delta_w) + 0.13(\delta_c - \delta_w)^2 \text{(Craig, 1965)}$$

or

$$T(^{\circ}C) = 17.0 - 4.52(\delta_c - \delta_w) + 0.03(\delta_c - \delta_w)^2 \text{(Erez and Luz, 1983)}$$

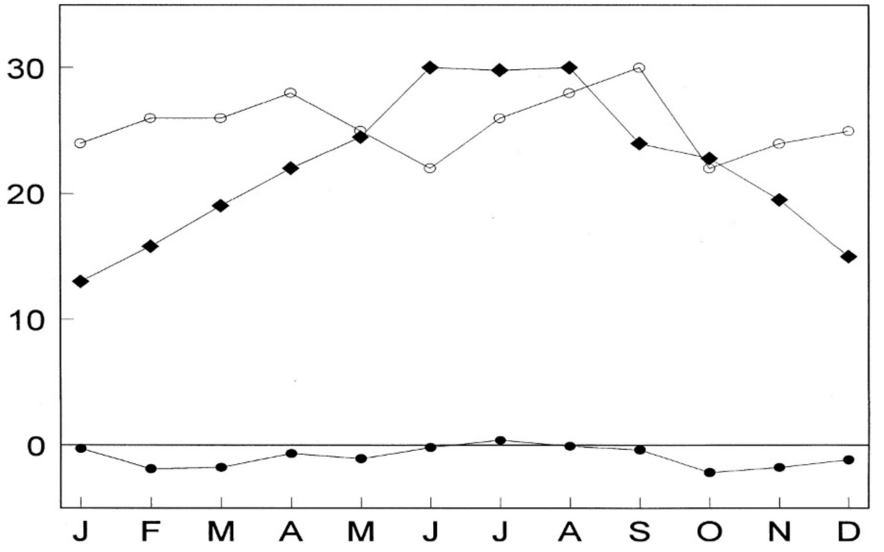


Fig. 18.3. Monthly water data as measured at the McQueen's Inlet creek collection site. Closed circles denote per mil $\delta^{18}O_w$ versus VSMOW, closed diamonds denote temperature in degrees centigrade, and open circles denote per mil salinity.

These equations were empirically derived from mollusks (Craig, 1965) and foraminifera (Erez and Luz, 1983), where $\delta_c = \delta^{18}O$ measured in sample carbonate and $\delta_w = \delta^{18}O$ of water at the site of carbonate precipitation. A 0.26‰ decrease in $\delta^{18}O_c$ represents approximately a 1°C increase in water temperature assuming several criteria are met: (1) there must no alteration of the shell carbonate, (2) there is isotopic equilibrium between the skeletal calcite and the water in which it precipitated, and (3) $\delta^{18}O$ value of the source water must be known.

The first two of these criteria are met in this study. Aragonite is a meta-stable mineral and the clams in this study are comparatively recent. There is no evidence of alteration of the shell material. Clam shells have been shown to be in or near oxygen isotope equilibrium with source water (e.g., Jones and Quitmyer, 1996). Any offset due to kinetic or metabolic fractionation effects appears to be minimal. In any event, absolute temperatures are not calculated in this study, only comparative values. Any offset would be uniform within the species.

$\delta^{18}O$ values of the source water are somewhat more problematic within this study. Estuaries are by definition changeable environments, and this holds true in regards to oxygen isotope content of the estuarine water. The $\delta^{18}O$ water values will fluctuate with tide, evaporation, and rainfall, often quite rapidly (Andrus, 1995). In this study, conditions are more favorable than in most estuaries. St. Catherines Island is not in the drainage of any freshwater river; consequently, the creeks drain only local precipitation. Tidal variation in the area is as much as 3 m, which flushes the system with seawater twice daily. Waters collected from the sample bed show a comparatively narrow range in $\delta^{18}O$ values (fig. 18.3), but the values cannot be considered constant. Therefore, absolute temperature calculation based on estuarine mollusks' $\delta^{18}O$ is not often possible due to these conditions, but if annual measurements are taken, comparative analysis is valid (Andrus and Crowe, 2000).

Carbon isotopes are less diagnostic of water temperature than oxygen. Several variables contribute to $^{13}C$ fractionation in marine biogenic calcite. $\delta^{13}C$ is shown to be in disequilibrium with seawater in several studies (e.g., Shackleton and Kennett, 1975). This is likely due to metabolic and

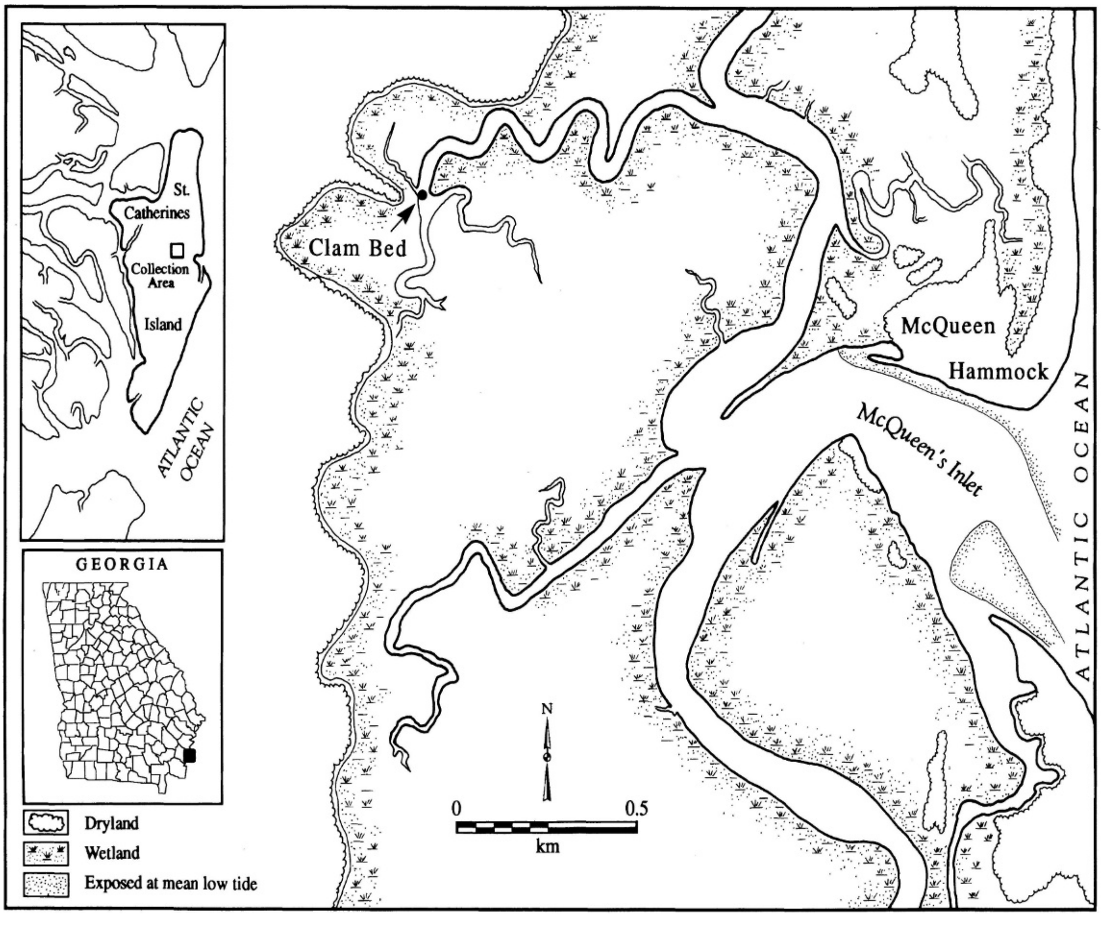


Fig. 18.4. Map of McQueen's Inlet collection area.

kinetic effects. $\delta^{13}C$ generally tracks with $\delta^{18}O$, but is depleted in $^{13}C$ relative to what would be expected in equilibrium conditions. The tracking may be due to metabolic rate fluctuating with water temperature and/or seasonal availability of food. Because of the variables associated with $\delta^{13}C$ values, this study will focus on $\delta^{18}O$ only.

## METHODS

### Field Collection

An annual collection of clams was necessary to serve as a control group to compare with archaeological specimens. Clams were collected monthly the day after the full moon for a period of 1 year (April 1994–March 1995). Samples were collected from a bed at the mouth of a small creek entering a tributary of McQueen's Inlet, on the seaward side of the island (fig. 18.4). All clams were taken from the intertidal and shallow subtidal portion of the bed at or near low tide. Clams were collected from various depths up to ~20 cm below the sediment–water interface. The clams were predominantly large and in the senile stage of growth. Approximately 20 clams (195 total) were taken from this site each month. Environmental data were collected on site. Salinity was measured by refractometer, water temperature and dissolved oxygen were measured with a YSI model 51-B meter without the stirrer engaged. One water sample per month was taken from the site at or near low tide, sealed in a collection bottle and frozen for future chemical analysis. Other environmental data, such as rainfall, were noted. The only fresh water input into this estuary is direct rainfall and rainwater draining from the island itself.

## Laboratory Methods

Clams were killed as soon as possible after collection by brief steaming over boiling water. The bulk of the soft tissue was removed manually and the shells were water mascerated for 28 days to remove residual tissues. After drying, digital calipers were used to measure the height (from the umbo to the point farthest away on the edge of the left valve), length (perpendicular to height), and width (the widest point across the two valves paired as if alive; fig. 18.1). All clams were labeled according to time of collection and measurements were recorded (Andrus, 1995). All specimens were then boxed and are currently stored at the Georgia Museum of Natural History.

Preparation for visual analysis of growth increments was accomplished by removing a thick section of the outer left valve of each specimen (fig. 18.1) using a Buehler low-speed diamond wafering saw.

Visual analysis of the thick sections was conducted using reflected light microscopy, with transmitted light used on senile specimens with small outer increments. Observations of most recent growth type (light or dark) were recorded for each shell.

Monthly subsamples for isotopic analysis were bisected using a Buehler low-speed diamond wafering saw. Shells with increments of approximately 1 mm or larger were chosen to facilitate more precise incremental sampling. The valves were washed briefly in acetone and pentane, then rinsed in distilled water before soaking in a 30 percent solution of $H_2O_2$ for 2 hr. Specimens were then rinsed again in distilled water and dried in a vacuum oven at approximately 120°C.

Shells excavated from St. Catherines Island archaeological sites were sent from storage at the American Museum of Natural History to the University of Georgia. The 25 shells were bisected for the previous season analysis by visual inspection (see chap. 17), and most were fragmented with only the outer portion of the valve intact. These archaeological shells were washed and sampled in the same manner as the modern controls.

Incremental carbonate samples for isotopic analysis were removed from the outer surface of the shell using a variable speed microdrilling assembly operated through a binocular microscope. Internal increments exposed on the bisected edge guided drilling to ensure accuracy with respect to increment type. Shell material was drilled in transects parallel to growth to collect calcite from each dark or light increment. Some small increments on the outer edge of senile individuals were removed completely to meet minimum sample size requirements. Thus the samples are a time-average of the shell growth in any increment (fig. 18.5).

Phosphoric acid digestion and $CO_2$ extraction methods were modified from Craig (1957). The carbonate was placed in a divided reaction vessel with approximately 3 ml of phosphoric acid separated from the powdered sample. The vessel was evacuated and allowed to equilibrate in a 50°C water bath for at least 30 min. The phosphoric acid and carbonate were then reacted overnight. The following day the reaction vessel was placed on a $CO_2$ extraction line and the evolved $CO_2$ gas was released, cryogenically purified, and analyzed for $\delta^{18}O$ and $\delta^{13}C$ on a Finnegan MAT Delta-E mass spectrometer.

Measured oxygen and carbon isotope values are reported in standard δ values ‰ (per mil) relative to the PDB standard. Harding Iceland Spar standards were analyzed frequently throughout isotopic sampling and compared to published values in Landis (1983) to determine precision limits. Precision was calculated to approximately ±0.1‰ for $\delta^{18}O$. Zero enrichments were run periodically to ensure instrument precision.

Oxygen isotope ratios were measured for the 12 monthly water samples. The extraction method followed Socki et al. (1992). The resulting gas was measured on a Finni-

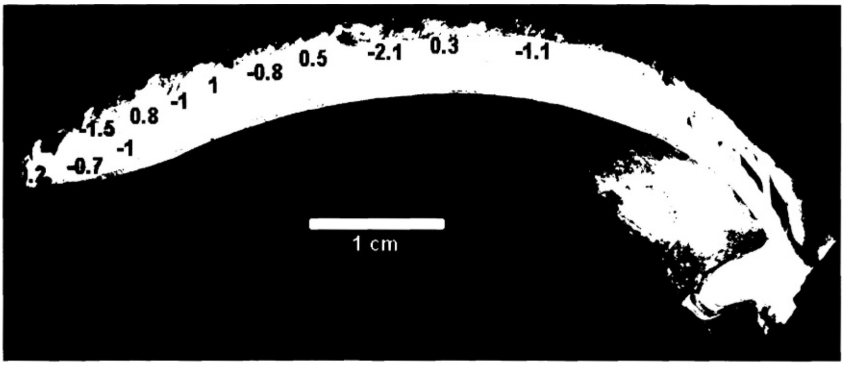


Fig. 18.5. Cross section of sample area in clam A1266b from site 9Li203 showing measured values of per mil $\delta^{18}O$ of all sampled light and dark increments.

gan MAT Delta-E mass spectrometer. Results are reported relative to VSMOW.

## RATIONALE

Two objectives of this study were methodological, namely (1) to determine the relationship between increment type and season, and (2) to create a cost-effective method of oxygen isotope analysis. To these ends, analysis of the $\delta^{18}O$ values of entire increments was chosen over microsampling within each increment.

Microsampling has the advantage of greater temporal resolution (on the order of weeks), but has the disadvantage of large numbers of analyses per clam. For the purpose of determining the temperature (season) of increment formation as a "ground truth" for visual analysis, such fine-scale resolution is unnecessary, because visual analysis cannot determine season of capture with equal precision.

Microanalysis can offer finer scale data for isotopic determination of season of capture, but is not often practical for archaeologists due to cost and time. The data presented here from the 25 archaeological clams represent 184 individual isotopic analyses, and much more if the modern control in considered. Had this same number of clams been analyzed via micromill or similar technology, over 5000 analyses would have been necessary. On most archaeology budgets, this would be prohibitive. Furthermore, the increased spatial precision would not directly translate into increased temporal precision because of uncertainties such as those related to $\delta^{18}O_{water}$ values, interannual variations in seasonal temperatures, and microenvironmental variation.

The method employed here is a cost-effective means of accurately determining season of capture on par with the cost of a few AMS radiocarbon age dates. This cost can be improved by selecting samples for isotopic analysis by visually determining the widest range of incremental growth in the smallest sample set. Additionally, cost can be lessened by limiting isotopic analysis to the final three or four increments, which is enough to determine a sinusoidal $\delta^{18}O$ oscillation indicative of season. It is hoped that this method will increase the number of sites subjected to seasonality analysis.

## RESULTS: MODERN CLAMS

The monthly distribution of most recent growth type in the modern clams (light or dark increments) is plotted in figure 18.6. In this figure, all clams collected each month were analyzed by examining the increment being precipitated at death, either light or dark. The relative percent of each type is plotted by histogram for the entire annual collection. Age variation is limited in this sample. Geriatric specimens were far more abundant than young, comprising 87

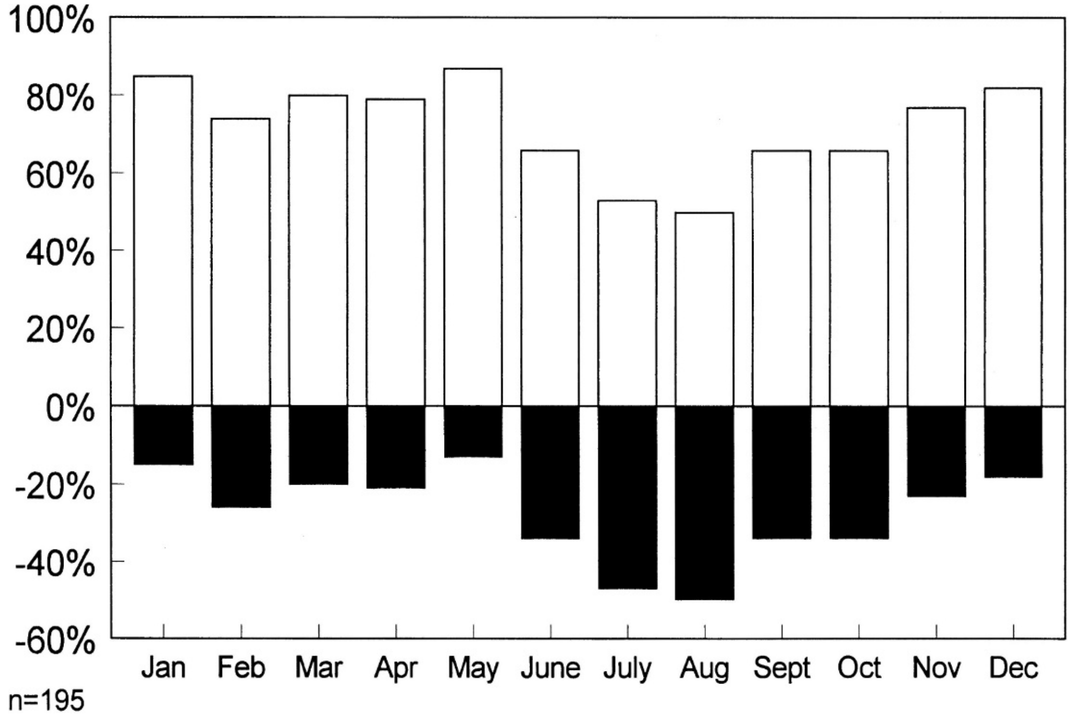


Fig. 18.6. Results of visual analysis of most recent (terminal) growth in all clams from the modern control sample. Relative percent of individuals precipitating light or dark shell material is plotted monthly.

percent of the collection. Figure 18.7 plots the same data with the geriatric specimens removed.

Examples of $\delta^{18}O$ distributions between increments are plotted in Figure 18.8. Data are plotted with the most recent growth on the right, and oldest shell on the left. Increment type is indicated by the color of the data symbols.

Environmental conditions (temperature, salinity, and $\delta^{18}O$ of the water) at the collection site are plotted in figure 18.3. Dissolved oxygen varied within a narrow range (11.2–14.5 mg/liter) throughout the testing period.

## RESULTS: ARCHAEOLOGICAL SPECIMENS

Beyond the methodological objectives, we also have attempted to compare the efficacy of determining the season of capture for archaeological specimens from St. Catherines Island using both oxygen-isotope and visual analyses of incremental shell growth.

The oxygen isotope profiles of 25 individual clams from six separate sites are shown in figs. 18.9–18.14. Samples are plotted from most recent growth on the right to earliest growth on the left. Increment type is indicated by the color of the data symbols.

Determining the season of capture based on visual analysis is dependent upon the correlation of incremental shell growth with regular seasonal patterns in environmental variables. Water temperature is the only measured growth variable that oscillated seasonally at the collection site (fig. 18.3). If temperature is the sole variable determining dark or light increment precipitation, then the monthly distribution of increment type at time of death should follow a similar regular pattern with particular increment types being precipitated during certain sea-

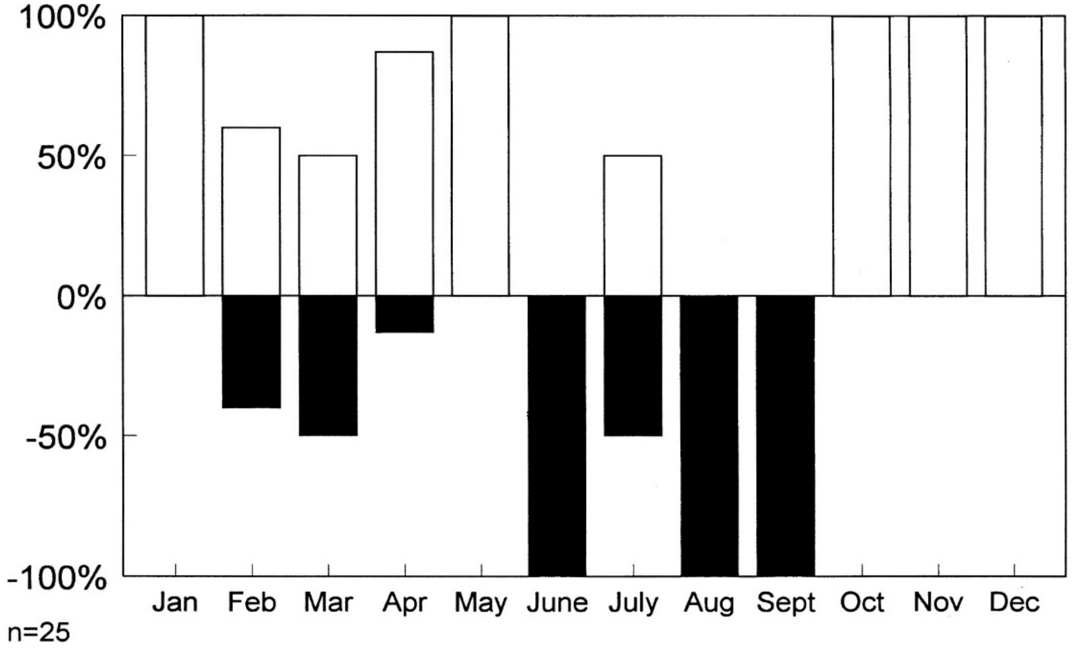


Fig. 18.7. Results of visual analysis of most recent (terminal) growth nongeriatric clams from the modern control sample. Relative percent of individuals precipitating light or dark shell material is plotted monthly.

sons. This correlation was not found in the control population due to the old average age at death of clams in the collection.

The monthly distribution of most recent increment type (fig. 18.6) demonstrates that at no time are all clams precipitating the same type of shell material; thus there is no fixed relationship between increment type and season in geriatric clams. There is a general trend of more rapid growth from September through May and slower growth in the summer, yet both increment types are present in each month's collection. These data corroborate the observation that several variables control rate of growth, and therefore precipitation of a particular increment type is not dictated by a single variable (Clark, 1979b; Lutz and Rhoads, 1980). Older clams appear to respond more often to these secondary stressors, while young clams seem to have growth rates that vary principally in response to temperature change.

Young clams precipitate light and dark increments seasonally. The control population here had too few young specimens to base any statistical correlation ($n = 25$), but isotopic analysis through ontogeny and other nearby control studies (e.g., Quitmyer et al., 1997) suggest that, in general, dark increments are precipitated in warm periods and light increments in cool periods. This regular seasonal pattern begins to disintegrate in the St. Catherines Island control at about the age of 5–8 years. Specimens from the control collection record sinusoidal $\delta^{18}O$ distributions during these first years of growth, but after about the 10th year, there is no regular sinusoidal pattern.

Examination of the distribution of $\delta^{18}O$ clarifies the relationship between temperature, season, and increment type. Figure 18.15 plots two predictive distribution models of monthly $\delta^{18}O$ clam carbonate over a 1-year period. Both models were constructed based on water temperature and $\delta^{18}O$ water values collected on site, and applied to equations a and c from Grossman and Ku (1986). Each equation produced a similar curve.

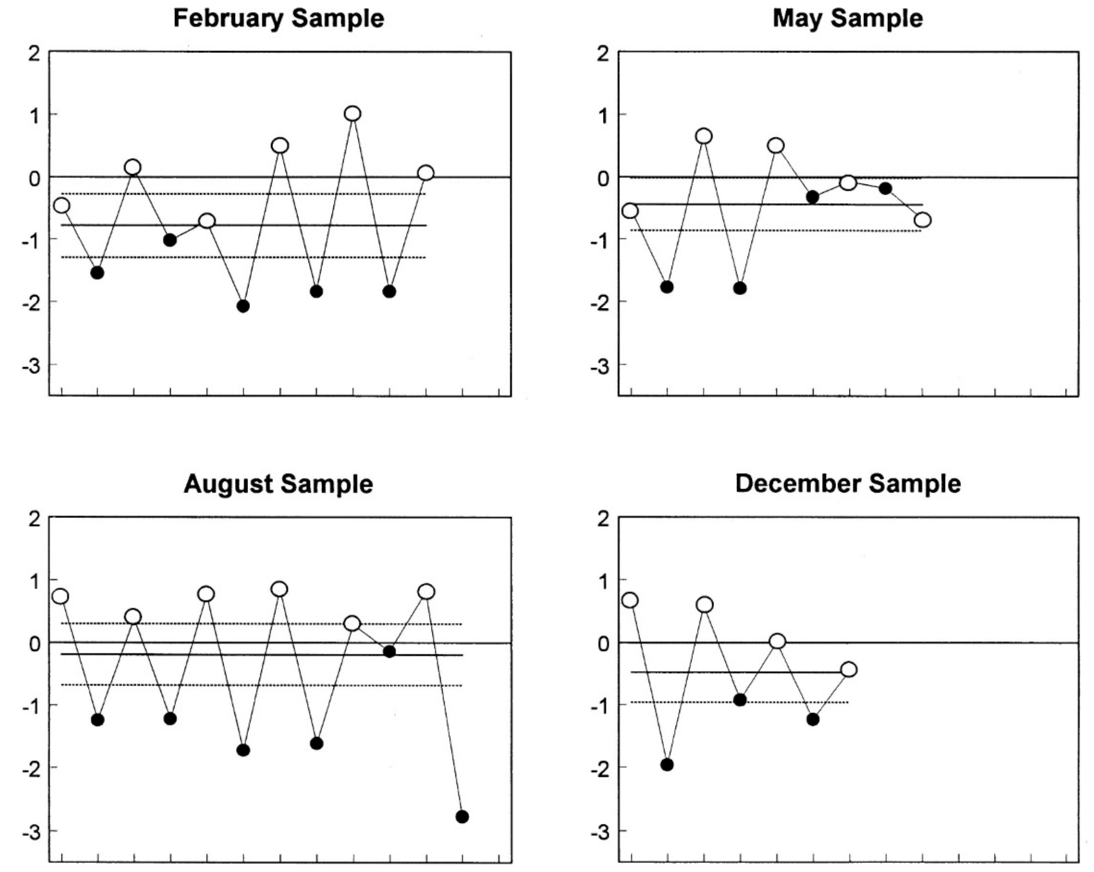


Fig. 18.8. Measured oxygen isotope values of four control clams representing typical seasonal isotope distributions. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light.

The average maximum amplitude of these curves is 4.1‰. The modern seasonal controls' average maximum amplitude is 2.7‰. This difference is due to time averaging values in modern controls by sampling entire increments and extreme $\delta^{18}O$ water values due to sampling at or near low tide. Time-averaging the models improves the comparison. If all months when temperature exceeded the optimum of 20°C are averaged as a group (hypothetically representing dark increments), and all months below 20°C are averaged as a second group (hypothetically representing light increments), the average model variation is 1.4‰. The average measured variation between neighboring dark and light increments in the modern control clams is 1.5‰. Thus predicted and observed annual variation in $\delta^{18}O$ demonstrates that temperature controls oxygen isotope values in clams, corroborating earlier studies such as Jones and Quitmyer (1996).

The average of the predicted values of $\delta^{18}O$ in both models is −1.3‰, and the observed $\delta^{18}O$ average of the seasonal samples is −0.5‰. This offset is probably a product of inaccuracy of the measured $\delta^{18}O_{water}$ value due to sampling bias toward low tide values and variation in water $\delta^{18}O$ and temperature between surface water (used to create the models) and the water near the buried clams.

Since $\delta^{18}O$ values are valid temperature (and by extension) seasonal proxies, examination of $\delta^{18}O$ variation in the seasonal

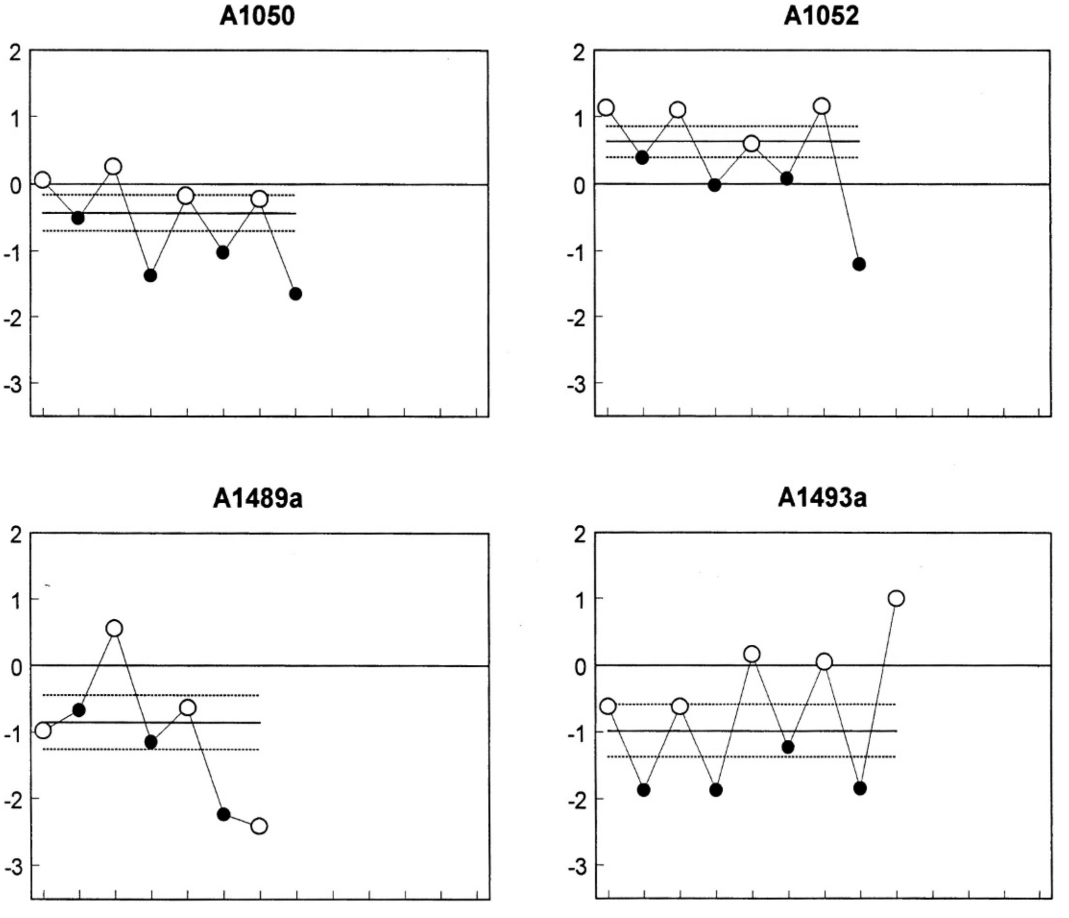


Fig. 18.9. Measured oxygen isotope values in clams excavated from site 9Li200. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one-half of one standard deviation, excluding the terminal increment.

control specimens indicates that all clams most often precipitate light or dark increments in tandem with seasonal temperature change, but there are some exceptions to this pattern.

Based on the modern control group, 85 percent of all light increments were precipitated in the cold months of the year. Seventy-seven percent of dark increments were precipitated in the warm months. When the geriatric periods of growth are removed from the analysis, 94 percent of light increments represent cool temperatures and 92 percent of the dark increments represent warm temperatures. In all cases when this pattern is broken, the temperatures during increment formation are intermediate between the annual extremes. The following paragraphs discuss these exceptions.

May sample no. 4 and August sample no. 2 (fig. 18.8) were in the geriatric phase of growth when captured, with the final four increments all approximately 1 mm wide. Accordingly, the last four increments did not display a regular oscillation as did the younger increments. The other clams sampled were all in a young phase of growth with large increments and show a regular, oscillating pattern of $\delta^{18}O$ values, with the exception of the fourth and fifth increments in the February sample. Similar unpredictable distributions were noted by

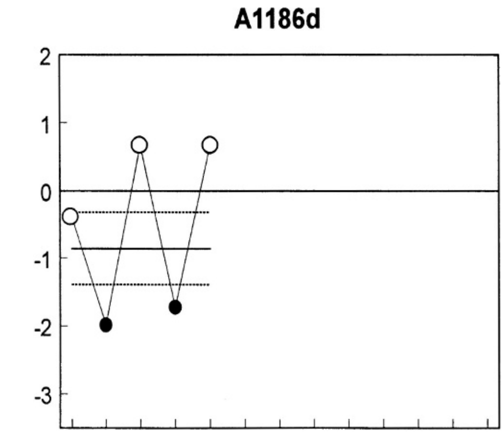


Fig. 18.10. Measured oxygen isotope values in the clam excavated from site 9Li201. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one-half of one standard deviation, excluding the terminal increment.

Andrus (1995), when using a high resolution IR laser microprobe to examine the outermost increments of very old shells from the same collection area.

Several factors could contribute to the more unpredictable distribution of $\delta^{18}O$ in geriatric shells. Older clams by their mass alone have higher energy requirements, and therefore may be more prone to external stress. Furthermore, this subpopulation would all be of spawning age, which has been noted to sometimes cause dark growth increments or sometimes growth breaks (Kennish, 1980). The effect of anaerobic respiration and shell dissolution on measured $\delta^{18}O$ values is not clear. Hypothetically, older individuals with thin outer increments may dissolve a greater percentage of shell material per increment and/or have the capacity for longer periods of anaerobic respiration than young clams, thus creating unconformities in the $\delta^{18}O$ record.

The variety of different stressors that affect geriatric clam shell growth would likely produce increments of irregular duration. Therefore, the increments are not necessarily time-equal, especially considering periodic growth breaks of unknown duration. Increments of equal size cannot be assumed to have formed during similar lengths of time. This might appear in the oxygen isotope record as extreme or intermediate $\delta^{18}O$ values compared to $\delta^{18}O$ values that represent long-term time averages. For example, an increment precipitated in just the month of August will have $\delta^{18}O$ values lower than an increment precipitated throughout an entire summer.

Visual analysis of clams from archaeological sites for the purpose of determining season of capture should rely on a modern control population of young clams and should be applied to only large sample sets. In most cases when analyzing young clams, increment precipitation can be linked to season, but there is some imprecision due to the variations in incremental growth patterns noted above. If a large archaeological sample set is available, visual analysis may be preferable over isotopic analysis due to cost and time concerns. In situations where sample size is small, isotopic analysis will result in a more precise assessment of season of capture.

## Seasonal Variation in Oxygen Isotopes

$\delta^{18}O$ values in clam increments oscillate seasonally. In most cases light increments are precipitated in cool temperatures and dark increments in warm temperatures. Examples of variation in this pattern are present. As discussed above (fig. 18.8), the last four incremental $\delta^{18}O$ values of the May sample do not oscillate at the amplitude of the young growth; thus the increments were precipitated independently of seasonal variables. However, the $\delta^{18}O$ values recorded in those increments do represent the average comparative water temperature over the time in which the increment grew. Therefore, the $\delta^{18}O$ value relative to the overall pattern indicates season of capture.

Additionally, when considering the May sample, the relative $\delta^{18}O$ value of the increment closest to the valve edge (hereafter referred to as terminal) is less than the average value of the increments precipitated early in life (fig. 18.8). This corresponds to

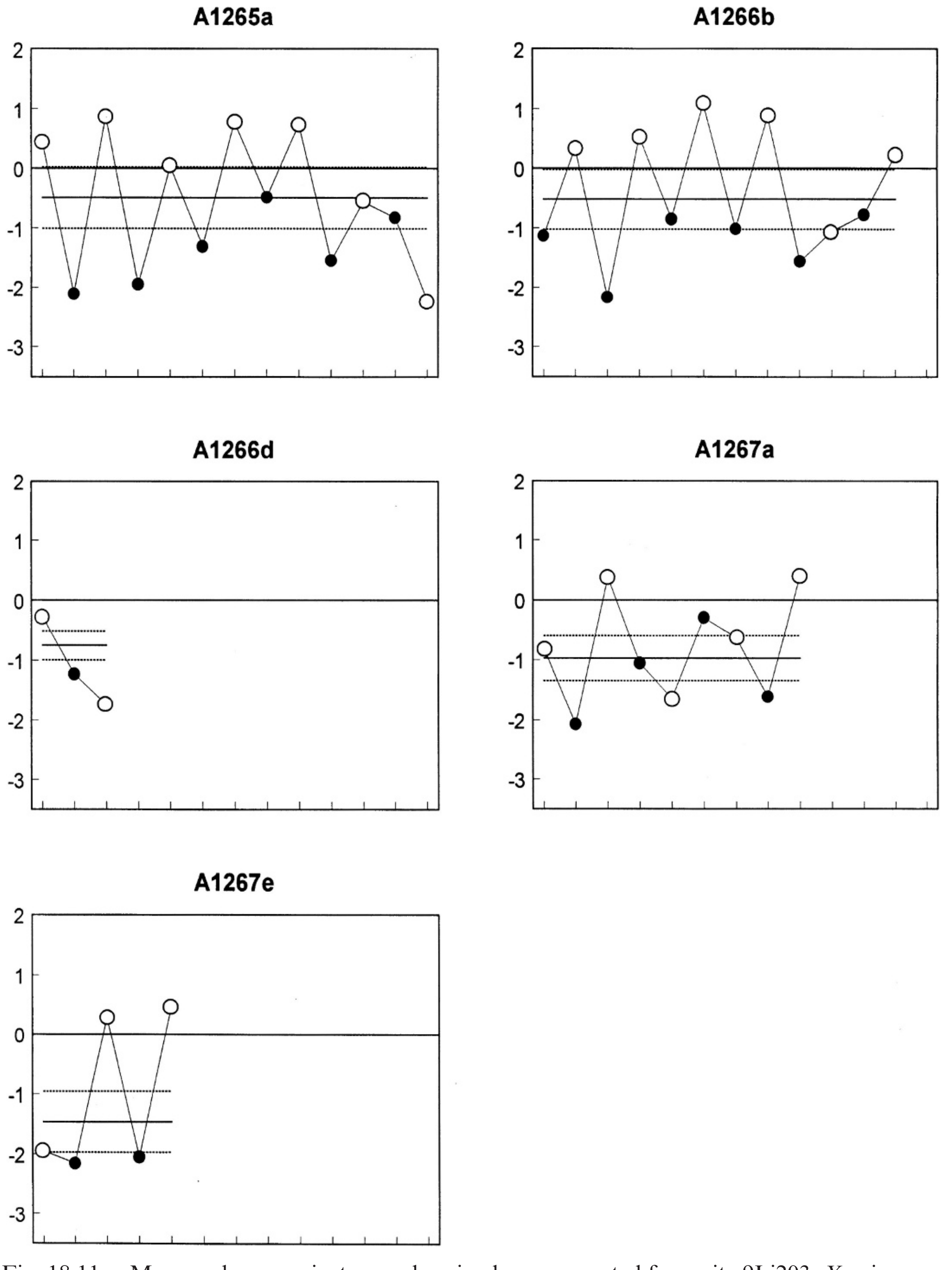


Fig. 18.11. Measured oxygen isotope values in clams excavated from site 9Li203. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one-half of one standard deviation, excluding the terminal increment.

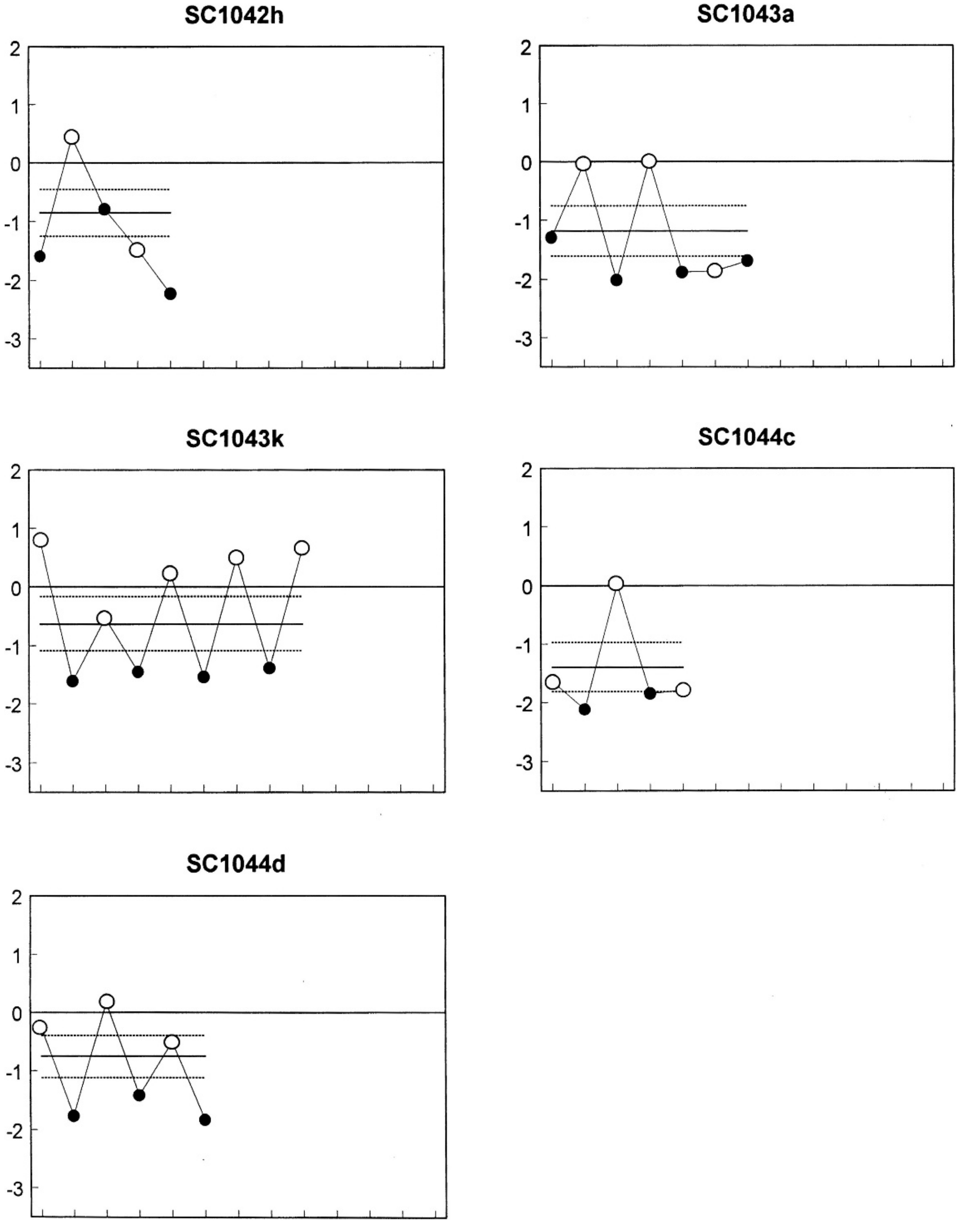


Fig. 18.12. Measured oxygen isotope values in clams excavated from site 9Li205. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one-half of one standard deviation, excluding the terminal increment.

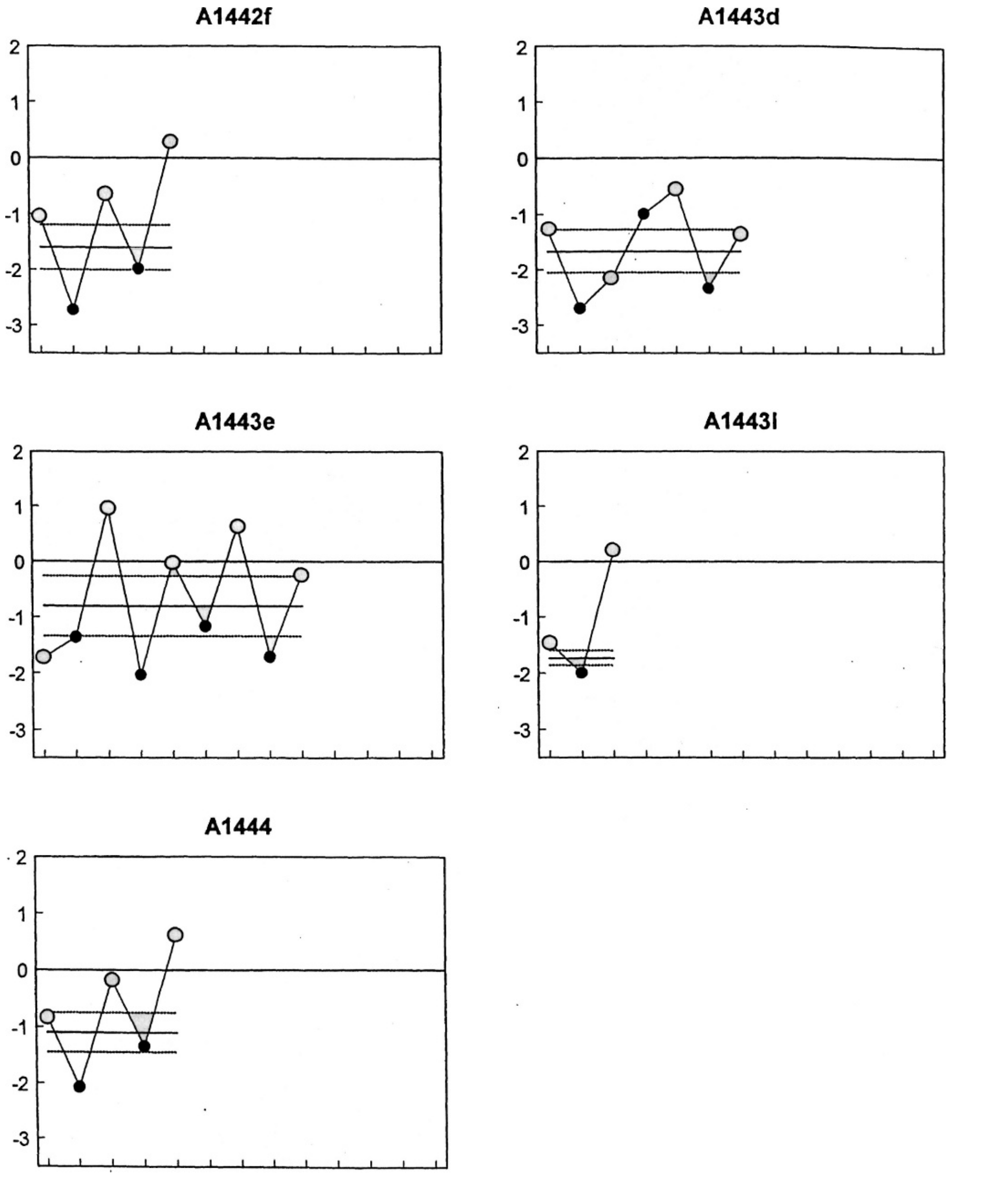


Fig. 18.13. Measured oxygen isotope values in clams excavated from site 9Li207. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one-half of one standard deviation, excluding the terminal increment.

warm water temperatures relative to what the clam experienced over its lifetime. It is tempting to state that this value is intermediate to the extremes of summer and winter, as would be expected in spring. This conclusion cannot be supported with as much confidence as the simple warm season designation. It is useful, however, to state that it is possible that a clam was captured during a transition period.

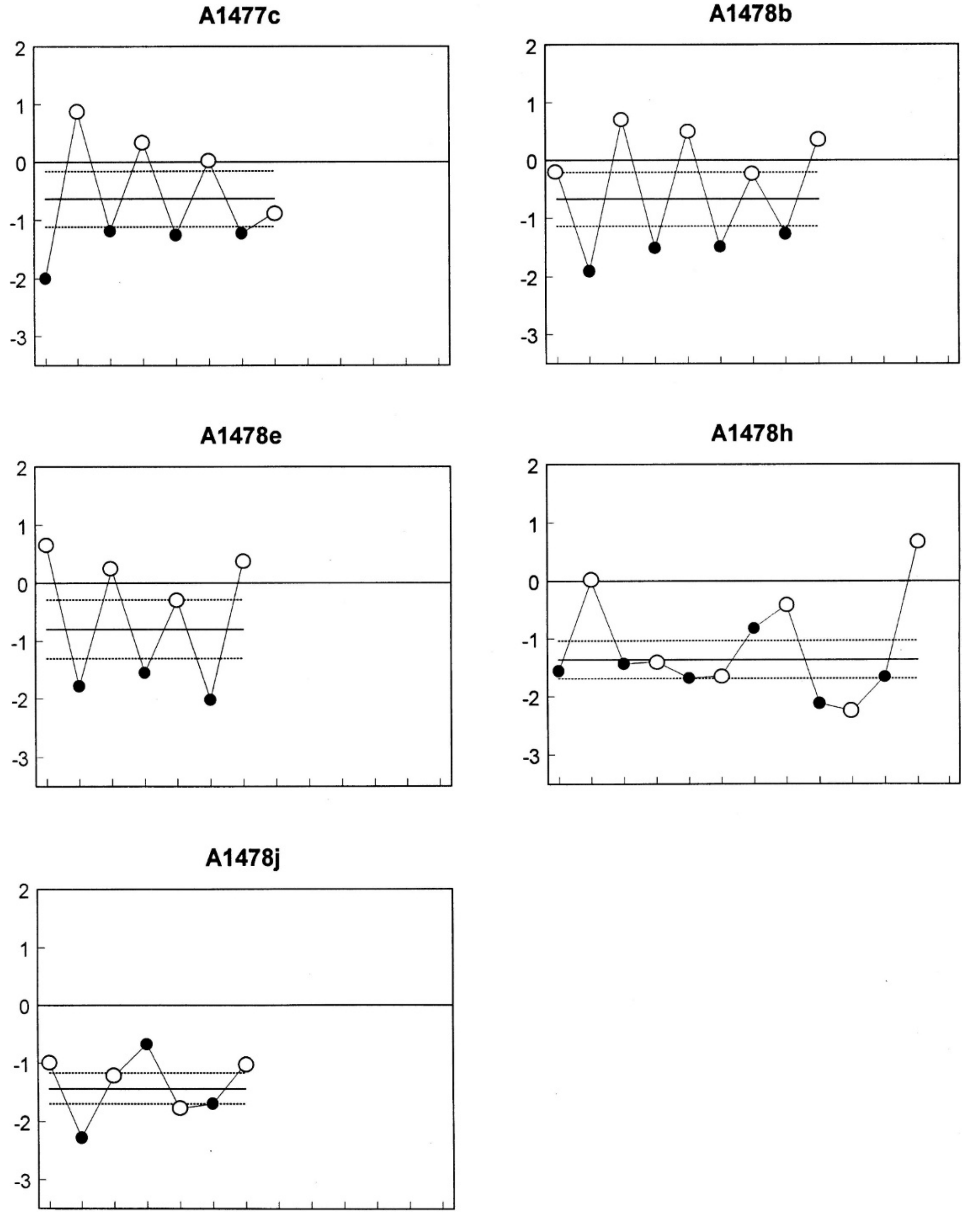


Fig. 18.14. Measured oxygen isotope values in clams excavated from site 9Li214. *Y*-axis: per mil $\delta^{18}O$. *X*-axis: increments following ontogeny (terminal increment on right). Symbol color indicates increment color under reflected light. Solid line denotes mean lifetime $\delta^{18}O$, excluding the terminal increment. Dashed lines denote one half of one standard deviation, excluding the terminal increment.

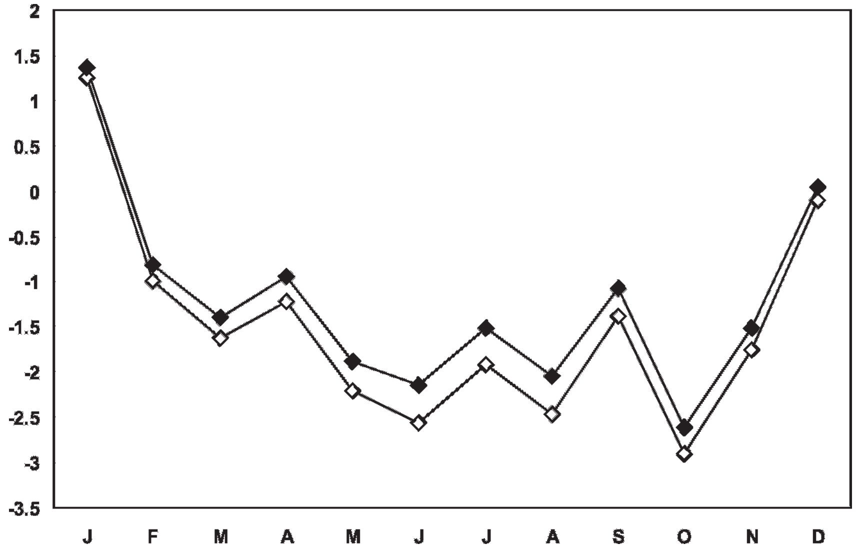


Fig. 18.15. Predicted distribution of $\delta^{18}O$ in clam carbonate based on the isotope/temperature equations of Grossman and Ku (1986): Equation a, open diamonds; Equation b; closed diamonds. Environmental variables of $\delta^{18}O_w$ and temperature were measured at the McQueen's Inlet Creek collection site.

Analysis of the pattern of $\delta^{18}O$ values over several increments is necessary to determine season of capture. Isolated $\delta^{18}O$ values of the terminal increment alone do not permit identification of position in the seasonal cycle at time of death. For example, the $\delta^{18}O$ values in the terminal increment of both the May and December samples are nearly identical (fig. 18.8). Only their relationship to the overall lifetime pattern discriminates season of death. This is because the average lifetime $\delta^{18}O$ value per clam is unique. Lifetime averages in these four samples range from −0.4‰ to −0.7‰. Furthermore, amplitude of seasonal oscillation changes over time, such as in December sample 1 (fig. 18.8).

These inter- and intraclam variations may be a product of environmental differences between microhabitats over time and space. A deeply buried clam will not experience the same seasonal range in water temperature and $\delta^{18}O_{water}$ as one living closer to the sediment–water interface. As noted previously, clams do move small distances over time. Variation in $\delta^{18}O_{water}$ and water temperature between different collection sites will also occur. Clam beds from the seaward side of the island will have $\delta^{18}O_{water}$ values closer to seawater (about −0.5) than will clam beds from the western (landward) side.

The isotope pattern variability between and within specimens must be addressed consistently so that an unambiguous method of determining season of capture using $\delta^{18}O$ values can be developed. Because of unpredictable variation in $\delta^{18}O$ patterns between different clams, determination of season of capture must be based solely on the isotopic history of each individual. Variation over the lifetime of a clam dictates that statistical relationships must be established to account for changes in both lifetime mean $\delta^{18}O$ values and for changes in amplitude of $\delta^{18}O$ oscillations over time.

Based on the modern control collection, the following statistical treatments are proposed: (1) The arithmetic mean $\delta^{18}O$ values of all increments other than the terminal increment must be calculated for each clam because of variation between individuals. This is the best approximation of lifetime median temperature considering that all increments are not time-equal. (2) Changes in amplitude and absolute value of $\delta^{18}O$ oscillations through time can be characterized through calculation of population standard deviation of $\delta^{18}O$ of all increments other than the terminal increment. This is the best approximation of the average range of seasonal variation in temperature over the lifetime of the clam.

Based on these statistical analyses, individual templates for determining the season of capture can be constructed for each clam. Season of capture can be resolved into two primary categories, each with two secondary categories:

**Cool:** defined by a terminal $\delta^{18}O$ value greater than the mean $\delta^{18}O$ value of all other increments. *Winter*: defined by the terminal $\delta^{18}O$ value being greater than the lifetime mean by at least half of one population standard deviation. *Fall*: defined by the terminal $\delta^{18}O$ value being within half of one population standard deviation from the mean, and having a $\delta^{18}O$ value greater than the previous increment.

**Warm:** defined by a terminal $\delta^{18}O$ value less than the mean $\delta^{18}O$ value of all other increments. *Summer*: defined by the terminal $\delta^{18}O$ value being less than the lifetime mean by more than half of one population standard deviation. *Spring*: defined by the terminal $\delta^{18}O$ value being within half of one population standard deviation from the mean, and having a $\delta^{18}O$ value less than the previous increment.

See figure 18.8 for examples of these relationships within seasonal controls.

Although any terminal increment can be defined as precipitating during warm or cool water temperatures, there is less confidence in the subdivision of transitional seasons (spring and fall) due to uncertainties in the cause of increment formation. Intermediate values defined by the above methods cannot be conclusively identified as spring or fall because a variety of scenarios could result in the precipitation of such an increment. For this reason, spring and fall designations are tentative and may represent only moderate summer or winter values.

In summary, analysis of $\delta^{18}O$ patterns during the lifetime of a clam provides a valid method of determining season of capture. Season of capture can be resolved into two different primary periods, Warm and Cool, and into secondary periods of winter, spring, summer, or fall.

Further seasonal distinctions may become possible when time-averaging $\delta^{18}O$ values of entire increments can be abandoned in favor of multiple analyses across a single increment. UV laser microprobes may permit this high spatial resolution. In this study, however, subdivisions of seasons finer than warm and cool, with possible transition periods, cannot be supported based on the analysis of the control sample. The St. Catherines Island clam population seems to be subject to a combination of growth variables that preclude fine-scale designations of season of capture as is possible in more extreme temperature environments as reported in Florida by Quitmyer et al. (1997). This problem may be resolved through microsampling within the growth increments to achieve a higher temporal resolution, but to do so is more costly and time-consuming than the methods used here.

## ASSESSING SEASONALITY OF ARCHAEOLOGICAL CLAMS

Analysis of season of capture in the archaeological clam specimens follows the method derived from the modern control sample described above. A sample of 25 *Mercenaria* was drawn from six archaeological sites investigated in the Island-wide survey, ranging in age from the Wilmington through Irene periods. Each site will be addressed separately.

**9Li200 (AMNH-452):** Four shells comprise this sample. Clams A1050, A1052, and A1489a were all captured in the Warm phase, probably summer. Clam A1493a was captured in the Cool phase, probably winter. Transitional season collections are not present (fig. 18.9).

**9Li201 (AMNH-453):** Only one clam was analyzed from this site. A1186d was collected in the Cool phase, probably winter (fig. 18.10).

**9Li203 (AMNH-461):** Five clams were analyzed from this site. A1266b, A1267a, and A1267e were all collected in the Cool phase, probably winter. A1265a was collected in the Warm phase, probably summer. A1266d was only an edge fragment. Without more history, it can only be designated as collected in the Warm phase (fig. 18.11).

**9Li205 (AMNH-465):** Five clams comprise this sample. SC1043k was captured in the Cool phase, probably winter. The other four clams were captured in the Warm phase, with three probably collected during the summer. SC1044c was likely collected in the early fall/late summer (fig. 18.12).

**9Li207 (AMNH-467):** Five clams were analyzed from this site. All of these clams were captured in the Cool phase. A1442f and A1444 were probably captured in winter; A1443d and A1443e were possibly captured in fall. A143l was an edge fragment so no further seasonal distinction was made beyond Cool phase (fig. 18.13).

**9Li214 (AMNH-483):** All five shells analyzed from this site were captured in the Cool phase. A1477c was possibly captured in fall, and the others were probably captured in winter (fig. 18.14).

No sites were conclusively found to be occupied year-round, yet all sites with more than one sample clam were occupied in at least two seasons. Two sites, 9Li200 and 9Li203 were occupied in at least winter and summer. 9Li205 was occupied in winter, summer, and early fall. Sites 9Li207 and 9Li214 were occupied at least in the fall and winter. In chapter 20, these results are compared with seasonal estimates derived from visual inspection of growth increments.

## CONCLUSIONS

Season of capture can be determined through analysis of patterns of $\delta^{18}O$ incremental values in clam shells. The oxygen isotope distributions indicate that light increments are most often precipitated in cool months, while dark increments are most often precipitated in warm months. This pattern is fairly consistent in young clams, but is less consistent in senile clams.

Evidence for clam collection, and thus occupation, is present for all seasons except spring on St. Catherines Island as a whole. It should be reiterated that season of capture and season of collection do not equate, and it is possible that these sites were occupied longer than the season of capture data indicate. Season of capture confirms occupation during at least portions of the year. Occupation may or may not have occurred at times not confirmed through this method. Larger sample sizes are required for a more complete picture of season of capture and occupation.

If excavations of these survey sites are completed, larger sample populations are likely to result and can be analyzed using the control collection from this study, which is in storage for future use at the Georgia Museum of Natural History. Increasing the number of taxa analyzed would also improve seasonal analysis. It is likely that deer teeth and oysters would be recovered, both of which can be used in similar analyses (e.g., Andrus, 1995; Weinand, 1998). Such a thorough analysis could present a clearer picture of season of occupation on St. Catherines Island. Seasonality studies must be conducted on more sites throughout the coastal plain in order to better define the economic base of the prehistoric southeast coast.

Even considering the small sample size, the seasons of occupation confirmed by this study contradict existing theories of coastal subsistence economies. This is part of a growing body of data indicating that prehistoric coastal resources were not marginal, but could sustain sedentary human populations to a greater extent than previously thought possible (e.g., Quitmyer et al., 1997). The models of seasonal round subsistence patterns must be modified in light of these new data or abandoned in favor of models in which sedentism was the norm and seasonal movement the exception.

# CHAPTER 19. ARCHAEOLOGICAL PROCEDURES AND ANALYTICAL PROTOCOLS

David Hurst Thomas

For sites discovered in the Island-wide transect survey, we excavated one or more test pits, widely separated to maximize between-sample diversity. Each of these test pits measured 1 m × 1 m, oriented toward the cardinal directions and excavated to sterile subdeposits. The archaeological deposits were removed in arbitrary 10-cm horizontal levels, subdivided whenever natural stratigraphic units were encountered. These tests were created using trowels and dustpans, and the entire matrix was screened through 1/4-in. hardware cloth. Screeners saved all cultural materials, vertebrate faunal remains, and fragments of *Mercenaria* shells (for possible analysis of seasonality). Charcoal samples were preserved in aluminum foil (for potential $^{14}C$ analysis). On occasion, as at Little Camel New Ground Field 5 (9Li206; AMNH-466), we used 1/16-in. screens because of the obvious abundance of fish bones in the deposit (see chap. 16). More than 400 of these 1-$m^2$ test pits were excavated in this stage of the Island-wide survey.

We began the shovel testing phase by selecting a random point along the southern margin of transect C-6 (located toward the center of the Island). At this point, we dug an initial shovel test pit (50 cm in diameter, 1 m deep) and screened all fill through a 1/4-in. screen. We then plotted and excavated similar pits at 50-m intervals along the entire southern margin of the C-6 transect. We then repeated the shovel testing for an additional 15 ("−6 series") transects, which are spaced at 1-km intervals. These shovel tests were excavated strictly according to these randomized criteria, without regard to the presence or absence of known sites. As discussed in chapter 20, we excavated more than 450 of these shovel tests across the island. As expected, we found most of them to be culturally sterile.

Rather different archaeological procedures were employed during the more intensive excavations at the Meeting House Field and Fallen Tree sites. Chapters 25 and 26 describe these field operations in some detail.

## PROTOCOLS

To prepare the site descriptions presented in the following chapters, we attempted to adhere to a set of operationally define protocols. In chapter 17, we discussed the methods used for selecting and assigning seasonal estimates to the survey sites. This chapter employs similar conventions when discussing site distributions and macrochronological placement.

Although archaeologists speak all the time about sites, many would be hard pressed to define what "site" actually means. For Willey and Phillips (1958: 18), the "site" is "the smallest unit of space dealt with by archaeologists and the most difficult to define." Thomas and Bettinger (1976: 271) previously discussed the difficulties of defining archaeological "sites" when conducting large-scale site surveys.

While it is tempting to create a specific and concrete definition, such as "during our St. Catherines Island surveys, we defined a 'site' whenever we recovered five pieces of cultural material within approximately 50 square meters." But such definitions do not work in practice. Sometimes, the archaeological sites on St. Catherines Island contain no artifacts at all (and in chap. 20, we discuss a number of "nonceramic", or perhaps better, "aceramic" sites). In many cases, the local geomorphological setting establishes an artificial boundary on a site's edges, as along an eroding cutbank or beach ridge.

In general, we will consider an archaeological "site" as basically anyplace where material evidence exists about the human past (Sassaman et al., 1990: 218). Usually, the term "site" refers to a distinct concentration of such evidence, but sometimes the artifact scatters seem to be more or less continuous, and the archaeologist has to make a judgment call. Although we attempted to standardize our field definitions, it is certainly possible that another team of archaeologists would have recorded the same distribution in a somewhat different manner.

But even if we could define sites in absolutely objective fashion, what, exactly, would these be? We tend to think of sites as discrete behavioral entities, but archaeological sites are not necessarily the archaeological equivalent of the ethnohistoric village, dispersed town, or foraging camp (although sometimes they are). Sites can result from multiple occupations over decades, or even hundreds or thousands of years, and archaeologists have to be wary of all the natural processes that go into the formation of a site.

We used the following ordinal categories to characterize the archaeological sites encountered in the transect and shoreline surveys:

**Small**: inferred subsurface extent less than 50 $m^2$.

**Medium**: inferred subsurface extent between 50 $m^2$ and 500 $m^2$.

**Large**: inferred subsurface extent greater than 500 $m^2$.

## DEFINING ARCHAEOLOGICAL COMPONENTS

Defining archaeological components is a critical first step in delineating the minimal analytical units employed in the analysis of vertebrate faunal remains, to define parameters for the incremental studies of *Mercenaria*, and to relate archaeological site distributions to the changing geomorphic landscape.

As explained in chapter 12, we follow the classic definition by Willey and Phillips (1958: 21): an *archaeological component* is a culturally homogeneous unit within a single archaeological site. The majority of archaeological sites encountered in the Island-wide survey were occupied multiple times, reflected by the diverse ceramic assemblages recovered during our test excavations. But the isolation of archaeological components, when possible, is particularly critical for the subsequent analyses of the zooarchaeological assemblages, particularly with respect to assigning particular taxa to specific temporal periods, to computing "minimum number of individuals" (see the discussion by Reitz in chap. 22), and interpreting the meaning of various indicators of seasonality (including incremental patterning in *Mercenaria* and the presence/absence of unshed deer antlers, sea catfish remains, etc). That is, without an understanding of the archaeological component(s) present, we cannot assign meaning to the associated zooarchaeological evidence (in its various configurations).

We employed the following operational definitions to designate archaeological components in the transect survey sites:

SINGLE-COMPONENT SITES: More than 75 percent of the diagnostic sherds derive from a single temporal period. Contiguous periods are sometimes grouped to define a single component, as in a component that dates to the "Refuge-Deptford" period or a site component that dates to "Wilmington/St. Catherines" times.

MULTIPLE COMPONENT SITES: **Major component**: more than 50 percent of the diagnostic sherds derive from a single temporal period. **Minor component**: more than 20 percent of the diagnostic sherds derive from a single temporal period; multiple minor components are sometimes evident.

CONFIDENCE LEVEL: a generally subjective assessment, based largely on the number of diagnostic sherds recovered:

A+ = 1000 or more diagnostic sherds
A = 500 or more diagnostic sherds
A− = 250 or more diagnostic sherds
B = 100 or more diagnostic sherds
C = 10 or more diagnostic sherds
D = 9 or fewer diagnostic sherds

These quantitative estimates of confidence were sometimes adjusted upward slightly if the nondiagnostic sherd collection supported the temporal assignment (generally based on distribution of tempers in the nondiagnostic materials) or if the diagnostics approached 100 percent for a single period. For instance, if a Deptford period site contained nine diagnostic sherds, it was assigned a confidence level of "D". If, however, the nondiagnostic ceramics from this same site were mostly sand tempered, then the confidence might be upgraded to "C−". These ancillary considerations never boosted a confidence score more than a single grade.

Below are some examples of how these protocols operated in practice (illustrated by sites and sherd frequencies documented in chap. 20):

**9Li13:** 86.7 percent of the diagnostic sherds ($n = 2926$) derive from the Altamaha period. We judge 9Li13 to be a single component Altamaha period site (with an "A" level of confidence).

**9Li197:** 91.7 percent of the diagnostic sherds ($n = 342$) derive from the Irene Period. We judge 9Li197 to be a single component Irene period site (with an "A−" level of confidence).

**9Li224:** 84 percent of the diagnostic sherds ($n = 16$) derive from St. Catherines and Wilmington periods. We judge 9Li224 to be a single component St. Catherines/ Wilmington period site (with a "C+" level of confidence).

**9Li183:** 67 percent of the diagnostic sherds ($n = 10$) derive from the St. Catherines period and 27 percent ($n = 4$) derive from the Irene period. We judge 9Li183 to have a primary St. Catherines period component and a secondary Irene period component (with a "C" level of confidence).

## PRESENTING RADIOCARBON EVIDENCE

As discussed in chapter 13, we have a total of 239 $^{14}$C determinations processed on archaeological and geological samples from St. Catherines Island, almost exclusively from mortuary and shell midden contexts. Eleven of these dates were processed in conjunction with the University of Georgia's excavations directed by Joseph Caldwell. The remaining dates were processed on samples recovered during our investigations.

Each radiocarbon date was calibrated according to the conventions detailed in chapter 13. For the marine samples, we applied an additional reservoir correction, derived specifically for the oysters (*Crassostrea*) from St. Catherines Island. We approximated this local mean for $\Delta R$ (the difference between the regional and global marine $^{14}$C estimates) to be $-134 \pm 26$ years (one of the most extreme values yet recorded). It may be that species-specific factors are operating here—meaning that the regional mean $\Delta R$ values computed on *Crassostrea virginica* (oysters) might not be directly transferable to other species. We have, however, applied the St. Catherines Island correction factor to the *Mercenaria mercenaria* recovered, and the paired-shell samples from numerous Island sites support this assumption. We have also assumed, as a first approximation, that the $\Delta R$ values derived for St. Catherines Island samples have remained constant during the human occupation of the island. Each of these assumptions may require revision as future research accumulates.

## INTERPRETING EVIDENCE OF SEASONALITY

Evidence for seasonal resource procurement at the various archaeological sites on St. Catherines Island comes from two primary sources: the analysis of the vertebrate faunal elements recovered during excavation and the examination of incremental analysis conducted on hard clams recovered from these sites.

As elaborated by Elizabeth Reitz in chapter 22, vertebrate remains do not provide ideal seasonal indicators because most taxa are available during all seasons in coastal environments. Nonetheless, some indication of seasonal activity can be derived from the condition of deer antlers and age at death. The presence of unshed antlers can indicate fall–winter hunting while juvenile deer remains suggest a spring–summer hunt. Similarly, remains of sharks and members of the sea catfish family (Ariidae) suggest a warm weather procurement.

More satisfying are the studies of incremental growth in hard clams (*Mercenaria*). Beginning with the "components" defined on the basis of ceramic analysis, we employed the following sampling conventions in the selection of *Mercenaria* appropriate for seasonal analysis (see also chap. 17):

SINGLE-COMPONENT SITES: If fewer than 25 readable clams were available, then all samples were analyzed. If more than 25 suitable clams were recovered, then a random sample of 25 specimens was selected

TWO-COMPONENT SITES: Each component was sampled independently. We favored relatively homogeneous test pits (based on ceramic evidence) from each major temporal component and selected up to 25 clams from each component (randomly sampling when necessary to keep the sample size within acceptable limits).

MULTIPLE-COMPONENT SITES: We analyzed the available sample and attempted to determine the archaeological age of each specimen by charting associated potsherds.

UNDATED COMPONENTS: Several sites contained sufficient *Mercenaria* for seasonal analysis but contained too few potsherds to assign a probable period of occupation. The seasonal estimates were included in the overall, Island-wide total, but not in the period-by-period tallies.

Using these criteria, we analyzed approximately 2000 individual *Mercenaria* shells (or fragments). Of these, 1771 individual specimens (or fragments) provided usable growth increment estimates.

## ARCHAEOLOGICAL COMPONENTS DISTINGUISHED FROM ARCHAEOLOGICAL LANDSCAPES

The concept of *archaeological component* is critical to this study because it provides an effective means of assessing intrasite contexts, particularly helping to establish the interrelationship between the various evidence streams (including ceramic chronology, radiocarbon dates, zooarchaeological assemblages, and seasonality estimates). In a single component site, for instance, all the radiocarbon, zooarchaeological, and seasonality evidence can be consisted relevant to single "period" in question, and hence germane to the entire site context.

At South New Ground Field 5 (9Li192), for instance, we recorded a low, subtle shell mound during the Island-wide archaeological survey (see chap. 20). We excavated three test pits at 9Li192 and recovered an assemblage of 213 potsherds, almost entirely Irene Complicated Stamped and Irene Plain ceramics (occasional Savannah Plain sherds were also present). Based on the ceramic evidence, we decided that South New Ground Field 5 is a single-component site dating to the Irene period and assigned a confidence level of "B" (table 20.6). This decision was important because it meant that all associated lines of evidence developed at 9Li192 are considered to be relevant to the Irene period occupation. Two statistically identical radiocarbon dates (Beta-20824 and Beta-20825), for instance, were processed on *Mercenaria* from 9Li192, and both assessments are considered to be relevant to dating the Irene period. Similarly, all zooarchaeological remains recovered at South New Ground Field 5 are attributed to the Irene occupation. The same is true of the seasonality study. Analysis of the all available *Mercenaria* shows that most clams (19 of 23) were harvested during the winter, with the rest collected during the early springtime. The presence of sea catfish remains also suggests an occupation sometime between April and October.

We encountered a rather different situation at King New Ground Field (9Li19), a large precontact period site located in a large antebellum field of the same name. The combined ceramic assemblage from the University of Georgia and the AMNH excavations consists of 1119 potsherds (table 20.3), of which 298 sherds were considered to be temporally undiagnostic. Of the "diagnostics", we assigned 58.6 percent (481 of 821) to the Irene period, which we designated at the "primary component". A total of 36.0 percent (296 of 821) of the diagnostic sherds define a secondary, St. Catherines period component. Whereas diagnostics were also recovered from all the additional periods in the St. Catherines Island sequence, the numbers were insufficient to define an additional component. Given the relatively large sample size, we assigned a confidence level of "A" to the definition of components at King New Ground Field. When dealing with a two-component site such as 9Li19, one must be careful when separating radiocarbon, zooarchaeological, and seasonal evidence into the appropriate context by period. Because *Mercenaria* are numerous in the King New Ground Field middens, we drew independent random samples ($n$ = 25) from the Irene and the St. Catherines components and assigned separate seasonality estimates to each. Based on provenience considerations, we assigned the entire zooarchaeological assemblage to the Irene component.

An important question remains unaddressed: Do we simply ignore the temporally diagnostic sherds that were not sufficiently abundant to define a discrete archaeological component in the King New Ground Field middens? We recovered, for instance, $n$ = 26 sherds diagnostic of the Wilmington period. Since this total represents only 3.2 percent of the total diagnostics, we cannot, using the test-excavation strategy employed here, adequately isolate a "Wilmington component" at King New Ground Field.

But, to be sure, these 26 Wilmington-age sherds were still recovered at 9Li19, apparently in primary context at a well-documented archaeological site. In fact, one of the two radiocarbon dates processed by the University of Georgia at 9Li13 would seem to date to this relatively small-scale Wilmington presence. And what about the 11 Refuge/Deptford-diagnostic sherds and the six fiber-tempered sherds recovered during the King New Ground Field excavations?

## ADDRESSING THE ARCHAEOLOGICAL LANDSCAPE

We feel strongly that such minority diagnostics must somehow play into any comprehensive analysis of aboriginal landscapes on St. Catherines Island, but that role should not be confused with that of the *archaeological component*, which is likewise critical. In adopting a "landscape" approach to the archaeology of St. Catherines Island, we sometimes find the concept of archaeological "site" to be perfectly serviceable; this is why we have gone to some effort to define archaeological "components" in an operational, repeatable fashion. For some purposes, we need to isolate those specific, stratigraphically defined chunks of sites that appear to date to a definable timespan.

Some time ago, we advocated for a "nonsite" approach to hunter–gatherer archaeology (Thomas, 1973, 1975; or, as some would have it, a "siteless" perspective, per Dunnell and Dancey, 1983). In arid landscapes, nonsite archaeology became a viable option because so much of the archaeological record lies on the ground surface, often with interspatial relationships preserved for millennia. In such cases, large-scale regional surveys provide insights into the ecological and social processes that led to the deposition of the artifacts. But such a truly "nonsite" approach, beyond all doubt, is wholly inappropriate for St. Catherines Island: Due to the dense vegetation and the geomorphological complexity of the archaeological deposits, making a comprehensive "surface collection" is simply impossible (see also Nance, 1980; Lightfoot, 1986; Nance and Ball, 1986; Sassaman, 1990: 218).

In the context of our Island-wide approach, we will privilege regional patterning over individual "site" context. This is why we (reluctantly) find it necessary to introduce another term to the already overtaxed archaeological lexicon. On St. Catherines Island, we have found it useful to employ the concept of the *archaeological landscape*, defined as the totality of all available archaeological evidence (termed a *presence*), partitioned according to specific temporal period and plotted across a well-defined and bounded geographical space. So defined, then, an archaeological "presence" can be one or more potsherds recovered in a solid archaeological context, one or more time-diagnostic lithic artifacts, or even an apparently reliable "cultural" radiocarbon date (in context, but not necessarily in the presence of ceramics).

To see how this works, consider South New Ground Field 1 (9Li187), two small shell mounds encountered while surveying in transect H-6 (see chap. 20). We excavated a single test pit here, and intersected a shell-filled pit (about 60 cm in diameter). The unusually clear-cut pattern of growth increments evident in the 23 clams recovered here shows that these *Mercenaria* were harvested exclusively during the wintertime (and probably in a single procurement episode, although we cannot prove this suggestion). Although no diagnostic ceramics turned up in this limited testing, this is clearly a "cultural" context, so we elected to process a radiocarbon date (Beta-183636) on a hard clam shell from this pit. The resulting $^{14}$C date determination, cal A.D. 560–770, defines a "Wilmington period presence" at 9Li187, despite the lack of ceramic evidence (so far).

In chapters 24 and 32, we assess the aboriginal mortuary complex evident on St. Catherines Island. Whereas we can document no specific ceremonial activities prior to cal 1000 B.C. on St. Catherines Island, we have found that the concept of "presence" helps us to evaluate the totality of evidence in the attempt to identify the complex beginnings of ritual activity and sacred spaces that characterize the entire aboriginal landscape of St. Catherines Island.

Johns Mound, for instance, is one of the most conspicuous burial mounds on St. Catherines Island, providing the final resting place for more than 70 aboriginal people. The most obvious ritual activities at Johns Mound took place during the St. Catherines period (in cal A.D. 990–1160). But a careful reading of the archaeological evidence shows that human activities at Johns Mound began during the St. Simons period, when several pits were excavated into the premound surface and filled with fiber-tempered ceramics. Similarly, at Cunningham Mound C (a burial mound likely constructed during the Wilmington period), we found another premound pit containing fiber-tempered ceramics and the associated $^{14}$C date (UGA-1686) that indicates that the pit was utilized about cal 1050–1370 B.C. Similar "premound" features dating to the St. Simons were documented during excavations at Cunningham Mound A and McLeod Mound (see chap. 24). While we cannot conclusively demonstrate that any of these early features were mortuary (or even ceremonial) in nature, we think it likely that this immediate landscape had become a sacred space long before the actual burial mound was constructed. In other words, we believe that the concepts of "presence" and "landscape" help us appreciate that the physical space upon which these four burial mounds were erected had a human history dating back to the Late Archaic.

To be sure, numerous natural and/or cultural events can account for the presence of one (or more) potsherds in a given locality. But we will argue that the archaeological presence deserves examination—particularly when an archaeological landscape is generated from samples numbering in the dozens, even hundreds of such presences. Finding a few fiber-tempered potsherds at the bottom of an archaeological site might not—by itself—seem particularly noteworthy; but a pattern comprised of a dozen similar presences may indeed carry some significance beyond that indicated by more conventional examination restricted to major archaeological components. And the sampling strategy employed on St. Catherines Island is all about detecting the overarching patterning in such presences.

# CHAPTER 20. THE TRANSECT SURVEY ON ST. CATHERINES ISLAND

DAVID HURST THOMAS

This chapter records the site-by-site specifics for the 122 archaeological sites encountered in the 20 percent randomized transect survey of St. Catherines Island (fig. 20.1). The bulk of the site descriptions derive from the 1977–1979 site survey; the research design and survey procedures employed in this reconnaissance have already been discussed in chapters 11 and 19. Similarly, several previous chapters have already discussed the macro- and microchronological controls employed here. Additional artifacts recovered from the transect survey are presented in chapter 21, and Elizabeth Reitz discusses the vertebrate faunal remains from the transect survey sites in chapter 22.[1]

When a new site was first encountered, it was assigned a field number in the American Museum of Natural History notes (such as AMNH-385). During the follow-up period, each of these AMNH localities was tested and analyzed. In most cases, we then assigned new Georgia State numbers to actual sites as defined here (e.g., 9Li166). These State of Georgia numbers are commonly isomorphic with the original AMNH designations, but in several cases, we combined two or more field numbers into a single site form. If the subsurface testing proved to be negative, we discarded that AMNH number altogether. In the following site descriptions, we provide both the State of Georgia and AMNH designations.

These site descriptions refer to a number of natural and cultural landmarks, many of which are plotted on the site distribution maps. Whenever possible, we have employed the place names most commonly used today. We consulted DePratter's field notes for those sites falling into the American Museum transect surveys; in these cases, AMNH crews also conducted follow-up test excavations. Elsewhere in this volume, DePratter's survey sites that fell outside the AMNH transects are described in detail and sherd counts are provided (chap. 23).

A few site descriptions were previously recorded by the University of Georgia, under the direction of Joseph R. Caldwell. In most cases, it was possible to locate evidence of Caldwell's test excavations, and we generally attempted to set our own test units adjacent to those previously excavated. When we began working on St. Catherines Island, the Department of Anthropology at the University of Georgia generously agreed to transfer both Caldwell's collections and field notes to the Island, eventually to be analyzed and published in the course of our investigations.[2] We published several aspects of the University of Georgia excavations on St. Catherines Island (especially Thomas and Larsen, 1979; Larsen and Thomas, 1982; Thomas, 1987), and we have integrated Caldwell's work, where relevant, into our own results in this chapter.

Evidence from Caldwell's research has been tabulated in several ways. Table 20.1 summarizes several characteristics of each site located in the Island-wide transect survey: elevation, soil type, geomorphic surface, and temporal assignment. Table 20.2 arrays the same series of sites, but arrayed by transect (in north–south order), with additional characteristics for each site. Table 20.6 (below) presents the raw sherd counts from all the sites and table 20.3 reports the time-diagnostic sherd counts (from which the archaeological components discussed in this chapter derive from these diagnostics). Table 20.4 reviews the distribution of Euro-American ceramics recovered from the Island-wide survey, and table 20.5 summarize the results of the 478 shovel tests conducted in conjunction with the transect survey.

## THE TRANSECT SURVEY SITES

### TRANSECT A-6

The northernmost transect begins at the northern margin of Walburg Creek and St.

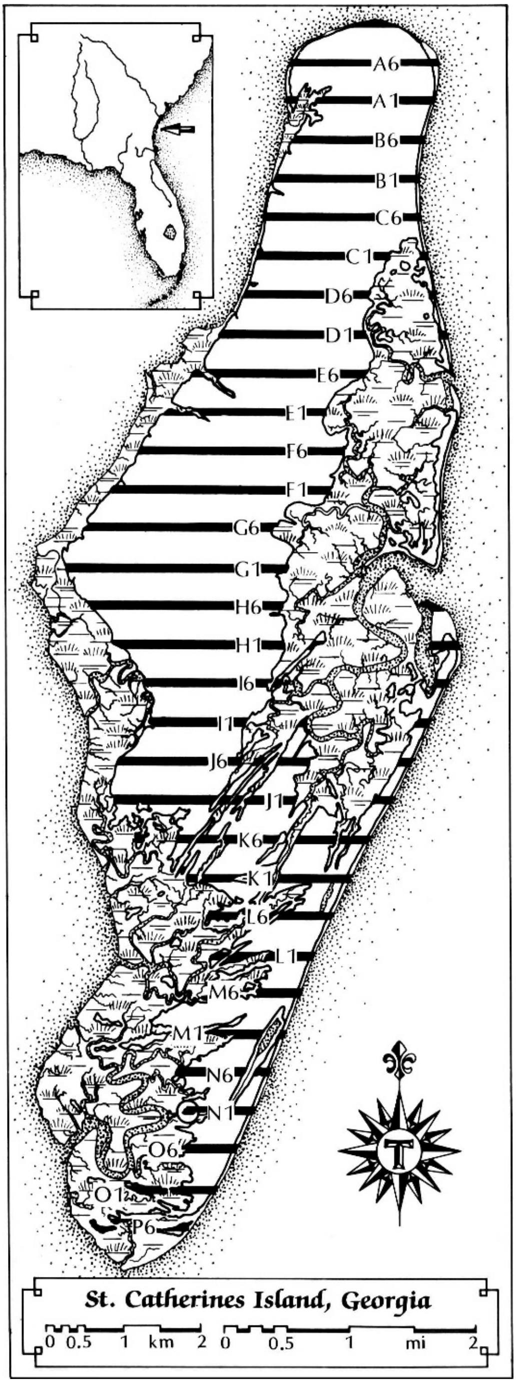


Fig. 20.1. The randomized transect research design employed in the Island-wide survey of St. Catherines Island (after Thomas, 1987: fig. 22).

Catherines Sound, runs eastward across Engineer's Road and the stabilized Holocene dunefield that blankets the northern end of St. Catherines Island, and ends on the extensive sand flats that front the Atlantic Ocean (see fig. 20.2). Vibracore 17 was taken immediately to the north of Transect A-6, along the mean tide line of the modern beach (Linsley, 1993: 16, 18).

We found no archaeological sites in Transect A-6.[3]

### Transect A-1

Transect A-1 begins at the narrow strip of fringing salt marsh, immediately to the north of the tidal creek that supplies Engineer's Point Marsh. A well-developed, low-energy marshland protected behind the dune line, this area has sometimes been called the "Northwestern Marsh" (e.g., Morris and Rollins, 1977: 93; Fierstien and Rollins, 1987: 8). Extensive beds of oysters presently buffer the shoreline from the waves of Walburg Creek. The Bohicket-Capers soils of the wetland tidal salt marsh interfinger into the inland area. A dune ridge about 0.5 m high defines the eastern marsh boundary, adjacent to a highland with ample palmetto and pine trees growing on the Pleistocene core.

Transect A-1 continues eastward across Engineer's Road and the northern dunefield, crossing the rolling dunes of the Fripp-Duckston complex and the shallow depressions and flats between dunes and marshes (fig. 20.3). Many of the inland segments of Transect A-1 are flooded for at least part of the year. The transect ends on the fine white sands that comprise the beach fronting the ocean side of St. Catherines Island, which is slightly to the south of Northeastern Point (Morris and Rollins, 1977: 93).

We recorded only one archaeological site in Transect A-1.

### 9Li166 (AMNH-385; Transect A-1)

This medium-sized site is located along the extreme western end of Transect A-1, near the northern margin of Engineer's

TABLE 20.1
**Archaeological Sites Recorded in the St. Catherines Island Transect Survey**

| Site | Transect | Elevation (m) | Soil type | Major component | Minor component | Confidence | Geomorphic surface |
|---|---|---|---|---|---|---|---|
| 9Li8 | I-6 | 1.5 | Foxworth fine sand | Altamaha | — | A− | Island core (west) |
| 9Li13 | I-6 | 1.5 | Foxworth fine sand | Altamaha | — | A+ | Island core (west) |
| 9Li15 | I-1 | 2.4 | Foxworth fine sand | Refuge-Deptford | — | C+ | Island core (west) |
| 9Li19 | F-6 | 4.9 | Foxworth fine sand | Irene | St. Catherines | A | Island core (east) |
| 9Li22 | B-1 | 6.1 | Foxworth fine sand | St. Catherines | — | C | Island core (east) |
| 9Li49 | L-6 | 1.5 | Fripp-Duckston complex | Refuge | — | C− | Southern Beach Ridge complex |
| 9Li50 | L-6 | 1.5 | Fripp-Duckston complex | — | — | — | Southern Beach Ridge Complex |
| 9Li51 | L-6 | 1.0 | Fripp-Duckston complex | Irene | — | C− | Southern Beach Ridge Complex |
| 9Li52 | L-6 | 1.5 | Fripp-Duckston complex | Irene | — | D | Southern Beach Ridge Complex |
| 9Li55 | L-6 | 1.5 | Fripp-Duckston complex | Irene | — | D | Southern Beach Ridge Complex |
| 9Li56 | L-6 | 1.5 | Fripp-Duckston complex | — | — | — | Southern Beach Ridge Complex |
| 9Li57 | K-1 | 1.5 | Fripp-Duckston complex | Wilmington | — | D | Southern Beach Ridge Complex |
| 9Li59 | K-1 | 1.5 | Fripp-Duckston complex | — | — | — | Southern Beach Ridge Complex |
| 9Li80 | J-1 | 1.5 | Capers silty clay | — | — | — | Southern Beach Ridge Complex |
| 9Li84 | M-1 | 3.1 | Rutledge fine sand | Irene | — | B− | Southern Beach Ridge Complex |
| 9Li87 | N-4 | 2.1 | Rutledge fine sand | Irene | — | B− | Southern Beach Ridge Complex |
| 9Li91 | N-1 | 1.5 | Fripp-Duckston complex | Irene | — | B− | Southern Beach Ridge Complex |
| 9Li97 | M-1 | — | — | — | — | — | Southern Beach Ridge Complex |
| 9Li98 | M-1 | — | — | — | — | — | Southern Beach Ridge Complex |
| 9Li114 | O-1 | 1.5 | Capers silty clay | — | — | — | Southern Beach Ridge Complex |

TABLE 20.1—(*Continued*)

| Site | Transect | Elevation (m) | Soil type | Major component | Minor component | Confidence | Geomorphic surface |
|---|---|---|---|---|---|---|---|
| 9Li116 | O-1 | 1.5 | Capers silty clay | — | — | — | Southern Beach Ridge Complex |
| 9Li117 | O-1 | 1.5 | Capers silty clay | — | — | — | Southern Beach Ridge Complex |
| 9Li118 | O-1 | 1.5 | Fripp-Duckston complex | Irene | — | D | Southern Beach Ridge Complex |
| 9Li123 | O-6 | 1.5 | Capers silty clay | — | — | — | Southern Beach Ridge Complex |
| 9Li124 | O-6 | 1.5 | Fripp-Duckston complex | — | — | — | Southern Beach Ridge Complex |
| 9Li128 | L-6 | 3.1 | Fripp-Duckston complex | Irene | St. Catherines | B− | Southern Beach Ridge Complex |
| 9Li137 | C-6 | 6.1 | Foxworth fine sand | Refuge/St. Simons | St. Catherines | A− | Southern Beach Ridge Complex |
| 9Li159 | I-6 | 1.5 | Foxworth fine sand | Irene | — | D | Island core (east) |
| 9Li160 | I-6 | — | — | — | — | — | — |
| 9Li162 | D-1 | 6.1 | Foxworth fine sand | Wilmington | — | D | Island core (east) |
| 9Li164 | M-1 | 1.5 | Fripp-Duckston complex | Wilmington | — | D | Southern Beach Ridge Complex |
| 9Li165 | M-1 | 1.5 | Fripp-Duckston complex | St. Catherines | — | B− | Southern Beach Ridge Complex |
| 9Li166 | A-1 | 2.13 | Fripp-Duckston complex | Wilmington | Altamaha | D | Island core (west) |
| 9Li167 | I-6 | 1.5 | Mandarin fine sand | Wilmington | — | D | Island core (east) |
| 9Li169 | D-6 | 4.6 | Rutledge fine sand | Irene | — | B− | Island core (east) |
| 9Li170 | C-6 | 3.7 | Mandarin fine sand | Irene | — | B | Island core (west) |
| 9Li171 | C-6 | 6.1 | Echaw/Centenary fine sand | St. Catherines | — | C | Island core (central) |
| 9Li172 | C-6 | 6.1 | Echaw/Centenary fine sand | Deptford | — | D | Island core (central) |
| 9Li173 | B-6 | 6.1 | Foxworth fine sand | Refuge-Deptford | Irene | B+ | Island core (west) |
| 9Li174 | E-6 | 3.4 | Echaw/Centenary fine sand | — | — | — | Island core (west) |
| 9Li175 | E-6 | 3.4 | Echaw/Centenary fine sand | Irene | — | D | Island core (west) |
| 9Li176 | E-6 | 3.1 | Echaw/Centenary fine sand | Irene | Wilmington | C+ | Island core (west) |
| 9Li177 | E-6 | 3.1 | Echaw/Centenary fine sand | Irene | — | D+ | Island core (west) |
| 9Li178 | F-6 | 5.2 | Echaw/Centenary fine sand | St. Catherines/ Wilmington | Refuge-Deptford | C | Island core (central) |
| 9Li179 | F-6 | 3.1 | Echaw/Centenary fine sand | Wilmington | — | B− | Island core (central) |
| 9Li180 | F-6 | 3.1 | Foxworth fine sand | Refuge | — | D | Island core (west) |

TABLE 20.1—(*Continued*)

| Site | Transect | Elevation (m) | Soil type | Major component | Minor component | Confidence | Geomorphic surface |
|---|---|---|---|---|---|---|---|
| 9Li181 | F-6 | 3.1 | Foxworth fine sand | Irene | — | B− | Island core (west) |
| 9Li182 | G-6 | 4.6 | Foxworth fine sand | Irene | — | B− | Island core (east) |
| 9Li183 | G-6 | 2.1 | Echaw/Centenary fine sand | St. Catherines/Irene | — | C | Island core (east) |
| 9Li184 | H-6 | 4.0 | Echaw/Centenary fine sand | Wilmington | — | C− | Island core (central) |
| 9Li185 | H-6 | 3.4 | Echaw/Centenary fine sand | St. Catherines | — | D | Island core (west) |
| 9Li186 | H-6 | 3.4 | Echaw/Centenary fine sand | Irene | Refuge-Deptford | C | Island core (west) |
| 9Li187 | H-6 | 6.1 | Echaw/Centenary fine sand | — | — | — | Island core (central) |
| 9Li188 | H-6 | 6.1 | Echaw/Centenary fine sand | — | — | — | Island core (central) |
| 9Li189 | H-6 | 4.6 | Foxworth fine sand | Irene | — | C+ | Island core (east) |
| 9Li190 | I-6 | 4.6 | Echaw/Centenary fine sand | Irene | — | B+ | Island core (east) |
| 9Li191 | I-6 | 5.2 | Foxworth fine sand | Irene | — | B+ | Island core (east) |
| 9Li192 | I-6 | 6.1 | Foxworth fine sand | Irene | — | B | Island core (east) |
| 9Li193 | I-6 | 6.1 | Foxworth fine sand | Irene | — | D | Island core (central) |
| 9Li194 | J-6 | 3.1 | Foxworth fine sand | Wilmington | Deptford | C | Island core (central) |
| 9Li195 | I-6 | 5.8 | Foxworth fine sand | Altamaha | — | D | Island core (central) |
| 9Li196 | I-6 | 6.1 | Foxworth fine sand | Wilmington | — | C+ | Island core (central) |
| 9Li197 | H-6 | 3.1 | Foxworth fine sand | Irene | — | A− | Island core (west) |
| 9Li198 | H-6 | 3.1 | Foxworth fine sand | Wilmington | | C+ | Island core (west) |
| 9Li199 | F-6 | 1.5 | Foxworth fine sand | St. Catherines/ Wilmington | Irene | B | Island core (east) |
| 9Li200 | H-6 | 3.4 | Foxworth fine sand | St. Catherines/ Wilmington | — | B− | Island core (west) |
| 9Li201 | H-6 | 3.4 | Foxworth fine sand | Wilmington | Irene | C | Island core (west) |
| 9Li202 | J-1 | 2.4 | Echaw/Centenary fine sand | Irene | — | C+ | Island core (west) |
| 9Li203 | J-1 | 2.7 | Echaw/Centenary fine sand | St. Catherines | — | C− | Island core (west) |
| 9Li204 | J-1 | 3.1 | Foxworth fine sand | Irene | — | B− | Island core (east) |
| 9Li205 | J-1 | 3.1 | Fripp-Duckston complex | Irene | St. Catherines | C | Island core (east) |
| 9Li206 | J-1 | 3.1 | Fripp-Duckston complex | Irene | St. Catherines | C− | Island core (east) |
| 9Li207 | I-1 | 3.7 | Foxworth fine sand | Irene | — | A− | Island core (east) |
| 9Li208 | I-1 | 4.0 | Foxworth fine sand | Irene | — | B | Island core (east) |
| 9Li209 | I-1 | 4.0 | Foxworth fine sand | St. Catherines/ Wilmington | — | C | Island core (central) |
| 9Li210 | H-1 | 3.4 | Foxworth fine sand | Altamaha | — | C+ | Island core (west) |
| 9Li211 | K-1 | 1.5 | Fripp-Duckston complex | Irene | — | C | Southern Beach Ridge Complex |

TABLE 20.1—(*Continued*)

| Site | Transect | Elevation (m) | Soil type | Major component | Minor component | Confidence | Geomorphic surface |
|---|---|---|---|---|---|---|---|
| 9Li212 | K-1 | 3.1 | Fripp-Duckston complex | Irene | — | C | Southern Beach Ridge Complex |
| 9Li213 | L-6 | 3.1 | Fripp-Duckston complex | Irene | — | C | Southern Beach Ridge Complex |
| 9Li214 | J-6 | 1.5 | Fripp-Duckston complex | St. Catherines | — | C+ | Southern Beach Ridge Complex |
| 9Li215 | H-1 | 5.2 | Echaw/Centenary fine sand | Wilmington | — | D | Island core (east) |
| 9Li216 | H-1 | 4.0 | Echaw/Centenary fine sand | Irene | — | C | Island core (east) |
| 9Li217 | H-1 | 4.0 | Echaw/Centenary fine sand | Wilmington | — | B− | Island core (east) |
| 9Li218 | H-1 | 5.8 | Echaw/Centenary fine sand | Irene | — | D+ | Island core (east) |
| 9Li219 | H-1 | 6.1 | Echaw/Centenary fine sand | — | — | — | Island core (east) |
| 9Li220 | H-1 | 6.1 | Foxworth fine sand | Wilmington | — | B− | Island core (central) |
| 9Li221 | H-1 | 6.1 | Foxworth fine sand | Wilmington | — | B− | Island core (central) |
| 9Li222 | H-1 | 6.1 | Echaw/Centenary fine sand | Irene | — | D | Island core (central) |
| 9Li223 | H-1 | 6.1 | Echaw/Centenary fine sand | Refuge-Deptford | — | C− | Island core (central) |
| 9Li224 | H-1 | 4.3 | Ellebelle loamy sand | St. Catherines | Wilmington | C+ | Island core (central) |
| 9Li225 | G-1 | 5.7 | Foxworth fine sand | Multicomponent | — | C | Island core (east) |
| 9Li226 | F-1 | 3.7 | Foxworth fine sand | Irene | — | B− | Island core (east) |
| 9Li227 | F-1 | 3.5 | Echaw/Centenary fine sand | Irene | — | B− | Island core (west) |
| 9Li228 | F-1 | 3.1 | Echaw/Centenary fine sand | Refuge-Deptford | — | C | Island core (west) |
| 9Li229 | E-1 | 1.5 | Mandarin fine sand | Irene | — | A | Island core (west) |
| 9Li230 | E-1 | 1.5 | Echaw/Centenary fine sand | St. Catherines | — | D | Island core (west) |
| 9Li231 | E-1 | 1.8 | Foxworth fine sand | St. Simons | — | A | Island core (west) |
| 9Li232 | E-1 | 3.1 | Echaw/Centenary fine sand | Wilmington | — | C | Island core (central) |
| 9Li233 | D-1 | 3.1 | Foxworth fine sand | Wilmington | St. Catherines | C | Island core (west) |
| 9Li234 | D-1 | 3.1 | Foxworth fine sand | Irene | — | C | Island core (west) |
| 9Li235 | C-1 | 6.1 | Foxworth fine sand | Refuge | — | D | Island core (east) |
| 9Li236 | C-1 | 6.1 | Mandarin fine sand | — | — | — | Island core (central) |
| 9Li237 | B-1 | 6.1 | Foxworth fine sand | Wilmington | — | D | Island core (east) |
| 9Li238 | B-1 | 6.1 | Echaw/Centenary fine sand | Refuge-Deptford | Wilmington | C | Island core (east) |
| 9Li239 | B-1 | 6.1 | Echaw/Centenary fine sand | Refuge-Deptford | — | C | Island core (central) |
| 9Li240 | B-1 | 4.9 | Echaw/Centenary fine sand | Wilmington | Irene | C | Island core (central) |
| 9Li241 | B-1 | 3.1 | Mandarin fine sand | Irene | — | B+ | Island core (west) |
| 9Li242 | B-1 | 4.6 | Echaw/Centenary fine sand | Altamaha | Irene | C | Island core (west) |
| 9Li243 | B-1 | 4.6 | Echaw/Centenary fine sand | Irene | — | B− | Island core (west) |
| 9Li244 | E-6 | 3.1 | Echaw/Centenary fine sand | Irene | — | B− | Island core (west) |

TABLE 20.1—(*Continued*)

| Site | Transect | Elevation (m) | Soil type | Major component | Minor component | Confidence | Geomorphic surface |
|---|---|---|---|---|---|---|---|
| 9Li245 | L-6 | 1.5 | Fripp-Duckston complex | Irene | — | C | Southern Beach Ridge Complex |
| 9Li246 | C-6 | 6.1 | Foxworth fine sand | Refuge-Deptford | — | C | Island core (east) |
| 9Li247 | G-6 | 5.5 | Foxworth fine sand | St. Simons | — | C | Island core (east) |
| 9Li248 | G-6 | 6.1 | Echaw/Centenary fine sand | St. Simons | — | D | Island core (central) |
| 9Li249 | G-6 | 4.6 | Rutledge fine sand | Refuge/St. Simons | — | C | Island core (central) |
| 9Li250 | G-6 | 3.1 | Echaw/Centenary fine sand | Wilmington | — | C | Island core (west) |
| 9Li251 | G-6 | 3.1 | Echaw/Centenary fine sand | Irene | — | C+ | Island core (west) |
| 9Li252 | E-6 | 4.3 | Foxworth fine sand | St. Simons | — | C+ | Island core (east) |
| 9Li253 | H-6 | 6.1 | Echaw/Centenary fine sand | Refuge | — | B– | Island core (central) |
| 9Li254 | H-6 | 6.1 | Echaw/Centenary fine sand | — | — | — | Island core (east) |
| 9Li255 | G-1 | 3.1 | Echaw/Centenary fine sand | Irene | — | A | Island core (west) |

Point. The greater part of 9Li166 extends northward of the transect. Vegetation is mostly saw palmetto, and there is considerable shell exposed in the cut-bank.

The sparse ceramic collection from two test pits (0.70 $m^3$) suggests a Wilmington period occupation, with two Altamaha sherds recovered as well. All the available ($n = 4$) *Mercenaria* were analyzed for seasonality; two had been harvested in the winter and two during the summer/fall.

## Transect B-6

Transect B-6 begins along the southern margin of Engineers Point Marsh, crosses Yankee Bridge Road and extends across a series of shallow depressions (Rutledge fine sand) and broad sand (the Mascotte soil group). The transect runs immediately to the north of Gator Pond, across the North Pasture, and ends near the terminus of Sand Pit Road, where it intersects the modern beachline.

We recorded one archaeological site in Transect B-6.

### 9Li173 (AMNH-415 and -416; Transect B-6)

This large site extends completely across the 100-m width of Transect B-6 and extends well to the south. Shell is eroding out of the cut-bank, and extends east–west at least 100 m. An extraordinary concentration of whelks was encountered in the buried deposits of this site. Two alligator vertebrae (from a very small individual) were also recovered at 9Li173 (one of two sites in the Island-wide survey containing alligator remains).

The survey crew initially recorded two sites (AMNH-415 and AMNH-416), which were tested independently. Because a clear-cut break between the two is lacking, the distance separating the concentrations is only 75 m, and both sites contain primarily Deptford ceramics, they were combined into a single site, designated as 9Li173.

A total of $n = 161$ sherds were recovered from the seven test pits (4.20 $m^3$), 140 of which are period diagnostic. The primary

TABLE 20.2
**Additional Characteristics of Archaeological Sites Recorded in the Transect Survey of St. Catherines Island, Sorted by Transects**

| Transect | Site no. | AMNH no. | Elevation (m) | Size[a] | Soil type | Sherds ($m^3$) | Geomorphic association | Distance to nearest marsh margin (m): Western | Eastern | Holocene Beach Ridge |
|---|---|---|---|---|---|---|---|---|---|---|
| A-1 | 9Li166 | 385 | 2.1 | M | Fripp-Duckston complex | 0.70 | Pleistocene core | 10 | — | — |
| B-6 | 9Li173 | 415, 416 | 6.1 | L | Foxworth fine sand | 4.20 | Pleistocene core | 25 | — | — |
| B-1 | 9Li22 | 512, lower 200 | 6.1 | L | Foxworth fine sand | 1.0 | Pleistocene core | — | 25+ | — |
| B-1 | 9Li237 | 511 | 6.1 | S | Foxworth fine sand | 1.5 | Pleistocene core | — | 90+ | — |
| B-1 | 9Li238 | 513 | 6.1 | S | Echaw/Centenary fine sand | 32.3 | Pleistocene core | — | 430+ | — |
| B-1 | 9Li239 | 514 | 6.1 | S | Echaw/Centenary fine sand | 28.5 | Pleistocene core | — | 640+ | — |
| B-1 | 9Li240 | 515 | 4.9 | S | Echaw/Centenary fine sand | 25.0 | Pleistocene core | 740 | — | — |
| B-1 | 9Li241 | 516 | 3.1 | L | Mandarin fine sand | 102.9 | Pleistocene core | 390 | — | — |
| B-1 | 9Li242 | 517 | 4.6 | L | Echaw/Centenary fine sand | 46.2 | Pleistocene core | 130 | — | — |
| B-1 | 9Li243 | 518 | 4.6 | L | Echaw/Centenary fine sand | 54.4 | Pleistocene core | 230 | — | — |
| C-6 | 9Li137 | 207 | 6.1 | M | Foxworth fine sand | 110.0 | Pleistocene core | — | 25+ | — |
| C-6 | 9Li170 | 411 | 3.7 | S | Mandarin fine sand | 116.0 | Pleistocene core | 320 | — | — |
| C-6 | 9Li171 | 413 | 6.1 | M | Echaw/Centenary fine sand | 11.7 | Pleistocene core | — | 640+ | — |
| C-6 | 9Li172 | 414 | 6.1 | S | Echaw/Centenary fine sand | 2.0 | Pleistocene core | — | 575+ | — |
| C-6 | 9Li246 | 521 | 6.1 | S | Foxworth fine sand | 6.8 | Pleistocene core | — | 360+ | — |
| C-1 | 9Li235 | 509 | 6.1 | S | Foxworth fine sand | 6.3 | Pleistocene core | — | 15 | — |
| C-1 | 9Li236 | 510 | 6.1 | S | Mandarin fine sand | 7.5 | Pleistocene core | — | 630 | — |
| D-6 | 9Li169 | 409, 410 | 4.6 | L | Rutledge fine sand | 44.2 | Pleistocene core | — | 40 | — |
| D-1 | 9Li162 | 219 | 6.1 | S | Foxworth fine sand | 6.7 | Pleistocene core | — | 400 | — |
| D-1 | 9Li233 | 506 | 3.1 | S | Foxworth fine sand | 18.0 | Pleistocene core | — | 10 | — |
| D-1 | 9Li234 | 508 | 3.1 | S | Foxworth fine sand | 64.0 | Pleistocene core | 165 | — | — |
| E-6 | 9Li174 | 418 | 3.4 | S | Echaw/Centenary fine sand | 16.0 | Pleistocene core | 390 | — | — |
| E-6 | 9Li175 | 419 | 3.4 | S | Echaw/Centenary fine sand | 24.3 | Pleistocene core | 360 | — | — |
| E-6 | 9Li176 | 420 | 3.1 | L | Echaw/Centenary fine sand | 28.2 | Pleistocene core | 290 | — | — |
| E-6 | 9Li177 | 421 | 3.1 | S | Echaw/Centenary fine sand | 30.0 | Pleistocene core | 210 | — | — |
| E-6 | 9Li244 | 519 | 3.1 | L | Echaw/Centenary fine sand | 70.8 | Pleistocene core | 40 | — | — |
| E-6 | 9Li252 | 527 | 4.3 | M | Foxworth fine sand | 6.3 | Pleistocene core | — | 120 | — |
| E-1 | 9Li229 | 502 | 1.5 | L | Mandarin fine sand | 132.9 | Pleistocene core | 10 | — | — |
| E-1 | 9Li230 | 503 | 1.5 | M | Echaw/Centenary fine sand | 14.0 | Pleistocene core | 10 | — | — |
| E-1 | 9Li231 | 504 | 1.8 | M | Foxworth fine sand | 102.3 | Pleistocene core | 30 | — | — |
| E-1 | 9Li232 | 505 | 3.1 | M | Echaw/Centenary fine sand | 14.2 | Pleistocene core | 310 | — | — |
| F-6 | 9Li19 | 202 | 4.9 | L | Foxworth fine sand | 294.5 | Pleistocene core | — | 120 | — |
| F-6 | 9Li178 | 422 | 5.2 | M | Echaw/Centenary fine sand | 26.0 | Pleistocene core | — | 1090 | — |

TABLE 20.2—(*Continued*)

| | | | | | | | | Distance to nearest marsh margin (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Transect | Site no. | AMNH no. | Elevation (m) | Size[a] | Soil type | Sherds ($m^3$) | Geomorphic association | Western | Eastern | Holocene Beach Ridge |
| F-6 | 9Li179 | 423 | 3.1 | S | Echaw/Centenary fine sand | 27.0 | Pleistocene core | 790 | — | — |
| F-6 | 9Li180 | 424 | 3.1 | S | Foxworth fine sand | 13.8 | Pleistocene core | 25 | — | — |
| F-6 | 9Li181 | 425 | 3.1 | S | Foxworth fine sand | 21.3 | Pleistocene core | 60 | — | — |
| F-6 | 9Li199 | 449 | 1.5 | L | Foxworth fine sand | 95.9 | Pleistocene core | — | 40 | — |
| F-1 | 9Li226 | 498 | 3.7 | L | Foxworth fine sand | 52.8 | Pleistocene core | — | 80 | — |
| F-1 | 9Li227 | 499 | 3.5 | S | Echaw/Centenary fine sand | 105.0 | Pleistocene core | 240 | — | — |
| F-1 | 9Li228 | 500 | 3.1 | L | Echaw/Centenary fine sand | 33.3 | Pleistocene core | 20 | — | — |
| G-6 | 9Li182 | 426 | 4.6 | L | Foxworth fine sand | 40.0 | Pleistocene core | — | 110 | — |
| G-6 | 9Li183 | 427 | 2.1 | S | Echaw/Centenary fine sand | 35.0 | Pleistocene core | — | 15 | — |
| G-6 | 9Li247 | 522 | 5.5 | M | Foxworth fine sand | 5.8 | Pleistocene core | — | 340 | — |
| G-6 | 9Li248 | 523 | 6.1 | S | Echaw/Centenary fine sand | 1.8 | Pleistocene core | — | 590 | — |
| G-6 | 9Li249 | 524 | 4.6 | S | Rutledge fine sand | 4.4 | Pleistocene core | — | 760 | — |
| G-6 | 9Li250 | 525 | 3.1 | S | Echaw/Centenary fine sand | 28.4 | Pleistocene core | 65 | — | — |
| G-6 | 9Li251 | 526 | 3.1 | L | Echaw/Centenary fine sand | 15.7 | Pleistocene core | 110 | — | — |
| G-1 | 9Li225 | 496 | 5.7 | M | Foxworth fine sand | 16.2 | Pleistocene core | 20 | — | — |
| G-1 | 9Li255 | 474, 494, 495 | 3.1 | L | Echaw/Centenary fine sand | 123.5 | Pleistocene core | — | 790 | — |
| H-6 | 9Li184 | 428 | 4.0 | S | Echaw/Centenary fine sand | 24.0 | Pleistocene core | — | 220 | — |
| H-6 | 9Li185 | 429 | 3.4 | S | Echaw/Centenary fine sand | 12.2 | Pleistocene core | 460 | — | — |
| H-6 | 9Li186 | 430 | 3.4 | S | Echaw/Centenary fine sand | 120.0 | Pleistocene core | 430 | — | — |
| H-6 | 9Li187 | 432 | 6.1 | S | Echaw/Centenary fine sand | 4.6 | Pleistocene core | — | 810 | — |
| H-6 | 9Li188 | 433 | 6.1 | S | Echaw/Centenary fine sand | 7.5 | Pleistocene core | — | 770 | — |
| H-6 | 9Li189 | 434 | 4.6 | L | Foxworth fine sand | 12.9 | Pleistocene core | 190 | — | — |
| H-6 | 9Li197 | 445, 446, 448, 450, 451 | 3.1 | L | Foxworth fine sand | 156.9 | Pleistocene core | 20 | — | — |
| H-6 | 9Li198 | 447 | 3.1 | S | Foxworth fine sand | 36.7 | Pleistocene core | 290 | — | — |
| H-6 | 9Li200 | 452 | 3.4 | L | Foxworth fine sand | 23.8 | Pleistocene core | 320 | — | — |
| H-6 | 9Li201 | 453 | 3.4 | S | Foxworth fine sand | 42.0 | Pleistocene core | 310 | — | — |
| H-6 | 9Li253 | 528 | 6.1 | M | Echaw/Centenary fine sand | 248.0 | Pleistocene core | — | 560 | — |
| H-6 | 9Li254 | 529 | 6.1 | S | Echaw/Centenary fine sand | 24.0 | Pleistocene core | — | 240 | — |
| H-1 | 9Li210 | 475 | 3.4 | L | Foxworth fine sand | 109.6 | Pleistocene core | 80 | — | — |
| H-1 | 9Li215 | 484 | 5.2 | S | Echaw/Centenary fine sand | 11.3 | Pleistocene core | — | 280 | — |
| H-1 | 9Li216 | 485 | 4.0 | M | Echaw/Centenary fine sand | 51.8 | Pleistocene core | — | 40 | — |
| H-1 | 9Li217 | 486 | 4.0 | S | Echaw/Centenary fine sand | 76.7 | Pleistocene core | — | 40 | — |
| H-1 | 9Li218 | 487 | 5.8 | M | Echaw/Centenary fine sand | 8.9 | Pleistocene core | — | 420 | — |

TABLE 20.2—(*Continued*)

| Transect | Site no. | AMNH no. | Elevation (m) | Size[a] | Soil type | Sherds ($m^3$) | Geomorphic association | Distance to nearest marsh margin (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Western | Eastern | Holocene Beach Ridge |
| H-1 | 9Li219 | 488 | 6.1 | L | Echaw/Centenary fine sand | — | Pleistocene core | — | 560 | — |
| H-1 | 9Li220 | 489 | 6.1 | L | Foxworth fine sand | 47.9 | Pleistocene core | — | 600 | — |
| H-1 | 9Li221 | 490 | 6.1 | M | Foxworth fine sand | 35.4 | Pleistocene core | — | 840 | — |
| H-1 | 9Li222 | 491 | 6.1 | S | Echaw/Centenary fine sand | 10.0 | Pleistocene core | — | 1040 | — |
| H-1 | 9Li223 | 492 | 6.1 | M | Echaw/Centenary fine sand | 28.8 | Pleistocene core | 810 | — | — |
| H-1 | 9Li224 | 493 | 4.3 | S | Ellebelle loamy sand | 27.1 | Pleistocene core | 580 | — | — |
| I-6 | 9Li8 | 441 | 1.5 | L | Foxworth fine sand | 250.4 | Pleistocene core | 0 | — | — |
| I-6 | 9Li13 | 208 | 1.5 | L | Foxworth fine sand | 1758.2 | Pleistocene core | 20 | — | — |
| I-6 | 9Li159 | 406 | 1.5 | S | Foxworth fine sand | 3.3 | Holocene Beach Ridge | — | — | 10 |
| I-6 | 9Li160 | 407 | 1.5 | S | Foxworth fine sand | — | Holocene Beach Ridge | — | — | 10 |
| I-6 | 9Li167 | 394 | 1.5 | S | Mandarin fine sand | 5.0 | Holocene Beach Ridge | — | — | 10 |
| I-6 | 9Li190 | 436, 437 | 4.6 | L | Echaw/Centenary fine sand | 132.0 | Pleistocene core | — | 140 | — |
| I-6 | 9Li191 | 438 | 5.2 | S | Foxworth fine sand | 20.3 | Pleistocene core | — | 280 | — |
| I-6 | 9Li192 | 439 | 6.1 | M | Foxworth fine sand | 226.3 | Pleistocene core | — | 430 | — |
| I-6 | 9Li193 | 440 | 6.1 | S | Foxworth fine sand | 13.3 | Pleistocene core | — | 560 | — |
| I-6 | 9Li195 | 443 | 5.8 | M | Foxworth fine sand | 40.0 | Pleistocene core | 590 | — | — |
| I-6 | 9Li196 | 444 | 6.1 | L | Foxworth fine sand | 33.3 | Pleistocene core | 720 | — | — |
| I-1 | 9Li15 | 473 | 2.4 | L | Foxworth fine sand | 64.3 | Pleistocene core | 110 | — | — |
| I-1 | 9Li207 | 467 | 3.7 | L | Foxworth fine sand | 220.0 | Pleistocene core | — | 220 | — |
| I-1 | 9Li208 | 470 | 4.0 | L | Foxworth fine sand | 99.4 | Pleistocene core | — | 340 | — |
| I-1 | 9Li209 | 471 | 4.0 | L | Foxworth fine sand | 54.5 | Pleistocene core | 520 | — | — |
| J-6 | 9Li194 | 442 | 3.1 | L | Foxworth fine sand | 44.4 | Pleistocene core | 200 | — | — |
| J-6 | 9Li214 | 483 | 1.5 | L | Fripp-Duckston complex | 88.7 | Holocene Beach Ridge | — | — | 10 |
| J-1 | 9Li80 | 331 | 1.5 | S | Capers silty clay | — | Holocene Beach Ridge | — | — | 2 |
| J-1 | 9Li202 | 460 | 2.4 | L | Echaw/Centenary fine sand | 53.3 | Pleistocene core | 40 | — | — |
| J-1 | 9Li203 | 461 | 2.7 | M | Echaw/Centenary fine sand | 26.7 | Pleistocene core | 60 | — | — |
| J-1 | 9Li204 | 463, 464 | 3.1 | L | Foxworth fine sand | 108.8 | Pleistocene core | 300 | — | — |
| J-1 | 9Li205 | 465 | 3.1 | M | Fripp-Duckston complex | 48.3 | Pleistocene core | 140 | — | — |
| J-1 | 9Li206 | 466 | 3.1 | M | Fripp-Duckston complex | 115.3 | Pleistocene core | 130 | — | — |

TABLE 20.2—(*Continued*)

| Transect | Site no. | AMNH no. | Elevation (m) | Size[a] | Soil type | Sherds ($m^3$) | Geomorphic association | Distance to nearest marsh margin (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Western | Eastern | Holocene Beach Ridge |
| K-1 | 9Li57 | 308 | 1.5 | S | Fripp-Duckston complex | 7.5 | Holocene Beach Ridge | — | — | 10 |
| K-1 | 9Li59 | 310 | 1.5 | S | Fripp-Duckston complex | — | Holocene Beach Ridge | — | — | 20 |
| K-1 | 9Li211 | 476 | 1.5 | M | Fripp-Duckston complex | 55.7 | Holocene Beach Ridge | — | — | 25 |
| K-1 | 9Li212 | 480 | 3.1 | M | Fripp-Duckston complex | 17.5 | Holocene Beach Ridge | — | — | 160 |
| L-6 | 9Li49 | 300 | 1.5 | L | Fripp-Duckston complex | 31.9 | Holocene Beach Ridge | — | — | 5 |
| L-6 | 9Li50 | 301 | 1.5 | S | Fripp-Duckston complex | 54.0 | Holocene Beach Ridge | — | — | 25 |
| L-6 | 9Li51 | 302 | 1.0 | S | Fripp-Duckston complex | 33.6 | Holocene Beach Ridge | — | — | 90 |
| L-6 | 9Li52 | 303 | 1.5 | S | Fripp-Duckston complex | 1.0 | Holocene Beach Ridge | — | — | 5 |
| L-6 | 9Li55 | 306 | 1.5 | M | Fripp-Duckston complex | 14.0 | Holocene Beach Ridge | — | — | 2 |
| L-6 | 9Li56 | 307 | 1.5 | S | Fripp-Duckston complex | — | Holocene Beach Ridge | — | — | 2 |
| L-6 | 9Li128 | 379 | 3.1 | M | Fripp-Duckston complex | 23.3 | Holocene Beach Ridge | — | — | 210 |
| L-6 | 9Li213 | 481 | 3.1 | S | Fripp-Duckston complex | 33.0 | Holocene Beach Ridge | — | — | 75 |
| L-6 | 9Li245 | 520 | 1.5 | S | Fripp-Duckston complex | 17.7 | Holocene Beach Ridge | — | — | 5 |
| M-1 | 9Li84 | 335 | 3.1 | M | Rutledge fine sand | 81.3 | Holocene Beach Ridge | — | — | 400 |
| M-1 | 9Li97 | 348 | — | S | Rutledge fine sand | — | Holocene Beach Ridge | — | — | 20 |
| M-1 | 9Li164 | 349 | 1.5 | S | Fripp-Duckston complex | 5.0 | Holocene Beach Ridge | — | — | 20 |
| M-1 | 9Li165 | 350 | 1.5 | L | Fripp-Duckston complex | 15.6 | Holocene Beach Ridge | — | — | 100 |

TABLE 20.2—(*Continued*)

| Transect | Site no. | AMNH no. | Elevation (m) | Size[a] | Soil type | Sherds ($m^3$) | Geomorphic association | Distance to nearest marsh margin (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Western | Eastern | Holocene Beach Ridge |
| N-6 | 9Li87 | 338 | 2.1 | M | Rutledge fine sand | 18.6 | Holocene Beach Ridge | — | — | 400 |
| N-1 | 9Li91 | 342 | — | L | Fripp-Duckston complex | — | Holocene Beach Ridge | — | — | 40 |
| O-6 | 9Li123 | 374 | 1.5 | S | Capers silty clay | — | Holocene Beach Ridge | — | — | 2 |
| O-6 | 9Li124 | 375 | 1.5 | S | Fripp-Duckston complex | — | Holocene Beach Ridge | — | — | 2 |
| O-1 | 9Li114 | 365 | 1.5 | S | Capers silty clay | — | Holocene Beach Ridge | — | — | 2 |
| O-1 | 9Li116 | 367 | 1.5 | S | Capers silty clay | — | Holocene Beach Ridge | — | — | 2 |
| O-1 | 9Li117 | 368 | 1.5 | S | Capers silty clay | — | Holocene Beach Ridge | — | — | 2 |
| O-1 | 9Li118 | 369 | 1.5 | M | Fripp-Duckston complex | 7.1 | Holocene Beach Ridge | — | — | 2 |

[a] "Site size" is operationally defined as inferred subsurface extent, partitioned as follows: small is $<50\ m^2$, medium is $50–500\ m^2$, and large is $>500\ m^2$.

TABLE 20.3
**Distribution of Temporally Diagnostic Aboriginal Ceramics Recovered in the Island-Wide Transect Survey**

| Site | Transect | Altamaha | Irene | Savannah | St. Catherines | Wilmington | Refuge-Deptford | St. Simons | All diagnostics | Nondiagnostics | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9Li8 | I-6 | 345 | 26 | — | 2 | — | 9 | — | 382 | 920 | 1302 |
| 9Li13 | I-6 | 2926 | 3 | 7 | 10 | 133 | 278 | 17 | 3374 | 1637 | 5011 |
| 9Li15 | I-1 | 1 | 5 | — | — | 2 | 39 | — | 47 | 43 | 90 |
| 9Li19 | F-6 | 1 | 481 | 38 | 296 | 26 | 11 | 6 | 859 | 260 | 1119 |
| 9Li22 | B-1 | — | — | — | 22 | — | 5 | 3 | 30 | 2 | 32 |
| 9Li49 | L-6 | — | — | 2 | — | — | 6 | — | 8 | 49 | 57 |
| 9Li50 | L-6 | — | — | — | — | — | — | — | — | 27 | 27 |
| 9Li51 | L-6 | — | 20 | 5 | — | — | — | — | 25 | 12 | 37 |
| 9Li52 | L-6 | — | 1 | — | — | — | — | — | 1 | — | 1 |
| 9Li55 | L-6 | — | 2 | — | — | — | — | — | 2 | 12 | 14 |
| 9Li57 | K-1 | — | — | — | — | 3 | — | — | 3 | — | 3 |
| 9Li84 | M-1 | 3 | 77 | 10 | — | — | — | — | 90 | 32 | 122 |
| 9Li87 | N-4 | — | 38 | — | — | — | — | — | 38 | 1 | 39 |
| 9Li118 | O-1 | — | 2 | 2 | — | — | — | — | 4 | 6 | 10 |
| 9Li128 | L-6 | 1 | 44 | 3 | 17 | — | — | — | 65 | 5 | 70 |
| 9Li137 | C-6 | — | — | 1 | 72 | 3 | 71 | 147 | 294 | 24 | 318 |
| 9Li159 | I-6 | — | 1 | — | — | — | — | — | 1 | — | 1 |
| 9Li162 | D-1 | — | 1 | — | 1 | 4 | — | — | 6 | 2 | 8 |
| 9Li163 | N-1 | — | 37 | 1 | — | — | — | — | 38 | 83 | 121 |
| 9Li164 | M-1 | — | — | — | — | 2 | — | — | 2 | 1 | 3 |
| 9Li165 | M-1 | — | 1 | — | 25 | — | — | — | 26 | 2 | 28 |
| 9Li166 | A-1 | 2 | — | — | — | 5 | — | — | 7 | 2 | 9 |
| 9Li167 | I-6 | — | — | — | — | 3 | — | — | 3 | 1 | 4 |
| 9Li169 | D-6 | — | — | 67 | — | — | 16 | 2 | 85 | 30 | 115 |
| 9Li170 | C-6 | — | 28 | — | — | 1 | — | — | 29 | 29 | 58 |
| 9Li171 | C-6 | — | — | 12 | 1 | — | 4 | 3 | 20 | 1 | 21 |
| 9Li172 | C-6 | — | — | — | — | — | 1 | — | 1 | — | 1 |
| 9Li173 | B-6 | — | 37 | 1 | — | 3 | 97 | 3 | 141 | 20 | 161 |
| 9Li174 | E-6 | — | — | — | — | — | — | — | — | 16 | 16 |
| 9Li175 | E-6 | — | 3 | — | — | — | — | — | 3 | 14 | 17 |
| 9Li176 | E-6 | — | 50 | — | — | 15 | 4 | — | 69 | 24 | 93 |
| 9Li177 | E-6 | — | 5 | — | 1 | — | — | — | 6 | 6 | 12 |
| 9Li178 | F-6 | — | — | — | 16 | 5 | 9 | — | 30 | 30 | 60 |
| 9Li179 | F-6 | — | — | — | — | 27 | — | — | 27 | — | 27 |
| 9Li180 | F-6 | — | — | — | — | — | 1 | — | 1 | 10 | 11 |
| 9Li181 | F-6 | — | 15 | — | — | — | — | — | 15 | 2 | 17 |

TABLE 20.3—(*Continued*)

| Site | Transect | Altamaha | Irene | Savannah | St. Catherines | Wilmington | Refuge-Deptford | St. Simons | All diagnostics | Nondiagnostics | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9Li182 | G-6 | — | 17 | — | — | — | — | — | 17 | 27 | 44 |
| 9Li183 | G-6 | — | 4 | 1 | 10 | — | — | — | 15 | 13 | 28 |
| 9Li184 | H-6 | — | — | — | — | 4 | 6 | — | 10 | 2 | 12 |
| 9Li185 | H-6 | — | — | — | 6 | 1 | 1 | — | 8 | 3 | 11 |
| 9Li186 | H-6 | 92 | 61 | 4 | 1 | 8 | 10 | — | 176 | 34 | 210 |
| 9Li187 | H-6 | — | — | — | — | — | — | — | — | 3 | 3 |
| 9Li188 | H-6 | — | — | — | — | — | — | — | — | 3 | 3 |
| 9Li189 | H-6 | — | 5 | 13 | — | — | — | — | 18 | 4 | 22 |
| 9Li190 | I-6 | — | 119 | 3 | 1 | — | — | — | 123 | 9 | 132 |
| 9Li191 | I-6 | — | 108 | 1 | — | — | — | — | 109 | 13 | 122 |
| 9Li192 | I-6 | — | 168 | 33 | — | — | — | — | 201 | 12 | 213 |
| 9Li193 | I-6 | — | 1 | — | — | — | — | — | 1 | 3 | 4 |
| 9Li194 | J-6 | — | 2 | 1 | 2 | 32 | 10 | 2 | 49 | 62 | 111 |
| 9Li195 | I-6 | 3 | 1 | — | — | — | — | — | 4 | 30 | 34 |
| 9Li196 | I-6 | — | 1 | — | — | 29 | — | — | 30 | 12 | 42 |
| 9Li197 | H-6 | — | 342 | 3 | — | 6 | 16 | 6 | 373 | 129 | 502 |
| 9Li198 | H-6 | — | — | 2 | 3 | 13 | — | — | 18 | 4 | 22 |
| 9Li199 | F-6 | — | 57 | 19 | 57 | 29 | 33 | 12 | 207 | 71 | 278 |
| 9Li200 | H-6 | — | — | — | 29 | 27 | — | — | 56 | 6 | 62 |
| 9Li201 | H-6 | — | 7 | — | — | 13 | 1 | — | 21 | — | 21 |
| 9Li202 | J-1 | — | 8 | 2 | — | — | — | — | 10 | 22 | 32 |
| 9Li203 | J-1 | — | — | — | 8 | — | — | — | 8 | 8 | 16 |
| 9Li204 | J-1 | — | 51 | 30 | — | 1 | — | — | 82 | 103 | 185 |
| 9Li205 | J-1 | — | 47 | 3 | 14 | — | 1 | — | 65 | 22 | 87 |
| 9Li206 | J-1 | — | 110 | 2 | 24 | — | — | — | 136 | 83 | 219 |
| 9Li207 | I-1 | — | 225 | 34 | 4 | 1 | 2 | — | 266 | 130 | 396 |
| 9Li208 | I-1 | — | 126 | 22 | 1 | 2 | — | — | 151 | 28 | 179 |
| 9Li209 | I-1 | — | 4 | — | 10 | 29 | 6 | — | 49 | 11 | 60 |
| 9Li210 | H-1 | 63 | 4 | 4 | 14 | 9 | 4 | — | 98 | 187 | 285 |
| 9Li211 | K-1 | — | — | 29 | 21 | — | — | — | 50 | 35 | 85 |
| 9Li212 | K-1 | — | 14 | 2 | — | — | — | — | 16 | 5 | 21 |
| 9Li213 | L-6 | — | 30 | 2 | — | — | — | — | 32 | 1 | 33 |
| 9Li214 | J-6 | 4 | 3 | 1 | 62 | — | — | — | 70 | 63 | 133 |
| 9Li215 | H-1 | — | 1 | — | — | 6 | — | — | 7 | 2 | 9 |
| 9Li216 | H-1 | — | 24 | — | 1 | — | 1 | 6 | 32 | 25 | 57 |
| 9Li217 | H-1 | — | — | — | — | 67 | — | — | 67 | — | 67 |
| 9Li218 | H-1 | — | 5 | — | — | — | — | — | 5 | 3 | 8 |

TABLE 20.3—(*Continued*)

| Site | Transect | Altamaha | Irene | Savannah | St. Catherines | Wilmington | Refuge-Deptford | St. Simons | All diagnostics | Nondiagnostics | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9Li220 | H-1 | — | — | — | — | 56 | 7 | — | 63 | 4 | 67 |
| 9Li221 | H-1 | — | — | — | — | 39 | — | — | 39 | — | 39 |
| 9Li222 | H-1 | — | 1 | — | — | — | — | — | 1 | 7 | 8 |
| 9Li223 | H-1 | 1 | — | — | 2 | 2 | 21 | — | 26 | 20 | 46 |
| 9Li224 | H-1 | — | — | — | 3 | 13 | 3 | — | 19 | — | 19 |
| 9Li225 | G-1 | — | 4 | — | — | 7 | 9 | — | 20 | 1 | 21 |
| 9Li226 | F-1 | — | 78 | 1 | — | — | 4 | — | 83 | 12 | 95 |
| 9Li227 | F-1 | — | 14 | 26 | — | — | — | — | 40 | 44 | 84 |
| 9Li228 | F-1 | — | 9 | — | 5 | — | 44 | 1 | 59 | 11 | 70 |
| 9Li229 | E-1 | — | 280 | 22 | 3 | 10 | — | — | 315 | 57 | 372 |
| 9Li230 | E-1 | — | — | 7 | — | — | — | — | 7 | 7 | 14 |
| 9Li231 | E-1 | — | — | — | — | — | — | 266 | 266 | — | 266 |
| 9Li232 | E-1 | — | 1 | — | — | 8 | 1 | 1 | 11 | 16 | 27 |
| 9Li233 | D-1 | — | — | — | 5 | 13 | — | — | 18 | — | 18 |
| 9Li234 | D-1 | — | 17 | 1 | 2 | — | — | — | 20 | 12 | 32 |
| 9Li235 | C-1 | — | — | — | — | — | 4 | — | 4 | 1 | 5 |
| 9Li236 | C-1 | — | — | — | — | — | — | — | — | 3 | 3 |
| 9Li237 | B-1 | — | — | — | — | 2 | — | — | 2 | — | 2 |
| 9Li238 | B-1 | — | — | — | — | 13 | 29 | — | 42 | — | 42 |
| 9Li239 | B-1 | — | 2 | — | — | — | 20 | 4 | 26 | 11 | 37 |
| 9Li240 | B-1 | — | 8 | — | 1 | 13 | — | — | 22 | 8 | 30 |
| 9Li241 | B-1 | — | 112 | 1 | 1 | — | 2 | — | 116 | 59 | 175 |
| 9Li242 | B-1 | 21 | 9 | — | — | — | — | — | 30 | 30 | 60 |
| 9Li243 | B-1 | — | 73 | 1 | — | — | 1 | — | 75 | 12 | 87 |
| 9Li244 | E-6 | — | 77 | 1 | — | 4 | — | — | 82 | 10 | 92 |
| 9Li245 | L-6 | — | 5 | 11 | — | — | — | — | 16 | 7 | 23 |
| 9Li246 | C-6 | — | — | — | — | — | 16 | 1 | 17 | — | 17 |
| 9Li247 | G-6 | — | — | — | — | — | 2 | 30 | 32 | — | 32 |
| 9Li248 | G-6 | — | — | — | — | — | 1 | 8 | 9 | — | 9 |
| 9Li249 | G-6 | — | — | — | — | — | 9 | 7 | 16 | 6 | 22 |
| 9Li250 | G-6 | 2 | — | 5 | — | 47 | 3 | — | 57 | 7 | 64 |
| 9Li251 | G-6 | — | 46 | 31 | — | — | — | 1 | 78 | 57 | 135 |
| 9Li252 | E-6 | — | — | — | — | — | 1 | 12 | 13 | 2 | 15 |
| 9Li253 | H-6 | — | — | — | — | — | 30 | — | 30 | 1 | 31 |
| 9Li254 | H-6 | — | — | — | — | 1 | — | 1 | 2 | 1 | 3 |
| 9Li255 | G-1 | — | 473 | 18 | 2 | — | — | 5 | 498 | 70 | 568 |
| Total | — | 3465 | 3631 | 485 | 755 | 737 | 849 | 544 | 10,466 | 4947 | 15,413 |

TABLE 20.4
**Distribution of Euro-American Ceramics Recovered in the Island-Wide Transect Survey**

| | Archaeological sites | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ceramic types | Fallen Tree 9Li8 | Wamassee Head 9Li13 | Shell Field 2 9Li15 | 9Li91 | 9Li169 | Little Camel Field 1 8Li202 | New Ground 9Li232 | Total |
| Glazed coarse earthenware | 1 | 1 | — | — | — | — | — | 2 |
| Olive jar | — | 227 | — | — | — | — | — | 227 |
| Olive jar, glazed | — | 21 | 2 | — | — | — | — | 23 |
| El Morro | — | 1 | — | 6 | — | — | — | 7 |
| Black lead glazed earthenware | — | 2 | — | — | — | — | — | 2 |
| Staffordshire slipware | — | — | — | — | — | — | 1 | 1 |
| Columbia plain | — | 4 | — | — | — | — | — | 4 |
| Sevilla blue on white | — | 2 | — | — | — | — | — | 2 |
| Fig springs polychrome | — | 2 | — | — | — | — | — | 2 |
| Ichtucknee blue on white | — | 1 | — | — | — | — | — | 1 |
| Aucilla polychrome | — | 1 | — | — | — | — | — | 1 |
| Puebla polychrome | 1 | — | — | — | — | — | — | 1 |
| White majolica, misc. | 1 | 3 | — | — | — | — | — | 4 |
| Refined earthenware, misc. | — | — | — | — | — | — | — | — |
| Pearlware, blue painted | — | — | — | — | — | 1 | — | 1 |
| Pearlware, banded | — | — | — | — | — | — | 6 | 6 |
| Annualar | — | — | — | 1 | — | — | — | 1 |
| Plain ironstone | — | — | — | — | 1 | — | 1 | 2 |
| Total | 3 | 265 | 2 | 7 | 1 | 1 | 8 | 287 |

component (accounting for 68% of the diagnostic sherds) dates to the Refuge-Deptford periods. A secondary component dates to the Irene period (accounting for 26% of the total diagnostic sherds), with the complete absence of Altamaha series and Irene Incised ceramics. Sherds from St. Simons, Wilmington, and Savannah types were also present.

Two radiocarbon dates are available from the Refuge-Deptford period component at 9Li173, and both are completely consistent with the associated ceramic samples.

Test Pit II (60–70 cm):

(Beta-21406, *Mercenaria*): 2850 ± 80 B.P. cal 1020 B.C.–560 B.C.

The following sherds were recovered from Test Pit II at 9Li173: 0–10 cm, Deptford Check Stamped (5), Deptford Cord Marked (3); 10–20 cm, none; 20–30 cm, Deptford Check Stamped (2), St. Simons Plain (1), Refuge, misc. (15); below 30 cm, none. Because the *Mercenaria* sample Beta-21406 was recovered in aceramic deposits below a stratigraphic sample of Refuge-Deptford period ceramics, we believe that Beta-21406 adequately estimates the age the early Refuge period (see table 12.2).

Test Pit V (30–40 cm):

(Beta-21407, *Mercenaria*): 2010 ± 70 B.P. cal A.D. 50–410

The following sherds were recovered from Test Pit V at 9Li173: Test Pit V, 0–10 cm, Irene Complicated Stamped (7), Savannah Burnished Plain (1); 10–20 cm, Irene Complicated Stamped (18), clay tempered cord-marked (2); 20–30 cm, Irene Complicated Stamped (3), Deptford Check Stamped (2), clay tempered, plain (5), sand tempered with grit inclusions (2); 30–40 cm, Deptford Check Stamped (8), Deptford Cord Marked (2), Refuge Plain (5). These ceramic associations indicate that Beta-21407 adequately estimates the Deptford period at 9Li173 (see table 12.2).[4]

We also encountered an extraordinarily dense concentration ($n = 36$) of whelk shells

(*Busycon carica*) from 9Li173, roughly one-fifth of which had been modified into tools (see chap. 21).

Because two components were evident at 9Li173, we attempted to subdivide the zooarchaeological specimens for potential seasonal analysis. Test Pits I, II, III, and IV contain almost exclusively Deptford and Refuge ceramics, and we analyzed the sample of 24 available *Mercenaria* from these units (insufficient clam shells were recovered in the other units, so seasonal analysis was not conducted for the Irene period component at 9Li173). Seasonal analysis of the Refuge-Deptford contexts revealed that many of the clams (17 of 24) were harvested in the winter, and five were collected during the early spring. The $T_1$ and $T_{2-3}$ growth increments were also represented by single valves. Sea catfish were also procured sometime between April and October.

## Transect B-1

Transect B-1 begins along Walburg Creek and runs across the moderately well-drained Echaw and Centenary fine sands of Little Sam Field. At roughly the intersection of Yankee Bridge Road, the soils shift to the poorly drained Mandarin fine sands that prevail eastward to the North Pasture (dominated by the Echaw/Centenary series soils). Marys Mound (9Li20) is located about 200 m to the south of this transect (see chap. 24). Crossing Yankee Bridge Road once again, Transect B-1 crosses the broad ridges and small knolls characteristic of Foxworth fine sands. The transect ends at the high bluff (commonly known as the Picnic Area). When this survey was conducted (in the late 1970s), this area overlooked a modern expanse of active beachfront; at this writing, that high bank has been heavily eroded and a broad band of new vegetation obscures the Atlantic Ocean. Exposed on the beachline is the northernmost relict marsh evident on North Beach (Morris and Rollins, 1977; see also chap. 3).

We recorded and tested eight archaeological sites in Transect B-1.

### Little Sam Field (9Li242; AMNH-517; Transect B-1)

This large shell midden, 20 m west of Yankee Bridge Road, is located in Little Sam Field, which is presently dominated by pine forest. The archaeological deposits have been disturbed by deep plowing that has penetrated to the basal, underlying sand rock in places.

Half of the 60 sherds recovered from the four test pits (1.30 $m^3$) are time diagnostic. Seventy percent of these date to the Altamaha period; the rest seem to document an earlier, Irene period occupation.

Most of the recovered vertebrate faunal remains derive from the Irene period levels (see chap. 22), but the available sample of 13 *Mercenaria* come almost entirely from the Altamaha period deposits. Four (of six) hard clams were harvested during the winter (the other two having been collected in the early springtime).

### 9Li243 (AMNH-518; Transect B-1)

This large site, largely lacking in surface shell, covers a 200 $m^2$ area. 9Li243 lies about 120 m east of Yankee Bridge Road in a grassland setting, with some pine present.

The five test pits (1.60 $m^3$) produced 87 sherds. Out of these, 74 sherds are diagnostic, and they virtually all date to the Irene period. Single sherds of Refuge-Deptford and Savannah ceramics were also recovered at 9Li243.

Although the recovered 24 *Mercenaria* were often edge damaged, the seasonality study indicates that 16 had been harvested in the winter (the other two in the early springtime).

### North Beach (9Li237; AMNH-511; Transect B-1)

This small concentration of subsurface shell is located near the North Beach Picnic area, south of the road to North Beach. It is approximately 100 m west of the beach bluff.

Only two sherds, both Wilmington Cord Marked, were recovered from the four test pits (1.30 $m^3$). The available 25 *Mercenaria* included many senile and edge-modified clams (and we have assigned an overall confidence level of only "B" to this analysis). Those valves with discernible patterns had been collected mostly during the winter (9 of 12), with the early spring and summer/fall increments also evident.

### Yankee Bridge (9Li241; AMNH-516; Transect B-1)

Although this large site lacks surface shell, it contains a significant buried midden that extends at least 100 $m^2$. 9Li241 lies 150 m west of site 9Li240 and 120 m east of Yankee Bridge Road, just north of the inlet.

Of the 175 sherds recovered from the four test pits (1.70 $m^3$), 115 diagnostic sherds date almost entirely from the Irene period, with occasional Refuge-Deptford, St. Catherines, and Savannah sherds present as well.

A random sample of 25 *Mercenaria* demonstrated that all but two had been harvested during the winter (the other two showing an early springtime increment). The presence of sea catfish remains also suggests site occupation sometime between April and October.

### 9Li240 (AMNH-515; Transect B-1)

This site consists of a small, disturbed surface scatter of shell and a buried midden about 7 m in diameter. It is located about 150 m east of 9Li243 and 500 m east of Yankee Bridge Road, in a forest dominated by pine, but also containing scattered oak trees with an understory of saw palmetto.

Only 22 diagnostic sherds were recovered from the three test pits (1.20 $m^3$); of these, more than half date to the Wilmington period. A secondary Irene component occurs here and an isolated St. Catherines sherd was also recovered.

Although the recovered vertebrate faunal remains are assigned to the Irene period levels (see chap. 22), we deliberately restricted the seasonal analysis to the Wilmington period, analyzing only clams recovered from Test Pits II and III. We found that 15 (of the available 16) *Mercenaria* were harvested during the winter.

### North Pasture 2 (9Li239; AMNH-514; Transect B-1)

Located in North Pasture, 9Li239 contains a buried midden deposit about 20 m in diameter. It is about 100 m west of 9Li238 and 350 m west of North Pasture Road.

The ceramic assemblage from the four test pits (1.30 $m^3$) consists of 37 sherds, 26 of which are time diagnostic. The Refuge-Deptford period account for 77 percent of these diagnostics, with a smattering of St. Simons and Irene period diagnostics also present.

Although the recovered vertebrate faunal remains are assigned to the Irene period, the seasonal analysis of *Mercenaria* is restricted to Test Pit I, which was dominated by Refuge-Deptford period ceramics. All of the *Mercenaria* studied had been harvested during the winter.

### North Pasture 1 (9Li238; AMNH-513; Transect B-1)

This small site contains both surface and buried shell deposits and is located within North Pasture, about 150 m north of Marys Mound (see chap. 24). Of the 42 diagnostic sherds recovered from the four test pits (1.30 $m^3$), 69 percent date to the Refuge-Deptford period; the presence of a few Deptford Complicated Stamped sherds might suggest a Deptford II occupation. A minor Wilmington period component (31%) is also indicated.

Four radiocarbon dates are available from 9Li238.

Test Pit I (10–20 cm):

(Beta-217241, *Mercenaria*): 1450 ± 40 B.P.
cal A.D. 690–920

Test Pit I (20–30 cm):

(Beta-217242, *Mercenaria*): 1510 ± 70 B.P.
cal A.D. 610–920

The following sherds were recovered from Test Pit I at 9Li238: 0–10 cm, none; 10–20 cm, Deptford Check Stamped (5); 20–30 cm, Deptford Check Stamped (17).

Test Pit II (10–20 cm):

(Beta-217239, *Mercenaria*): 1470 ± 70 B.P. cal A.D. 660–970

Test Pit II (20–30 cm):

(Beta-217240, *Mercenaria*): 1610 ± 60 B.P. cal A.D. 510–790

The following sherds were recovered from Test Pit II at 9Li238: 0–10 cm, none; 10–20 cm, Deptford, misc. (2), Deptford Complicated Stamped (3), Deptford, tetrapod (1), Wilmington Plain (6); 20–30 cm, Wilmington Plain (3); 30–40 cm, Wilmington Plain (1).

These results are curious: Whereas the four radiocarbon dates clearly indicate a Wilmington age, three of the four *Mercenaria* we selected for dating were contextually associated mostly with earlier, Deptford-era ceramics. This phenomenon—earlier sherds associated with later shell middens—happens several times on St. Catherines Island, particularly when the ceramics date to the Deptford period and earlier (see chap. 16). In chapter 30, we will discuss our hypothesis to explain this seemingly anomalous situation.

All available *Mercenaria* were analyzed, and the analysis demonstrates that all seven were harvested during the winter.

### Sea Breeze (9Li22; AMNH-512 or Lower 200; Transect B-1)

During his 1959 reconnaissance of St. Catherines Island, Lewis Larson visited the North Beach area, probably near the eastern extent of Transect B-1. While in this area, he noted "a ten-in-thick layer of shell midden, buried beneath an 18-in. accumulation of windblown sand, exposed in the vertical face of an eroding dune" (Larson, 1980c: 12).

John Griffin, who inspected this same area 6 years later, described "a site on the eroding bluff facing the ocean on the northern end of the Island. Looking up one can see a thin shell midden near the surface and occasional shell-filled pits extending downward from it. Sherds which have tumbled down the slope include numerous examples of the type Savannah Fine Cordmarked, although some Deptford and Wilmington sherds appear as well. This is an interesting site from the prehistoric period of the Indian occupation of the island, but portions of it are constantly being lost as the bluff erodes" (Griffin, 1965b: 9).

Joseph Caldwell and his students from the University of Georgia recorded this area as the "Sea Breeze" site. Although Caldwell made surface collections here, we are uncertain of their precise provenience and have therefore not included those sherds in the present analysis.

During the Island-wide survey, we recorded site 9Li22 at the extreme eastern margin of Transect B-1, eroding out of the high bluff at North Beach; this is undoubtedly the remnant of the site(s) observed previously by Larson, Griffin, and Caldwell. When encountered in the late 1970s, this medium-sized site consisted mainly of a 5-cm-thick shell lens buried 30–40 cm below the present dune surface. Over the years, we observed the severe erosion affecting the northern bluff and our crews excavated several test pits in this site before it sloughed off into the ocean. Because only three test pits fell into the boundaries of Transect B-1, only materials from that unit are included in this analysis.

The three sample test pits (1.0 $m^3$) yielded 32 sherds, 30 of which are period diagnostic. Seventy-three percent (22 of 30) of the diagnostic sherds date to the St. Catherines period; a few sherds are also present from the St. Simons/Deptford periods.

Only three *Mercenaria* from 9Li22 were available for seasonal analysis, and each one was harvested during the winter. The presence of deciduous lower third premolars suggests that juvenile deer were hunted in late summer or early spring.

### Transect C-6

Transect C-6 runs across the southern part of Sam Field, crosses North Beach Road, skirts North Pasture (about 200 m south of Marys Mound), and ends at the shoreline of the intertidal zone on the middle stretch of North Beach. The steep sand bluff that ranges from 6 to nearly 8 m in elevation has been undergoing severe erosion over the past few decades, which is causing extensive slumping onto the beach (Morris and Rollins, 1977: 92; see also chap. 3, this volume).

Running along the western margins of St. Catherines Island (extending from Transect C-6 southward to Transect G-1) is a band of moderately well-drained soils (mostly Foxworth fine sands). The presence of several antebellum fields (Rock Field, Meeting House Field, Long Field, and Jesamin Finger) attest to the somewhat increased agricultural potential of this area.

A similar swath of Foxworth soils runs along the eastern margin of the island core, fronting Seaside and McQueens inlets. A string of antebellum fields (Seaside, King New Ground, Dick New Ground, Davy and Nigger Fields) were constructed along this zone of relatively higher agricultural potential.

Intermittent pockets of very poorly drained Rutledge soils occur throughout both the western and eastern bands of higher agricultural potential; these ponded and flooded areas were generally avoided in antebellum agricultural practices. Vibracore Transect A–A′ is located near the eastern end of archaeological Transect C-6, extending across the relict marsh exposed on the intertidal wash zone of the modern beach (Linsley, 1993; see also chap. 3).

Somewhere near the western end of Transect C-6, John Griffin (1965a) encountered and described an "enigmatic" feature:

> [L]ocated a little over a half mile north of the "Big House" [is one of two] enigmatic features which we will here call "tabby blocks".[5] These two features are similar in appearance and are located at comparable spots at the mouth of 'draws' or 'cuts' which extend inland at roughly right angles to the shore.
>
> The "blocks" are rather formless masses of lime and oyster shell. They do not closely resemble tabby floors, being too thick. Nor do they appear to be collapsed walls, since once again they are too thick. Also, they do not show the impressions of forming boards. I hesitate to say what they are, but advance the suggestion that they may be spots in which oyster shell, removed from aboriginal middens, was burned to make lime for tabby construction which was commonly used n the island in the plantation period. This is, however, only a hypothesis.

We have inspected this shell feature several times (and another similar feature immediately south of Transect G-1) and believe that they are aboriginal dams rather than tabby features. Each is made of badly decomposed oyster shell, which appears dissolved by saltwater (rather than burned, as in the case of tabby). So positioned, they would have created a freshwater reservoir, available for use by those living at the nearby habitation sites (see chap. 5 for further discussion of hydrology during the aboriginal period).

We recorded five additional archaeological sites in Transect C-6.

### 9Li170 (AMNH-411; Transect C-6)

This small but very dense deposit of decomposing oyster shell is located approximately 130 m east of Yankee Bridge road. It consists of a slight shell mound, roughly 10 cm high and about 5 m in diameter. 9Li170 is located inside Little Sams Field, an antebellum clearing now overgrown with pine and saw palmetto.

The ceramic evidence from two test units (0.50 $m^3$) consists of 58 sherds (only 29 of which were period diagnostic). Ninety-seven percent of these date to the Irene period. Some charcoal was recovered from Test Pit I during the excavations in the late 1970s. In April 1987, we returned to 9Li170 to clear the northern sidewall of Test Pit I and take three additional charcoal, oyster, and clam shell samples (each recovered about 20 cm below ground surface).

We processed four $^{14}C$ determinations on samples from Test Pit I.

Test Pit I (10–20 cm):

(Beta-20805, *Crassostrea*): 530 ± 70 B.P. cal A.D. 1480–1820

Test Pit I (10–20 cm):

(Beta-20810, charcoal): 330 ± 60 B.P. cal A.D. 1450–1660

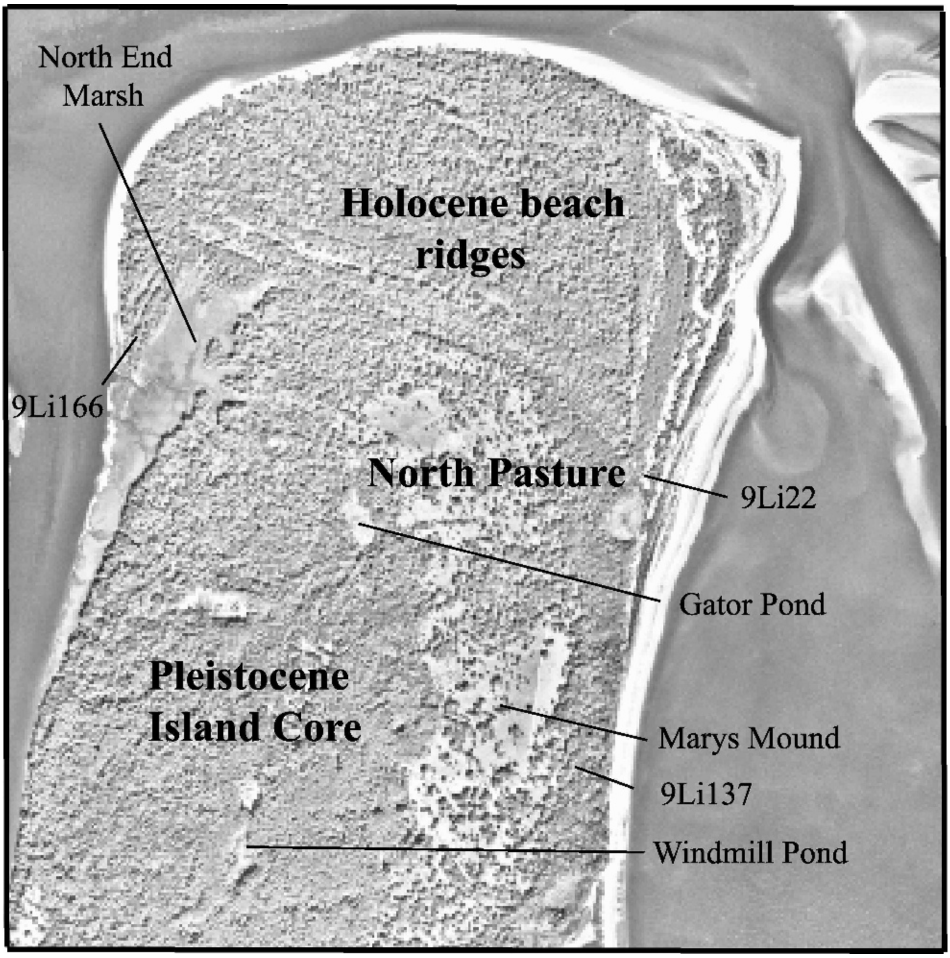


Fig. 20.2. Aerial photograph of the extreme northern end of St. Catherines Island, with key localities highlighted.

Test Pit I (10–20 cm):

(Beta-21396, *Mercenaria*): 740 ± 70 B.P. cal A.D. 1330–1620

Test Pit I (20–30 cm):

(Beta-21395, *Mercenaria*): 580 ± 60 B.P. cal A.D. 1470–1700

These samples are significantly different at the 0.95 percent level ($t = 19.56$; chi-square $= 7.81$).

The following sherds were recovered from Test Pit I at 9Li170: 0–10 cm, Irene, misc. (2); 10–20 cm, Irene Complicated Stamped (9), Irene, misc. (12), Altamaha, stamped (1), clay tempered (1); 20–30 cm, Altamaha, stamped (1); 20–30 cm, Deptford Check Stamped (17). All four radiocarbon determinations date to the Irene period, and the ceramic associations from Test Pit I are consistent with this finding (see chap. 15).[6]

Analysis of 25 randomly selected *Mercenaria* showed that 10 were harvested during the summer/fall, and six each harvested during the winter and early springtime.

### North Pasture 3 (9Li171; AMNH-413; Transect C-6)

This site occurs in North Pasture, about 15 m south of North Beach road; the present vegetation is mostly long-leaf pine. Surface and buried shell are scattered about, but since the field was recently plowed, it

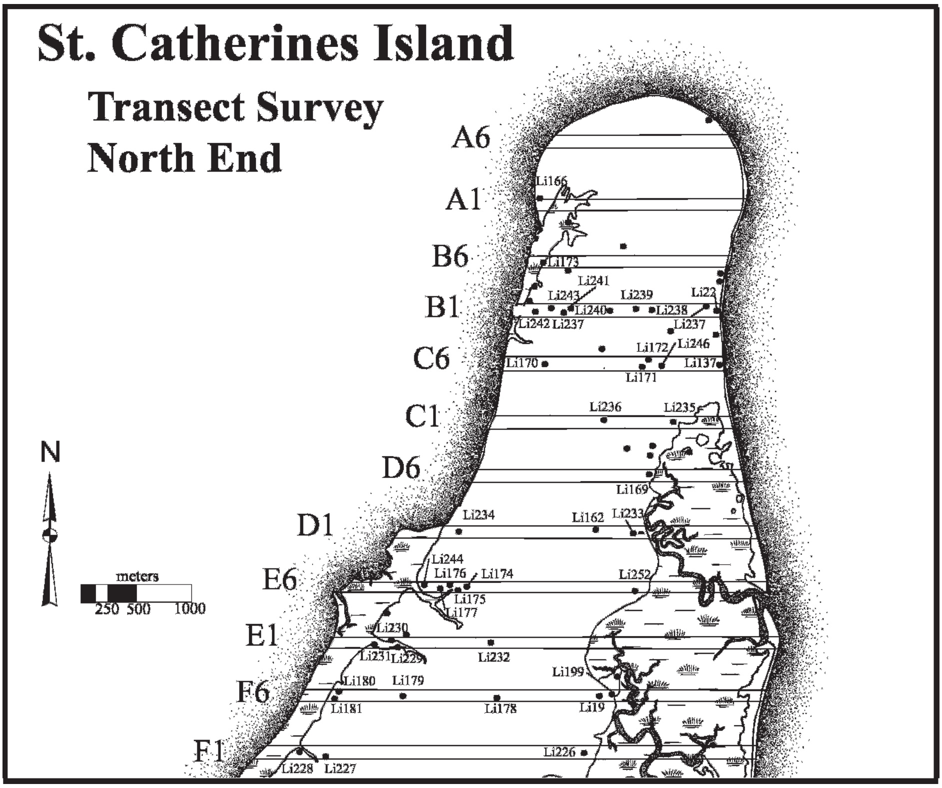


Fig. 20.3. Distribution of archaeological sites located on the northern end of the Island-wide transect survey of St. Catherines Island.

is likely that the shell was disturbed. Buried shell deposits are also evident as very slight rises in the topography.

The ceramic evidence from the seven test pits (1.8 $m^3$) at 9Li171 consists of only eight diagnostic sherds, all of which belong to the St. Simons/Refuge-Deptford periods. Numerous Savannah sherds were also found.

During our initial excavations in late 1970s, we encountered a dense charcoal concentration in Test Pit II, but worried that the charcoal came from a burned root. In April of 1987, we returned to the North Pasture 3 site and verified that the earlier sample was indeed derived from a large, intrusive root that had subsequently burned. To obtain an uncontaminated sample from this Savannah-age midden, we moved to Test Pit IV, clearing the southern face and taking samples from three oyster shells and one clam shell for possible $^{14}C$ dating.

Two radiocarbon dates are available from 9Li171:

Test Pit IV (10–20 cm):

(Beta-20809, *Crassostrea*): 1090 ± 70 B.P.
cal A.D. 1040–1300

The following sherds were recovered from Test Pit IV at 9Li171: Test Pit IV, 0–10 cm, none; 10–20 cm, Savannah Fine Cord Marked (7), St. Catherines Fine Cord Marked (1); 20–30 cm, Savannah Fine Cord Marked, with grit (1). All but one of the associated sherds belong to the Savannah ceramic series, but Beta-20809 is a rather early for the northern Georgia coastal chronology (DePratter, 1979a, 1991). Perhaps this sample is associated instead with the lone St. Catherines Fine Cord Marked sherd, and hence dates to the earlier St. Catherines period; see the discussion of this issue in chapter 15.

Test Pit II (20–30 cm):

(Beta-218094, charcoal): 130 ± 40 B.P. cal A.D. 1670–1950

The following sherds were recovered from Test Pit II at 9Li171: Test Pit II, 0–10 cm, Refuge Incised, possible (2); 10–20 cm, none; 20–30 cm, grit tempered, perhaps early (1); 30–40 cm, none; 40–50 cm, St. Simons (3). This charcoal date likely reflects root disturbance.

All available *Mercenaria* were analyzed. Two were harvested during the winter and one during the early springtime. The presence of unfused deer actebular fragments may indicate late summer/early fall harvesting.

### North Pasture 4 (9Li172; AMNH-414; Transect C-6)

This small site is located on the western margin of the north pasture, about 90 m north of 9Li171. The area once hosted a dense stand of long-leaf pine, which was cleared for pastureland in the 1930s. Presently, the area has a savanna-like appearance, with a number of stately longleaf pines punctuating the otherwise flat grassy area. The area was formerly kept open by almost continuous grazing. But since the cattle were removed, numerous long-left pine seedlings have sprouted across the entire pasture area. This area would reseed itself unless kept open by forestry management (mostly mowing and/or burning).

Little surface or subsurface shell was located during the survey, and probing indicates that the radius of buried shell concentration is 5 m. Only a single Deptford Check Stamped sherd was recovered in the two test pits (0.50 $m^3$). The terminal growth increments on analyzed *Mercenaria* ($n = 14$) represented all growth stages except $T_1$ (late springtime).

### 9Li246 (AMNH-521; Transect C-6)

This small site is located just east of the intersection of North Beach Road and Lovers Lane, immediately south of North Beach Road. No surface evidence was detected, likely because this part of North Pasture has been considerably disturbed in the mid-20th century. We did not detect 9Li246 during the transect survey, but it was found during the systematic shovel testing of Transect C-6.

The ceramic evidence from the three test pits (2.50 $m^3$) consists of 17 diagnostic sherds, 94 percent of which date from the Refuge-Deptford period. Shell was completely absent from the test pits.

### 9Li137 (AMNH-207; Transect C-6)

Located on the extreme eastern edge of Transect C-6, this bluff-top site was eroding into the Atlantic Ocean when discovered. North Beach Road runs through the middle of the sparse shell scatter (fig. 20.4). There is little shell of any kind present in this site, and a number of the sherds were recovered in what appeared to be sterile sand.

The ceramic evidence from five test pits (2.90 $m^3$) consists of a sample of 318 sherds, with 293 of them period diagnostic. Of these, 73 percent date to the St. Simons and Refuge periods and 25 percent date to the St. Catherines period. All available *Mercenaria* ($n = 24$) were analyzed for seasonality, and most of these (19 of 23) were harvested during the winter months; the other four were collected in the summer/fall. We attribute these seasonal data to the St. Simons component.

Three radiocarbon dates are available from 9Li137:

Test Pit II (30–40 cm):

(Beta-217217, *Mercenaria*): 3930 ± 80 B.P. cal 2400 B.C.–1920 B.C.

The following sherds were recovered from Test Pit II at 9Li137: 0–10 cm, St. Catherines, misc. (2); 10–20 cm, St. Catherines, misc. (1); 20–30 cm, St. Catherines or Wilmington (2), St. Simons (1); 30–40 cm, sand + fiber tempered (2); 40–50 cm, Refuge Plain (5), St. Simons Plain (21); 50–60 cm, St. Simons Plain (7); 60–70 cm, St. Simons Plain (1).

Test Pit IV (30–40 cm):

(Beta-217219, *Mercenaria*): 3410 ± 80 B.P. cal 1690 B.C.–1520 B.C.

Test Pit IV (30–40 cm):

(Beta-217218, *Mercenaria*): 3380 ± 40 B.P. cal 1590 B.C.–1340 B.C.

These two dates are statistically identical (at the 0.95 level, $t = 0.096$, chi-square = 5.99) with a mean two-sigma age of cal 1600 B.C.–1350 B.C.

The following sherds were recovered from Test Pit IV at 9Li137: 0–10 cm, none; 10–20 cm, St. Catherines/Wilmington Cord Marked (1); 20–30 cm, St. Simons Plain (2), Refuge Plain (2); 30–40 cm, Refuge Plain (16), St. Simons Plain (8); 40–50 cm, Refuge Plain (3), St. Simons Plain (5); 60–70 cm, St. Simons Plain (1). Beta-217218 is clearly associated with fiber-tempered ceramics, and the resulting date appears to derive from middle of the St. Simons period on St. Catherines Island.

## Transect C-1

Transect C-1 begins immediately to the north of the main compound on St. Catherines Island, crosses the "Y" that splits North Beach from Yankee Bridge roads, runs south of Windmill Pond, then traverses the broad expanse of island core characterized by poorly drained Mandarin soils that dominate the central portion of the island. At about East Road, the substrate shifts to the moderately well-drained Foxworth fine sands. Transect C-1 extends across the broad salt marsh at the extreme northern end of Seaside Inlet. At the far eastern end, our survey crew crossed the modern overwash fans and marsh sediments that border the modern beach front. Vibracore Transect B-B′ was situated immediately to the south of archaeological Transect C-1 (Linsley, 1993: 60; see fig. 3.4, this volume).

We recorded two archaeological sites in Transect C-1.

### 9Li236 (AMNH-510; Transect C-1)

In this small site (approximately 20 m north–south × 10 m east–west), there is a slight mound visible. It is 300 m east of East Road and just west of North Pasture, in an area presently covered by pine trees.

Although no typable ceramics were recovered in the two test pits (0.40 $m^3$), all three sherds found are grit tempered, suggesting a late prehistoric or protohistoric occupation. The five available *Mercenaria* specimens from 9Li236 were harvested in all seasons except the late spring.

### 9Li235 (AMNH-509; Transect C-1)

This small site has limited surface scatter, with a greater quantity of buried materials. It is located 50 m west of the marsh, in a mixed oak and pine forest.

The ceramic evidence from three test pits (0.80 $m^3$) consists of four diagnostic sherds, all of which date to the Refuge period. Analysis of the available *Mercenaria* shows that 12 (of 20 analyzed specimens) were harvested during the winter, the rest in the early springtime.

Two radiocarbon dates are available from Test Pit II:

Test Pit II (10–20 cm):

(Beta-217237, *Mercenaria*): 1170 ± 40 B.P.
cal A.D. 1010–1220

Test Pit II (20-30 cm):

(Beta-217238, *Mercenaria*): 1220 ± 40 B.P.
cal A.D. 940–1180

The following sherds were recovered from Test Pit II at 9Li235: 0–10 cm, none; 10–20 cm, Refuge Plain (1); 20–30 cm, Refuge Simple Stamped (1).

These two dates are statistically the same (at the 0.95 level, $t = 0.549$, chi square = 3.84), with a pooled two-sigma age of cal A.D. 990–1190. This is a mid-St. Catherines period age estimate, which does not agree with the Refuge period ceramic assemblage; no clay-tempered sherds of any kind were recovered at this site, and none of the potsherds had been utilized as hones. In this case, the ceramic assemblage is a poor predictor of $^{14}C$ dates at 9Li235. Evidently, the midden matrix of Test Pit II accumulated several centuries after the Refuge-age occupation (for the implications of this pattern, see the discussion in chaps. 16 and 30).

## Transect D-6

Transect D-6 begins near the main dock and modern boathouse, then extends eastward across the vast, poorly drained soils of the island core. The survey team crossed Seaside Road and ended near Black Hammock (an erosional remnant from the Pleistocene Island core). Vibracore Transect B-B′ lies at the extreme end of archaeological Transect D-6, extends from the beach westward to the overwash fan, and crosses the northern extreme of the large salt marsh complex that forms the eastern central part of the island. At Seaside, the transect turns northward to a low elevation hammock, then extends to within 30 m of the island core (cores 5–8; Linsley 1993; see also chap. 3).

One archaeological site was recorded in Transect D-6.

### 9Li169 (AMNH-409 and -410; Transect D-6)

This large site, at the far eastern end of Transect D-6, extends from the cut-bank across Seaside Road, just to the east of East Road. 9Li169 extends across the entire 100-m width of the transect. The vegetation in this area consists of oak, hickory, pine, and saw palmetto. Two sites were initially designated in the field (AMNH-409 and 410), and they were tested independently. Because both middens lie within 40 m of one another and both contain Savannah ceramics, we combined them into a single site.

The University of Georgia tested several shell middens in this area during the summer of 1970. Their unpublished report reads in part:

> Here and there among the trees on a beautiful high bluff overlooking the northeast marshes and beaches of St. Catherine's are scattered heaps of prehistoric oyster shells. These shell heaps are covered by recent human and leaf mould and appear as slight rises which [are numbered] as Middens 1–10.
>
> Two of the shell middens investigated belonged to the Wilmington Period, with radiocarbon determinations of 735 and 905 A.D. respectively [see discussion of these dates below]. The latest midden was assigned to the Savannah II Period on the basis of pottery fragments and a radiocarbon date of 1270 A.D. At the present time it looks as if the heaviest occupation was during the Wilmington Period between 700 and 900 A.D.: Wilmington pottery is found over most of the 10 acres of the site…
>
> Incidentally, the Wilmington shell heaps nearest the bluff and therefore nearest the marshes from which the oysters were gathered have shown very little pottery. Wilmington shell heaps further back from the bluff have a higher proportion of pottery, animal bones or other debris. This suggests that the opening of oysters was a major activity carried on at the edge of the bluff nearest the source of supply. Farther inland more varied domestic activities went on. (Caldwell, 1970)

Additional information is available for Seaside Midden 2 (and is adapted from field notes of Chung Ho Lee):

> This appeared as a circular rise 25 feet across and situated 200 feet north of Mound I. The midden was covered by a layer of topsoil but troweling downward located a solid layer of oyster and other shell. We then proceeded to make a 15 × 10 foot excavation toward the center of the heap. This was done mostly with trowels, shovels being used to throw out the loosened shell. The shell layer turned out to be about 16 inches thick. Below was a zone of dark sand, presumably the old humus prior to the shell accumulation.
>
> In the shell were found 128 pottery fragments of the Wilmington Period, evidently the time when the shell heap accumulated [see discussion of $^{14}$C date UGA/SC2 below] … The midden and underlying zone also contained four sherds with Deptford Period decoration. These are clearly older than the Wilmington pottery. (Lee, 1970)

In his handwritten notes, Caldwell noted that the Wilmington middens mapped at Seaside tended to be extensive, but not necessarily of long duration ("same thing noted years ago in Chatham county"). The ceramics recovered by the University of Georgia are not included in tables 20.3 and 20.6, but we have included the $^{14}$C determinations in the chapter 16 analysis:

Midden 1:

(UGA-SC1, *Crassostrea*): 1660 ± 180 B.P. cal A.D. 200–990

Midden 2:

(UGA-105, *Crassostrea*): 1130 ± 120 B.P. cal A.D. 880–1350

(UGA-SC2, *Crassostrea*): 1300 ± 200 B.P. cal A.D. 570–1330

We excavated six 1-m squares in the Seaside middens (2.60 $m^3$), recovering an assemblage of 115 sherds. Sixty-seven of these belong to the Savannah ceramic complex, with a relative abundance of Savannah Check Stamped sherds.

Four additional radiocarbon dates are available from Test Pit I at 9Li169 (AMNH-409):

Test Pit II (0–10 cm):

(Beta-215812, *Mercenaria*): 1040 ± 60 B.P. cal A.D. 1060–1300

Test Pit II (10–20 cm):

(Beta-215813, *Mercenaria*): 840 ± 60 B.P. cal A.D. 1290–1470

(Beta-183627, *Mercenaria*): 850 + 60 B.P. cal A.D. 1290–1470

(Beta-183628, *Mercenaria*): 780 + 60 B.P. cal A.D. 1310–1520

The following sherds were recovered from Test Pit II at 9Li169 (AMNH-409): 0–10 cm, Savannah Cord Marked (2), Savannah (4), Savannah, complicated stamped (1); 10–20 cm, Savannah Check Stamped (10), Savannah Cord Marked (13), Savannah Plain (1), Savannah Burnished Plain (4), Savannah complicated stamped (1).

Test Pit III (10–20 cm):

(Beta-21397, *Mercenaria*): 820 ± 70 B.P. cal A.D. 1290–1500

The following sherds are associated with Beta-21397 at 9Li169 (AMNH-409): Test Pit III, 0–10 cm, Savannah Cord Marked (3), Savannah (1), Savannah, complicated stamped (1); 10–20 cm, Savannah Check Stamped (4), Savannah Cord Marked (7), Savannah Plain (3), Savannah complicated stamped (1), grit tempered plain (3), Savannah, decorated (1), sand tempered with a little grit (2), Deptford Check Stamped (1); 20–30 cm, Savannah Check Stamped (5), Savannah Cord Marked (1), Savannah, possibly corncob impressed (1); 30–40 cm, Deptford Check Stamped (4), Refuge Simple Stamped abrader (1), Refuge (1).

The uppermost date, Beta-215812, is clearly associated with Savannah period ceramics and spans the Savannah/St. Catherines period interval as projected by DePratter (1979a: table 30; 1991: table 1). The other four dates (each located stratigraphically below Beta-215812) are younger and statistically the same (at the 95% level, $t = 0.672$; chi-square = 7.81). The pooled two-sigma probability for Beta-215813, Beta-183627, Beta-183628, and Beta-21397 is cal A.D. 1290–1500. Although each date is unquestionably associated exclusively with Savannah series ceramics, this pooled age estimate falls squarely into the Irene period time span, about two centuries too late for the northern Georgia coastal chronology; this matter is discussed in chapter 15.

All available *Mercenaria* from Test Pit II (AMNH-409) and Test Pits I and II (AMNH-410) were analyzed for seasonality (thereby restricting the seasonality study to the Irene period). Twelve (of 18) of these hard clams were collected during the winter, three in the early spring, and three in the summer/fall. This trend is reinforced by the seven values harvested during the fast growth increment ($O_{1-3}$, winter/early spring). The presence of unshed deer antlers suggests an occupation sometime between November and February. In addition, the presence of sea catfish remains indicates an occupation sometime between April and October.

To summarize, the University of Georgia encountered a Wilmington period component at 9Li169, and three radiocarbon dates confirmed the dates of this component. The combined $^{14}C$ and ceramic evidence from our excavations encountered a single component dating to the Irene period.

## Transect D-1

Transect D-1 begins at the large bend in Walburg Creek and runs across Long Field (presently used as pastureland for the Wildlife Conservation Society). After crossing State Road, the transect runs into the poor-

Fig. 20.4. Susan Bierwirth (left) and Stacy Goodman excavating test pits at 9Li137 (photograph taken in April 1980, looking east). This site has since been entirely eroded away.

ly drained area dominated by Mandarin fine sands.

Three archaeological sites were recorded in Transect D-1.

### 9Li234 (AMNH-508; Transect D-1)

This small site, located about 10 m west of Western Road, runs into the marsh. In the 1980s, this area was heavily disturbed by construction of New York Zoological Society animal enclosures, which lie about 40 m west of the site.

Thirty-two sherds were recovered from two test pits (0.50 $m^3$); 89 percent of the 19 diagnostic sherds date to the Irene period. No *Mercenaria* samples were available for seasonal analysis.

### 9Li162 (AMNH-219; Transect D-1)

This small site is located in the eastern portion of Transect D-1, about 20 m south of King New Ground Road. The site consists of scattered midden shell on the surface, with a slight mound in the center of the site.

Although the shell concentration seems to be quite dense, few cultural materials were encountered in the four excavated test pits (1.20 $m^3$). Of the six diagnostic sherds recovered, four date to Wilmington Plain. All the available *Mercenaria* ($n$ = 24) were analyzed for seasonality. Roughly half (12 of 22) of the specimens were collected in the summer/fall; the rest were harvested during the winter.

### 9Li233 (AMNH-506; Transect D-1)

This small site extends approximately 50 m north–south and consists of three major areas, each containing buried deposit. Situated approximately 40 m west of the marsh edge, this site lies in a mixed forest of oak, pine, and hickory with an understory of saw palmetto. Shell was not present on the ground surface. We excavated three test pits, for a total of 1.0 $m^3$ of deposit.

Of the 19 diagnostic sherds recovered from three test pits (1.0 $m^3$), 72 percent date to the Wilmington period. Twelve of these are Walthour Complicated Stamped, pinpointing the occupation to the Wilmington period (probably Wilmington I). Five additional sherds date to the St. Catherines period.

Two radiocarbon dates are available from 9Li233:

Test Pit II (10–20 cm):

(Beta-217235, *Mercenaria*): 1300 ± 60/ B.P.
cal A.D. 800–1120

The following sherds were recovered from Test Pit II at 9Li233: 0–10 cm, St. Catherines Net Marked (4).

Test Pit III (10–20 cm):

(Beta-217236, *Mercenaria*): 1360 ± 50 B.P.
cal A.D. 780–1030

The following sherds were recovered in Test Pit III at 9Li233: 0–10 cm, St. Catherines Plain (1); 10–20 cm, Walthour Complicated Stamped (12).

These two dates are statistically indistinguishable ($t = 0.483$, chi square = 3.84) and the pooled two-sigma age of cal A.D. 830–1030 is entirely consistent with the early part of the St. Catherines period (as defined in chap. 15). DePratter (1991: table 1) has previously associated Walthour Complicated Stamped with an early Wilmington age, but if the dozen sherds of this type recovered in Test Pit II at 9Li233 are truly associated with Beta-217236, then this age may be too early (see chap. 15).

A random sample of 25 *Mercenaria* shows that the majority (17 of 23) were collected in the winter, the rest during the early spring.

## Transect E-6

Transect E-6 begins at the small creek that separates Rock Field (to the north) from Meeting House Field. A swath of very poorly drained Rutledge soils runs from Transect E-6 through G-1 and along the central portion of the island core, trending toward the southwest and running parallel to the western island margin. The excessive wetness in this zone makes it very poorly suited for use as farmland, and no antebellum fields were constructed on the Rutledge soils. Immediately to the east of Middle Road runs a long, narrow ridge of moderately well-drained soils (mostly Echaw and Centenary fine sands). These soils are moderately suited for agricultural uses (as reflected by the construction of Greenseed, Billy, and Duncan fields during antebellum times). The transect then runs eastward across State Road, traversing the moderately well-drained Foxworth fine sands. The middle portion of the island core is dominated by alternating north–south patches of Echaw and Centenary, Rutledge, and Mandarin soils. The transect crosses Seaside Field and East Road, an area characterized by the moderately well-drained broad ridges of the Foxworth fine sands.

Six archaeological sites were recorded in Transect E-6.

### 9Li244 (AMNH-519; Transect E-6)

This large, single-component Irene site lies in a previously plowed field that is presently used as pastureland for the New York Zoological Society's program. A considerable amount of shell is scattered on the surface, due in large measure to recent disturbance. We excavated seven test pits and found relatively undisturbed midden throughout.

The ceramic assemblage consists of 92 sherds recovered from four test pits (1.30 $m^3$). Of the 81 diagnostics, 95 percent date to the Irene period.

Analysis of the 24 available *Mercenaria* recovered from strictly Irene period contexts (Test Pits I [0–10 cm], II, IV, and V) demonstrated that clams were harvested mostly during the winter (17 of 20), with some specimens harvested in the early spring and summer/fall. The presence of sea catfish remains also suggests an occupation sometime between April and October.

### Rock Field 3 (9Li176; AMNH-420; Transect E-6)

Located in the north part of Transect E-6, this large site is 25 m west of the creek that runs through Rock Field. This area has long been cultivated, with New York Zoological Society animal pens located nearby. Shell, some of it burned, is concentrated on the surface of site 9Li176.

A ceramic assemblage of 93 potsherds was recovered from the six test pits (3.30 $m^3$) excavated. Sixty-nine of these sherds are diagnostic, of which 72 percent of them date to the Irene period and 22 percent date to the Wilmington period.

Most (14 of 19) of the analyzed clams were collected during the winter, with the other five harvested during the summer/fall.

### Rock Field 4 (9Li177; AMNH-421; Transect E-6)

Also located in Rock Field, this small and badly disturbed site today stands in a pine forest, approximately 200 m west of State Road. The ceramic evidence from the single test pit (0.40 $m^3$) consists of only a dozen sherds. Of the six diagnostics recovered, 83 percent date to the Irene period.

A biface (28.0/2211) resembling a Jack's Reef Pentagonal projectile point was recovered at 9Li177. Justice (1995) notes that these points, found mostly in northeastern North America, is diagnostic of the Late Woodland period, dating between A.D. 500 and 1000.

Analysis of the nine available *Mercenaria* indicates that three were harvested during winter; an additional specimen was collected in the summer/fall.

### Rock Field 2 (9Li175; AMNH-419; Transect E-6)

This small site, with a very light concentration of surface and limited subsurface shell, is also located in Rock Field, approximately 100 m west of State Road. Only three diagnostic sherds (all of them dating to the Irene period) were recovered in the two test pits (0.70 $m^3$) excavated at 9Li175; an additional 11 grit-tempered sherds reinforces this assessment.

Most (9 of 11) of the analyzed clams were collected during the summer, while the remaining two were harvested in the early spring.

### Rock Field 1 (9Li174; AMNH-418; Transect E-6)

This small subsurface site is located 75 m west of State Road and inside Rock Field, which has been under cultivation for many years. Today, the vegetation consists of pine, palm, and saw palmetto. No diagnostic sherds were recovered from the three test pits excavated (1.00 $m^3$). Both available *Mercenaria* were harvested in the winter.

### Seaside Field (9Li252; AMNH-527; Transect E-6)

This medium-sized site consists of a shallow shell lens, buried 25 cm below the surface. Approximately 300 m east of Seaside Road, Seaside Field is located about 130 m west of the marsh in a mixed pine and oak forest. 9Li252 is probably the "fiber-tempered site" mentioned in the University of Georgia's field notes from 1969; Caldwell's crew made a small surface collection from this site, but conducted no excavations.

All but 1 of the 13 diagnostic sherds recovered from the seven test pits (2.40 $m^3$) are St. Simons Plain.

Two radiocarbon dates are available from Test Pit II:

Test Pit II (0–25 cm):

(Beta-217243, *Mercenaria*): 1380 ± 50 B.P.
cal A.D. 780–1030

Test Pit II (25–50 cm):

(Beta-217244, *Mercenaria*): 1440 ± 40 B.P.
cal A.D. 700–940

The following sherds were recovered from Test Pit II at 9Li252: 0–25 cm, St Simons Plain (2); 25–50 cm, Deptford Check Stamped (1); St. Simons Plain (2).

These two dates are statistically indistinguishable (at the 0.95 level, $t = 0.660$, chi-square = 384), with a pooled two-sigma age of cal A.D. 730–970. This is an early St. Catherines period for 9Li252, which is considerably too late for the Deptford and/or St. Simons ceramics recovered here. Here is another case (as at 9Li235, discussed above)

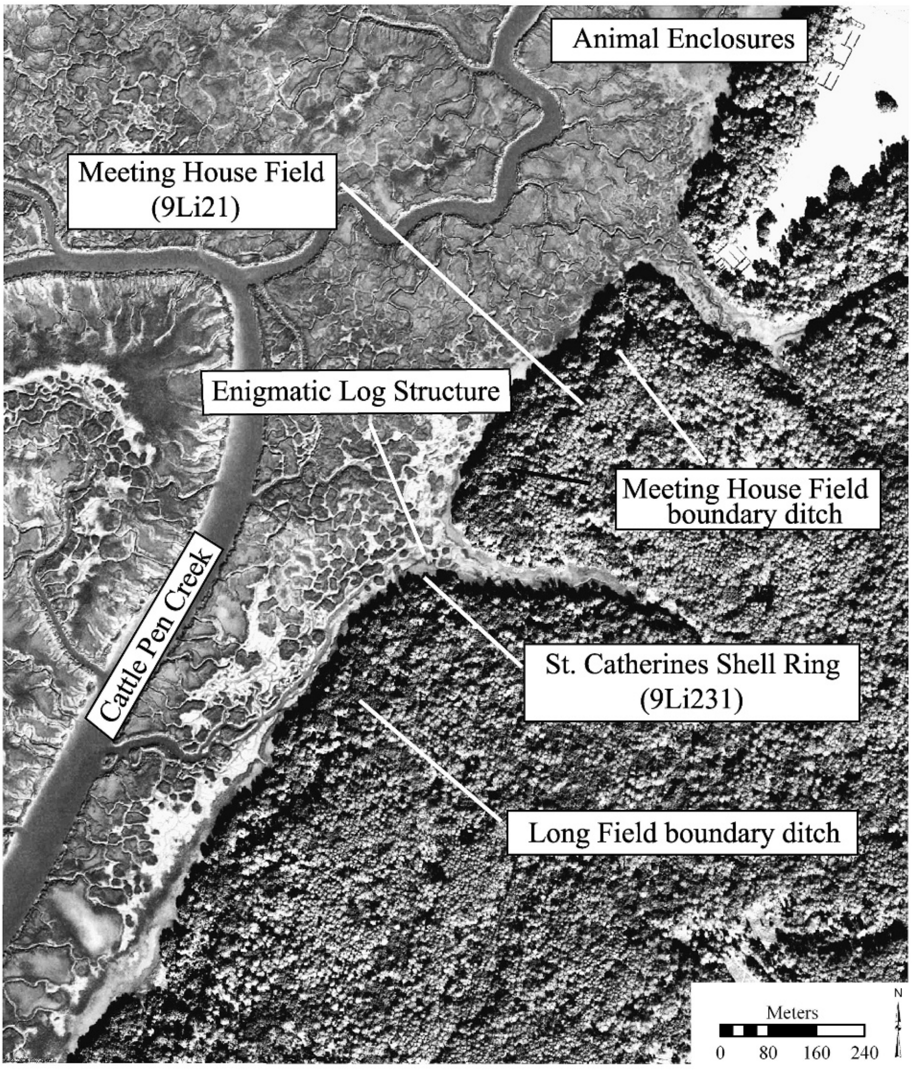


Fig. 20.5. Aerial photograph of the western margin of St. Catherines Island, showing Meeting House Field, Long Field, and several associated archaeological sites.

in which the shell midden apparently accumulated much later than did the ceramic assemblage.

Analysis of the available *Mercenaria* showed that three were collected in the winter, three more in the early springtime, and a single specimen in the summer/fall.

### Transect E-1

Transect E-1 begins along the southern boundary of Meeting House Field, crosses Savannah and State roads, and proceeds across the island core immediately to the north of Greenseed Field (fig. 20.5). Transect E-1 then continues across East Road and King New Ground Field.

During his 1965 reconnaissance, John Griffin made note of a curious log structure at the extreme western point of Transect E-1:

> Toward the end of my visit on the island, Mr. Woods took me to a spot on the shore just south of Meeting House Field where what proved to be a most interesting and enigmatic log structure was located [see fig. 20.6].
>
> The site was located on the shore, but above ordinary high tides. … Pine posts, with bark attached, about six inches in diameter, outlined a rectangular structure about 34′ 4″ by 28′ 8″. … The southeast corner was not uncovered, but since the sand was somewhat deeper there, the structure no doubt was complete.
>
> Small poles, about two inches in diameter, lay parallel with the north wall, inside the line of posts and on the surface of the ground. An initial thought was that they represented wattles woven in place among the posts, but none were visible in place.
>
> A test hole was dug at the sixth post from the north end on the west side of the structure. At about six inches below the surface a pine pole about 4–5 inches in diameter was found flanking each side of the upright post. These, too, retained their bark. The ends had been cut with a sharp axe, and the poles continued back into the building at an unknown distance. Perhaps the entire structure is floored with poles. …
>
> The upright post extends at least 19 inches below the present surface without a sign of ending. The posts are, therefore, rather deeply set. …
>
> Interpretation of this structure is difficult. It is hard to image the reason for its construction. The bark on the logs would indicate that they had been set in a wet condition since being placed. Otherwise one would expect them to have rotted away long ago, if present-day experience with pine logs can be used as a basis for comparison.
>
> The condition of the logs argues against any real antiquity for the structure. One would assume that with the known recent gradual rise in sea level the site would have been drier several centuries ago and the logs would have rotten away.
>
> No cultural materials were found on the surface, and a search with a metal detector was unsuccessful.
>
> Before writing the site off as some unexplained but recent structure, it would probably be well to investigate it more thoroughly. The name of the nearby salt water arm, Cattle Pen Creek, may provide a clue, but the structure does not resemble any cattle pen with which I am familiar. (Griffin 1965b: 6–8)

We also examined this curious log structure and, in 2004, collected a $^{14}$C sample from one of the corner pine uprights. The resulting date (Beta-183638) yielded an age of 100 $\pm$ 50 B.P., effectively dating the curious wooden structure to the post-aboriginal historic period.

We found four archaeological sites in Transect E-1.[7]

### St. Catherines Shell Ring (9Li231; AMNH-504; Transect E-1)

During the Island-wide transect, we recorded a medium-sized, crescent-shaped shell midden, which contained only St. Simons ceramics; subsequent mapping and excavation disclosed that 9Li231 is a nearly complete circle (fig. 20.7). This is the only such site known on St. Catherines Island

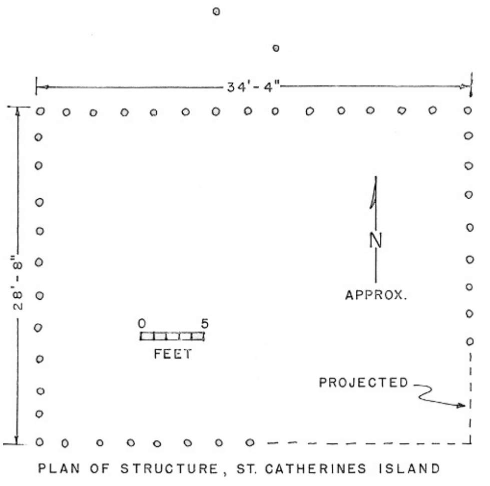


Fig. 20.6. John Griffin's sketch map of the curious log structure located at the northern margin of Long Field (and the westernmost extension of AMNH transect E-1).

and it lies just north of the Long Field boundary ditch, immediately to the west of 9Li229. The site extends westward to the marsh, into where the inlet cuts.

A ceramic assemblage of 266 potsherds was recovered from three test pits (2.60 $m^3$). Virtually all of these are diagnostic of the St. Simons period. The near absence of decorated forms of St. Simons ware suggests the St. Catherines Shell Ring dates to the early part of the St. Simons period.

This impression is confirmed by the six available radiocarbon dates from this site, two of which derive from Test Pit I:

Test Pit I (10–20 cm):

(Beta-21409, *Mercenaria*): 4370 ± 90 B.P. cal 2950–2470 B.C.

Test Pit I (60–70 cm):

(Beta-21408, *Mercenaria*): 3860 ± 80 B.P. cal 2300–1810 B.C.

The following sherds were recovered from Test Pit I at 9Li231: 0–10 cm, St. Simons Plain (1); 10–20 cm, St. Simons Plain (18); 20–30 cm, St. Simons Plain (17); 30–40 cm, St. Simons Plain (20); 40–50 cm, St. Simons Plain (5), St. Simons Incised (1); 50–60 cm, St. Simons Plain (4); 60–70 cm, St. Simons Plain (1); 70–80 cm, St. Simons Plain (1). Although Beta-21409 and Beta-21408 are reversed stratigraphically, both dates are clearly associated with fiber-tempered ceramics and both age estimates are consistent with the accepted time span of the St. Simons period (chap. 15).

In March 2006, the American Museum returned to the St. Catherines Shell Ring to initiate a long-term archaeological investigation. Although we will report the results of these excavations elsewhere, we think it useful to present the newest radiocarbon evidence from this site. Four additional radiocarbon dates are available from 9Li231, and all of these samples were taken from within 35 m of the test pits excavated during the Island-wide survey. Although we cannot provide precise sherd counts for the radiocarbon dates processed in 2006, our field observations verify that all these dates are overwhelmingly associated with fiber-tempered ceramics (in approximate proportions as noted for the Test Pit I results reported above).

N789 E801 (83 cm):

(Beta-215824, *Crassostrea*): 4120 ± 60 B.P. cal 2580–2200 B.C.

N789 E801 (23 cm):

(Beta-215823, *Crassostrea*): 3880 ± 60 B.P. cal 2260–1920 B.C.

N784 E801 (67 cm):

(Beta-215822, *Crassostrea*): 3800 ± 60 B.P. cal 2160–1770 B.C.

N782 E801 (66 cm):

(Beta-215821, *Crassostrea*): 4140 ± 50 B.P. cal 2600–2270 B.C.

From a statistical perspective, these six $^{14}C$ determinations represent three distinctive probability distributions. The earliest date (Beta-21409) is unique at cal 2920–2470 B.C. A second dating cluster (comprised of Beta-215824 and Beta-215821) is statistically indistinguishable (at 95%, $t$ = 0.54, chi square = 3.84), defining a pooled mean age of cal 2590–2240 B.C. The latest cluster (comprised o f Beta-21408, Beta-21523, and Beta-215822) is also statistically indistinguishable (at 95%, $t$ = 0.79, chi square = 5.99), with a pooled mean age of cal 2180–1890 B.C. Each of the three dating clusters is statistically distinct from the others ($t$ = 17.17, chi square = 3.84).

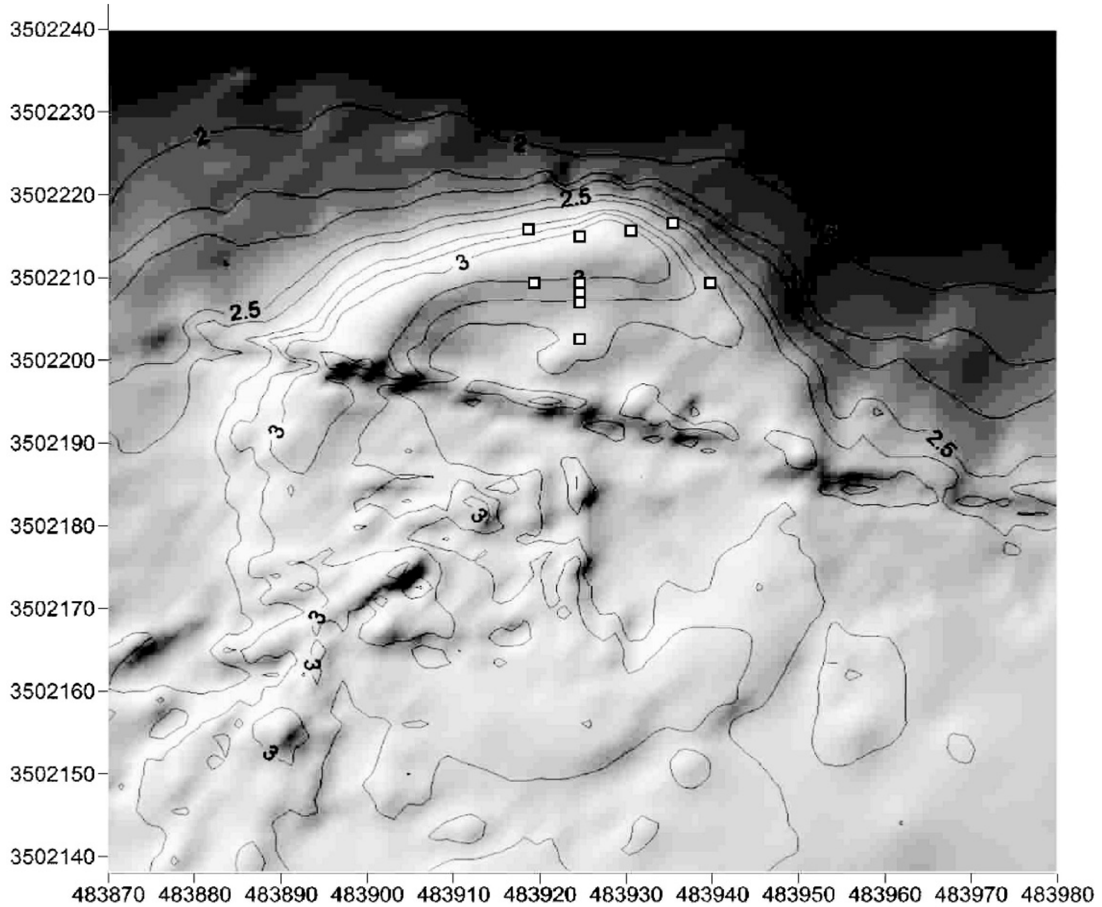


Fig. 20.7. A preliminary map of the St. Catherines Shell Ring (9Li231). The long diagonal feature, cross-cutting the shell ring, is the antebellum boundary ditch bordering Long Field. The scale is metric, with north at the top of the figure.

The stratigraphic situation at the St. Catherines Shell Ring is complex and not fully understood at present. But the suite of six radiocarbon dates all consistently fall within conventional estimates for the early half of the St. Simons period (table 15.2).

A random sample of 25 *Mercenaria* demonstrates that clams were collected during the winter and early springtime, in approximately equal proportions. An extraordinarily large vertebrate faunal sample was recovered from this site (comprising the largest single collection available from the transect survey). The presence of shark and sea catfish remains also indicates an occupation sometime between April and October.[8]

### 9Li229 (AMNH-502; Transect E-1)

This is a large Irene period site, located along the inlet between Long and Meeting House fields. Several midden mounds are visible, extending 100 m east of the marsh.

The total ceramic assemblage recovered from the six test pits (2.80 $m^3$) consists of 372 potsherds, 293 sherds of which were temporally diagnostic (96% dating to the Irene period). The virtual absence of Irene Incised sherds and Savannah complex sherds might suggest an early Irene presence.

Analysis of the available 15 *Mercenaria* from strictly Irene period contexts (Test Pits I, III, V [0–20-cm levels only], and V) shows that clams were harvested during the winter and early spring. The presence of sea catfish remains also indicates an occupation sometime between April and October.

### 9Li230 (AMNH-503; Transect E-1)

This medium-sized site occurs directly across the inlet from 9Li229, extending approximately 250 m along the cut-bank. These two excavation units ($1.0^3$ m) produced only 14 potsherds, including 7 Savannah Cord Marked and Savannah Plain ceramics.

Four radiocarbon dates are available from 9Li230. Initially, we processed two $^{14}$C determinations from 9Li230, and in March 2006, Thomas returned to this site and removed two additional radiocarbon samples (Beta-215819 and -21520) from the standing sidewalls of Test Pit I:

Test Pit I (0–10 cm):

(Beta-215820, *Crassostrea*): 1200 ± 50 B.P. cal A.D. 950–1220

Test Pit I (30–40 cm):

(Beta–21398, *Mercenaria*): 1310 ± 70 B.P. cal A.D. 780–1130

Test Pit I (basal level):

(Beta-215819, *Crassostrea*): 1330 ± 70 B.P. cal A.D. 740–1080

The following sherds were recovered from Test Pit I at 9Li230: Test Pit I, 0–10 cm, clay tempered cord marked (1); 10–20 cm, Savannah Burnished Plain (2), clay and grit tempered, complicated stamped (1), grit tempered, stamped (1).

One additional date was processed here:

Test Pit II (0–10 cm):

(Beta-21399, *Mercenaria*): 1140 ± 90 B.P. cal A.D. 950–1300

The following sherds were recovered from Test Pit II at 9Li230: 0–10 cm, Savannah Cord Marked (6), sand tempered (2).

These four radiocarbon dates are statistically indistinguishable (at 95%, $t = 3.95$, chi square = 7.81), with a pooled two-sigma age range of cal A.D. 910–1140. Although the ceramic associations are undoubtedly Savannah series, the age range is undeniably St. Catherines period, in both the northern Georgia coastal chronology (DePratter, 1979a: table 1, 1991: table 1) and the St. Catherines Island chronology (developed in chap. 15).

Analysis of the available *Mercenaria* shows that four had been harvested during the winter, and another four harvested in the early springtime.

### 9Li232 (AMNH-505; Transect E-1)

This medium-sized site, located within the boundaries of Meeting House Field, appears to extend across the 100-m-wide transect, with scattered concentrations of buried shell midden. It is 30 m east of Meeting House Road. Considerable plantation period debris turned up in the excavations.

Only 27 aboriginal sherds were recovered from the five test pits (1.90 m$^3$) excavated at 9Li232. Of the 12 diagnostic sherds, 67 percent date to the Wilmington period. In addition, one kaolin pipe stem fragment, one sherd of Staffordshire Slipware; one sherd of plain ironstone, and six sherds of banded pearlware were also found, clearly resulting from the subsequent, Euro-American occupation of this area.

Although many of the $n = 18$ available *Mercenaria* samples are quite senile, all of the analyzed clams were harvested during the winter.

## Transect F-6

Transect F-6 crosses Long Field, Savannah Road, State Road, and Greenseed Field, cutting across the broad expanse of Foxworth fine sands contained within King New Ground Field, near the modern dock.

Six archaeological sites were recorded in Transect F-6.

### 9Li181 (AMNH-425; Transect F-6)

This site is only 3 m in diameter, consisting of a subsurface shell deposit, with scattered shell also exposed by uprooted trees. The two test pits (0.80 m$^3$) excavated produced a total assemblage of 17 sherds, with the 15 diagnostics all dating to the Irene period. No *Mercenaria* were recovered.

Long Field 3 (9Li180; AMNH-424; Transect F-6)

This small site, due north of 9Li181, occurs in Long Field, in an area now covered with oak forest. It consists of a shell concentration buried to a depth of approximately 20–30 cm.

Although 11 sherds were recovered from the three test pits (0.80 $m^3$), only one (Refuge Plain) was period diagnostic.

Two radiocarbon dates are available from 9Li180:

Test Pit I (10–20 cm):

(Beta-217220, *Mercenaria*): 1170 ± 40 B.P. cal A.D. 1010–1220

Test Pit I (10–20 cm):

(Beta-217221, *Mercenaria*): 1220 ± 70 B.P. cal A.D. 890–1230

The following sherds were recovered from Test Pit I at 9Li180: 0–10 cm, none; 10–20 cm, sand-tempered check stamped (1), sand tempered plain (1), clay tempered (1); 20–30 cm, Refuge Plain (1), sand + grit tempered, stamped (1).

These two dates are statistically the same (at the 0.95 level, $t$ = 0.318, chi square = 3.84), with a mean two-sigma age of cal A.D. 990–1210. This is a St. Catherines period age estimate, which would seem to be consistent with the presence of clay and sand-tempered sherds (but clearly too late for the lone diagnostic Refuge sherd).

Analysis of the available *Mercenaria* shows that seven were collected in winter and two harvested during the summer/fall.

Greenseed Field 2 (9Li179; AMNH-423; Transect F-6)

This small site occurs within Greenseed Field, roughly 50 m west of Savannah Road. 9Li179 is small and consists of a subsurface shell deposit concentrated within an area roughly 4 m in diameter. All 27 sherds recovered from the three test pits (1.00 $m^3$) date to the Wilmington period.

Two $^{14}C$ determinations are available from 9Li179:

Test Pit III (20–30 cm):

(Beta-21404, *Mercenaria*): 1700 ± 70 B.P. cal A.D. 400–700

Test Pit III (30–40 cm):

(Beta-21403, *Mercenaria*): 1630 ± 60 B.P. cal A.D. 480–770

The following sherds were recovered from Test Pit III at 9Li179: 0–10 cm, Wilmington Heavy Cord Marked (4), Wilmington Plain (4); 10–20 cm, Wilmington Heavy Cord Marked (2), Wilmington Plain (3); 20–30 cm, Wilmington Heavy Cord Marked (5), Wilmington Plain (3); 40–50 cm, Wilmington Plain (1).

These two dates are statistically indistinguishable at the 0.95 level ($t$ = 0.497, chi square = 3.84). The association is clearly with Wilmington period ceramics, and the pooled two-sigma age range of cal A.D. 470–770 falls squarely within the accepted temporal span of the Wilmington period.

Analysis of all available *Mercenaria* specimen showed that 8 (of 13) of the clams were harvested during the winter, and the rest during the early spring.

Greenseed Field 1 (9Li178; AMNH-422; Transect F-6)

This medium-sized site occurs inside Greenseed Field, roughly 50 m east of State Road and 30 m northeast of Cemetery Road.

Half of the 60 sherds recovered from the three test pits (2.30 $m^3$) are period diagnostic: 70 percent date from the St. Catherines/Wilmington periods while 30 percent are diagnostic of the earlier Refuge-Deptford interval. Analysis of the available 17 *Mercenaria* shows that six clams were harvested during the winter and two in the early spring.

King New Ground Field (9Li19; AMNH-202; Transect F-6)

Located in the antebellum field of the same name, this large site consists of several shell middens scattered across an area 75 m north to south (fig. 20.8). The site is approximately 20 m east of King New Ground Road, which runs along its west side. C. B. Moore excavated a burial mound and tested middens in this area during the 1890s (see chap. 24).

On July 29, 1969—his first full day on St. Catherines Island—Joseph Caldwell and his crew staked out units in King New Ground Field and tested three shell middens. Caldwell also excavated extensively at nearby Johns Mound (see chap. 24). Our crews subsequently surveyed and excavated here in the 1970s, where Royce Hayes recently rediscovered Moore's "Mound in Kings New Ground Field" (see fig. 20.8 and chap. 24).

Two $^{14}C$ determinations are available from the University of Georgia excavations at Midden 2 of King New Ground Field:

(UGA-58, charcoal): 1070 ± 60 B.P. cal A.D. 780–1150

(UGA-60, *Crassostrea*): 1570 ± 60 B.P. cal A.D. 560–830

Although these two dates are statistically distinct (at the 0.95 level, $t = 31.74$), both fall within the St. Catherines period.

After our crews relocated the University of Georgia excavations at King New Ground, we excavated five additional test pits (3.80 $m^3$) into adjacent deposits; table 20.6 includes only the sherd counts from the AMNH excavations. The ceramic assemblage consists of 1119 sherds. Of the 821 diagnostics recovered, 58.6 percent date to the Irene period (the primary component) and 36 percent derive from a secondary, St. Catherines period component. Wilmington period diagnostics are also present.

The following sherds were recovered during American Museum of Natural History excavations in Midden II at 9Li19: Test Pit I, 0–10 cm, St. Catherines Plain (1); 10–20 cm, Irene Plain (2), St. Catherines Net Marked (1); 20–30 cm, St. Catherines Plain (1), Irene Complicated Stamped (2), Irene Plain (3), Irene Burnished Plain (1), Savannah Plain (1), Deptford Check Stamped (2); 40–50 cm, Irene Complicated Stamped (2), Savannah Plain (1), St. Catherines Fine Cord Marked (1); 50–60 cm, Irene Complicated Stamped (2), Irene Plain (1), Savannah Check Stamped (1), St. Catherines Fine Cord Marked (1), St. Catherines Plain (1), St. Catherines Cord Marked (2), Irene (2).

Given the relative abundance of St. Catherines (and the presence of Savannah series ceramics), we attribute dates UGA-58 and UGA-60 to the St. Catherines period (see also Caldwell, 1970).

A Savannah River Stemmed projectile point (28.0/0337) was also recovered during our excavations at 9Li19. Although this type is thought to be diagnostic of the Late Archaic Period (Justice, 1995), with a suggested temporal range of cal 1000 B.C.–3000 B.C., the lack of St. Simons period ceramics suggest that our testing of this site was incomplete or this artifact may have been curated or salvaged from an earlier context.

Because *Mercenaria* are numerous in the King New Ground Field middens, we drew independent random samples ($n = 25$) from the Irene and the St. Catherines components. *Mercenaria* harvested in the late spring (19 of 25) dominate the Irene period sample (from Midden 4, Test Pit I). There are, however, several additional early springtime clams and a single wintertime clam present as well. The St. Catherines period sample (Midden 10, Test Pit I) was harvested primarily during the winter (14 of 21), with clams gathered in summer/fall and early spring also present.

The recovered vertebrate faunal remains are assigned to the Irene component.

### 9Li199 (AMNH-449; Transect F-6)

This large site extends across the 100-m width of Transect F-6 and continues west to King New Ground Road. Several areas of scattered and concentrated shell occur here; we collected a few sherds from the surface. A widespread midden scatter is buried at a depth of 10–20 cm below the surface, and this concentration seems to trail off toward the marsh. The densest midden occurs near the ditch that defines King New Ground Field.

The total ceramic assemblage from the six test pits (2.90 $m^3$) consists of 278 potsherds (188 of them diagnostic): 46 percent date from the St. Catherines/Wilmington periods and 30 percent from the Irene peri-

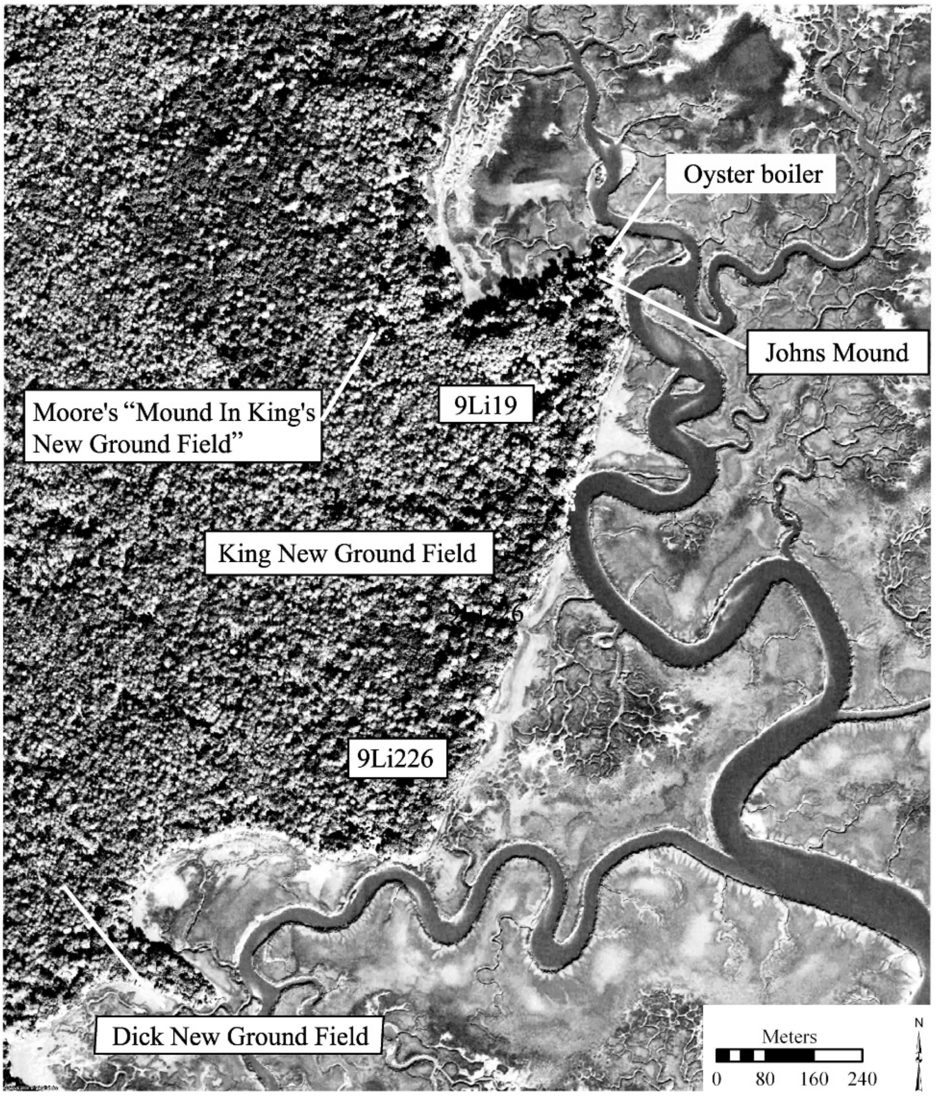


Fig. 20.8. Aerial photograph showing the King New Ground area, located along the eastern margin of St. Catherines Island.

od, with a mixture of sherds dating back to the St. Simons period.

The major component dates to the St. Catherines/Wilmington periods, though a minor Irene period component is also present. Because of the apparent mixture and long time span represented, no attempt was made to assess seasonality from the *Mercenaria* recovered.

### Transect F-1

Transect F-1 begins in the Echaw-Centenary fine sands of Long Field, runs eastward across the low-lying Rutledge soils, through Greenseed Field into King New Ground Field. Three archaeological sites were recorded in Transect F-1 (fig. 20.3).

#### 9Li228 (AMNH-500; Transect F-1)

This large site has considerable shell scattered across the surface, and dense exposures of shell and ceramics appear in the cut-bank. The midden continues along the marsh edge north to the stream; 9Li228 extends from the boundary ditch of Long Field westward to the marsh.

The five excavated test pits (2.10 $m^3$) contained 70 sherds. Of the 59 diagnostic sherds recovered, 74 percent date to the Refuge-Deptford component. A few Irene period ceramics also occur, but not enough to define an Irene component at 9Li228.

Three radiocarbon dates are available from 9Li228:

Test Pit II (0–10 cm):

(Beta-217232, *Mercenaria*): 2040 ± 50 B.P.
cal A.D. 70–320

Test Pit II (10–20 cm):

(Beta-217233, *Mercenaria*): 2080 ± 50 B.P.
cal 10 B.C.–A.D. 270

Test Pit II (10–20 cm):

(Beta-217234, *Mercenaria*): 2190 ± 50 B.P.
cal 150 B.C.–A.D. 140

The following sherds were recovered from Test Pit II at 9Li228: 0–20 cm, none; 20–30 cm, Deptford Check Stamped (1), Irene, stamped (1).

These three dates, which occur in a well-defined stratigrahic sequence, are nevertheless statistically indistinguishable (at the 0.95 level, $t = 3.799$, chi-square $= 5.99$), with a mean two-sigma age of cal A.D. 1–240. Given the association in Test Pit II, and the overall prevalence of Deptford ceramics throughout the site, we feel confident in assigning these three $^{14}C$ determinations to the Deptford period.

Although several *Mercenaria* were recovered, all were too senile for seasonal analysis.

#### 9Li227 (AMNH-499; Transect F-1)

This small site contains two subtle shell mounds. The mound nearest to the stream is nearly solid shell, measuring 4 m × 3 m and 40 cm high. The other mound, located 30 m to the west, has scattered shell on its surface. 9Li227 is inside Long Field, 150 m west of Savannah Road and 20 m south of a gully.

The ceramic assemblage from the two excavated test pits (0.80 $m^3$) consists of 84 potsherds. A mixture of Savannah and Irene period ceramics are present, and we assign 9Li227 to the Irene period.

The available *Mercenaria* sample from 9Li227 shows that most (23 of 25) were harvested during the early springtime while the other 2 showed a "late spring" ($T_1$) growth increment. Results of growth increments in the modern control sample of *Mercenaria* shows considerable temporal overlap between the $O_3$ and $T_1$ increments (particularly between mid-April and mid-June), indicating that a single springtime harvest could readily account for the distribution of growth increments observed at Li227.

The recovered vertebrate faunal remains derive primarily from the Irene period component.

#### 9Li226 (AMNH-498; Transect F-1)

Located along the eastern end of Transect F-1, this large site extends from Back Creek Road eastward to the marsh. The western part of 9Li226 lies in King New Ground Field, and it continues westward across the boundary ditch. Shell is exposed in the boundary ditch and in the road, and at least two shell mounds are also evident. A relatively disarticulated human burial was found about 15 cm below the surface, beneath a cap of shell midden (see chap. 24).

The ceramic assemblage recovered from the four test pits (1.80 $m^3$) consists of 82 sherds; all are diagnostic of the Irene period.

A random sample of 25 *Mercenaria* demonstrates that most of the clams (17 of 23) were harvested during the winter; the rest were gathered in the early springtime and summer/fall. The presence of sea catfish remains also suggests occupation sometime between April and October.

### Transect G-6

The western end of Transect G-6 began to the north of Persimmon Point, crossed Long Field (Echaw-Centenary fine sands), ran eastward across the poorly drained Rutledge soils into Duncan and Billy Fields, and ended in the Echaw-Centenary soils of Davy Field (fig. 20.9). Seven archaeological sites were recorded in Transect G-6.

#### 9Li250 (AMNH-525; Transect G-6)

9Li250 is located in Long Field, along the far western edge of the transect (about 50–75 m from the marsh). No surface evidence is present, and this small site was discovered only during systematic shovel-testing, where scattered deposits of oyster shells were evident.

The ceramic assemblage from the three test pits (2.25 $m^3$) consists of 64 sherds. Of the 52 diagnostics, 90 percent date to the Wilmington period. No *Mercenaria* were available for seasonal analysis.

#### Persimmon Point (9Li251; AMNH-526; Transect G-6)

9Li251 is located just east of the marsh that lies north of Persimmon Point (on the eastern side of the stream, directly across from 9Li250). This large site is located in Long Field, today covered with pine, oak, and magnolia forest. It consists of a discontinuous shell scatter and a mounded area of buried shell midden.

The ceramic evidence from the 12 test pits (8.58 $m^3$) consists of 135 sherds, with the temporally diagnostic sherds belonging to the Irene period (with Savannah ceramics also present). Analysis of the seven available *Mercenaria* demonstrates that clams were collected during the early springtime and summer/fall.

#### 9Li249 (AMNH-524; Transect G-6)

This small site is located 450 m west of State Road, in a mixed oak and pine forest with an understory of saw palmetto. No shell is present at 9Li249 and the site was detected only through the systematic shovel testing of this transect.

The ceramic assemblage recovered from the five test pits (5.00 $m^3$) consists of 22 sherds. Of these, 16 were diagnostic of the Refuge/St. Simons periods. No *Mercenaria* were available for seasonal analysis.

#### 9Li248 (AMNH-523; Transect G-6)

This small site occurs on the southern margin of Transect G-6. No surface evidence is visible: 9Li248 was undetected in the survey, found only through the systematic shovel testing of this transect. Shell is completely absent from the site.

The ceramic assemblage recovered from the five test pits (5.00 $m^3$) shows that this is a single-component site. Although only 7 (of $n = 22$) sherds were diagnostic, all but 1 dated to the St. Simons period. No *Mercenaria* samples were recovered.

#### 9Li247 (AMNH-522; Transect G-6)

This medium-sized site occurs 100 m west of State Road, along the southern margin of Transect C-6, in a mixed pine and oak forest. Like 9Li246, this site was passed over in the initial survey and located only during the systematic shovel testing program.

The ceramic assemblage from the five test pits (5.50 $m^3$) excavated consists of 32 diagnostics, 94 percent of which date to the St. Simons period. Shell is completely absent.

A single Hernando projectile point (28.0/3465) was recovered from 9Li247. Although Bullen (1975) attributed Hernando points to the Deptford period, the ceramic evidence from 9Li247 suggests a St. Simons context.

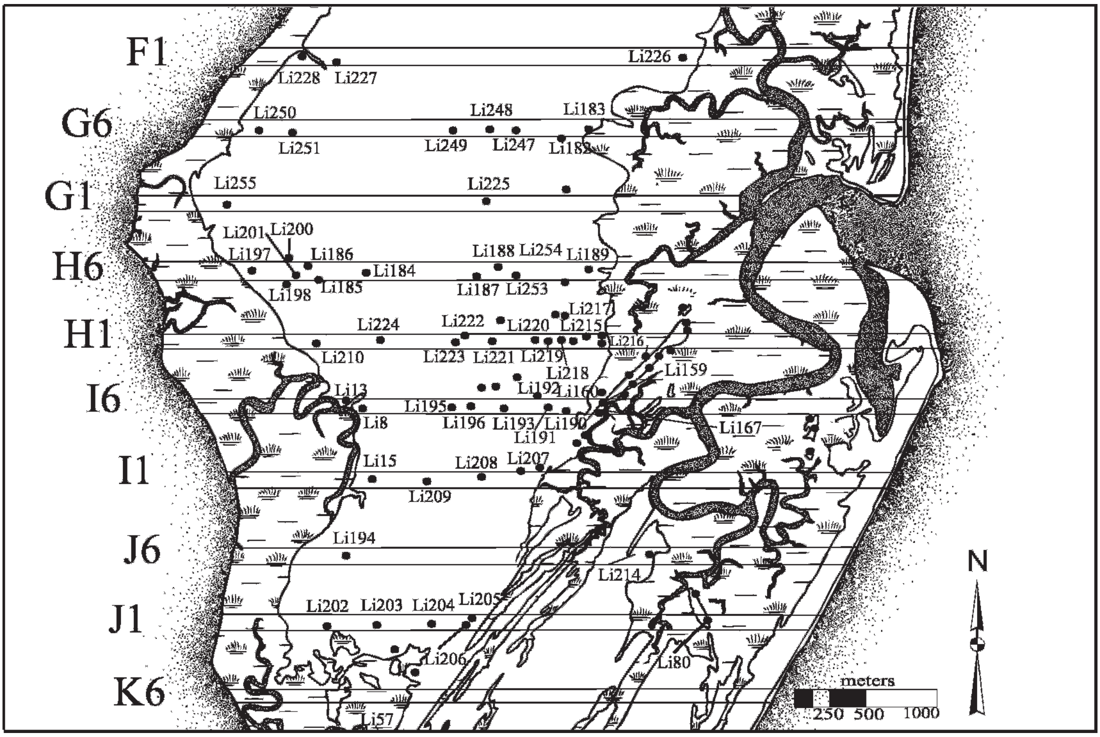


Fig. 20.9. Distribution of archaeological sites located in the middle of the Island-wide transect survey of St. Catherines Island.

### 9Li182 (AMNH-426; Transect G-6)

This very large site is located about 30 m west of the junction of Back Creek Road and the road that continues north to the dock at King New Ground Field. It consists of a subsurface shell midden, buried at a depth of 10 cm below the surface.

The ceramic assemblage from the three test pits (1.10 $m^3$) consists of 44 sherds, 15 of which are diagnostic of the Irene period.

Analysis of all available *Mercenaria* showed that 9 (of 10) clams in the analyzed sample were collected during the winter. The presence of unshed deer antlers confirm an occupation sometime between November and February, while sea catfish remains further suggest an occupation sometime between April and October.

### 9Li183 (AMNH-427; Transect G-6)

This small site is located near a cut-bank, roughly 20 m south of the fork of Back Creek and King New Ground Roads. The densest midden occurs on the top of a small knoll on the western margin of the site. A field boundary ditch runs north–south, just to the west of the excavated test pits.

The ceramic evidence from the two test pits (0.80 $m^3$) consists of 28 sherds. Of the 14 diagnostic sherds recovered, 71 percent date from the St. Catherines period and 29 percent from the Irene period.

Analysis of the available 19 *Mercenaria* shows that virtually all the clams were collected during the winter.

### Transect G-1

Transect G-1 begins immediately to the south of English Cut (also known as Persimmon Point), the westernmost portion of St. Catherines Island. The transect crosses Jesamin Finger Field and moves east and crosses over Savannah Road, Middle Road, and Duncan Field. At Back Creek Road, the transect enters Davy Field, then exits the island core and runs across the marshland of McQueens Inlet.

About 100 m to the south of the southern margin of Transect G-1 is the second tabby block structure noted by John Griffin in 1965 (already discussed above, in conjunction with Transect C-6).

Two archaeological sites were recorded in Transect G-1.

### Jesamin Finger (9Li255; AMNH-474, 494, 495; Transect G-1)

Located along the western part of Transect G-1, 9Li255 is a large site immediately south of Persimmon Point, on the westernmost part of St. Catherines Island (fig. 20.10). This area was examined in July 1969 by archaeologists from the University of Georgia, but we have no record of their having excavated here (and their collections, if any, are not available for this analysis).

Part of this site lies inside Jesamin Finger Field and was undoubtedly disturbed in places by antebellum agriculture. Mounded shell middens, some of them crescent-shaped, occur throughout this area and, although originally recorded as three separate sites, AMNH-474, 494, and 495 have now been combined, as there are no clear-cut boundaries between the various areas.

The ceramic evidence from the 11 test pits (4.60 $m^3$) consists of 568 sherds; of the 480 diagnostic sherds recovered, 99 percent date from the Irene period.

Our analysis of all available clams from AMNH-474 and AMNH-494, plus a random sample of 25 *Mercenaria* from AMNH-495, demonstrates that many of the hard clams (28 of 38) were harvested during the winter. The three other seasons were also represented, particularly the early spring. The presence of sea catfish remains further confirms an occupation sometime between April and October.

### Duncan Field (9Li225; AMNH-496; Transect G-1)

This medium-sized site consists of a buried shell lens roughly 20 m × 15 m and is situated in pine forest, 80 m west of State Road. The ceramic assemblage from the four test pits (1.30 $m^3$) consists of 20 diagnostic sherds, representing the Irene (20%), Wilmington (35%), Deptford (20%), and Refuge (25%) periods.

Three $^{14}C$ determinations are available from 9Li225:

Test Pit III (10–20 cm):

(Beta-217230, *Mercenaria*): 1650 ± 40 B.P. cal A.D. 500–710

Test Pit III (20–30 cm):

(Beta-21405, *Mercenaria*): 1630 ± 70 B.P. cal A.D. 480–780

The following sherds were recovered from Test Pit III at 9Li225: 0–10 cm, Wilmington Heavy Cord Marked (2), Deptford Complicated Stamped (1); 10–20 cm, Wilmington Heavy Cord Marked (2), Refuge, misc. (1); 20–30 cm, Refuge Simple Stamped (2), Refuge, stamped (1). These two dates are statistically identical (at the 0.95 level, $t$ = 0.051, chi-square = 3.84), with a pooled two-sigma age of cal A.D. 500–720.

Test Pit IV (20–30 cm):

(Beta-217231, *Mercenaria*): 1660 ± 40 B.P. cal A.D. 490–700

The following sherds were recovered from Test Pit IV at 9Li225: 0–20 cm, none; 20–30 cm, Refuge Simple Stamped (2); 30–40 cm, Refuge, stamped (2).

These three radiocarbon determinations are statistically the same (at the 0.95 level, $t$ = 0.115), with a two-sigma pooled mean of cal A.D. 530–700. This Wilmington period age estimate is consistent with the presence of Wilmington Heavy Cord Marked sherds in Test Pit III, and clearly postdates the Refuge sherds recovered in both test pits. Once again, this appears to be a case of earlier sherds being associated with later shell midden.

All of the available 15 *Mercenaria* were harvested during the winter.

## Transect H-6

The distribution of potentially arable soils changes markedly to the south of Transect H-6. The central, lowland trough

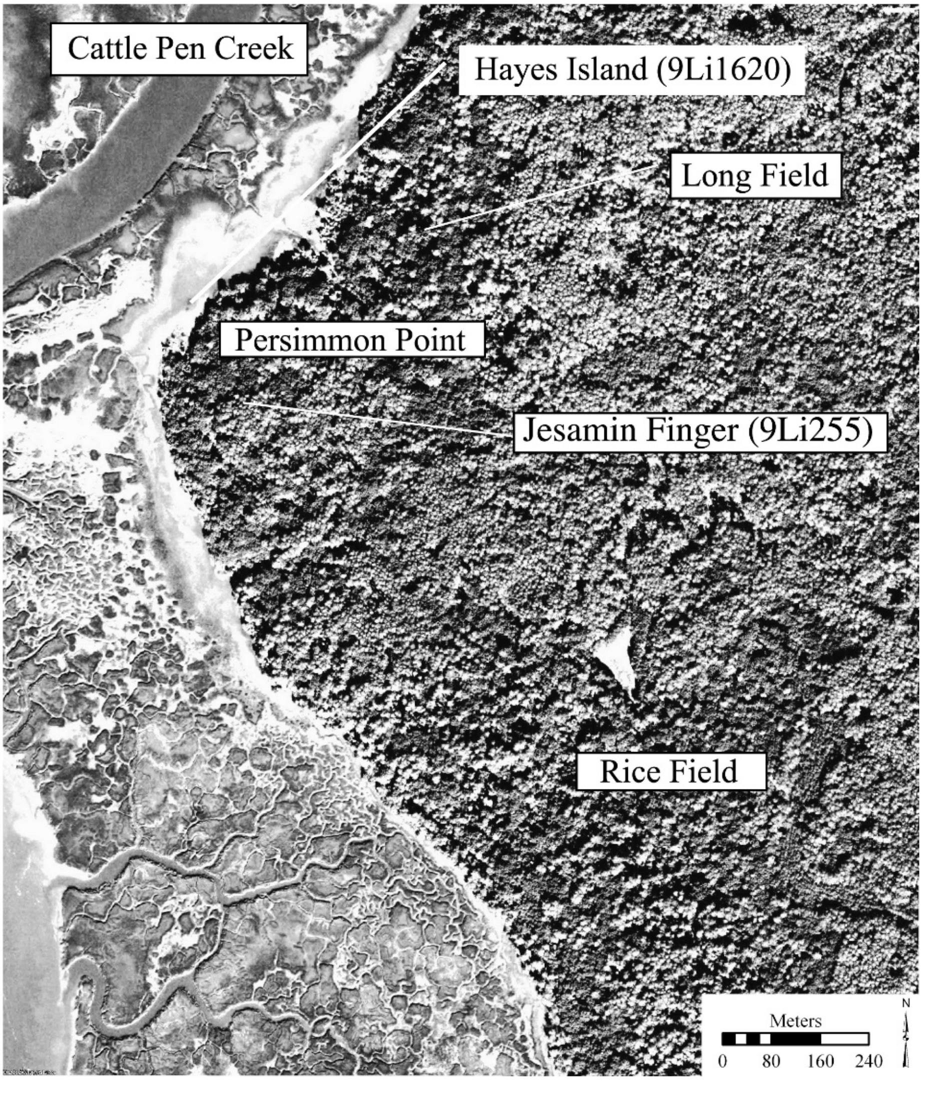


Fig. 20.10. Aerial photograph of the Persimmon Point, the westernmost portion of St. Catherines Island.

that characterizes the northern half of the island pinches out slightly to the south of Persimmon Point, and soils of greater agricultural potential dominate the southern one-quarter of the island core. Except for a patch of poorly drained Rutledge soils in the vicinity of South Beach Road, most of the south end is dominated by the moderately well-drained Foxworth (and, to a lesser extent, Echaw) series soils. A number of antebellum fields—including Rice, McLeod, Cunningham, South End, and Camel and Little Camel New Ground fields—were established in this area, clearly exploiting the somewhat better agricultural potential.

Transect H-6 begins along Persimmon Point road, running inland immediately to the south of Jesamin Finger Field. After crossing Savannah Road, it crosses Rice, McLeod, and South New Ground Field, passing immediately to the north of the Cunningham Mound group. McLeod and Cunningham Mounds C and D are located about 300 m from the southern margin of Transect H-6, which ends in Davy Field at the eastern edge of the island core.

We encountered 12 archaeological sites in Transect H-6.

### 9Li197 (AMNH-445, 446, 448, 450, 451; Transect H-6)

This large site, located approximately 80 m east of Wamassee Road, consists of numerous shell mounds, surface scatters, and buried deposits. In the field, we considered these various middens to represent five distinct sites. However, because they all lie within 100 m of one another and they all contain Irene ceramics, we decided to combine them. Some pothunting was noted in the area (an extremely unusual incident on St. Catherines Island). A possible, discontinuous field boundary ditch runs through here.

From a relatively large ceramic assemblage at 9Li197, nearly 90 percent date to the Irene period. Four radiocarbon samples were processed from Test Pit I, AMNH-450 locus at 9Li197:

Test Pit I (0–10 cm):

(Beta-20821, *Mercenaria*): 860 ± 60 B.P. cal A.D. 1280–1490

Test Pit I (20–30 cm):

(Beta-218097, *Mercenaria*): 1980 ± 80 B.P. cal A.D. 50–450

Test Pit I (30–40 cm):

(Beta-218098, *Mercenaria*): 1700 ± 70 B.P. cal A.D. 400–700

Test Pit I (40–50 cm):

(Beta-20822, *Mercenaria*): 3240 ± 80 B.P. cal 1480–1050 B.C.

The following sherds were recovered from Test Pit I [AMNH-450, Mound R-1] at 9Lil97: 0–10 cm, Irene Complicated Stamped (35), Irene Plain (14), Wilmington, hones (2), Irene, rims (4), sand + clay tempered decorated (4), sand tempered stamped (1); 10–20 cm, Irene Complicated Stamped (5); 20–30 cm, Irene Complicated Stamped (1), St. Simons Plain (1), sand tempered, stamped (1), St. Simons Plain (1); 40–50 cm, St. Simons Plain (2).

These four radiocarbon dates occur in approximate stratigraphic order within Test Pit I, but considerable mixture is evident in the deposit. Beta-20822, the bottom-most *Mercenaria* sampled here, provides a late St. Simons period age estimate (despite the fact that all the fiber-tempered ceramics were undecorated). The next $^{14}$C date up the stratigraphic column, Beta-218098, is associated with St. Simons ceramics, but it dates to the early Wilmington period. Overlying this, Beta-218097 is associated with mostly St. Simons ceramics, with a few Irene sherds present as well, but it dates to the Deptford–Wilmington transition.

The uppermost *Mercenaria* dated, Beta-20821, is associated almost exclusively with Irene ceramics and produced an acceptable Irene period age estimate.

The combined $^{14}$C and ceramic evidence from the seven test pits (3.20 m$^3$) shows that the site contains a major Irene component, with a St. Simons component found beneath the shell lens. Based on stratigraphic criteria and ceramic associations, the vertebrate faunal sample from Li197 could be partitioned into relatively distinct components.

Analysis of 25 *Mercenaria* randomly sampled from the Irene component of

AMNH-445 as well as available samples from AMNH-446, AMNH-448, AMNH-450, and AMNH-451 indicates that 30 of 51 clams were harvested during the winter, 7 in the springtime, and 14 in the summer/fall. The presence of sea catfish remains suggests an occupation sometime between April and October.

### 9Li198 (AMNH-447; Transect H-6)

9Li198 is located 300 m east of Wamassee Road, amidst forest dominated by oak, magnolia, bay, and saw palmetto. The small site consists of a shell mound, roughly 50 cm high and 3 m in diameter.

The ceramic assemblage from the single test pit (0.60 $m^3$) consists of 16 diagnostic sherds (81 percent diagnostic of the Wilmington period). Three sherds date to the St. Catherines period, but this seems insufficient evidence to define a secondary component.

We processed three radiocarbon determinations on *Mercenaria* recovered from the same excavation unit at 9Li198:

Test Pit I (10–20 cm):

(Beta-218099, *Mercenaria*): 1380 ± 40 B.P. cal A.D. 770–1010

Test Pit I (20–30 cm):

(Beta-218100, *Mercenaria*): 1150 ± 60 B.P. cal A.D. 1000–1260

Test Pit I (40–50 cm):

(Beta-20823, *Mercenaria*): 1420 ± 50 B.P. cal A.D. 710–980

The following sherds were recovered from Test Pit I at 9Li198: 0–10 cm, Wilmington Heavy Cord Marked (1), Wilmington Plain (1), Wilmington, eroded (2); 10–20 cm, St. Catherines Burnished Plain (1), Wilmington or St. Catherines Cord Marked (1); 20–30 cm, Savannah Plain (2), Wilmington Plain (2); 30–40 cm, St. Catherines Burnished Plain (1), Wilmington Plain (3); 40–50 cm, Wilmington Plain (4), Wilmington or St. Catherines Plain (1), clay tempered, eroded (1).

The uppermost and bottom determinations, Beta-218099 and Beta-20823, are statistically the same; both are associated with Wilmington and St. Catherines ceramics, and they appear to date the transition between these two periods. The stratigraphically intermediate date, Beta-218100, had the same apparent ceramic associations, but dated later, to the later St. Catherines period.

Analysis of the eight available *Mercenaria* demonstrates that clams were mostly collected during the winter. The presence of sea catfish remains indicates an occupation sometime between April and October.

### 9Li200 (AMNH-452; Transect H-6)

9Li200 occurs 300 m east of Wamassee Road, on the north edge of the transect in mixed oak and pine forest, with a thick understory of saw palmetto. Several shell mounds are evident across a 100-m wide area, and we tested each of these with single test pits.

The large site extends the full width of Transect H-6, and may be continuous with 9Li198; both sites contain Wilmington ceramics. The ceramic assemblage from the four test pits (2.60 $m^3$) consists of 56 diagnostic sherds, almost equally distributed between the St. Catherines and Wilmington periods.

A total of six $^{14}C$ determinations are available from 9Li200, three of them processed from Midden I, Test Pit I at 9Li200:

Midden I, Test Pit I (0–10 cm):

(Beta-20826, *Crassostrea*): 1200 ± 60 B.P. cal A.D. 930–1220

Midden I, Test Pit I (20–30 cm):

(Beta-20819, *Mercenaria*): 1190 ± 70 B.P. cal A.D. 920–1250

Midden I, Test Pit I (30–40 cm):

(Beta-20827, *Crassostrea*): 1760 ± 70 B.P. cal A.D. 340–670

The following sherds were recovered from Midden I, Test Pit I at 9Li200: 0–10 cm, Wilmington Plain (2), St. Catherines Plain (4); 10–20 cm, Wilmington Plain (6); 20–30 cm, Wilmington Cord Marked (1), Wilmington Plain (2), St. Catherines Plain (2); 30–40 cm, St. Catherines Fine Cord Marked (1), St. Catherines Burnished Plain (5), Wilmington Plain (12), St. Catherines Plain (1); 40–50 cm, Wilmington Plain (4), Irene (1), clay + sand tempered, burnished (2), clay tempered, incised (2). The uppermost two dates (which are statistically identical at the 0.95 level) are clearly associated with St. Catherines period ceramics, and Beta-20827 derives from a Wilmington period component.

Two additional dates are available from Midden II, Test Pit I at 9Li200:

Midden I, Test Pit I (30–50 cm):

(Beta-20815, *Crassostrea*): 1110 ± 70 B.P. cal A.D. 1020–1290

Midden I, Test Pit I (40–50 cm):

(Beta-20820, *Mercenaria*): 1490 ± 70 B.P. cal A.D. 640–950

The following sherds were recovered from Midden II, Test Pit I at 9Li200: 0–30 cm, none; 30–40 cm, St. Catherines Net Marked (1), St. Catherines Burnished Plain (1); 40–50 cm, St. Catherines Net Marked (1). Both dates are associated with St. Catherines period ceramics.

A single date is available from Midden III, Test Pit I (50–70 cm):

(Beta-20816, *Crassostrea*): 1280 ± 70 B.P. cal A.D. 810–1160

The following sherds are associated with Beta-20816 at 9Li200: Midden III, Test Pit I, at 9Li200: 0–50 cm, none; 50–60 cm, St. Catherines Burnished Plain (1); 60–70 cm, St. Catherines Net Marked (4), St. Catherines Burnished Plain (1); sidewall cleanup, St. Catherines Net Marked (3), St. Catherines Plain Burnished (2). Beta-20616 is clearly associated with St. Catherines period ceramics.

From a random sample of 25 *Mercenaria,* we successfully determined the growth stage at time of harvest for all but 1 of the specimens, indicating that these hard clams had been harvested during the winter and in the late spring.

### 9Li201 (AMNH-453; Transect H-6)

This small site occurs roughly 200 m east of Wamassee Road, 100 m west of the 9Li200 and 9Li198 mounds. A series of distinctive furrows, spaced at regular intervals across 20 m, are cut into several of the smaller middens. Other areas exhibit a thin distribution of shell, as if a shell midden had been systematically demolished and strewn about. These are curious features, since no antebellum field is recorded in this area.

The single test pit (0.50 $m^3$) produced 21 diagnostic sherds, 62 percent of which date to the Wilmington period, while one-third are diagnostic of the Irene period.

We analyzed all available *Mercenaria*, finding that eight (of nine) had been harvested during the $O_{1-2}$ growth stage and the last one during the $T_1$ interval. Comparing these zooarchaeological results with the modern control sample, we conclude the hard clams we analyzed were harvested mostly during the wintertime. Sea catfish (Ariidae) remains were recovered at 9Li201, indicating probable occupation between April and October.

### 9Li186 (AMNH-430; Transect H-6)

9Li186 is a small site, located 325 m east of Persimmon Point Road and 30 m from the southern margin of Transect H-6. Two mounds of densely packed shell, situated about 5 m apart, were at this site. The ceramic assemblage from the four test pits (1.80 $m^3$) consists of 216 sherds. Of the 176 diagnostics, 52 percent date to the Altamaha period and 35 percent to the Irene period.

A random sample of *Mercenaria* ($n = 25$) selected from the Irene period component shows an extremely consistent pattern: Clams were harvested primarily during the winter and/or early spring.

### Rice Field 2 (9Li185; AMNH-429; Transect H-6)

This small site, located in Rice Field, is 200 m west of a small canal and 500 m east of the marsh. The midden consists of a dense, buried shell deposit. The ceramic evidence from the two test pits (0.90 $m^3$) consists of eight diagnostic sherds, 75 percent of which date to the St. Catherines period.

A random sample of 25 *Mercenaria* was selected from Test Pit I (0–30 cm), II (0–30 cm), and III (all levels), as these proveniences contain only St. Catherines period materials. Analysis of this sample demonstrates an extraordinarily consistent incremental pattern and suggests a single wintertime harvest.

### Rice Field 1 (9Li184; AMNH-428; Transect H-6)

9Li184, also in Rice Field, is located in a mixed oak and pine forest. This small site is 75 m west of Rice Field Road. The two test pits (0.50 $m^3$) produced 10 diagnostic sherds, 6 of them dating to the Refuge period; the other 4 sherds are Wilmington Plain:

Test Pit I (0–10 cm):

(Beta-217222, *Mercenaria*): 1490 ± 50 B.P. cal A.D. 660–900

The following sherds were recovered from Test Pit I at 9Li184: 0–10 cm, Deptford Complicated Stamped (4), sand tempered (1), Wilmington Plain (4); 10–20 cm, Deptford Complicated Stamped (1); 20–30 cm, Deptford Complicated Stamped (1), grit tempered (1). Beta-217222 appears to be associated with the Wilmington period occupation, which overlies a Deptford period component.

The single analyzed *Mercenaria* was harvested during the winter.

### South New Ground Field 1 (9Li187; AMNH-432; Transect H-6)

This small site is located 30 m east of State Road inside South New Ground Field, now vegetated in mixed pine and oak forest. Two small mounds are present, separated by about 25 m. Only a single test pit was excavated, intersecting a single shell-filled pit, roughly 60 cm in diameter, and extending 65 cm below the present surface. No diagnostic sherds were recovered in the single test pit (0.65 $m^3$).

A single radiocarbon date is available from Test Pit I (10–20 cm) at 9Li187:

(Beta-183636, *Mercenaria*): 1610 + 50 B.P. cal A.D. 550–780

The following sherds were recovered from Test Pit I at 9Li187: 10–20 cm, sand + grit tempered (3). This $^{14}C$ date suggests that 9Li187 dates to the Wilmington period.

The unusually clear-cut pattern of growth increments evident in the 23 available clams shows that the *Mercenaria* were likely harvested exclusively during the winter.

### McLeod Field (9Li188; AMNH-433; Transect H-6)

This small site was disturbed by the boundary ditches delimiting McLeod Field. The shell midden is buried at a depth of roughly 20 cm. A single test pit was excavated here and revealed only a thin shell lens. No diagnostic sherds were recovered in the single excavated test pit (0.40 $m^3$).

Analysis of the 10 available *Mercenaria* demonstrates that the clams were collected during the winter and early springtime.

### 9Li253 (AMNH-528; Transect H-6)

This medium-sized site was undetected in the regular survey, but found in conjunction with the systematic shovel testing of Transect H-6. Thirty diagnostic sherds were recovered, all of them diagnostic of the Refuge period. Shell was almost completely absent and no clams were recovered from this site.

### Davy Field 2 (9Li254; AMNH-529; Transect H-6)

This very thin buried shell lens was also discovered by systematic shovel testing. It lies within Davy Field, immediately east of Back Creek Road. Single diagnostic sherds from the Wilmington and St. Simons periods were recovered. No *Mercenaria* were recovered.

### Davy Field 1 (9Li189; AMNH-434; Transect H-6)

This large site is located in Davy Field, 100 m east of Back Creek Road, in an area of mixed oak and pine forest. Several areas of concentrated subsurface shell deposits occur here, in a linear alignment roughly parallel to the marsh edge (although the shell does not extend all the way to the coast). The seven test pits (1.70 $m^3$) contained diagnostic Irene period sherds, in addition to a number of Savannah Check Stamped sherds.

Two radiocarbon dates are available from 9Li189:

Test Pit I (0–10 cm):

(Beta-215815, *Mercenaria*): 830 ± 50 B.P. cal A.D. 1300–1470

The following sherds were recovered from Test Pit I at 9Li189: 0–10 cm, Irene Complicated Stamped (2), Savannah Check Stamped (1), Irene (1); 10–20 cm, Irene Complicated Stamped (1).

Test Pit II (10–20 cm):

(Beta-215814, *Mercenaria*): 580 ± 60 B.P. cal A.D. 1470–1700

The following sherds were recovered from Test Pit II at 9Li189: 0–10 cm, Savannah Check Stamped (6); 10–20 cm, Savannah Check Stamped (1); 20–30 cm, Savannah Check Stamped (3).

Both of these statistically distinct radiocarbon determinations date to the Irene period, as defined in the St. Catherines Island chronology (chap. 15).

Analysis of the seven available *Mercenaria* demonstrates that three clams were harvested during the winter and another likely harvested during the summer/fall. The presence of sea catfish remains further indicates an occupation sometime between April and October, as does the presence of unfused deer actebular fragments, which indicates late summer/early fall harvesting.

## Transect H-1

Transect H-1 begins at Persimmon Point road, traverses Rice Field, and crosses near Wamassee Pond. The transect then runs through South New Ground Field, crosses Back Creek Road, bisects Nigger Field, and ends up off the island core in the marshes of McQueens Inlet.

Transect H-1 runs through the middle of the Cunningham Mound group (Thomas and Larsen, 1979; see also chap. 24, this volume). McLeod, Cunningham C, and Cunningham D lie immediately to the north; South New Ground Mound, Cunningham A, and Cunningham B are located within 300 m of the southern margin. Cunningham Mound E lies in the middle of Transect H-1, immediately to the east of Back Creek Road.

Excluding the mortuary sites mentioned above, we encountered 11 previously unrecorded archaeological sites in Transect H-1.

### 9Li210 (AMNH-475; Transect H-1)

This large site contains several large mounded shell middens and is located in the far western portion of Transect H-1. It extends from the marsh edge eastward across Wamassee Road (approximately 60 m east–west). The ceramic assemblage from the six test pits (2.60 $m^3$) consists of 285 sherds, 94 of them diagnostic. Of these, 67 percent of these can be attributed to the Altamaha period (and possibly the Irene period as well). Site 9Li210 has been utilized sporadically since Deptford times, and the ceramic evidence does not allow definition of a secondary component.

Analysis of all available *Mercenaria* demonstrates that clams were harvested throughout the year.

### Wamassee Pond (9Li224; AMNH-493; Transect H-1)

This small scatter of subsurface shell is just south of Wamassee Pond, about 30 m west of Wamassee Road. It is within Rice Field, today covered by pine and Bermuda grass. 9Li224 is the only known site to exist on Ellebelle loamy sand, a very poorly drained soil common to depressions, bays, and large drainage ways.

The ceramic assemblage from the two test pits (0.70 $m^3$) consists of 19 sherds, all of them temporally diagnostic, and 60 percent are Wilmington Cord Marked. Although three St. Catherines period sherds were also present, we judge this insufficient evidence to define a secondary component at 9Li224.

No *Mercenaria* were recovered.

### South New Ground Field 4 (9Li223; AMNH-492; Transect H-1)

9Li223 is a medium-sized, discontinuous scatter of surface and buried shell midden. The site extends the full 100-m width of the transect for at least 30 m north–south and is completely contained within South New Ground Field.

The ceramic assemblage recovered in the the four test pits (1.60 $m^3$) consists of 46 potsherds. Of the 26 diagnostics, 81 percent date to the Refuge-Deptford period.

Analysis of the available 24 *Mercenaria* from exclusively Refuge-Deptford contexts (Test Pits I, II [0–20 cm levels only], III, and IV) indicates that clams were harvested in almost equal proportions during the winter and early spring.

### South New Ground Field 3 (9Li222; AMNH-491; Transect H-1)

This small site is only 20 m in diameter and consists of a shallow, buried shell lens. It is located in South New Ground Field, approximately 45 m east of State Road. A single Irene Complicated Stamped sherd was recovered from the two test pits (0.80 $m^3$). McLeod Mound stands about 200 m to the northeast.

All of the available *Mercenaria* were harvested during the winter, while the presence of sea catfish remains suggests an occupation sometime between April and October. It is curious that such a small site should indicate year-round procurement. Perhaps this is actually two separate field camps, a small (but seasonally permanent) outpost, or even an outlier of a much larger site?

### South New Ground Field 2 (9Li221; AMNH-490; Transect H-1)

This medium-sized scatter of surface shell and dense buried shell lens is inside South New Ground Field, 100 m east of State Road. The ceramic evidence from the three test pits (1.10 $m^3$) consists of 39 potsherds, all of them dating to the Wilmington period.

As at 9Li220, the *Mercenaria* from this site are extremely fragile, and several have ambiguous patterning, making them difficult to interpret. A random sample of 25 indicates that most (15 of 24) clams were collected during the winter, 6 during the early spring, and 3 during the summer/fall. The presence of sea catfish remains also indicates an occupation sometime between April and October.

### 9Li220 (AMNH-489; Transect H-1)

The large site consists of an irregular distribution of surface shell, with some buried deposit. Spanning the width of the 100-m transect, 9Li220 straddles the eastern boundary ditch of South New Ground Field. Back Creek Road lies approximately 300 m further to the east, and South New Ground Mound lies about 200 m due south.

The ceramic assemblage recovered from four test pits (1.4 $m^3$) consists of 63 diagnostic sherds, 89 percent of them from the Wilmington period and the rest are Deptford diagnostics.

Two $^{14}$C determinations are available from 9Li220:

Test Pit II (0–10 cm):

(Beta-21401, *Mercenaria*): 1680 ± 70 B.P. cal A.D. 420–720

Test Pit II (10–20 cm):

(Beta-21400, *Mercenaria*): 1810 ± 70 B.P. cal A.D. 270–620

The following sherds were recovered from Test Pit II at 9Li220: 0–10 cm, Wilmington Heavy Cord Marked (7), Wilmington, shell scraped (2); 10–20 cm, Wilmington, sandy (1), Wilmington Cord Marked (2). These two determinations are statistically indistinguishable at the 95 percent level ($t$ = 1.515). The two-sigma mean is cal A.D. 400–620, which corresponds to the Wilmington period diagnostics recovered in Test Pit II.

A random sample of 25 *Mercenaria* indicates that 16 (of 23) clams were taken during the winter, 5 during the early spring, and 2 in the summer/fall. We should note, however, that these samples were difficult to analyze, as the seasonal bands were almost obscured (perhaps because environmental conditions were different during this time period or perhaps because of postdepositional decay). The presence of sea catfish remains indicates an occupation sometime between April and October.

### 9Li219 (AMNH-488; Transect H-1)

This large site, consisting of several isolated buried shell lenses, is about 175 m southeast of 9Li220, with Cunningham Mound E located about 200 m due east.

No ceramics were recovered in the single test pit excavated (0.30 $m^3$). All of the available seven *Mercenaria* were harvested during the early springtime.

### 9Li218 (AMNH-487; Transect H-1)

This surface and subsurface scatter of shell extends over an area approximately 40 cm in diameter. This medium-sized site is located about 160 m west of Back Creek Road and just 50 m west of the Cunningham E burial mound (Thomas and Larsen, 1979).

Only five diagnostic sherds were recovered from the three test pits (0.90 $m^3$) excavated, and all of them were manufactured during the Irene period. The available *Mercenaria* demonstrate that 10 (of 12) clams were collected during winter; the other two were harvested in early spring.

### 9Li215 (AMNH-484; Transect H-1)

Located in Nigger Field, this small site consists of a light concentration of subsurface shell, amidst a mixed forest of oak, hickory, and pine with an understory of saw palmetto. It is located in the middle of this transect, 100 m east of Back Creek Road. The ceramic assemblage from the two test pits (0.80 $m^3$) consists of seven diagnostic sherds, all but one dating to the Wilmington period.

Analysis of available 12 *Mercenaria* demonstrates that 5 clams were likely collected during the winter, 3 during the summer/fall, and 3 more during the spring. The presence of sea catfish remains also indicates occupation sometime between April and October.

### 9Li216 (AMNH-485; Transect H-1)

This medium-sized site is located about 50 m west of the marsh, on the edge of Nigger Field. 9Li216 consists of a slight surface shell scatter evident near tree roots and a slight mound of shell. The dimension are 10 m north–south × 8 m east–west.

The ceramic assemblage recovered from the three test pits (1.10 $m^3$) consists of 57 potsherds, 32 of them temporally diagnostic. Of these, 75 percent date to the Irene period.

Two radiocarbon dates are available from 9Li216:

Test Pit I (20–30 cm):

(Beta-217228, *Mercenaria*): 830 ± 40 B.P. cal A.D. 1310–1460

Test Pit I (30–40 cm):

(Beta-217229, *Mercenaria*): 670 ± 50 B.P. cal A.D. 1440–1630

The following sherds were recovered from Test Pit I at 9Li216: 0–10 cm, Irene Complicated Stamped (6), Irene Plain (1), Irene Burnished Plain (1); 10–20 cm, Irene Complicated Stamped (3), Irene Incised (4), Irene Burnished Plain (1); 20–30 cm, Irene Burnished Plain (2), St. Simons Plain (1); 30–40 cm, St. Simons Plain (5). These two dates are significantly different (at the 0.95 level, $t = 4.70$), but both are clearly associated with Irene ceramic diagnostics, and the estimated age ranges fall within the Irene period of the St. Catherines chronology.

A random sample of *Mercenaria* from the Irene component (the 0–20-cm levels of Test Pits I, II, and III) demonstrates that 19 (of 24) clams were harvested during the winter, 3 more during the summer/fall, and 2 during the spring. The presence of sea catfish remains also suggests occupation sometime between April and October.

### 9Li217 (AMNH-486; Transect H-1)

Along the boundary of Nigger Field, 9Li217 is a small site with only a slight concentration of surface shell. It is located 50 m west of the marsh, about 50 m north of 9Li216. Only a single test pit was excavated (0.90 $m^3$), but it reached a depth of 75 cm below the surface and may contain refuse from a single episode. All of the 41 potsherds recovered appear to derive from a single Wilmington Plain vessel.

A single $^{14}C$ determination is available from 9Li217:

Test Pit I (20–30 cm):

(Beta-21402, *Mercenaria*): 1880 ± 90 B.P. cal A.D. 140–590

The following sherds were recovered from Test Pit I at 9Li217: 20–30 cm, Wilmington Plain (4), Wilmington, brushed or shell scraped (4); 30–40 cm, Wilmington Plain (1); 40–50 cm, Wilmington, brushed or shell scraped (4); 50–60 cm, Wilmington Plain (5), Wilmington, brushed or shell scraped (1); 60–70 cm, Wilmington Plain (8), Wilmington, brushed or shell scraped (4); 70–80, Wilmington Plain (23), Wilmington, brushed or shell scraped (13). Beta-21402 is clearly associated with Wilmington ceramics, and the age range corresponds to the early Wilmington period (as defined in the St. Catherines chronology).

A random sample of *Mercenaria* demonstrates that 17 (of 22) hard clams were harvested during the winter and in the early springtime.

## Transect I-6

Transect I-6 begins at Wamassee Head, where Wamassee Creek intersects the island core, near the outlet of the freshwater creek that flows to the southwest out of Wamassee Pond. After traversing Middle Road, the transect crosses the northern margin of Briar Field, crosses State Road and enters South New Ground Field. At Back Creek Road, Transect I-6 runs along the southernmost margin of Nigger Field and crosses the marsh to a long, narrow peninsula that juts out into McQueens Inlet.

Figure 20.11 shows the relationship of Transect I-6 to the various archaeological sites at Wamassee Head. The westernmost part of this transect contains the previous test pits excavated by the University of Georgia in 1969 and 1970. Immediately to the south of the freshwater creek draining Wamassee Pond is Fallen Tree midden, an area also explored by the University of Georgia. About 200 m inland from Wamassee Creek is the block excavation conducted by Lewis Larson in the 1950s. Although the exact location of Larson's excavation was unknown at the time of the transect survey, subsequent remote sensing by Jack Alan May determined the exact location (see chap. 26), which is plotted on figure 26.11. Each of these excavations encountered portions of the Guale Indian village situated along the southern margin of Mission Santa Catalina de Guale. Our subsequent investigations have defined the locations of several mission period structures, including the mission church, two (superimposed) conventos, and the kitchen. Each of these structures is located within 300 m of the northern margin of Transect I-6. We also plot the 1-ha reconnaissance "quads" (denoted by Roman numerals) that were utilized during subsequent exploration of Mission Santa Catalina de Guale (Thomas, 1987).

Further east, Transect I-6 encountered the southern margin of the Cunningham Mound group, with Cunningham Mound A situated approximately 100 m from the northern margin of the transect.

We recorded 11 archaeological sites in Transect I-6 (excluding the burial mounds mentioned above).

### Wamassee Head (9Li13; AMNH-208; Transect I-6)

Located on the marsh side of the island and immediately to the north of Wamassee Creek is perhaps the largest archaeological site on St. Catherines Island.

As discussed elsewhere (chap.1, this volume; see also Thomas, 1987: 103–107), we believe that Lewis Larson was the first archaeologist to conduct first-hand research in this area. In 1952, as part of the Georgia Historical Commission's examination of potential 16th/17th century Spanish mission sites, Larson visited St. Catherines Island (1952: 2; see also Larson 1953: 11, 31) and lists "Wamassee Head on St. Catharines as the location of Santa Catarina de Guale." He notes this site as being among

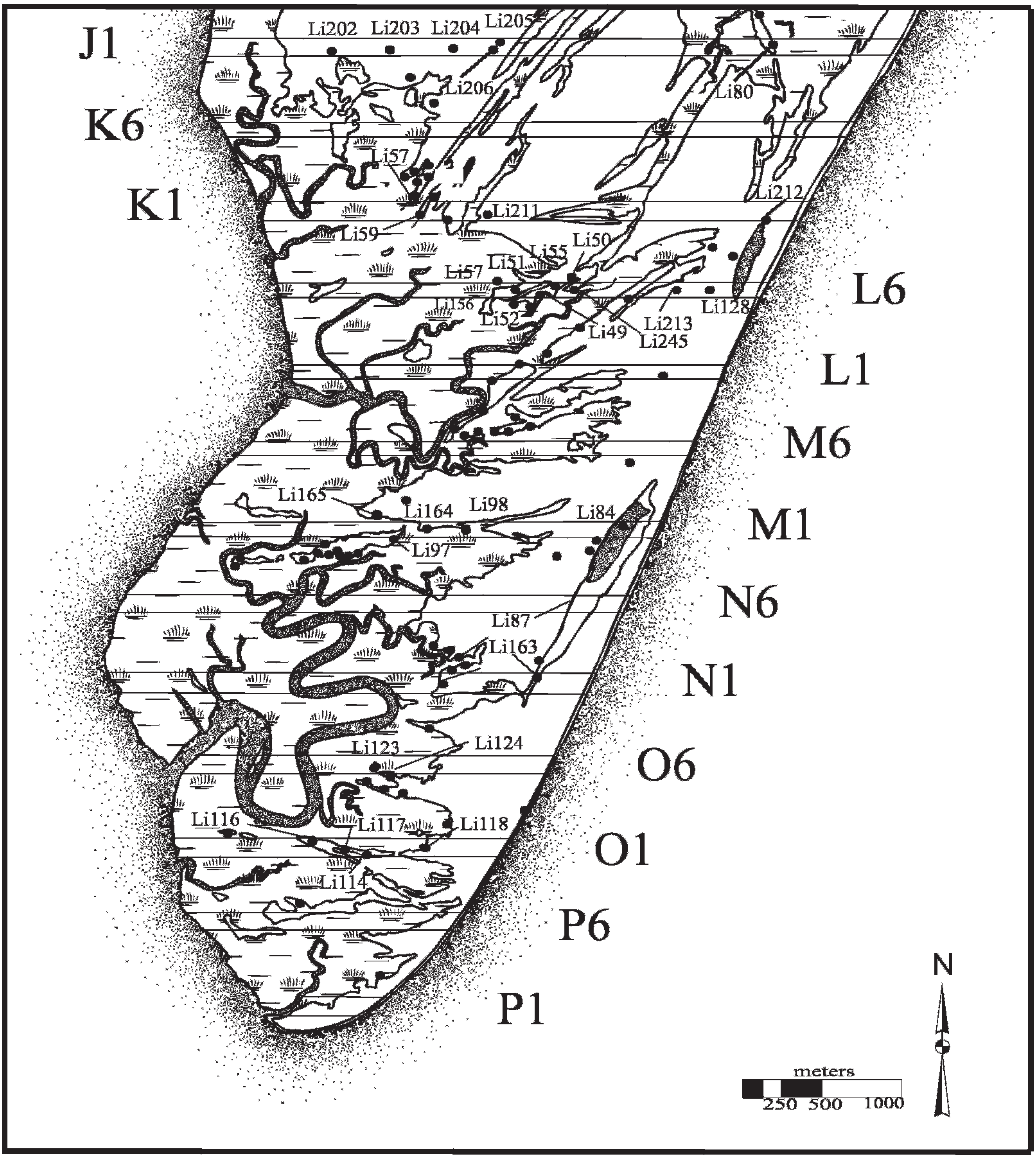


Fig. 20.11. Distribution of archaeological sites located on the southern end of the Island-wide transect survey of St. Catherines Island.

the "good candidates for the location of a mission," but warns that "no final and conclusive identification of a mission site can be made until adequate excavation … has been undertaken."

On August 12, 1952, Larson prepared site form Li13 (formerly listed as Lb8), reporting "a series of shell mounds [that] ranged along the marsh edge [of Wamassee Head]. They are approximately 3′ high and 50′ in diameter." Larson reports recovering Spanish and aboriginal sherds from 9Li13.

Three years later, this site was independently "rediscovered" by Mr. John W. Bonner, Jr. and Ms. Carroll Hart, who were retained by Mr. Edward John Noble to prepare a historical overview of St. Catherines

Island (Hart and Bonner, 1956). Apparently unaware of Larson's previous investigations in the area, Bonner and Hart worked southward from Persimmon Point. Noting several of the dense shell middens in this area, they were extraordinarily impressed with the quantities of historic period ceramics washing from the freshwater cutbank at Wamassee Head (John Bonner and Gaffney Blalock, personal commun.). They photographed and collected several majolica and olive jar fragments, correctly surmising that Mission Santa Catalina de Guale was buried somewhere in the Wamassee Creek area.

Lewis Larson returned to Wamassee Head in July–August of 1959 to explore the area in more detail. In his surface collection, he recovered 40 majolica sherds and 82 olive jar fragments (Brewer 1985: 18). Larson's block excavation, which covered 950 square feet, was located roughly 100 m south of the freshwater creek and less than 200 m east of the bluff along the tidal marsh (and we include a discussion of Larson's findings with the Fallen Tree site, below; see also chap. 22 for the results of more recent excavations at this site).

In April 1965, John W. Griffin (then Staff Archaeologist for the National Park Service) visited St. Catherines Island. Familiar with Larson's previous work, Griffin assembled the information necessary to nominate Mission Santa Catalina de Guale as a Registered National Historic Landmark (Griffin, 1965a, 1965b), correctly pinpointing the location of the mission site as somewhere near Wamassee Head.

Largely as a result of Griffin's report to the Noble Foundation, Joseph Caldwell (University of Georgia) conducted three summer field schools (1969–1971) on St. Catherines Island. This fieldwork included excavations in the Wamassee Head area and water-screening of numerous specimens eroding from the margin of the freshwater stream draining Wamassee Pond (recovering olive jar and majolica fragments, a number of pieces of Spanish-period iron, and several dozen glass trade beads). In his unpublished field notes, Caldwell speculated:

> On the north side of the site test excavations A, B, D and E all yielded Deptford III Period pottery in the lower levels. A radiocarbon determination for Deptford III from Excavation B was 490 A.D. +/– 90 years (UGA 116) and fits nicely in our Coastal sequence. [We discuss these excavations later in this section.]
>
> On the south side of the site the lower levels of the Fallen Tree shell midden shows a distinctive protohistoric pottery complex which we have named Fallen Tree. [The Fallen Tree excavations will be discussed in chap. 26.]
>
> Blanketing the entire site … are pottery and artifacts of the Spanish Mission Period. There is no reason to believe, at present, that this is not the site of mission Santa Catalina. So far, however, our excavations have yielded little structural detail. (Caldwell, 1970)

Figure 20.12 shows the distribution of archaeological sites and antebellum fields near Wamassee Head. For present purposes, we concentrate on the archaeology of 9Li13, part of which falls into Transect I-6.

The University of Georgia excavations at Wamassee, begun in July 1969, proceeded in a series of 10-foot squares.[9] Caldwell processed two $^{14}C$ determinations from their excavations at 9Li13. These raw determinations are taken from Caldwell (1970), and are then calibrated according to criteria developed in chapter 13.

One date comes from excavation A (20 cm below the surface):

(UGA-120, *Crassostrea*): 880 ± 80 B.P. cal A.D. 1200–1490

This date clearly derives from the Irene period occupation of Wamassee Head (and we note that some Altamaha series sherds were recovered in the top level of this unit).

A second date was processed on an oyster shell specimen recovered in Caldwell's Excavation B:

(UGA-116, *Crassostrea*): 2070 ± 70 B.P. cal 30 B.C.–A.D. 340

This date appears to be associated with the Deptford III occupation of 9Li13.

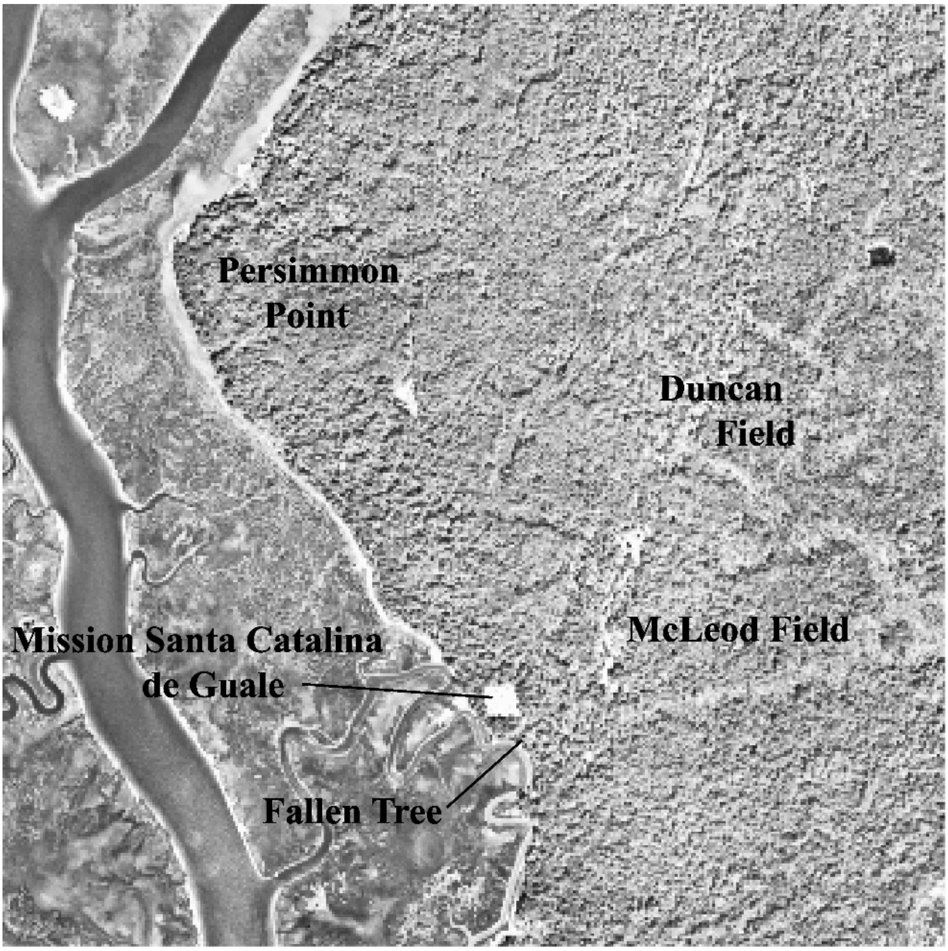


Fig. 20.12. Distribution of archaeological sites located at Wamassee Head, St. Catherines Island.

As noted above, Caldwell's excavation at Wamassee Head sheds some light on the long-standing problem of clay-tempered and check-stamped sherds (Caldwell and Waring, 1939a; DePratter, 1991: 7). Working from the large sample recovered in several excavations at 9Li13, Caldwell (1971) used the term "Deptford III" to classify the clay-tempered sherds that had been check stamped or complicated stamped, suggesting that the Deptford III period spanned the transition between the Deptford and Wilmington periods. DePratter (1979a) subsequently renamed these types Walthour Check Stamped and Walthour Complicated Stamped and placed these types (with Wilmington Cord Marked and Wilmington Plain) into the Walthour period of the Wilmington period. This period is thought to date A.D. 500–A.D. 600 (expressed in uncorrected $^{14}C$ years). Testing here as part of the systematic Island-wide survey (in March 1978), our crews dug a series of 1-$m^2$ test units. These were positioned adjacent to the previous University of Georgia excavations in order to obtain clam samples for use in the seasonal dating studies (see chap. 17). The ceramic evidence from these five test pits (2.85 $m^3$) generated ceramics from all time periods, though more than 80 percent of the sherds recovered from our excavations at 9Li13 derive from the protohistoric Altamaha period of Mission Santa Catalina de Guale (Thomas, 1987). The 1978 excavation team also added a concrete marker (labeled "AMNH-208D") at the southern end of the 1969 "D" excavation.

In April 1986, the American Museum of Natural History returned to 9Li13 to map and plot all previous excavations and explorations in the area. Working with the available field notes and unpublished reports, we were able to reconstruct the following:

**Square A**: This somewhat irregular excavation, originally dug by the University of Georgia about 15 years before, was clearly visible in 1986. The exposure is roughly 40 feet across the southern edge, oriented 40° west of north. Because of trees left in place during the excavation, it was difficult to determine the actual extent of excavation. To obtain samples for radiocarbon and seasonal analysis, we excavated a 1 m × 1 m test unit along the southern margin of Square A.

**Square B**: This excavation complex, clearly evident in 1986, consisted of three contiguous 10 foot × 10 foot squares, arrayed in an "L" shape, and oriented approximately 25° west of north. We excavated a contiguous 1 m × 1 m test unit along the western margin of Square B.

**Square C**: This operation consisted of two 10 foot × 10 foot excavation squares, located a few meters to the northeast of Square A.

**Square D**: This excavation, clearly visible on the surface, corresponds to "Mr. Lee's Unit" in the University of Georgia field notes. The 10 foot × 10 foot excavation square was oriented 10° west of north. We excavated a 1 m × 1 m square on the southern border and established a subsequent grid system for excavating Mission Santa de Guale. A coordinate marker was placed in approximately the center of the University of Georgia unit.

**Square E**: This relatively shallow excavation, barely visible in 1986, is northeast of Square D. It measures about 10 feet on one side and is oriented approximately 30° off north. The coordinate on the northwestern corner is N80, W54.

**Square F**: Although no field notes have been located, we believe that Square F was located immediately to the east, but with extant margins too indistinct to be mapped.

**Square G**: We failed to locate the University of Georgia square "G".

**Square I ("Kent's excavation")**: This test pit was located almost directly north of the fresh water creek, in line with the "corduroy bridge". The excavated area penetrated a thick shell midden, immediately adjacent to one of our test pits (dug in November of 1984). This was perhaps a 10 foot × 10 foot excavation, but it is possible to plot only approximate coordinates.

As a direct outgrowth of the Island-wide survey, we discovered the exact location of several mission-period structures in 1981—including the church, the convento(s), and the mission kitchen (see Thomas, 1987, for a complete discussion of this find). To clear up the chronology of the Wamassee Head area, we returned to Caldwell's previous excavations to collect additional $^{14}C$ samples.

Working in the exposed sidewall of Square I, we remove several radiocarbon samples from our Test Pit I:

Square I, Test Pit I (0–10 cm):

(Beta-20802, *Mercenaria*): 580 ± 60 B.P. cal A.D. 1470–17090

Square I, Test Pit I (40–50 cm):

(Beta-20811, charcoal): 360 ± 60 B.P. cal A.D. 1440–1650

Square I, Test Pit I (40 cm):

(Beta-20803, *Crassostrea*): 1670 ± 80 B.P. cal A.D. 20–400

Square I, Test Pit I (50 cm):

(Beta-20804, *Mercenaria*): 820 ± 70 B.P. cal A.D. 1290–1500

The following sherds were recovered from Test Pit I (adjacent to UGA's Square I) at 9Li13: 0–10 cm, Irene stamped or Altamaha (2), sand + clay eroded (1); 10–20 cm, Altamaha Line Blocked Stamped (6), sand + grit plain (1); 20–30 cm, Altamaha Line Blocked Stamped (10), Altamaha Incised (3), Altamaha Check Stamped, grit + sand eroded (1); 30–40 cm, Altamaha Line Blocked Stamped (12), Irene Burnished Plain (1); 40–50 cm, Altamaha Line Blocked Stamped (4), Altamaha, eroded (1); 50–60 cm, Altamaha Line Blocked Stamped (10), Altamaha Incised (1), grit, decorated (1); 60–70 cm, Altamaha Line Blocked Stamped (3), sand, plain (4).

The two shell dates, UGA-120 and B-20804, are statistically the same (at 95%), with a mean age of cal A.D. 1300–1460, though this composite age seems too ancient to be associated with contact period material. The charcoal date, Beta-20811, is slightly later (and in better accord with the associated mission period ceramics).

A second date was processed on an oyster shell specimen recovered in Caldwell's Excavation B:

(UGA-116, *Crassostrea*): 2070 ± 70 B.P. cal 30 B.C.–A.D. 340

This date appears to be associated with the Deptford III occupation of 9Li13.

Excluding the materials recovered by the University of Georgia, the aboriginal ceramic assemblage from Wamassee Head consists of 5012 potsherds (see table 20.6). Of these, 3367 are considered to be time diagnostic at 9Li13. Some 2835 (84%) of these are Altamaha Line Block Stamped. Because Irene Plain and Irene are virtually absent, we can confidently assign 9Li13 to the Altamaha period, which saw the rise and fall of Mission Santa Catalina de Guale. This abundant ceramic evidence, however, likewise documents that the utilization of this area began during the St. Simons period.

A total of 265 Euro-American sherds were recovered in the testing of 9Li13 (a small sample of the much larger sample recovered from the extensive excavations at Mission Santa Catalina, to be discussed in a subsequent monograph): 1 glazed coarse earthenware, 227 olive jar fragments, 21 glazed olive jars, 1 El Morro, 2 black lead glazed earthenwares, 4 Columbia Plain, 2 Savilla Blue on White, 2 Fig Springs Polychrome, 1 Ichtucknee Blue on White, 1 Aucilla Polychrome, and 3 miscellaneous white majolica. Red filmed aboriginal ceramics were also recovered.

Most of the recovered vertebrate faunal remains are associated with the mission period component at 9Li13. Although most of these bones are deer, two domestic pigs were also recovered from these excavations.

We sectioned and analyzed 40 *Mercenaria* from the upper (historic-period) component of this important site, and the relative proportions of the growth increments are discussed in chapter 17. A total of 45 percent (18 of 40) of the analyzed clams had been harvested in the $O_{1-2}$ growth stage (probably mid-December through mid-March), 15 percent were harvested in the $O_3$ increment (early springtime), 15 percent in the $T_1$ increment (late springtime), and 25 percent during the $T_{2-3}$ increment (probably between mid-March and mid-May). The presence of unshed deer antlers suggests an occupation sometime between November and February, and sea catfish remains further confirm occupation sometime between April and October.

### Fallen Tree (9Li8; AMNH-441; Transect I-6)

Located along the western margin of Briar Field, this large site extends at least 40 m east of Wamassee Road (which cuts through the site), and west from the road to Wamassee Creek. From the cut-bank north along the creek, this site extends along the southern margin of Mission Santa Catalina de Guale (fig. 20.11).

Lewis Larson conducted a block excavation about 150 m northeast of 9Li8 (Brewer, 1985; see also discussion in chap. 26, this volume), and excavated immediately to the south of the freshwater creek bordering Santa Catalina de Guale mission. Larson recovered a broad range of aboriginal occupations and Brewer (1985) reports that these excavations recovered 3732 aboriginal sherds; most were "San Marcos wares" (more commonly termed Altahama Line Block Stamped in Georgia's northern coastal chronology; see chap. 26 for a reconsideration of this collection). Roughly 100 sherds date to the Deptford, Wilmington, Savannah, and Irene periods. Majolica includes Columbia Plain, Columbia Plain, La Vega Blue on Blue, Ichtucknee Blue on Blue, Fig Springs Polychrome, St. Luis Blue on White, and Puebla Polychrome. A possible El Morro sherd was also recovered, as were hand-wrought nails, iron pins, glass fragments, a lead ball, a blue glass bead, and a brass finger ring.

The dense shell midden extends for about 200 m along the marsh and is exposed in the steep cutbank. The University of Georgia excavations from August 1969 were clearly evident during the Island-wide survey; their dimensions were apparently 5 feet × 25 feet, oriented 30° west of north. This material is included in the present analysis. As part of the Island-wide transect survey, we excavated five test pits (2.20 $m^3$) adjacent to the University of Georgia excavations. In March 1978, AMNH crews returned to Fallen Tree to take mollusk samples from the top 30 cm of the exposed eastern sidewall of the University of Georgia excavations. The present discussion includes all of these materials (estimating the total volume of fill excavated to be 5.2 $m^3$.[10]

Of the 1303 aboriginal sherds recovered during these operations at Fallen Tree, only 382 were considered to be period-diagnostic sherds—in part because 638 of these could only be classified as "grit tempered, decorated". Of the diagnostic sherds, 319 are Altamaha Line Block Stamped and clearly define the mission-age occupation at 9Li8. A few historic period sherds of European manufacture were recovered as well (see table 20.4).

A random sample of 25 *Mercenaria* demonstrates that most clams (13 of 19) were harvested during the summer/fall and the rest during the winter. The recovered vertebrate faunal sample includes domesticated pig and chicken (Reitz and Dukes, chap. 27). The majority of the individual faunal remains were fishes, with hardhead catfish more abundant than other fishes (reinforcing a summertime occupation). The presence of deciduous lower third premolars may suggest that juvenile deer were harvested in late summer or early spring.

### South New Ground Field 7 (9Li195; AMNH-443; Transect I-6)

This medium-sized site occurs immediately to the south of South New Ground field, near State Road (which undoubtedly disturbed part of 9Li195). A very thin, but dense shell lens is buried at a depth of 15–20 cm and extends over a 50 $m^2$ area. The heaviest midden concentration occurs at the southern end of the site.

Of the 34 sherds recovered in the four excavated test units (0.85 $m^3$), only four were period diagnostic: three are Altamaha Line Block Stamped, and the other is Irene Plain. No seasonal data are available from 9Li195.

### 9Li196 (AMNH-444; Transect I-6)

Located about 215 m east of State Road, this large site consists of a long, low mound of subsurface shell that extends about 50 m atop a small ridge. The heaviest concentration of midden occurs at the southern end. Cunningham Mound A lies 130 m to the north.

Each of the four test pits (1.26 $m^3$) encountered a buried shell lens at a depth of 20–30 cm below the present surface. The ceramic assemblage consists of 42 sherds, 30 of them period diagnostic. Most ($n$ = 21) date to the Wilmington Plain and 8 more are "Wilmington misc".

Three radiocarbon dates are available from 9Li196:

Test Pit II (0–10 cm):

(Beta-217225, *Mercenaria*): 1670 ± 50 B.P.
cal A.D. 460–700

Test Pit II (10–20 cm):

(Beta-217226, *Mercenaria*): 1760 ± 50 B.P.
cal A.D. 390–650

Test Pit II (20–30 cm):

(Beta-217227, *Mercenaria*): 1830 ± 50 B.P.
cal A.D. 280–570

The following sherds were recovered from Test Pit II at 9Li196: 0–10 cm, Wilmington (2), clay tempered (1), Wilmington, sandy (6); 10–20 cm, Wilmington (3), sand + clay tempered (1); 20–30 cm, Wilmington (1), clay tempered (1); 30–40 cm, Wilmington (2), sand + clay tempered (1).

Although these three dates occur in appropriate stratigraphic sequence, they are statistically indistinguishable (at the 0.95 level, with $t$ = 4.05). The two-sigma pooled average is cal A.D. 420–630, which falls in the middle of the Wilmington period of the St. Catherines chronology and corresponds with the associated ceramics in Test Pit II.

A random sample of 25 *Mercenaria* was selected from the Wilmington component at 9Li196. Analysis shows that 9 were harvested during the summer/fall, 6 in the winter, and 10 in the early spring. Sea catfish were also harvested sometime between April and October. The presence of deciduous lower third premolars may suggest that juvenile deer were harvested in late summer or early spring.

### South New Ground Field 6 (9Li193; AMNH-440; Transect I-6)

Also located south of South New Ground Field, 9Li193 is merely a small shell lens buried 10–15 cm below the present surface; the midden may lie within a small pit or depression. The single test pit (0.3 $m^3$) contained one diagnostic sherd (Irene Complicated Stamped).

Analysis of all available *Mercenaria* shows that most (six of eight) were harvested during the winter, and the other two were harvested during the springtime.

### South New Ground Field 5 (9Li192; AMNH-439; Transect I-6)

This medium-sized site is 150 m west of Back Creek Road, in South New Ground Field. 9Li192 is a low, subtle shell mound that roughly trends north–south and is apparently separated into three distinct areas that span the 100-m width of the transect. The three test pits (0.80 $m^3$) produced a ceramic assemblage of 213 sherds, almost entirely Irene Complicated Stamped and Irene Plain ceramics (with occasional Savannah Plain sherds also present).

Two radiocarbon dates are available from 9Li192:

Test Pit I (10–20 cm):

(Beta-20824, *Mercenaria*): 790 ± 60 B.P. cal A.D. 1310–1560

The following sherds were recovered from Test Pit I at 9Li192: 0–10 cm, Irene Complicated Stamped (11), Irene Burnished Plain (2), Savannah Burnished Plain (2), Irene (1); 10–20 cm, Irene Complicated Stamped (3), Irene Burnished Plain (1), Irene (1); 20–30 cm, Irene Complicated Stamped (18), Irene Burnished Plain (1), Savannah Burnished Plain (5).

Test Pit III (20–30 cm):

(Beta-20825, *Mercenaria*): 820 ± 60 B.P. cal A.D. 1300–1490

The following sherds were recovered from Test Pit III at 9Li192: 0–10 cm, Irene Complicated Stamped (3), Irene Incised (40), Irene Burnished Plain (1), Savannah Burnished Plain (10); 10–20 cm, Irene Complicated Stamped (19), Irene Burnished Plain (4), Irene Savannah Burnished Plain (6), sand + clay cordmarked (1), sand tempered, incised + clay (1). 20–30 cm, Irene Complicated Stamped (11), Irene Burnished Plain (7), Irene (1), sand + clay cordmarked (1).

Beta-20824 and Beta-20825 are statistically indistinguishable (at the 0.95 level, $t = 0.105$). The two-sigma pooled estimate is cal A.D. 1320–1480, which corresponds to the Irene period of the St. Catherines chronology and is consistent with the ceramic associations from Test Pits II and III.

The seasonality study was restricted to Test Pits I and II, which almost exclusively contain Irene period ceramics. Analysis of the available *Mercenaria* shows that most clams (19 of 23) were harvested during the winter, with the rest collected during the early springtime. The presence of sea catfish remains also suggests an occupation sometime between April and October.

### 9Li191 (AMNH-438; Transect I-6)

9Li191 is located 20 m west of Back Creek Road. It is a small site that consists of a distinctive mound of undisturbed midden, with the heaviest concentration occurring at the center. The two test pits (0.60 $m^3$) produced a ceramic assemblage of 122 sherds; virtually all of the 108 diagnostics date to the Irene period.

A random sample of 25 *Mercenaria* demonstrates that two-thirds (15 of 23) of the specimens were collected during the winter, while the rest were taken during the spring.

### 9Li190 (AMNH-436 and -437; Transect I-6)

Located in the southern part of Nigger Field, this large site extends from roughly 20 m east of Back Creek Road to about 110 m east of the road. A sparse concentration of shell midden occurs about 25 cm below the surface, and a slight mounding of the middens is apparent. The heaviest concentration of midden occurs on the southern extension of the site.

AMNH-436 and 437 were recorded separately during our survey and they were independently tested. Because they lie within 100 m of one another, however, and both contain Irene ceramics, they were combined. The four test pits (1.0 $m^3$) yielded 132 potsherds; virtually all of the 120 diagnostics date to the Irene period.

We randomly sampled 25 *Mercenaria* from both AMNH-436 and AMNH-437. All growth increments are represented at 9Li191, and analysis shows the majority (30 of 41) of the clams were collected during the winter. Sea catfish were harvested sometime between April and October.

### 9Li160 (AMNH-407; Transect I-6)

This small concentration of shell has a diameter of 0.5 m. It does not extend inland and there were no cultural materials recovered.

### 9Li159 (AMNH-406; Transect I-6)

This small site is located on a northeastward trending spit, where shell was observed eroding from the bank. A single Irene Complicated Stamped sherd was found in the one excavated test pit (0.3 $m^3$). No *Mercenaria* were recovered.

### 9Li167 (AMNH-394; Transect I-6)

This small site, located along the southern margin of Transect I-6, is on the eastern shoreline of the long peninsula that extends to the northeast. 9Li167 is approximately 350 m east of Back Creek Road and has only a minor surface scatter of shell. The two test pits (0.80 $m^3$) contained only three diagnostic sherds, all Wilmington Cord Marked. All recovered *Mercenaria* were too eroded for seasonal analysis.

## Transect I-1

Transect I-1 begins in the marshland near Johnson Creek and runs eastward across State Road through Briar Field. After traversing State Road, the transect runs through Cunningham Field and crosses Campbell Road into Camel (Campbell) New Ground Field. After crossing Back Creek Road, the transect leaves the island core and intersects some of the earliest of the Holocene dune fields.

Located along the inner edge of the tidal creeks associated with McQueen's Inlet, the salt marsh is centuries old (as evident from on early historical maps); it overlies relict salt marshes, explored in vibracore studies conducted by H. B. Rollins along nearby Cracker Tom causeway. This area is near a pronounced meander of Back Creek, a moderately large tidal creek. Microenvironments include high and low marsh settings, ponded marshland, and well-developed tidal creeks. Barrens and sand flats occur on the high marsh, and stands of *Juncus* spp. grow here.

Four archaeological sites were recorded in Transect I-1.

### Shell Field 2 (9Li15; AMNH-473; Transect I-1)

In 1965, John Griffin briefly surveyed an area immediately to the north boundary of the western reach of Transect I-1. Calling this "Shell Field 2", Griffin made the following observations: "Extensive shell fields near the river. Land is quite flat and the site appears to be thin; may have had shell removed. Toward the south end of this site, Deptford period sherds were found. … [T]oward the north end, not far from Wamassee Head, San Marcos sherds of the mission period were found [discussed above as Fallen Tree midden (9Li8, AMNH-441)]" (Griffin 1965b: 9).

Our transect survey encountered this same large site, which contains concentrations of subsurface shell, also evident in the eroding cut-bank. It extends along the marsh for 100 m (width of the transect), and roughly 60 m west of Wamassee Road. Joseph Caldwell's map also shows the designation "Shell Field 2" in this area, but we have no indication that any excavations were actually conducted here.

The ceramic assemblage from the four test pits (1.40 $m^3$) consists of 90 sherds, 47 of them time diagnostic. Seventy-four percent of these date to the Refuge-Deptford period occupation of 9Li15. A lone Altamaha sherd was recovered, as were two glazed olive jar fragments (table 20.4).

In April 1987, we returned to AMNH Test Pit III, where shell samples had been previously collected in an attempt to date the Deptford-age occupation encountered here. Thomas' field notes record "some concern about this sample because later sherds occur higher in the profile. I have taken shells from the very bottom of the shell lens, along the south margin of the test pit. Although there are no old shells in this area, I am concerned that the Deptford sherds may come from the shell-less matrix at 40 cm."

The resulting $^{14}C$ date from Test Pit III (30–40 cm) at 9Li15 is:

(Beta-20812, *Crassostrea*): 2230 ± 70 B.P.
cal 250 B.C.–A.D. 150

The following sherds were recovered from Test Pit III at 9Li15: surface, Deptford Check Stamped (1), Deptford Linear Check Stamped (2), grit tempered (1), sandy grit tempered decorated (1); 0–10 cm, grit tempered simple stamped (2), grit tempered complicated stamped (1), clay tempered eroded (1); 10–20 cm, sand tempered eroded (2), grit tempered stamped (4); 20–30 cm, sand tempered eroded (1); 30–40 cm, Deptford Check Stamped (3). Beta-20812 falls into the temporal range of the Deptford period within the St. Catherines Island chronology and corresponds to the associated sherds recovered in Test Pit III.

Similar results prevail in additional radiocarbon samples processed from Test Pit I at 9Li15. Because of the concerns noted above, we also took $^{14}C$ samples from Test Pit I, where only Deptford-period sherds were recovered. These oyster shell samples were taken from (1) the bottom extent of the midden, along the northern wall and (2) the very top of the midden deposit cut by Test Pit I. Since the entire test pit contained Deptford potsherds, we hoped that the samples would bracket the time of occupation.

Test Pit I (0–10 cm):

(Beta-20814, *Crassostrea*): 2030 ± 60 B.P.
cal A.D. 40–370

Test Pit I (bottom of midden):

(Beta-20813, *Crassostrea*): 1970 ± 70 B.P.
cal A.D. 90–440

The following sherds were recovered from Test Pit I at 9Li15: 0–10 cm, Deptford Check Stamped (2); 10–20 cm, Deptford Complicated Stamped (1), Deptford, eroded (1); 20–30 cm, Deptford Check Stamped (1), Deptford Linear Check Stamped (1). Beta-20814 and Beta-20813 are statistically the same (at the 0.95 level, with $t = 0.365$). The two-sigma pooled average is cal A.D. 90–380, which falls in the late Deptford period of the St. Catherines Island chronology and corresponds to the ceramic assemblage recovered in Test Pit I at 9Li15.

A single Hernando projectile point (28.0/2443) was recovered from 9Li15. Bullen (1975) attributed Hernando points to the Deptford period, and both the ceramic and radiocarbon evidence confirm this assignment at 9Li15.

Analysis of the seven available *Mercenaria* from Refuge-Deptford contexts (Test Pits I, III, and IV) demonstrates that all individuals were harvested during the winter. Unshed deer antlers also suggest an occupation sometime between November and February, while recovery of sea catfish remains confirms an April through October presence.

### Cunningham Field (9Li209; AMNH-471; Transect I-1)

This large site consists of several deposits of subsurface shell and low mounds; it is located in Cunningham Field, 250 m west of Back End Cut Road, and just east of State Road.

Of the 60 recovered sherds, 49 diagnostic sherds were recovered from the four test pits (1.10 $m^3$) excavated. Fifty-nine percent of these date to the Wilmington period. The presence of Walthour Check Stamped and Walthour Complicated Stamps suggests an early Wilmington period component at 9Li209 (DePratter, 1991: table 1; see also chap. 14, this volume), and the recovered vertebrate faunal sample derives almost entirely from the Wilmington period levels. The secondary component is defined by the 10 sherds of St. Catherines Plain.

Analysis of the available ($n = 24$) *Mercenaria* recovered in primarily Wilmington period contexts (Test Pits I, II, and III) indicates that 18 (of 23) clams were harvested during the winter, although the other growth increments are represented as well. The presence of sea catfish remains provides evidence of occupation sometime between April and October.

### 9Li208 (AMNH-470; Transect I-1)

Located southwest of 9Li207, this large site lies between Cunningham and Camel New Ground fields. It may be part of same site complex as 9Li207.

The ceramic assemblage contained in the five test pits (1.80 $m^3$) consists of 179 potsherds. Virtually all of the 129 period-diagnostic sherds date to the Irene period, though several Savannah sherds were also present.

The available ($n = 24$) *Mercenaria* from the Irene component indicates that most (21 of 23) clams were harvested during the winter (single values were also likely taken during the late spring and summer/fall). The presence of sea catfish remains suggests an occupation sometime between April and October.

### Back Creek Village (9Li207; AMNH-467; Transect I-1)

This large site extends at least 75 m west of Back Creek Road. Numerous shell scatters are evident across the 100-m-wide transect, and midden seems to surround the depressed area, which may have been dug out to create a small lake. Several distinct shell mounds occur here, and test pits were excavated in each.[11]

The ceramic assemblage from five test pits (1.80 $m^3$) consists of 396 potsherds (232 of them period diagnostic), 87 percent of these diagnostic of the Irene period, and several Savannah sherds were also found.

An interesting aboriginal pipe bowl (decorated with a cross-in-circle motif) and a (historic period) kaolin pipe stem were found at 9Li207 (see chap. 21).

A random sample of 25 *Mercenaria* recovered in strictly Irene period contexts (Test Pit I) provides ample evidence of hard clam procurement during the winter and the late spring. Three specimens suggest that *Mercenaria* were also harvested sometime between mid-July and mid-November (as represented by the $T_{2\text{–}3}$ growth increment). Although Back Creek Village produced no evidence of an early springtime harvest of *Mercenaria*, the vertebrate remains indicate that sea catfish were procured sometime between April and October.

## Transect J-6

Transect J-6 runs across South End, Little Camel New Ground, and Cunningham Fields. Immediately to the east of Back Creek Road, this transect runs across a series of Holocene dunes and crosses onto Cracker Tom Hammock (see fig. 20.13). Not far from Transect J-6, Booth et al. (1999a) took three vibracore sediment samples at Cracker Tom Hammock (see also chap. 3).

In general, the late Pleistocene core of St. Catherines Island is dominated by alternating bands of poorly drained lowlands (largely host to the rapidly permeable Rutledge soil series) and the better drained Foxworth and Echaw series soils, with somewhat better agricultural potential. Antebellum fields were constructed on those areas with the highest agricultural productivity.

The southeastern portion of St. Catherines Island, which is comprised of accretionary Holocene-age dunes, follows a rather different pattern. The moderately well-drained sandy dune ridges and knolls contain mostly Fripp-Capers-Duckston and Centenary series soils. Interspersed between these areas of higher agricultural potential are the very poorly drained tidal marshes and swales (with their associated Bohicket series soils). No antebellum fields were constructed anywhere on the Holocene beach ridge complex.

In John Griffin's 1965 reconnaissance, he recorded another archaeological site ("Shell Field No. 1"), located about 100 m north of Transect J-6: "This site is at the north end of South Pasture and is marked by shell and sherds on the surface of the ground. There were a few sherds of the mission period and some shell tools. This site would hardly be suspected of being a major part of the mission site, but it may have been an outlying portion."

Two archaeological sites were recorded in Transect J-6.

### South End Field (9Li194; AMNH-442; Transect J-6)

Located in South End Field, 9Li194 is a large site that extends between Wamassee Road and the coastline (fig. 20.14). The scatter also extends eastward into Little Camel New Ground and Cunningham Fields. This area has been extensively plowed and was used most recently as pastureland. The densest portion of this archaeological site was heavily disturbed, apparently for building material used in the South End tabby buildings. This may be the southern extension of Griffin's Shell Field No. 1, but we cannot be certain without additional archaeological survey.

An assemblage of 111 potsherds was recovered from the excavation of six test pits (2.50 $m^3$). Forty-eight diagnostics were identified, 65 percent of which date to the Wilmington period and 20 percent of which belong to the Deptford period. In addition, we noted several pockets of isolated sherd concentrations from other periods.

Six $^{14}C$ determinations are available from 9Li194. The first derives from an oyster shell sample taken from the sidewall in April 1987 (nearly a decade after the unit had been excavated). Although several sherds were recovered from the previous excavation of this unit, Thomas' field notes record that numerous grit-tempered ("probably Irene") sherds were encountered removing the oyster shells from the sidewall.

Test Pit II (20–30 cm):

(Beta-20817, *Crassostrea*): 800 ± 60 B.P. cal A.D. 1310–1500

The following sherds were recovered from Test Pit II at 9Li194: 0–10 cm, Irene Complicated Stamped (1), Wilmington Plain (9); 10–20 cm, Wilmington Plain (2), sand + clay (1); 20–30 cm, Irene Complicated Stamped (2), Wilmington Plain (1), St. Simons Plain (1).

Two radiocarbon dates come from Test Pit IV at Li194:

Test Pit IV (0–10 cm):

(Beta-217223, *Mercenaria*): 1450 ± 40 B.P. cal A.D. 690–920

Test Pit IV (10–20 cm):

(Beta-217224, *Mercenaria*): 1440 ± 40 B.P. cal A.D. 700–940

The following sherds were recovered from Test Pit IV at 9Li194: 0–10 cm, Irene Complicated Stamped (3), clay tempered (1), sand + clay tempered (1), sand tempered (3), sand + grit, burnished plain (1); 10–20 cm, Irene Complicated Stamped (2), clay tempered (3), grit tempered (2); 20–30 cm, Deptford Cord Marked (3), St. Simons Plain (1), clay tempered (1), grit tempered (1); 30–40 cm, Deptford Cord Marked (5); 40–50 cm, Deptford Cord Marked (1). The two radiocarbon dates from Test Pit IV appear to date to the Wilmington/St. Catherines transition, but without clear-cut ceramic associations.

Three $^{14}C$ determinations are available from Test Pit V at 9Li194:

Test Pit V (20–30 cm):

(Beta-20818, *Crassostrea*): 1260 ± 90 B.P. cal A.D. 800–1220

Test Pit V (20–30 cm):

(Beta-218095, *Mercenaria*): 1340 ± 40 B.P. cal A.D. 810–1030

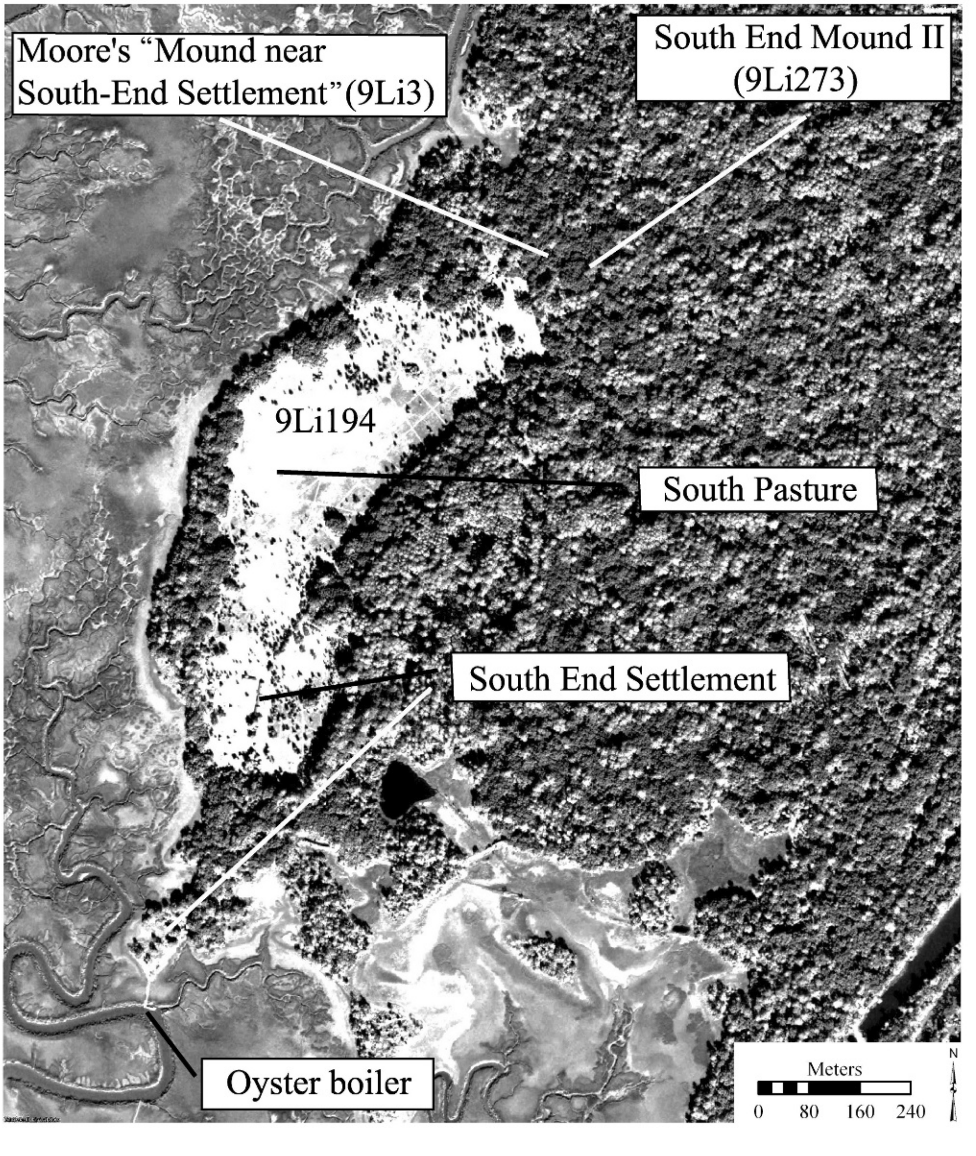


Fig. 20.13. Aerial photograph of the South End field area, along the southern end of the Pleistocene Island core of St. Catherines Island.

Fig. 20.14. Photograph of archaeological crew surveying South End Field in the late 1970s, near 9Li194. Note the two "slave trees" in the background.

Test Pit V (20–30 cm):

(Beta-218096, *Mercenaria*): 1280 ± 90 B.P. cal A.D. 780–1200

The following sherds were recovered from Test Pit V at 9Li194: 0–10 cm, Irene Complicated Stamped (2), grit tempered (1), sand + clay tempered plain (1); 10–20 cm, Irene Complicated Stamped (1), Irene (1), Savannah Burnished Plain (1), Wilmington Plain (4), Wilmington Incised (1); 20–30 cm, St Catherines Burnished Plain (2), Wilmington Plain (4), Wilmington Incised (1); 30–40 cm, Deptford stamped (1). The three radiocarbon dates from Test Pit V seem to be associated with St. Catherines period shell middens.

Analysis of the available 16 *Mercenaria* demonstrates that clams were harvested in roughly equal proportions during the summer/fall and winter.

### Cracker Tom Hammock (9Li214; AMNH-483; Transect J-6)

This large site, located on the northeastern margin of Cracker Tom Hammock, contains several small shell mounds, each roughly 6 m in diameter. The site extends from the marsh westward about 50 m, and runs at least 90 m north–south.

The ceramic assemblage from the six test pits excavated (1.50 $m^3$) consists of 133 sherds. Of the 69 diagnostics, 90 percent can be attributed to the St. Catherines period.

Two radiocarbon dates are available from 9Li214:

Test Pit IV (10–20 cm):

(Beta-183631, *Mercenaria*): 1260 + 60 B.P. cal A.D. 860–1170

Test Pit IV (30–40 cm):

(Beta-183632, *Mercenaria*): 1120 + 60 B.P. cal A.D. 1030–1280

The following sherds were recovered from Test Pit IV at 9Li214: 0–10 cm, Irene Complicated Stamped (5), sand + grit tempered (1); 10–20 cm, grit tempered (19); 20–30 cm, St. Catherines Plain (1), grit tempered decorated (1), Savannah complicated stamped (1); 30–40 cm, Savannah Cord Marked (1).

These two dates are statistically indistinguishable (at 0.95, $t = 2.29$). The two-sigma pooled average is cal A.D. 980–1220, which falls into the St. Catherines period date and correlates with the ceramic assemblage recovered in Test Pit IV at 9Li214.

The random sample of 25 *Mercenaria* recovered from the St. Catherines component (Test Pit IV [below 10 cm], V, and VI) produced ample evidence of wintertime clam procurement. The presence of deciduous lower third premolars may suggest that juvenile deer were harvested in late summer or early spring.

## Transect J-1

Transect J-1 begins along the high marsh on a tidal creek levee to the west of the island core, runs across the high marsh *Spartina* onto the island core and through the tabby ruins of South End Settlement, then crosses through Little Camel and Camel New Ground fields. Traversing South Beach Road, Transect J-1 then continues eastward across a long series of Holocene beach ridges and hammocks and eventually reaches South Beach.

Six archaeological sites were recorded in Transect J-1.

### Little Camel New Ground Field 1 (9Li202; AMNH-460; Transect J-1)

9Li202 is located just outside the boundary ditch that marks the southward extension of Little Camel New Ground Field. This large deposit of subsurface shell is about 150 m east of the tabby cabins still standing at South End Settlement (and one bowl fragment of a historic period kaolin pipe was recovered at 9Li202).

The ceramic evidence from two test pits (0.60 $m^3$) consists of 32 sherds, 8 of which date to the Irene period (Irene Complicated Stamped and Irene Incised). A single sherd of Blue Pearlware was also recovered. The recovered vertebrate faunal remains are assigned to the Irene period.

Although ample *Mercenaria* were recovered, many are senile, with significantly altered rims. Although the confidence level is relatively low, the sample of 16 "readable" clams shows that 5 (of 8) were harvested during the winter, with 3 others likely collected in the spring.

### Little Camel New Ground Field 2 (9Li203; AMNH-461; Transect J-1)

Site 9Li203 is also immediately to the south of Little Camel New Ground Field. This medium-sized site is 20 m east of the marsh, 100 m west of the walking trail portion of State Road, and loops around to the east of South End Settlement. The area may not have been plowed in antebellum times, and today supports a stand of live oak, hickory, and magnolia. The site itself is an indistinct concentration of subsurface deposit, without any apparent surface mounds.

The ceramic evidence from the two test pits (0.60 $m^3$) shows that this is a St. Catherines period site. Analysis of the 20 available *Mercenaria* demonstrates that almost half (9 of 20) were harvested in the $O_{1-2}$ growth stage (probably mid-December through mid-March), and the other 50 percent were harvested during the $O_3$ increment (between mid-March and mid-May).

### Little Camel New Ground Field 3 (9Li204; AMNH-463 and -464; Transect J-1)

This large site extends across the 100-m width of the transect. It is located inside Camel New Ground Field, 75 m west of South Beach Road. Although they originally received separate field designations, the two areas were excavated as a single site.

The ceramic evidence from the four test pits (1.70 $m^3$) consists of 185 sherds, 52 of them diagnostic. Virtually all date to the Irene period.

A random sample of 25 extremely well-patterned *Mercenaria* indicates that more than half (13 of 24) were harvested in the winter, with all other growth increments also represented.

### Little Camel New Ground Field 4 (9Li205; AMNH-465; Transect J-1)

This medium-sized site, also located in Camel New Ground Field, is intersected and partially disturbed by Back Creek Road.

Ceramic evidence from the three test pits (1.00 $m^3$) consists of 87 sherds. Of the 62 diagnostic sherds recovered, 76 percent date from the Irene period and 23 percent from the St. Catherines period.

A random sample of 25 *Mercenaria* was taken from Test Pit III (a provenience dating strictly to the Irene period). The results indicate that 14 (of 21) were harvested during the summer/fall and another 6 specimens were collected during the winter.

### Little Camel New Ground Field 5 (9Li206; AMNH-466; Transect J-1)

Also located in Camel New Ground Field, this medium-sized site is 10 m east of South Beach Road. As the initial test units were being excavated, we discovered a number of fish bones. This find prompted us to excavate two additional test units, using 1/16-in. screens to enhance recovery. We also recovered five sea turtle bones from test pits I and IV; these were the only sea turtles remains encountered during the entire Island-wide transect survey.

Ceramic evidence from the four test pits ($1.90\ m^3$) consists of 219 sherds. Of the 154 diagnostics, 71 percent date to the Irene period. Eighteen percent of the diagnostic sherds date to the St. Catherines period, and the relatively large sample size enables us to define a secondary component.

A random sample of 25 *Mercenaria* from the Irene component (the 0–20-cm levels from Test Pit II) demonstrates that clams were harvested equally in the winter and in summer/fall; late fall was also represented. The presence of sea catfish remains suggests an occupation sometime between April and October.

### 9Li80 (AMNH-331; Transect J-1)

North of Beach Pond, just west of the beach, is a series of peninsulas. Site 9Li80, located on a small island near one of these peninsulas, consists of a surface scatter 3 m in diameter. A buried lens, 10 cm thick, is covered by sterile sand. A smaller surface shell scatter was found 20 m to the northwest. This island is a late Holocene-age hammock, situated in the tidal marsh between the southern forks of Cracker Tom Creek, due west of the southern end of beach hammock. The first scatter, about 3 m in diameter, is near the tip itself; the other shell concentration occurs about 20 m to the north. Vegetation is mostly wind sculptured oak, yaupon, cabbage palm, and cedar, with an understory of saw palmetto.

No pottery or *Mercenaria* were recovered in the single test pit excavated ($0.20\ m^3$) at site 9Li80.

### Transect K-6

Transect K-6 begins in the hammocks and marshlands to the east of Factory Creek and runs to the south of the island core and into the Holocene dune ridge complex along the west of South Beach Road. It crosses through the broken terrain of beach ridges, traverses Cracker Tom Hammock, and eventually reaches South Beach.

Vibracore Transect C-C′ is located along archaeological Transect K-6 and documents some of the earliest-formed Holocene period beaches as they abutted against the island core (Linsley, 1993; see also chap. 3, this volume).

No archaeological sites were recorded in Transect K-6.

### Transect K-1

Transect K-1 begins along the southernmost extension of several dissected Holocene ridges. The transect crosses South Beach Road, which then turns sharply to the east; from there, Transect K-1 parallels and runs 100–200 m to the north of South Beach Road. The transect eventually intersects South Beach immediately to the north of Beach Pond, a freshwater pond and marsh situated approximately 50–100 m inland of the beach scarp. Vegetation associated with Beach Pond is dominated by marsh-fleabane (Pluchea and other composites), *Typha*, Cyperaceae (sedges), and Poaceae (grasses). The surrounding vegetation is mostly pine and oak, with button-bush, wax myrtle, cabbage palm, and willow also present.

Four archaeological sites were recorded in Transect K-1.

### 9Li59 (AMNH-310; Transect K-1)

This small area of crushed shell lies on the southwestern tip of a dissected terminal Holocene ridge (that also contains 9Li58). Marsh meadows surround this end of the ridge, while tidal meadows flank the ridge. Area vegetation consists of scrub oak and cedar, an understory of saw palmetto, and rush grass in the lower dissected depressions. The shell deposits, about 10 m long and 1–3 m wide, occur on the southeastern edge of the peninsula.

No cultural materials or *Mercenaria* were recovered.

### 9Li57 (AMNH-308; Transect K-1)

This small site consists of several small scatters of shell, which occur intermittently for 50 m along the southern edge of a Holocene beach ridge. Today the area is covered by scrub oak forest with an understory of saw palmetto. Marsh meadows border the site to the east and west, and a tidal marsh adjoins the shoreline on the south.

All three sherds recovered from the single test pit (0.40 $m^3$) are Wilmington Plain.

The five available *Mercenaria* were badly broken, with eroded interiors and altered rims, making seasonal estimates difficult. The three readable clams were harvested during the winter.

### 9Li211 (AMNH-476; Transect K-1)

This medium-sized site contains several dense concentrations of subsurface shell, particularly evident in the roots of upturned trees. It is located 40 m west of South Beach Road, on a dune crest covered densely with saw palmettos and scattered with oaks.

The ceramic evidence from the four test pits (1.40 $m^3$) consists of 78 sherds. Of the 50 diagnostic sherds, 29 belong to the Savannah series, and the rest are St. Catherines Burnished Plain.

Three $^{14}C$ determinations are available from 9Li211:

Test Pit III (20–30 cm):

(Beta-20828, *Mercenaria*): 880 ± 60 B.P. cal A.D. 1280–1450

The following sherds were recovered from Test Pit III at 9Li211: 0–10 cm, none; 10–20 cm, none; 20–30 cm, Savannah Check Stamped (2), St. Catherines Burnished Plain (1), very gritty check stamped (2).

Test Pit IV (0–10 cm):

(Beta-183633, oyster): 890 + 60 B.P. cal A.D. 1260–1450

(Beta-183634, oyster): 900 + 50 B.P. cal A.D. 1270–1430

The following sherds were recovered from Test Pit IV at 9Li211: 0–10 cm, Savannah Burnished Plain (5), Savannah burnished plain, fluted (2); 10–20 cm, Savannah Check Stamped (6), St. Catherines Burnished Plain (3), Savannah burnished plain, fluted (1), grit tempered (2); 20–30 cm, Savannah Cord Marked (2), grit tempered, decorated and incised (2); 30–40 cm, Savannah Cord Marked (1), St. Catherines burnished plain, fluted (1).

These three radiocarbon dates are statistically the same (at the 0.95 level, $t = 0.54$), with a pooled two-sigma average of cal A.D. 1290–1430. These radiocarbon dates are certainly consistent with the Savannah age estimate (cal A.D. 1280–1310/1390) in the northern Georgia coast chronology (DePratter, 1979a, 1991), but as explained in chapter 15, we will group this component with the Irene period.

Although the recovered *Mercenaria* have significantly altered rims and several are senile, analysis of the growth increments shows that 6 (of 13) were harvested during the winter, while 4 were collected in the summer/fall and 3 were gathered in the spring.

### 9Li212 (AMNH-480; Transect K-1)

This medium-sized site is northwest of Beach Pond and just west of Duck Hunting Road. The site consists of a dense subsurface shell concentration, restricted to an area of 40–50 m in diameter.

The ceramic evidence from the five test pits (1.20 $m^3$) consists of 16 diagnostic sherds, all of them dating to the Irene period (with a few Savannah sherds also present).

Analysis of the available eight *Mercenaria* from Irene contexts (Test Pit IV) demonstrates that clams were mostly gathered during the winter.

## Transect L-6

Transect L-6 begins in the northernmost tidal marsh drained by Camp Creek, runs across several dissected Holocene ridges, crosses Long Marsh and Jungle Road, then intersects South Beach immediately to the south of Beach Pond.

Immediately to the north of archaeological Transect L-6 is Vibracore Transect D-D′. It extends east–west across the extensive Holocene beach dune ridges, crosses the southern end of the island core, and ends in modern marsh on the western side of the island (Linsley, 1993; see also chaps. 3 and 29).

Nine archaeological sites were recorded in Transect L-6.

### 9Li56 (AMNH-307; Transect L-6)

This small area of crushed and whole shell extends 3 m along the marsh shoreline. The shell deposit occupies the end of a small promontory adjoining an extensive tidal marsh to the west and a large marsh bay meadow to the northeast. Today, the area is covered by sparse scrub oak forest, with a dense understory of saw palmetto. We excavated a single test unit (0.20 $m^3$) in the heaviest area of shell scatter; no cultural materials were recovered.

Only three *Mercenaria* were analyzed; one with a wintertime growth increment, the other two suggesting an early springtime harvest.

### 9Li51 (AMNH-302; Transect L-6)

This small site is an area of crushed shell that extends 22 m along the marsh edge. It is located on a grassy rise between a Holocene dune ridge and a small hammock. No cultural materials were evident on the surface. This site may be situated on a relic meadow that once existed between one ridge to the north and another ridge on which 9Li49 and 9Li50 are located.

The ceramic evidence from the four test pits (1.10 $m^3$) consists of 37 sherds, 20 of which are diagnostic, all of them dating to the Irene period.

Analysis of 25 available clams showed that virtually all analyzed *Mercenaria* were collected during winter.

### 9Li52 (AMNH-303; Transect L-6)

This small area of crushed and whole shell extends 15 m along the shoreline of an old creek cut. 9Li52 is situated on a Holocene ridge that forms part of the dissected peninsula. Previous meanderings of Camp Creek have cut into the ridge, exposing and eroding shell deposits along the shoreline of Long Marsh. Although the thick root mat from the oak and saw palmetto vegetation hampered our efforts, we excavated here in 1978 and recovered a single diagnostic Irene Plain sherd from four test pits (1.00 $m^3$).

A random sample of 25 clams was selected for seasonal analysis. Most (16 of 23) were harvested during the $O_{1-2}$, the rest during the $O_3$ increment (early spring). When we compare these results with the modern control sample from St. Catherines Island, the most likely interpretation is a wintertime harvest followed by a second collection episode in the early springtime. Because the $O_{1-2}$ and $O_3$ stages have some temporal overlap, however, the thick-section analysis of *Mercenaria* from 9Li52 could also be interpreted as a single harvest conducted between mid-February and mid-April.

### 9Li55 (AMNH-306; Transect L-6)

This medium-sized site occurs on the eroded bank of a Holocene beach ridge. Previous meanderings of Camp Creek have cut into this ridge, forming a small bay meadow that adjoins the shoreline. Today, the ridge is covered by a hickory forest with dense saw palmetto understory. Two shell middens, spaced about 22 m apart, were exposed in the eroding shoreline.

Two Irene Complicated Stamped sherds were recovered from the four test pits (1.00 $m^3$). Since the remaining sherds were likewise grit tempered, the site can (with a relatively low level of confidence) be assigned to the Irene period.

Most (9 of 14) of the available *Mercenaria* from 9Li55 were harvested during the winter, with an early springtime collection also represented (note, however, the alternative explanation suggested for similar data recovered from 9Li52).

### 9Li50 (AMNH-301; Transect L-6)

This small site is located on the southern end of the same ridge containing 9Li49. DePratter recovered ceramics that were scattered on the surface within a 4–5 $m^2$ area. No shell is apparent along this portion of the ridge.

No diagnostic sherds were recovered from the four test pits (0.50 $m^3$), although since all fragments were grit tempered, the site probably dates from the late prehistoric or protohistoric period. No *Mercenaria* were recovered.

### 9Li245 (AMNH-520; Transect L-6)

This small site, approximately 15 m in diameter, is located on a peninsula that extends into the marsh. A considerable concentration of whelks was encountered. The ceramic evidence from the three test pits (1.30 $m^3$) consists of 23 potsherds (only 5 diagnostic sherds), all of them dating to the Irene period (with some Savannah Plain sherds present as well).

The available sample of 21 *Mercenaria* shows extremely clear-cut patterns, demonstrating that virtually all clams were harvested during the winter.

### 9Li49 (AMNH-300; Transect L-6)

This large site consists of several shell scatters and concentrations exposed along the eroding blank of a Holocene dune ridge. This ridge formed as part of a larger dissected peninsula undergoing erosion along its southern exposure, where Long Marsh is flooded and drained by Camp Creek. The shell extends 60 m along the edge of the bank. The sparse ceramic collection from the four test pits (1.80 $m^3$) consists of 57 sherds, with only 6 diagnostics, all of them dating to the Refuge period.

Two $^{14}C$ determinations are available from 9Li49:

Test Pit III (0–10 cm):

(Beta-218101, *Mercenaria*): 680 ± 40 B.P. cal A.D. 1430–1620

Test Pit III (30–40 cm):

(Beta-20829, *Mercenaria*): 1700 ± 60 B.P. cal A.D. 430–640

The following sherds were recovered from Test Pit III at 9Li49: 0–10 cm, none; 10–20 cm, Refuge Incised (1); 20–30 cm, 20—30 cm, Refuge (1), Refuge Punctated (1), Refuge Incised (1); 30–40 cm, Refuge Punctated (1), Refuge Incised (1). Both *Mercenaria* processed from 9Li49 clearly postdate the Refuge-Deptford ceramics from Test Pit III.

A sample of 25 *Mercenaria* was selected from Test Pits I and III in order to restrict the seasonal analysis to Refuge period contexts. Twelve (of 22) clams were collected in the wintertime, with all other growth increments also represented.

### Jungle Road 2 (Li213; AMNH-481; Transect L-6)

9Li213 lies northwest of Flag Pond. A small surface scatter is evident in Jungle Road, which cuts through the fairly open scrub habitat of mixed wax myrtle, cabbage palm, saw palmetto, and grasses. A barrow pit has partially disturbed this site. The remaining shell deposit measures 10 m long × 1–3 m wide, with an apparent thickness of 10–15 cm. Shell is also scattered an additional 9 m around the northeast margin of the barrow. The shell deposit and associated barrow occur on a Holocene dune slope on the east side of the road.

The ceramic evidence from the two test pits excavated (1.00 $m^3$) consists of 30 diagnostic sherds, all of which date to the Irene period.

Analysis of the available *Mercenaria* demonstrates that most (15 of 18) clams were collected during the winter, with early springtime and summer/fall increments also represented. The presence of deciduous lower third premolars may suggest that juvenile deer were harvested in late summer or early spring.

### Jungle Road 1 (9Li128; AMNH-379; Transect L-6)

This medium-sized site lies along the west side of Jungle Road, 55 m south of the intersection with South Beach Road. The buried shell was exposed when this part of the Holocene beach dune was disturbed for road fill. The deposit was probably once 10 m in diameter, but the borrow area has been disturbed roughly 10 $m^2$ along the eastern side. Undisturbed deposit continues westward into a dense palmetto thicket.

Ceramic evidence from the four test pits (3.00 $m^3$) consists of 62 diagnostic sherds, 71 percent of which date to the Irene period, with a secondary St. Catherines period occupation accounting for 27 percent of the diagnostic sherds.

The sample of hard clams was selected from Test Pits II and III, limiting the seasonality to the Irene period. Thirteen (of 20) of the available *Mercenaria* were harvested during the winter, while the rest display a summer/fall growth increment. The presence of deciduous lower third premolars may suggest that juvenile deer were harvested in late summer or early spring.

## Transect M-6

Transect M-6 begins in the marsh drained by Camp Creek, crosses several small hammocks, traverses a large contiguous set of beach ridges, crosses Jungle Road, and ends at North Beach.

No archaeological sites were recorded in Transect M-6.

## Transect M-1

Transect M-1 begins in the northernmost marshland drained by Brunsen Creek. It runs eastward, crosses Jungle Road and the northern reach of Flag Pond, and then intersects South Beach.

Five archaeological sites were recorded in Transect M-1.

### 9Li165 (AMNH-350; Transect M-1)

9Li165 extends along the south bank of a peninsula. Covered by saw palmettos, this large site consists of scattered surface shell, as well as a dense concentration of subsurface shell along the bank, extending inland about 15 m. The ceramic evidence from the five test pits (1.80 $m^3$) consists of 26 diagnostic sherds, 96 percent of which date to the St. Catherines period.

Two radiocarbon dates are available from 9Li165:

Test Pit IV (0–10 cm):

(Beta-183630, *Mercenaria*): 1350 ± 60 B.P.
cal A.D. 760–1040

Test Pit IV (10–20 cm):

(Beta-183629, *Mercenaria*): 1390 ± 50 B.P.
cal A.D. 730–1000

The following sherds were recovered in Test Pit IV at 9Li165: 0–10 cm, St. Catherines Net Marked (3); 10–20 cm, St. Catherines Net Marked (1), St. Catherines Burnished Plain (20).

These two dates are statistically the same (at 0.95, $t = 0.215$). The pooled two-sigma mean is cal A.D. 770–1020, which dates to the St. Catherines period and corresponds to the ceramic assemblage recovered from Test Pit IV at 9Li65.

The random sample of 25 *Mercenaria* shows an unusually clear-cut seasonal patterning. Most (20 of 23) were harvested during the winter, though late spring and summer/fall are also represented. The presence of sea catfish remains also indicates an occupation sometime between April and October.

### 9Li164 (AMNH-349; Transect M-1)

9Li164 occurs on a hammock, about 10 m north of the marsh edge and about 440 m east of 9Li165. Saw palmettos are the only vegetation. This small site consists of only a thin subsurface shell lens, approximately 3 m in diameter. Two Wilmington

Plain sherds were recovered from two test pits (0.60 $m^3$).

Only four clams were recovered and thin-section analysis suggests that they were harvested in the summer/fall, winter, and late spring.

### 9Li97 (AMNH-348, Transect M-1)

This three-part site was found along the southern margin of a long peninsula. The first midden is exposed in the bank, about 4 m long and 5–10 cm thick, and extends a meter inland, buried at a depth of 20–40 cm below the surface. A second midden, 6 m long and possessing a configuration similar to the first, is exposed in the bank. The third, thick midden concentration is eroding out along 20 m of shoreline and extends 4–6 m inland.

A single radiocarbon date is available from 9Li97:

Test Pit III (10—20 cm)

(Beta-183637, *Mercenaria*): 1500 ± 50 B.P.
cal A.D. 660–890

No sherds of any kind were recovered in the test excavations at 9Li97, but Beta-183637 suggests a late Wilmington period presence.

All available hard clams were analyzed. Sixteen (of 21) were harvested during the winter, and 4 were harvested during the summer/fall.

### 9Li98 (AMNH-349, Transect M-1)

This site is located 10 m inland from the marsh edge, on the south side of an interior dune ridge. The buried shell concentration was 10–20 cm thick and about 3 m in diameter. No cultural materials were recovered.

### Jungle Road 3 (9Li84; AMNH-335; Transect M-1)

This medium-sized site lies on the western border of Flag Pond, immediately west of Jungle Road. 9Li84 is a shell scatter, visible in the roadbed, with intermittent shell deposits along the Holocene dune edge to the immediate west. A buried deposit of concentrated shell, roughly 13 m long, 4–5 m wide, and 10–40 cm thick is located around a large oak on the northern reaches of the site. These shell deposits stretch for an estimated 50 m. The shell scatter occurs about 10 m west of Flag Pond, where cabbage palm dominates the strip between the pond and the road. An oak forest with an understory of saw palmetto occupies the dune ridge west of the road.

The ceramic assemblage from the four test pits (1.50 $m^3$) consists of 122 potsherds (80 of which are diagnostic). Ninety-six percent date to the Irene period.

A random sample of 24 *Mercenaria* was selected from Test Pits II and IV, which almost exclusively produced ceramics from the Irene period. Winter and summer/fall harvests were equally represented, and several springtime specimens occurred as well.

## Transect N-6

Transect N-6 traverses the beach ridges immediately to the south of Flag Pond.

One archaeological site was recorded in Transect N-6.

### 9Li87 (AMNH-338; Transect N-6)

Scattered shell is dispersed along a stretch about 38 m in length, exposed in places by the Jungle Road cut, which follows the crest of a Holocene dune, with Flag Pond immediately to the east. The heaviest shell concentration, near the center of this medium-sized site, has been bulldozed, and possibly borrowed for road fill. Another shell scatter, 18 m to the south, may be fill that was removed from 9Li87. The ceramic evidence from four test pits (2.10 $m^3$) consists of 38 diagnostic sherds, all of them from the Irene period.

A random sample of *Mercenaria* was selected for study. Sixteen (of 22) were harvested in the winter; 3 specimens each were collected in the late spring and summer/fall.

## Transect N-1

Transect N-1 runs from the Brunsen Creek drainage, crosses the extreme margin of Flag Pond, and ends on South Beach. One archaeological site was recorded in Transect N-1.

### 9Li91 (AMNH-342; Transect N-1)

This large palmetto-covered site occurs about 300 m west of Flag Pond Road, on a peninsula that approaches a tributary of Brunsen Creek (figs 20.11 and 20.15). Two buried midden areas were recorded here, each about 5–6 m in diameter and buried 10 cm below the surface. Only a small amount of shell was exposed along the shoreline. Site 9Li91 also includes some small shell concentrations located at the end of the peninsula. One is a midden on the southwestern tip, extending 10 m along the southern shore and 13 m along the western shore. The shell scatter is extensive, consists of both surface and buried deposits, and reaches across the full 100-m extent of Transect N-1. Shell deposits are also evident in the cut-bank and into the marsh.

The ceramic evidence from five test pits (1.90 $m^3$) consists of 121 sherds, only 38 of which are period diagnostic; all but 1 of these date from the Irene period. Seven El Morro earthenware sherds were also found in Test Pit IV. A faceted carnelian bead (28.0/5287) was also found in Test Pit V (see chap. 21).

A random sample of clams was selected for analysis. Thirteen (of 22) were collected in the winter, with early spring and summer/fall collections also well represented.

## Transect O-6

Transect O-6 is less than 1 km long, and runs from the Brunsen Creek marshland to South Beach. Two archaeological sites were recorded in this transect.

### 9Li124 (AMNH-375; Transect O-6)

Small concentrations of shell occur along the shoreline and inland on the slope of a dune. The site, approximately 10 m in diameter, lies along the southern shoreline of the north fork of the South Brunsen peninsula.

No ceramics were recovered from two test pits excavated (0.60 $m^3$), and all recovered *Mercenaria* were too eroded for seasonal analysis.

### 9Li123 (AMNH-374; Transect O-6)

This small site consists of a surface shell scatter, roughly 2 m in diameter. Probing in the vicinity showed no buried shell deposits. 9Li123 is located at the western terminus of the north fork of the South Brunsen peninsula, which is part of a Holocene ridge system now covered with oak, yaupon, and a dense understory of saw palmetto. Erosion has dissected the ridge and isolated its western end into a small hammock; 9Li123 is located to the east, on the peninsula proper.

No ceramics were recovered from the two excavated test pits (0.50 $m^3$), and the *Mercenaria* specimens were too eroded for seasonal analysis.

## Transect O-1

Transect O-1 begins in the marshland drained by Little Brunsen Creek. Four archaeological sites were recorded in Transect O-1.

### 9Li116 (AMNH-367; Transect O-1)

This small site is a thin midden roughly 5–6 m in diameter, buried to a depth of 5–10 cm. 9Li116 is situated on Todd Hammock, an east–west trending dissected Holocene ridge. The shell was deposited on the eastern side of a small rise, covered today with oak, cedar, cabbage palm, and saw palmetto. Brunsen and Todd Creek flood and drain the tidal marshes to the north and south. No ceramics were recovered from four test pits excavated (0.80 $m^3$).

All of the available clams were analyzed. Thirteen (of 22) were harvested during the winter and 9 were harvested in the summer/fall.

### 9Li114 (AMNH-365; Transect O-1)

This small buried midden is 3 m in diameter and is located on the south side of a peninsula. The midden is exposed on the surface in some places, and elsewhere buried up to 20–30 cm. 9Li114 lies on an east–west trending Holocene ridge, which has been dissected by erosion. The immediate

Fig. 20.15. Deborah Mayer O'Brien, Dennis O'Brien (center) and David Hurst Thomas excavating Test Pit I at 9Li91 (November 1979, looking northeast).

site area is covered with oak, cedar, and saw palmetto. Todd Creek floods and drains the tidal marsh to the south, and a tributary of Brunsen Creek flows through the marsh to the north. Marshland vegetation fringes the ridge laterally. Sites 9Li114, 9Li116, and 9Li117 are unusual because they are located on the Capers silty clay, in an area commonly flooded by spring tides (and sometimes daily tides as well). No ceramics were recovered from the two test pits (0.70 $m^3$).

The available *Mercenaria* ($n = 3$) were harvested during the fast growth period (winter and early spring).

### Todd Hammock (9Li117; AMNH-368; Transect O-1)

This small site is a scattered surface shell deposit along the shoreline of a peninsula. The midden scatter measures 20 m long and 3–6 m wide. This site also lies on Todd Hammock, between 9Li114 and 9Li116. Two test pits were excavated (0.70 $m^3$), but no ceramics were recovered.

A single radiocarbon date is available for 9Li117:

Test Pit IV (20–30 cm):

(Beta-183635, *Mercenaria*): 810 + 50. B.P. cal A.D. 1310–1480

This date suggests that 9Li117 was utilized during the Irene period.

A random sample of *Mercenaria* was selected for incremental analysis. The shells were in extremely good condition and extraordinarily consistent. Twenty-one (of 25) hard clams were harvested during the early spring. $O_{1-2}$ and $T_1$ increments were also represented in small numbers; these data suggest a winter and late spring harvest (but the modern control sample indicates that such a ratio could result from a single harvest conducted between mid-April and mid-June).

TABLE 20.5
**Summary of the 478 Shovel Tests Conducted on St. Catherines Island (sterile tests excluded)**

| Test unit | Ceramics | Additional artifact(s) recovered | Comments |
|---|---|---|---|
| | | Transect B-6 (27 tests excavated) | |
| 5 | — | 1 flake | — |
| 6 | 2 grit tempered | — | Oyster shell |
| 7 | 1 Savannah Plain (abrader), 1 grit tempered | — | — |
| 8 | 6 Walthour Check Stamped, 7 Deptford Check Stamped, 3 Irene Complicated (1 with rim node) | — | Oyster shell, close to 9Li170 |
| | | Transect C-6 (33 tests excavated) | |
| U | 1 Refuge Cord Marked (abrader) | — | Charcoal, associated with AMNH-412 |
| UU | 1 Refuge decorated | — | Charcoal, associated with AMNH-412 |
| VV | 1 Refuge Simple Stamped | — | Charcoal, associated with AMNH-412 |
| WW | 1 Refuge Plain (abrader) | — | Associated with AMNH-412 |
| | | Transect D-6 (27 tests excavated) | |
| 1 | — | — | Clam shells, 20 m to 9Li169 |
| 13 | 1 Refuge Check Stamped | — | — |
| 14 | — | 1 flake | — |
| | | Transect E-6 (tests excavated) | |
| 4 | 2 Deptford Plain (misc. small sherds) | — | 30 m to 9Li177 |
| 6 | 2 grit tempered (1 small sherd) | — | 20 m to 9Li177 |
| 8 | 1 clay tempered | — | 10 m to 9Li175 |
| 24 | — | 1 flake | Probably associated with 9Li175 |
| 46 | 2 grit tempered | — | Oyster shells, probably associated with 9Li419 |
| | | Transect F-6 (50 tests excavated) | |
| 4 | 2 St. Catherines Fine Cord Marked | — | Oyster shells, 50 m to 9Li180 |
| 31 | 1 Altamaha stamped | — | 40 m from 9Li178 |
| 51 | 2 St. Catherines Burnished Plain, 1 St. Catherines Net Marked, 2 clay tempered decorated | — | Oyster shell, bone fragments, margin of 9Li199 |
| 52 | 3 St. Catherines Burnished Plain, 3 St. Catherines Fine Cord marked, 1 Refuge Plain | — | Oyster shell, bone fragments, margin of 9Li199 |
| 53 | 5 St. Catherines Fine Cord Marked | — | Oyster shell, bone fragments, margin of 9Li199 |
| 54 | 1 Irene Incised, 3 Wilmington Cord Marked, 3 St. Catherines Fine Cord Marked, 1 St. Catherines Plain, 2 Irene Plain, 2 Irene decorated, 1 Deptford Check Stamped | — | Oyster shell, bone fragments, margin of 9Li199 |
| | | Transect G-6 (53 tests excavated) | |
| 2 | 2 St. Catherines Burnished Plain, 1 Irene Complicated Stamped | — | Oyster shells, 14 m from 9Li183 |
| 3 | 1 grit and clay tempered | — | Oyster shells, 35 m from 9Li182 |
| 9 | 4 St. Simons Plain | — | — |
| 13 | — | 1 flake | — |
| 16 | 1 St. Simons Plain, 1 Deptford Plain (burnished) | — | — |
| 49 | 3 Irene, 1 grit tempered | — | — |
| 50 | 1 Savannah hone, 1 Irene complicated or Altamaha Line Block | 1 glass fragment | — |
| 51 | 1 sand tempered (eroded) | — | — |

TABLE 20.5—(*Continued*)

| Test unit | Ceramics | Additional artifact(s) recovered | Comments |
|---|---|---|---|
| 52 | 3 Irene Plain | — | Oyster shells |
| | Transect H-6 (49 tests excavated) | | |
| 3 | 2 Irene Burnished Plain, 1 St. Catherines Plain, 1 Deptford/Walthour | — | Oyster shell, associated with 9Li197 |
| 5 | 1 St. Catherines Fine Cord Marked, 1 historic sherd | — | Oyster shell, associated with 9Li197 |
| 11 | 1 small sherd | — | Associated with 9Li186 |
| 12 | 3 Irene decorated | — | Associated with 9Li186 |
| 33 | 6 Deptford Cord Marked | — | 25 m south of 9Li188 |
| 37 | 1 Wilmington Plain | — | — |
| 47 | 1 Irene | — | — |
| 50 | 1 St. Catherines Fine Cord Marked, 3 Irene cord marked | — | Oyster shell, close to 9Li189 |
| | Transect I-6 (47 tests excavated) | | |
| 1 | 1 Irene/Altamaha punctated rim, 2 grit and clay tempered | — | Oyster shell, probably associated with 9Li8 and 9Li13 |
| 2 | 1 Savannah Check Stamped, 3 sand and clay decorated, 1 grit tempered decorated | — | Probably associated with 9Li8 and 9Li13 |
| 4 | 3 Irene simple stamped, 1 clay tempered with grit | — | Probably associated with 9Li8 and 9Li13 |
| 5 | 1 sand and grit tempered | — | Shell, probably associated with 9Li8 and 9Li13 |
| 6 | 1 Altamaha Incised, 1 Altamaha stamped or Irene | — | Probably associated with 9Li8 and 9Li13 |
| 17 | 1 Altamaha or Irene stamped | — | Oyster shell, 60m to 9Li196 |
| 21 | 1 Altamaha stamped, 1 Irene Corn Cob Incised | — | 9Li193 is 45 m to the south |
| 22 | 1 Altamaha Line Block | — | 9Li192 is 25 m to the north |
| 23 | 1 Altamaha incised and punctated | — | 9Li192 is 17 m to the south |
| 27 | 2 Irene Complicated Stamped, 1 Irene | — | Near 9Li190 |
| 28 | 1 Altamaha, 1 Irene decorated | — | Associated with 9Li190 |
| 29 | 3 Altamaha, 1 St. Catherines Plain | — | Associated with 9Li190 |
| 30 | 5 Irene complicated stamped, 1 grit tempered | — | Associated with 9Li190 |
| | Transect J-6 (28 tests excavated) | | |
| 1 | 1 Irene Plain | — | Associated with 9Li194 |
| 4 | 1 Irene | — | Associated with 9Li194 |
| 5 | Unidentifiable sherd | — | Associated with 9Li194 |
| 7 | 1 Irene/Altamaha | — | Oyster shell, associated with 9Li194 |
| 9 | 2 Irene decorated | — | Associated with 9Li194 |
| 13 | 2 Irene plain (1 hone) | — | Associated with 9Li194 |
| 14 | 1 Savannah decorated | — | Oyster shell, associated with 9Li194 |
| 15 | 5 Irene Complicated Stamped, 1 Irene Plain | — | Associated with 9Li194 |
| 16 | 5 Irene Complicated Stamped (1 hone), 2 Irene/ Altamaha (1 decorated) | — | Associated with 9Li194 |
| 17 | 1 unidentifiable sherd | — | Associated with 9Li194 |
| 19 | 2 sand and clay tempered | — | Bone fragments, associated with 9Li194 |
| 20 | 1 Irene Complicated Stamped, 3 St. Catherines Plain | — | Associated with 9Li194 |

TABLE 20.5—(*Continued*)

| Test unit | Ceramics | Additional artifact(s) recovered | Comments |
|---|---|---|---|
| | | Transect K-6 (43 tests excavated) | |
| No cultural materials recovered | | | |
| | | Transect L-6 (18 tests excavated) | |
| 11 | 1 Irene cordmarked | — | 25 m south of 9Li128 and 9Li213 |
| | | Transect M-6 (18 tests excavated) | |
| No cultural materials recovered | | | |
| | | Transect N-6 (21 tests excavated) | |
| No cultural materials recovered | | | |
| | | Transect O-6 (17 tests excavated) | |
| No cultural materials recovered | | | |
| | | Transect P-6 (6 tests excavated) | |
| No cultural materials recovered | | | |

### 9Li118 (AMNH-369; Transect O-1)

This medium-sized site is located on an island, on the southern slope of the first major dune, 35–40 m from the marsh edge. The shell deposit is sparsely exposed on the surface, but probing indicated that shell extends 22 m along the base of the ridge (a Holocene dune) and forms the northern border of a large cabbage palm grove. The vegetation is typical of a mixed Holocene ridge formation, dominated by cabbage palm with an understory of saw palmetto. The marsh meadow cove lying to the north connects with a large marsh embayment that is flooded and drained by a major tributary of Brunsen Creek.

The ceramic assemblage from three test pits (1.40 $m^3$) consists of 10 sherds, the only 2 diagnostic sherds date to the Irene period.

A random sample of *Mercenaria* shows that 14 (of 21) were harvested in the winter; all other growth intervals (especially early springtime) were represented in small numbers.

## SYSTEMATIC SHOVEL TESTING: RESULTS

As discussed in chapters 12 and 19, we attempted to control for the obvious bias toward shell midden sites by conducting an Island-wide program of systematic shovel testing. In all, we excavated a total of 478 such shovel tests during this systematic sampling (table 20.5). As expected, the majority (413 of 478 [86.5%]) of the shovel tests were entirely sterile. But 65 of the shovel tests contained cultural debris and/or marine shell (which we assume was likely transported culturally). Roughly 70 percent of these (46 of 65) test pits were clearly associated with an archaeological site previously located in the Island-wide survey. But roughly 4 percent (19 of 478) of the systematic shovel tests produced previously undiscovered evidence of cultural materials and/or marine shell, and these finds are significant (see also table 20.5).

**St. Simons Period:** Two test pits contained fiber-tempered St. Simons Plain sherds, unassociated with shell deposits.

**Refuge-Deptford Period:** One test pit (D-6-13) contained a single Refuge Check Stamped sherd, and four test pits in Transect C-6 contained evidence of a Refuge-Deptford occupation. The C-6 tests pits were all associated with a shell concentration buried 10–15 cm below the ground surface. This concentration was situated along a patch of high ground by an open marsh area near the midpoint of the Island.

TABLE 20.6
**Raw Sherd Counts for Aboriginal Ceramics Recovered during the University of Georgia Excavations at Wamassee Head**
Typological categories are those specified in Chapter 12

| Ceramic Type | Frequency |
|---|---|
| Altamaha Line Block Stamped | 56 |
| Altamaha circle in square | 3 |
| Altamaha Red Filmed | 2 |
| Altamaha Incised | 2 |
| Altamaha decorated | 10 |
| Grit-tempered, stamped | 10 |
| Grit-tempered, plain | 24 |
| Grit-tempered, decorated | 4 |
| Grit-tempered, punctated | 2 |
| Grit-tempered, miscellaneous | 7 |
| Grit-tempered, burnished plain | 10 |
| Grit-tempered, check stamped | 1 |
| Grit-tempered, complicated stamped | 8 |
| Grit-tempered, incised | 7 |
| Grit-tempered, miscellaneous | 10 |
| Grit/sand incised | 1 |
| Grit/sand punctated | 1 |
| Grit/sand decorated | 1 |
| Savannah Plain | 1 |
| Sand, incised | 1 |
| Sand-tempered | 4 |
| Sand-tempered, plain | 4 |
| Sand-tempered, incised | 2 |
| Clay tempered, plain | 1 |
| Clay/grit tempered, plain | 2 |
| Clay/grit tempered, miscellaneous | 1 |
| Clay/sand with grit, plain | 2 |
| Clay/sand with grit, decorated | 1 |
| Wilmington Plain | 2 |
| Walthour Complicated Stamped | 3 |
| Deptford Check Stamped | 5 |
| Deptford, tetrapod | 2 |
| Deptford Cord Marked | 1 |
| Refuge Simple Stamped | 3 |
| St. Simons Plain | 3 |
| Total | 197 |

We assigned this concentration a field designation (AMNH-412), but because it seemed like an isolated shell scatter, we considered it a "nonsite" and did not assign a Liberty County site number. However, because the shovel tests turned up four Refuge sherds and a charcoal concentration, this decision was incorrect. AMNH-412 is clearly an archaeological site that we misinterpreted during the Island-wide survey.

**Wilmington Period:** A single sherd of Wilmington Plain was found, unassociated with shell, in test 37 of Transect H-6.

**St. Catherines Period:** None.

**Savannah Ceramics:** A single Savannah Plain sherd (subsequently used as an abrader) was recovered, unassociated with shell, in pit 7 of Transect B-6. Another hone made on a Savannah sherd turned up in unit 50 of Transect G-6 (along with a glass fragment). A sand-tempered sherd was also found in unit 51 of Transect G-6.

**Irene/Altamaha Periods:** Evidence of Irene period occupation was found, associated with shell in places, in units 49 and 51 of Transect G-6. We obviously missed this site during the transect survey. Irene/Altamaha sherds were recovered in units 6 and 7 of Transect B-6 and unit 1 of Transect I-6.

**Isolated Lithics:** Three test pits turned up single, isolated flakes.

To summarize, 65 of the more than 450 shovel tests turned up evidence of historic or prehistoric habitation: Prehistoric sherds were found in 59 shovel tests, and marine shells (mostly oyster) were found in 22 of the test pits. Most of these were outliers from known sites. Bone fragments were recovered in six units, lithic flakes were recovered in four units, and one fragment each of Euro-American ceramics and glass.

By comparing the results of the systematic shovel testing and the intensive site survey programs, we can obtain a fairly reasonable notion of how effective each method is for locating prehistoric sites, as well as the biases involved in each method. Shovel testing located only two sites that were not found in the 10 percent transect survey. This means that, as long as shell is taken as an indicator of aboriginal occupation, we can locate most sites with a high degree of accuracy. The high proportion of nonshell sites (11) discovered in the shovel testing period, though, indicates that a sizable number of sites are not, in fact, associated with shell (and are hence overlooked in conventional site surveys).

In roughly 10 percent of the shovel tests, however, we did find evidence of human activity. While it remains true that virtually all subsurface concentrations of potsherds and artifacts could be linked with the shell-associated archaeological sites, a handful of nonshell sites were also discovered. We therefore found the shovel testing program to be a useful adjunct to transect sampling (and we will return to the significance of these nonshell sites in chap. 32).

## NOTES

1. We particularly wish to acknowledge the assistance of the late Greg Paulk, who filled out many of the Georgia Archaeological Survey forms; some of Paulk's descriptions are incorporated in this chapter.

2. As noted in chapter 1, Caldwell's archaeological collections from St. Catherines Island (along with those collections made by the American Museum of Natural History) are presently being curated as part of the permanent collection of Fernbank Museum of Natural History (Atlanta). All of the paleoenvironmental collections described here—including the vertebrate and invertebrate zooarchaeological materials—are now curated at the Florida Museum of Natural History (Gainesville).

3. Although a partial transect was inspected along the extreme northernmost extent of St. Catherines Island (fig. 20.1), so little landmass was actually involved that we discarded this transect from further consideration.

4. These two samples are significantly different at the 95 percent level.

5. The other "tabby block" feature is located on Persimmon Point, immediately to the south of Transect G-1.

6. Beta-20895 is slightly later than the other three dates, but there is no more association of this sample with Altamaha ceramics than the other two dates from the same level, so we will assign all determinations to the Irene period.

7. As fate would have it, the very large Meeting House Field (9Li21) fell outside of the systematic Island-wide Transect survey; see chapter 25 for a discussion of the archaeology of Meeting House Field.

8. As noted in chapter 1, the American Museum of Natural History has recently returned to the St. Catherines Shell Ring for more intensive investigations; for completeness, we have included the most recently available radiocarbon dates from 9Li231, which conform nicely with the earliest results obtained during the Island-wide survey and testing.

9. All ceramic and vertebrate faunal material collected in the 1969 excavations are included in this analysis.

10. The Fallen Tree site is presently eroding into the adjacent saltwater creek, and we have lost all evidence of both Caldwell's and the AMNH excavations conducted during the transect survey sampling. In 2005 and 2006, we returned to Fallen Tree to conducted necessary salvage excavations of endangered deposits. Data from these recent excavations are not included in the discussion here and will be presented elsewhere.

11. In the 1990s, AMNH crews returned to Back Creek Village to prepare a fine-grained map, to conduct remote sensing across much of the site, and to excavate several additional test pits; these results are not included in the present discussion and will be reported elsewhere.

# CHAPTER 21. ADDITIONAL MATERIAL CULTURE FROM THE ISLAND-WIDE SURVEY

DAVID HURST THOMAS

WITH CONTRIBUTIONS BY PETER FRANCIS, CAMILLE LICATE, AND JESSICA MCNEIL

Potsherds aside, we recovered a relatively small sample of material culture in the Island-wide survey of St. Catherines Island. This chapter briefly describes these additional artifacts.

## ABORIGINAL CLAY PIPE[1]

One pipe of aboriginal manufacture, artifact 28.0/2345, was recovered in the Island-wide archaeological survey, at Back Creek Village (9Li207, Test Pit III, 10–20 cm). The coarse gray paste contains large, sandy inclusions with a coarse temper, and a large quartz inclusion is imbedded in the bowl (fig. 21.1). Measurements are:

Bowl length: 23.71 mm
Bowl wall thickness: 11.39 mm
Height from heel to bowl: 25.44 mm
Weight: 14.3 g

The pipe bowl is highly ornamented, with an intact circular foot, and is encrusted with several circular bosses, each of which has been perforated by a deep, center-punched hole (somewhat similar to the pipe in Moore, 1897: fig. 9). The bowl base is flattened and completely covered with an intricate circle-in-a-square motif, a design element commonly associated with the Southeastern Ceremonial Complex (Waring and Holder, [1945] 1968; Waring, 1968e). The basal element is clearly a "cross in circle," a combination of the cross and Sun Circle (Waring and Holder, [1945] 1968: figs. 2I, 4B; Waring, 1968e: fig. 9d; Emerson, 1989: fig. 7C; Galloway, 1989: 334–335; Brown, 1989: fig. 8).

A second clay pipe, from Meeting House Field (9Li21), is likewise rendered in the style of the Southeastern Ceremonial Complex (illustrated in Saunders, 2000a: fig. 5-4 and discussed in chap. 25, this volume). The incised decoration is a zoomorphic motif that appears to be a bird, incised on the bowl, and a curved clay strip suggests the shape of a mouth.

Larson (1958b: 428) discussed a "surprisingly large amount of material which can be classified as SECC," especially to the north of the Altamaha River (see also Cook and Pearson, 1989: fig. 151). Such iconography is most common on the Piedmont during the Savannah Period (Hally and Rudolph, 1986: 59), and lasts into the early 17th century (M.T. Smith, 1989: 146).[2]

## EUROPEAN KAOLIN PIPES

Several kaolin pipe fragments were recovered in the Island-wide survey. Artifact 28.0/2407 comes from Little Camel New Ground Field 1 (9Li202, Test Pit 1). This bowl fragment contains a possible piece of the rim and a possible Maker's Mark. Along one of the fragmented edges is an incised marking, most likely made before firing, in the shape of either an M or a W with the upper left corner of the letter missing (in the case of the M). The marking, however, is very crude, giving rise to the possibility that the marks may be due to natural forces. Additionally, there are burn marks on the inner surface of the fragment. Measurements are as follows:

Length: 17.12 mm
Width: 15.50 mm
Bowl wall thickness: 3.81 mm
Weight: 0.9 g

Artifact 28.0/2406, also from Little Camel New Ground Field 1 (9Li202, Test Pit I, 0–10 cm) is a small fragment of a kaolin pipe bowl (maximum thickness, 0.43 cm).

Artifact 28.0/2339, recovered from Back Creek Village (9Li207, Test Pit III, upper level) is a small stem fragment (4.25 cm; 2.7 g) of a kaolin pipe, made of very fine-grained clay, with a smooth white slip. The inside diameter is 6/64 in.

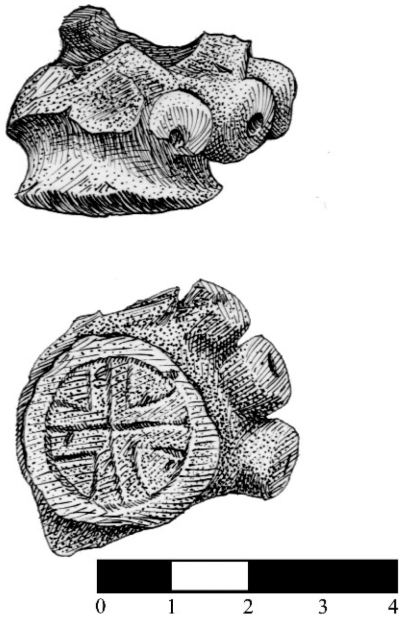


Fig. 21.1. Clay pipe bowl (28.0/2345) with a cross-in-circle motif carved into the base, recovered at Back Creek Village (9Li207).

Artifact 28.0/3233 (9Li232, Test Pit V, 40–50 cm) is a small fragment of a kaolin pipe stem (5.23 cm; 3.7 g). It was recovered at 9Li232 (Test Pit V, 40–50 cm), a medium-sized site located within the boundaries of Meeting House Field; considerable antebellum period debris turned up in the excavations. The inside diameter is 5/64 in.

## CARNELIAN BEAD

BY PETER FRANCIS

A single carnelian bead (28.0/5287) was recovered from 9Li91 (Test Pit V, 20–30 cm), a large palmetto-covered site occurs about 300 m west of Flag Pond Road, on a peninsula that approaches a tributary of Brunsen Creek (figs 20.11 and 20.15). It is oblate in form and relatively large, measuring 12.0 mm long, with a diameter of 13.2 mm, with the orange-red color typical of carnelians from western India (fig. 21.2). This bead was faceted all around its surface and polished by abrasion. The two ends were then chip dimpled and the bead drilled from both ends with double tipped diamond drills.

Carnelian is a mineral within the chalcedony (fibrous microcrystalline) group of quartz.[3] It is banded and translucent, and its hardness on the Mohs scale is 6.5, indicating that it is closely related to agate. Its color may range from yellow to a deep red. It is almost never found red in nature. Carnelian is almost always a less desirable color—gray, brown, or olive—when first dug. The stones needed to be heated in a muffled furnace to convert the iron within them to a reddish color.

There is little doubt that the carnelian bead from St. Catherines Island originally came from India. While Cambay (in western India) could have made such beads, the bead industry in southern India was always

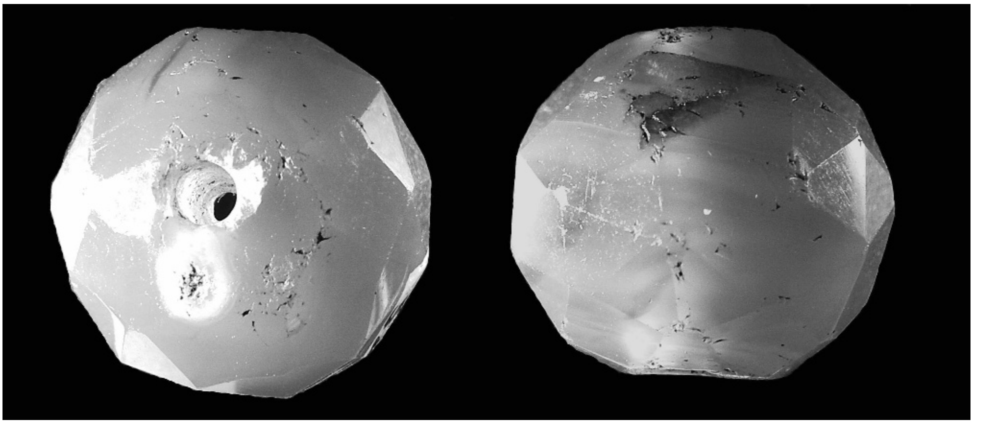

Fig. 21.2. Carnelian bead (28.0/5287.0001) recovered at 9Li91. This diameter is 13.2 mm.

more inclined to make faceted beads. Moreover, in Cambay, beads are drilled and then polished, while the opposite procedure (polishing, then drilling) was followed in the South. An example of this bead has been found on the surface of Kodumanal, Tamil Nadu. This is an old site, and, while it did make beads, it is likely that this was an intrusion. It is interesting, though, that the bead was found at an old lapidary site in South India.

Carnelian beads are not common on Spanish colonial sites. Deagan (1987: 182) shows that few such beads have been found and nearly all are from the period after ca. 1730. The one exception she noted was a fragment found at Puerto Real, Haiti.

This well-known bead type is common, though valued, in markets in Iran and Egypt (personal observation). Van der Sleen (1973: 56) wrote this about them: "Nearly all great-grandmothers of our times possessed necklaces of beautiful, rounded cornelians, mostly ground to multifaceted beads, in all coulours from milk-white to red."[4] He was in his seventies when he wrote the line around 1960. A portrait of Mme. Panchouke by Jean Auguste Dominique Ingres painted in 1811 and now hanging in the Louvre shows her wearing a necklace and a four-stranded bracelet of what can hardly be anything other than these beads.

St. Catherines is the only place where this bead has been excavated to date, and the apparent association with El Morro ceramics would suggest a date range of 1600–1770 (based on dating from St. Augustine; see Deagan 1987: 51). The other two datable sources noted above place it in the early to mid-19th century, suggesting that the popularity of this bead type may have lasted over 2 centuries. Its use in Europe as well as in Egypt and Iran likewise suggests that it was a most fashionable bead for some time.[5]

## SHELL BEADS AND ORNAMENTS

We recovered several shell beads and ornaments in the Island-wide survey on St. Catherines Island. Each specimen was examined by the late Peter Francis, and will be discussed in more detail as part of his analysis of the entire bead collection from Mission Santa Catalina de Guale and St. Catherines Island (which will appear in a future monograph of the American Museum of Natural History). For now, we will only present the basic descriptions, drawn from notes prepared by Peter Francis.

Columella shell bead 28.0/3212 (fig. 21.3a) is an ellipsoidal barrel, with the perforation drilled in hourglass fashion, off-center and not drilled all the way through. The maximum diameter is 14.1 mm and the total length is 39.6 mm. It was found at 9Li217 (Test Pit II, 10–20 cm), a small Wilmington-age site.

Artifact 28.0/2408 is a shell "waster" (19.2 to 30.4 mm in diameter and 3.3 mm thick), from which five bead blanks have been extracted (fig. 21.3b). The holes were drilled with a conical, hollow drill (or perhaps punched, but not pierced). This artifact was found at Little Camel New Ground Field 1 (9Li202; Test Pit I, 20–30 cm), a large Irene period site.

Artifact 28.0/1808 (fig. 21.3c) is a small circular shell gorget, 25.5 mm in diameter and 3.5 mm thick. On the interior face, 10 drillings adorn the periphery, with only two going all the way through (at the top); these are drilled from one side only, with the obverse side chipped away. Two similar dots were drilled with a conical drill into the center. The edge is ground, often with facets. It was found at 9Li1197, a large Irene period site, located approximately 80 m east of Wamassee Road. A very similar gorget was recovered at the Irene Mound (Caldwell and McCann, 1942: 53, Plate XIXG).

Artifact 28.0/3217 is a shell pin, with a large, rounded head (fig. 21.4m). The maximum diameter is 11.0 mm and the maximum length is 39.0. It is well polished throughout, with no signs of tool use. It was found at Jesamin Finger (9Li255; Test Pit I, 0–10 cm), a large Irene period site immediately south of Persimmon Point, on the westernmost part of St. Catherines Island.

Specimen 28.0/2324 is a rough shell pendant (20.2 mm to 24.5 mm in diameter and 8.7 mm long), with an off-center, hour-

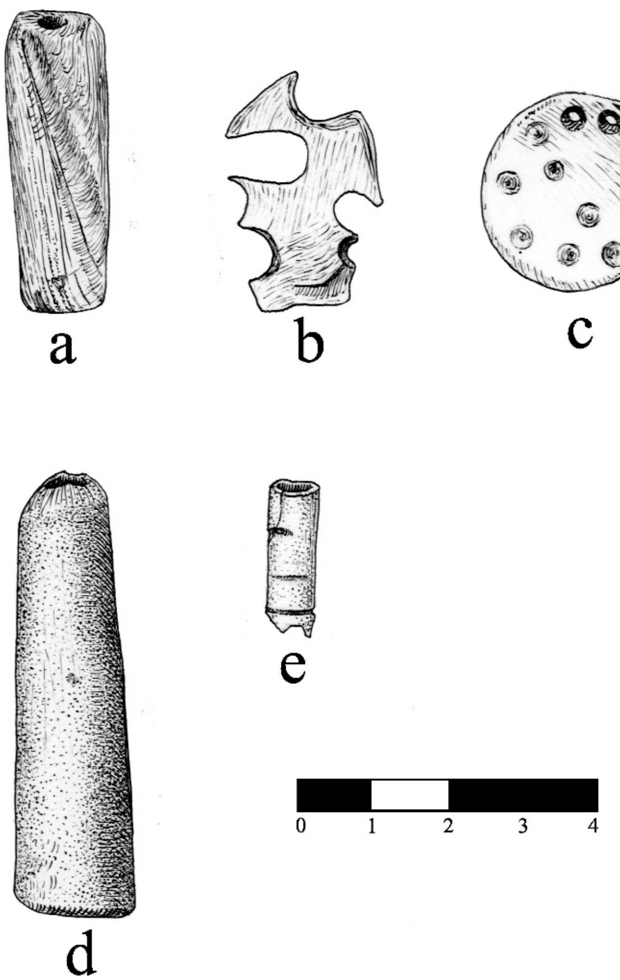


Fig. 21.3. Beads and ornaments made of shell and bone. **a.** 28.0/3212; **b.** 28.0/2408; **c.** 28.0/1808; **d.** 28.0/3210; **e.** 28.0/2316.

glass-shaped perforation. The margins are only minimally ground. It was found at Little Camel New Ground Field 4 (9Li205; Test Pit III, 10–20 cm), in Irene period contexts.

## WHELK TOOLS

BY CAMILLE LICATE

All of the whelk shells from the Island-wide survey, Mission Santa Catalina de Guale, and the various mortuary sites were analyzed at once. Dr. Paula Mikkelson, Curator of Invertebrates (American Museum of Natural History) identified all species of whelk represented in the St. Catherines Island assemblage (*Busycon contrarium*, *Busycon carica*, and *Busycon canaliculatum*).

The database for this collection of whelk tools followed the typology established by Marquardt (1992). Each archaeological specimen was coded according to basic provenience information, length, width, weight, lip thickness, working-edge angle, if applicable, cutting edge, hammer, and celt/adze attributes (table 21.1). Breakage was noted and all perforations or other anomalies on the shell were noted. All measurements were taken in millimeters using digital calipers. The length of the whelk was taken along

TABLE 21.1
**Shell Tools Recovered in the Island-wide Survey; All Artifacts Are Manufactured from *Busycon carica***

| Tool type | Catalog no. | Site | Unit[a] | Level[b] | Comments |
|---|---|---|---|---|---|
| Gastropod cutting-edge tool | 28.0/1870 | 9Li169 | TP II | 60–70 | — |
| Gastropod cutting-edge tool | 28.0/2122 | 9Li202 | TP I | 0–10 | — |
| Gastropod cutting-edge tool | 28.0/2564 | 9Li211 | TP I | 0–10 | — |
| Gastropod cutting-edge tool | 28.0/2706 | 9Li163 | TP IV | Surface | — |
| Gastropod cutting-edge tool | 28.3/3001 | 9Li19 | Md 4 | 0–6 in. | — |
| Gastropod cutting-edge tool | 28.0/3023 | 9Li199 | TP III | 0–10 | — |
| Gastropod cutting-edge tool | 28.0/3104 | 9Li255 | TP I | 10–20 | — |
| Gastropod cutting-edge tool | 28.0/3136 | 9Li224 | TP II | 10–20 | — |
| Gastropod cutting-edge tool | 28.0/2121 | 9Li209 | TP IV | 10–20 | — |
| Gastropod cutting-edge tool, type E | 28.0/2782c | 9Li211 | TP I | 20–30 | — |
| Gastropod cutting-edge tool, type E | 28.0/3055 | 9Li216 | TP II | 0–10 | Working edge is oblique |
| Gastropod cutting-edge tool, type E | 28.0/1440 | 9Li87 | — | Surface | — |
| Gastropod cutting-edge tool, type E | 28.0/1809 | 9Li197 | TP I | 40–50 | — |
| Gastropod grinder/pulverizer | 28.0/2766 | 9Li241 | TP III | 20–30 | — |
| Gastropod hammer | 28.0/2118 | 9Li208 | TP III | 20–30 | — |
| Gastropod hammer | 28.0/3010 | 9Li223 | TP II | 20–30 | — |
| Gastropod hammer, type E/G | 28.0/2891 | 9Li229 | — | — | — |
| Gastropod hammer, type E | 28.0/2275 | 9Li255 | TP VI | 10–20 | — |
| Gastropod hammer, type F | 28.0/2127 | 9Li204 | TP I | 0–10 | — |
| Gastropod hammer, unhafted | 28.0/1874 | 9Li13 | TP I | 10–20 | — |
| Gastropod hammer, unhafted | 28.0/1877 | 9Li13 | TP II | 10–20 | — |
| Gastropod hammer, unhafted | 28.0/2240 | 9Li173 | TP IV | 10–20 | — |
| Gastropod hammer, unhafted | 28.0/2245 | 9Li255 | TP II | 20–30 | — |
| Gastropod hammer, unhafted | 28.0/2246 | 9Li255 | TP II | 20–30 | — |
| Gastropod hammer, unhafted | 28.0/2247 | 9Li255 | TP II | 20–30 | — |
| Gastropod hammer, unhafted | 28.0/2248 | 9Li255 | TP II | 20–30 | — |
| Gastropod hammer, unhafted | 28.0/2249 | 9Li255 | TP II | 20–30 | — |
| Gastropod hammer, unhafted | 28.0/3269 | 9Li245 | TP II | 0–10 | — |
| Gastropod hammer/pounder | 28.0/2115 | 9Li208 | — | — | — |
| Gastropod hammer/pounder | 28.0/2782b | 9Li237 | TP I | 20–30 | — |
| Gastropod handle | 28.0/2106 | 9Li173 | TP II | 0–10 | — |
| Gastropod handle | 28.0/2117 | 9Li208 | TP III | 30–40 | — |
| Gastropod handle | 28.0/2491 | 9Li255 | TP VI | 20–30 | — |
| Gastropod handle | 28.0/2782a | 9Li237 | TP I | 20–30 | — |
| Columella cutting-edge tool | 28.0/1854 | 9Li173 | TP I | 20–30 | — |
| Columella cutting-edge tool | 28.0/1858 | 9Li173 | TP II | 20–30 | — |
| Columella cutting-edge tool | 28.0/2822 | 9Li277 | TP II | 10–20 | — |
| Columella cutting-edge tool | 28.0/3218 | 9Li189 | TP II | 30–40 | — |
| Columella cutting-edge tool | 28.0/5351 | 9Li8 | UGa, Square B | — | — |
| Columella hammer | 28.0/1904 | 9Li13 | TP I | 0–10 | — |
| Columella hammer | 28.0/2111 | 9Li176 | TP IV | 10–20 | — |
| Columella perforator | 28.0/1857 | 9Li13 | TP I | 20–30 | — |
| Columella perforator | 28.0/3217 | 9Li255 | TP I | 0–10 | Smooth, with scrapes and incisions |
| Columella plane | 28.0/3000 | 9Li19 | Md 4 | 0–6 in. | — |

[a] TP: Test Pit; Md: Midden; UGa: University of Georgia site.
[b] In centimeters unless otherwise noted.

its axis. Measurement was oriented vertically down the columella. Breakage of the apex, sutures, spire, and base of the columella was noted because breakage or absence of these portions of the shell affected the original length measurement. If a particular area was broken, it was noted under "Breakage". The location of the breakage was noted under "Location". In some instances the entire portion of the shell was missing. If this occurred, the missing portion was written under "Location". The width of the whelk was taken at a horizontal vantage point, across the widest part of the shell. The widest part of the shell was usually the top portion. Breakage of the body whorl, nodules, shoulder, or outer lip was noted because the breakage or absence of these portions of the shell would affect the original width. If a particular portion was broken, it was noted under "Breakage". The location of the breakage was noted under "Location". In some cases, the portion of the shell was missing. If this occurred, the missing portion was written under "Location". Lip thickness was measured opposite the point of constriction, otherwise known as point "X". If the outer lip at the point of constriction was missing, an intact section of the outer lip was measured. This alteration was noted in the database. Each whelk was weighed in grams using a Sartorius 1003 digital scale. In the cases where whelks exceeded the digital scale's weight capacity a Dial-o-Gram balance was used.

All breakage of the whelk shells was noted in the database. A section of the analysis sheet pertained to the presence or absence of the body whorl. If the body whorl was present, "present" was marked, if the body whorl was absent, "not present" was marked, and if part of the whorl was missing, "partially present" was marked. Holes and perforations were also noted. If a perforation seemed anthropogenic, it was noted under the "Number of Perforations and Notches" column. The location of the perforation was also noted.

Most of the wear patterns and tool attributes could be easily recognized, but a microscope and neon magnifying lamp were used to study the shell more closely. The working edge could be classified as broken, blunt, single beveled, double beveled, rounded beveled, or pointed. Hammer and cutting-edge tool wear was classified as spalled, little–no spalling, straight, acute, or shattered (after Marquardt, 1992). The working-edge angle was judged to be perpendicular, parallel, or obtuse. Defining a working-edge angle was done by what the working edge most closely resembled. Determining the working-edge angle in most cases was a matter of judging whether or not the angle was parallel, perpendicular, or obtuse. In a minority of the cases Marquardt's method of measuring hafting angles was used.

To identify a whelk shell as a utilized tool, it was necessary to determine whether the distinguishing markers on the shell were natural or anthropogenic. There were a variety of factors involved in breakage. Breakage could be attributed to weathering (being tossed around in the surf) and prey such as birds and crabs. Perforations and holes could be attributed to moon snails and other sea creatures. Intentional breakage, including perforations, was evident when other tool attributes were present or when the quality of the break or perforation was in a precise location. Working edges of cutting-edge tools possessed a distinct look, usually via a single or double bevel. Hammers exhibited a distinctly shattered and perpendicular quality.

The complete whelk tool database will be discussed in conjunction with the overall archaeological description of Mission Santa Catalina de Guale. For present purposes, we will briefly describe the whelk tools recovered in the Island-wide survey.

### Gastropod Cutting-edged Tools ($n = 13$)

Gastropod shells with working edges and bevels placed obliquely to the long axis are called "cutting-edged tools" (after Leur et al., 1986: 106). Following Goggin's (n.d.) original typology, as subsequently modified by Leur et al. (1986), Marquardt (1992: 193, fig. 3) uses the term Type A to denote gastropods having a notch cut into the lip for hafting through a hole in the opposite side of the shell. So hafted, these gastropods were lashed to handles. Marquardt's (1992) Type B is hafted through two holes (rather than the notch and a hole). Gastropod cutting-edged tool Type E lacks notches in the lip and holes in the body whorl; apparently they were hafted through the aperture (Marquardt, 1992: 197–198).

### Gastropod Grinder/Pulverizer ($n = 1$)

Marquart (1992: 203) defines this tool based on recoveries at the Pineland site (Florida). These large whelks have the entire posterior portion removed down to the shoulder, then cut edges ground smooth. The function is unknown, but the tool could have been used to pulverize/tenderize either plant or animal foodstuffs.

### Gastropod Hammers ($n = 5$)

Three forms of gastropod hammers were found in the St. Catherines Island survey collection. Marquardt's (1992) Type E hammers were hafted from the aperture through a hole above the shoulder. But unlike the smoothed, beveled cutting edge tools, such hammers show a blunt working surface smoothed by repeated pounding (Marquardt, 1992: 200–201). In Type F hammers, the upper part of the columella and most of the spire have been removed; then two shallow notches are cut on either side of the whorl for hafting. Type G hammers are smaller and lighter than the others, commonly made of smaller shells and perhaps used as expedient tools.

### Gastropod Hammers, Unhafted ($n = 9$)

On occasion, *Busycon carica* shells were used for hammering without any hafting at all (Marquardt, 1992: 202); Goggin (n.d.) termed these tools "hand hammers".

### Gastropod Hammer/Pounders ($n = 2$)

"Pounders" are large gastropod shells with the outer whorls stripped away, then used for battering with the posterior end of the shell. Marquardt (1992: 203) notes that such tools work quite well for knocking individual oysters loose from a cluster. Some such pounders also have hammer wear on the anterior surface as well.

### Gastropod Handles ($n = 4$)

Much of the body whorl has been stripped away, with the anterior part of the shell left intact (Marquardt, 1992: 204). Their function is unknown: Perhaps they were hafted and used for digging clams or they might have been used as rakelike tools to move large quantities of shellfish or finfish. They may even have been used as "handles" for holding stone, bone, antler, or shell artifacts.

### Columella Cutting-edge Tools ($n = 5$)

These columella tools, apparently unhafted, have beveled edges, with the opposite ends commonly tapered, and ground smooth (Marquardt, 1992: 204).

### Columella Hammers ($n = 2$)

These hammers are battered on the anterior end of the whelk's columella (Marquardt, 1992: 205). There is no evidence that columella hammers were hafted.

### Columella Perforators ($n = 2$)

Often called "awls", these tools have one (or both) end of the columella sharpened to a point, rather than a bevel (Marquardt, 1992: 204).

### Columella Plane ($n = 1$)

In this tool type, the columella has a very smooth and flat surface parallel to the long axis; Marquardt (1992: 207) suggests that columella planes may be woodworking tools.

## BONE ARTIFACTS

We recovered numerous worked bones in the Island-wide survey: one bone bead, a bone tube, and fourteen awls and awl fragments.

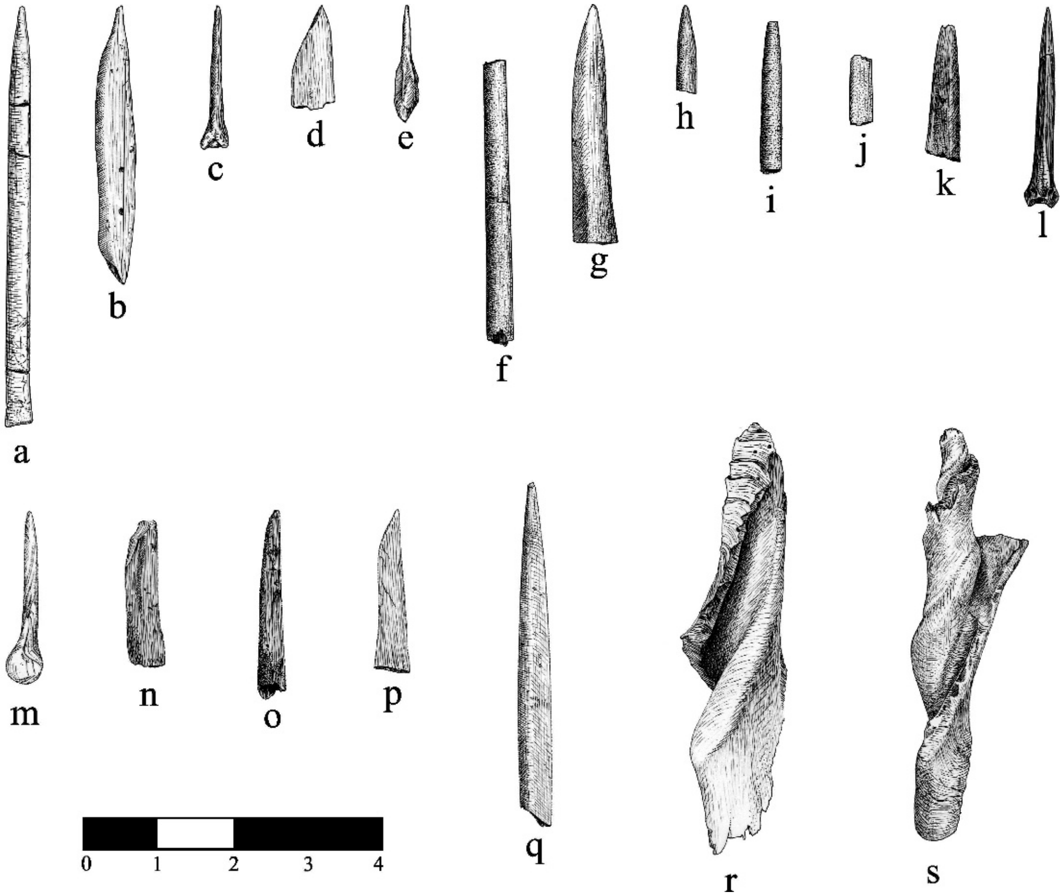


Fig. 21.4. Worked bone and shell tools. **a.** 28.0/1828; **b.** 28.0/1868; **c.** 28.0/1920; **d.** 28.0/2210; **e.** 28.0/2334; **f.** 28.0/3205; **g.** 28.0/3207; **h.** 28.0/3206; **i.** 28.0/3209; **j.** 28.0/3208; **k.** 28.0/3213; **l.** 28.0/3215; **m.** 28.0/3217; **n.** 28.0/3219; **o.** 28.0/3220; **p.** 28.0/3225; **q.** 28.0/5350; **r.** 28.0/5351; **s.** 28.0/3218.

A large bone bead (28.0/3210) was recovered at 9Li217 (Test Pit I, 40–50 cm); it measures 59.0 mm long and 15.0 mm in diameter (fig. 21.3d). The smaller end has been extensively ground. The natural perforation has been enlarged.

A broken, incised, bone tube (28.0/2316) was found at 9Li209 (Test Pit III, 10–20 cm), measuring 21.0 mm long and 6.1 mm in diameter (fig. 21.3e). One end has been carefully scored and broken, and three additional incised grooves are evident on the shaft.

Figures 21.3 and 21.4 illustrate all of the bone artifacts recovered during the Island-wide survey, and table 21.2 provides the provenience information for each.

## LITHIC ARTIFACTS

BY JESSICA McNEIL

The Island-wide survey of St. Catherines Island produced 103 lithic artifacts, including bifaces, debitage, and groundstone (tables 21.3, 21.4, 21.5). The analysis of these artifacts followed the procedure set forth in the analysis of the material that was recovered from the Santa Catalina de Guale and Pueblo Santa Catalina de Guale lithic assemblages.

### Projectile Points

Six of the seven chert projectile points were complete, and four of them could be classified morphologically.

TABLE 21.2
**Worked Bone Recovered in the Island-wide Survey**

| Specimen no. | Site no. | Provenience | Artifact form |
|---|---|---|---|
| 28.0/1828 | 9Li200 | Mound II (40–50 cm) | Bone awl tip |
| 28.0/1868 | 9Li169 | TP II (10–20 cm) | Bone awl tip |
| 28.0/1920 | 9Li13 | TP I (10–20 cm) | Bone awl tip |
| 28.0/2210 | 9Li177 | TP I (20–30 cm) | Worked bone |
| 28.0/2334 | 9Li206 | TP I (10–20 cm) | Bone awl tip |
| 28.0/3205 | 9Li199 | TP I (10–20 cm) | Bone awl midsection |
| 28.0/3207 | 9Li199 | TP I (10–20 cm) | Bone awl tip |
| 28.0/3206 | 9Li199 | TP I (10–20 cm) | Bone awl tip |
| 28.0/3209 | 9Li199 | TP I (10–20 cm) | Bone awl tip |
| 28.0/3208 | 9Li199 | TP I (10–20 cm) | Bone awl midsection |
| 28.0/3213 | 9Li220 | TP I (10–20 cm) | Bone awl tip |
| 28.0/3215 | 9Li192 | TP II (10–20 cm) | Bone awl tip |
| 28.0/3219 | 9Li255 | TP I (0–10 cm) | Worked bone |
| 28.0/3220 | 9Li255 | TP IV (0–10 cm) | Bone awl tip |
| 28.0/3225 | 9Li233 | TP III (20–30 cm) | Bone awl tip |
| 28.0/5350 | 9Li8 | UGa, Square B | Bone awl tip |
| 28.0/3210 | 9Li217 | TP I (40–50 cm) | Bone bead |
| 28.0/2316 | 9Li209 | TP III (10–20 cm) | Incised bone tube |

HERNANDO POINTS: Two projectile points (28.0/2443 and 28.0/3465) can be classified as Hernando points, a type thought to be associated with the Deptford period (Bullen, 1975, 1968; Whatley, 2002: 51), which dates to between cal 350 B.C. and cal A.D. 350 in the St. Catherines Island chronology (chap. 15, this volume). According to Purdy (1981), Hernando points are commonly found throughout southeastern North America.

Hernando points have a plan view that is roughly the shape of an isosceles triangle, and exhibit two basal notches that form the hafting element. The presence of basal notches makes Hernando points distinctive from most Southeastern projectile points (Bullen, 1975).

Artifact 28.0/2443 exhibits a biconvex cross section, straight blade margins, and a random flake scar patterning (fig. 21.5a). The length of this projectile point is only slightly greater than its maximum width, making it a squat projectile point that, to the naked eye, appears to have a plan view of an equilateral triangle. Striations are present along the basal notches, indicating possible evidence of hafting, although this may simply have occurred during the production of the basal notches. This point comes from 9Li15, the Shell Field 2 site, where the combined ceramic and $^{14}C$ evidence agrees with an assignment to the Deptford phase (chap. 15, this volume).

Artifact 28.0/3465 exhibits a plano-convex cross section and straight blade margins (fig. 21.5g). The basal half of one margin has coarse serrations, in contrast to the remainder of the point margins, which are not serrated. It is a tall, narrow projectile point that has a maximum length that is almost twice that of its maximum width. Although this artifact is extremely weathered, it is possible to determine that it exhibits a random flake scar patterning. Several striations are evident; however, these appear to be random and are probably the result of manufacturing technique rather than use. This artifact was found at 9Li247, where the associated ceramic assemblage consists almost entirely of St. Simons period diagnostics.

SAVANNAH RIVER STEMMED: Savannah River Stemmed projectile points belong to the Savannah River Cluster, and in the Southeast are diagnostic of the Late Archaic Period; this type dates from between 3000 B.C. and 1000 B.C. (Justice, 1995; Whatley, 2002: 99–100). Although it is slightly smaller than the dimensions that

TABLE 21.3
**Projectile Points from the Island-wide Survey**

| Site no. | Test pit | Depth | Catalog no. | Actual weight (g) | Estimate weight (g) | Material | Thickness (mm) | Maximum length (mm) | Axial length (mm) | Maximum width (mm) | Neck width (mm) | Basal width (mm) | DSA | PSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9Li251 | X | 50–75 cm | 28.0/3461 | 4.5 | — | Chert | 8.11 | 27.25 | — | 21.52 | 16.91 | 13.75 | 115 | 70 |
| 9Li229 | V | 20–30 cm | 28.0/3223 | 10.8 | — | Chert | 9.25 | 38.21 | — | 28.87 | 14.84 | 13.95 | 185 | 90 |
| 9Li19 | — | Surface | 28.0/0337 | 11.6 | — | Chert | 8.58 | 49.96 | — | 25.5 | 18.12 | 15.66 | 210 | 80 |
| 9Li15 | III | 20–30 cm below surface | 28.0/2443 | 4.7 | — | Chert | 6.71 | 36.92 | — | 29.38 | — | — | — | — |
| 9Li247 | II | 50–75 cm | 28.0/3465 | 6.8 | — | Chert | 4.78 | 54.27 | — | 30.5 | — | — | — | — |
| 9Li128 | III | 80–90 cm | 28.0/3311 | 2.1 | — | Chert | 6.83 | 17.65 | — | 19.39 | — | — | — | — |
| 9Li177 | V | – | 28.0/2211 | 1.9 | — | Chert | 1.90 | 24.83 | — | 17.94 | — | 16.92 | — | — |

Justice sets forth (1995: 252), artifact 28.0/337 can be classified as belonging to this morphological variety. This is an asymmetrical projectile point that exhibits a wide stem and a straight-edged blade; its shoulders are almost nonexistent (fig. 21.5b). Flake scar patterning is random and two large hinge fractures remain on one face. This artifact was recovered from the surface at 9Li19, and only six St. Simons sherds were recovered in our excavations. This would suggest that 28.0/0337 may have been curated or salvaged from earlier contexts.

Jack's Reef Pentagonal: Artifact 28.0/2211, classified as a Jack's Reef Pentagonal projectile point, is a small asymmetrical projectile point that exhibits excurvate blade margins (Ritchie, 1961; Whatley, 2002: 53–54; see fig. 21.5f). Its flake scar patterning is primarily random; however, the basal portion of one face is shaped by several long, slightly overlapping, parallel pressure flake scars. On the opposite face, the basal margin exhibits a large flake scar that terminates in a hinge fracture. One of the blade margins of this projectile point exhibits a small degree of nibbling—however, this is probably not a function of utilization as it covers only a very small area.

In Justice's chronology, this projectile point belongs to the Unnotched Pentagonal Cluster and is primarily found in the Northeast. Jack's Reef Pentagonal points are diagnostic of the Late Woodland period and date to between A.D. 500 and 1000 (Justice, 1995). This point was recovered at 9Li177 (in Rock Field); the limited ceramic assemblage from the single test pit excavated here dates mostly to the Irene period.

Untyped Projectile Points: Artifact 28.0/3223 is a straight-stemmed projectile point that exhibits excurvate blade margins and pronounced shoulders. It was produced from a relatively thick percussion flake; several percussion flake scars are still evident along both faces. This projectile point exhibits random pressure flake scars.

Artifact 28.0/3461 is a small asymmetrical projectile point, which did not fit into any of Justice's classifications. It exhibits

TABLE 21.4
**Miscellaneous Biface Fragments Recovered in the Island-wide Survey**

| Site no. | Test pit | Depth | Catalog no. | Material | Weight (g) | Thickness (mm) | Length (mm) | Width (mm) |
|---|---|---|---|---|---|---|---|---|
| 9Li204 | III | 0–10 cm | 28.0/2399 | Chert | 3.3 | 9.01 | 31.71 | 14.29 |
| 9Li238 | IV | 20–30 cm below surface | 28.0/5315 | Chert | 0.9 | 4.26 | 23.28 | 13.76 |

a small barb on one side and unpronounced shoulders. Several flake scars terminate in large step fractures, and pressure flaking is random. The stem of this projectile point is large and is only slightly smaller in length than its blade. The base of the stem was the striking platform of the original percussion flake and remains unmodified.

Artifact 28.0/3311 is the distal end of a projectile point. This artifact was broken by a straight bending fracture. The blade exhibited excurvate margins and the flake scar patterning on this projectile point was primarily random. One of the blade margins was shaped by alternate pressure flaking. As only a small portion (less than 18 mm) remained, this projectile point could not be morphologically typed.

## Miscellaneous Biface Fragments

Two small biface fragments (28.0/5315 and 28.0/2399) were found during this survey. In both cases, these fragments were too small to make an accurate determination of their original function (fig. 21.5h,i). Both of these fragments were triangular in shape and did not exhibit any evidence of use wear. Alternate face pressure flaking shaped the only unbroken edge of artifact 28.0/2399.

## Groundstone

Artifact 28.0/3462 is a large portion of a quartz groundstone object. The object was broken approximately in half and the portion that remains is oblong in shape. Striations that are oriented in several different directions cover the surface of the object. These striations are an indication that this piece may have been utilized for grinding.

Artifact 28.0/0002 is a circular sandstone object, the sides of which are ground, thereby giving it its circular shape. The top and bottom faces of this object were not ground and exhibit numerous indentations on both faces. On both faces of this object there is a deep indentation in the approximate center, the purpose of which is unknown. Both faces exhibit long, relatively straight striations that were visible to the naked eye. This artifact could not be examined microscopically due to the reflective nature of the quartz grains.

Artifact 28.0/5317 is a small fragment of a grinding stone. Only a small portion (less than 200 $mm^2$) of the original surface remains, the rest no longer remains. Approximately one-quarter of the original surface exhibits several parallel striations. This is an indication that this artifact may have functioned as a grinding stone of some sort.

TABLE 21.5
**Groundstone Recovered in the Island-wide Survey**

| Site no. | Test pit | Depth | Catalog no. | Material | Weight (g) | Thickness (mm) | Length (mm) | Width (mm) |
|---|---|---|---|---|---|---|---|---|
| 9Li249 | III | 25–50 cm | 28.0/3462 | Quartz | 387.4 | 45.25 | 79.33 | 70.78 |
| 9Li243 | IV | 10–20 cm below surface | 28.0/5317 | Unknown | 25.8 | 20.6 | 49.2 | 21.45 |
| 9Li122 | — | Surface | 28.0/0002 | Sandstone | 189.4 | 31.49 | 60.08 | 58.41 |
| 9Li13 | II | 0–10 cm below surface | 28.0/5285 | Basalt | 15.3 | 45.07 | 26.16 | 45.14 |

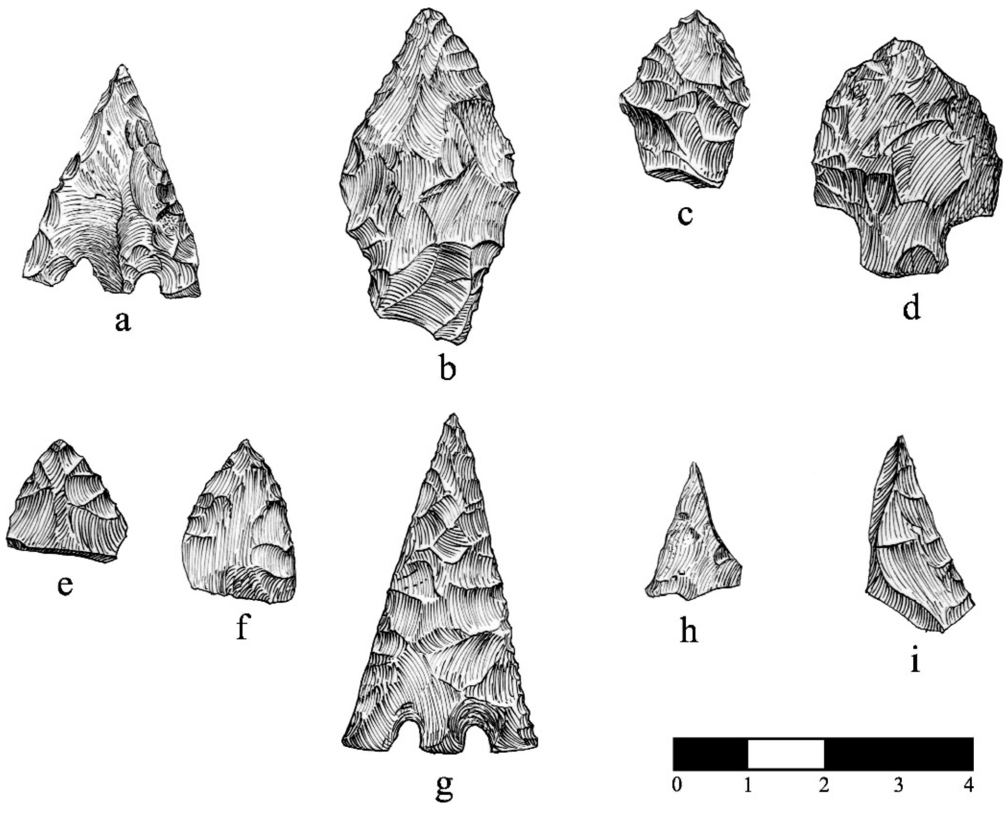


Fig. 21.5. Projectile point and miscellaneous biface fragments recovered on the Island-wide survey. **a.** Hernando point (28.0/2443); **b.** Savannah River Stemmed (28.0/337); **c.** untyped (28.0/3461). **d.** untyped (28.0/3223); **e.** untyped (28.0/3311); **f.** Jacks Reef Pentagonal (28.0/2211); **g.** Hernando point (28.0/3465); **h.** biface fragment (28.0/5315); **i.** biface fragment (28.0/2399).

However, the function remains inconclusive given that only a small portion of the original grinding surface remains.

## Debitage

One of the more interesting aspects of this assemblage is the probable existence of a few distinct episodes of tool production evident throughout the island. Although much of this is based on only a small number of flakes, it creates the potential for some intriguing results.

Site 9Li246 contained two chert flakes that were produced from the same raw material source. One of these (28.0/3466) was a percussion flake, while the second (28.0/3467) was a biface thinning flake. The presence of these two flakes that were produced from the same raw material nodule is an indication that some sort of manufacturing took place at this location. But only two flakes were found here, and it was not possible to refit them.

Artifact 28.0/3464, a large biface thinning flake, which was found within 9Li248, also appears to be from the same raw material source as 28.0/3466 and 28.0/3467.

Within Transect G-6, the distal portion of a large biface thinning flake (28.0/3236) was found. It too, was produced from very similar raw material (perhaps the same chert nodule) as 28.0/3464, 28.0/3466, and 28.0/3467, further suggesting that these flakes represent different episodes of production.

Two of the flakes (28.0/2187 and 28.0/2188) recovered from site 9Li176 appear to have been produced from the same raw material nodule. Both were detached during the early stages of manufacture, as they are both percussion flakes and exhibit cortex that covers 100 percent of their dorsal faces. This is an indication that primary reduction may have occurred at this location.

A total of 32 pieces of debitage was found at 9Li137. Four of the chert flakes (28.0/3471, 28.0/3473, 28.0/3474, and 28.0/3475) from 9Li137 were all produced from the same raw material source. One of these flakes (28.0/3475) is a percussion flake, whereas the other three are all biface thinning flakes.

The remaining debitage assemblage from 9Li137 was made exclusively of quartz (comprising 88% of the quartz artifacts that were recovered in the Island-wide survey). Sixteen of the flakes from 9Li207are from the same raw material source.

Overall, biface thinning flakes comprised the majority of the debitage assemblage, while percussion flakes and shatter accounted for 24 percent and 22 percent, respectively. This situation differed from that of the Mission proper and the Pueblo debitage assemblages, where shatter accounted for the majority of the assemblage in both cases (McNeil, 1999). This can be preliminarily interpreted as a situation of differential activity episodes within the island. Production activities throughout the island appear to include all the stages of stone tool manufacture, from primary reduction through final shaping. However, given the small sample size of the Island-wide survey assemblage, it is difficult to provide more than a vague and inconclusive interpretation of the results.

### Conclusion

Although this assemblage is quite small, a few interesting points can be deciphered from these artifacts. While only two quartz pebbles were present in this lithic assemblage, the absence of naturally occurring rock on St. Catherines Island makes their presence worthy of note (McNeil, 1999).

The analysis of the debitage indicated the presence of activity areas wherein production and/or rejuvenation appeared to have been taking place; this was evident at several different sites, throughout the island. The dating of the projectile points also provides another way to assess the chronological placement of these sites.

## NOTES

1. We gratefully acknowledge the assistance of Elliot Blair, Anna Boozer, and Ada Prieto in helping to prepare this section.
2. See also chapter 25 (this volume) for a discussion of additional SECC symbolism at the Meeting House Field site.
3. Some carnelians have a quantity of iron in them naturally and need only be heated. The lapidaries at Idar-Oberstein, Germany, import chalcedony from Minas Gerais, Brazil, and have to impart iron into them before the heating. This industry is too recent (started about 1820) for consideration here.
4. He is correct on the color range of these beads, though the white ones would more properly be described as chalcedony.
5. There is little documentary evidence, but my observations of the beads traded from Europe in the last few centuries to Egypt and Persia/Iran indicate that both of these countries bought beads that were fashionable in Europe and northern North America. This is in contrast to trade beads sold in sub-Saharan Africa or to most Native Americans, where during the last several centuries only the cheaper sorts were available.

# CHAPTER 22. NONHUMAN VERTEBRATE REMAINS

ELIZABETH J. REITZ

From around 2500 B.C. until the introduction of domestic mammals by Europeans in the 1500s, zooarchaeological evidence indicates that marine organisms were the principal animals used by humans on the islands and adjacent mainland of the Florida, Georgia, and Carolina coasts (Reitz, 1982a, 1985, 1988a, 1991, 1995; Reitz and Quitmyer, 1988). Although they are the largest coastal herbivores, deer are not as consistently abundant in archaeological collections as marine fishes. The presence of deer, small mammals, and turtles indicates that mammals and reptiles were used, but they apparently did not play as prominent a role in the human diet as did marine vertebrates. Wild birds are consistently rare in coastal archaeological assemblages. Marine vertebrates found in archaeological coastal sites include sharks, rays, and bony fishes. Among the bony fishes, catfishes and drums are usually the most common animals; however, they are associated with dozens of other animals. Many of the fishes are so small that nets or baskets were likely used to acquire them. There is no evidence that highly seasonal fishes such as sturgeons, shads, or bluefishes formed an important part of the economy. The earliest unequivocal examples of this estuarine-focused strategy are found in Late Archaic sites. Evidence so far indicates that this strategy continued without substantial change into the 17th and 18th centuries in many places (Reitz, 1991, 1993, 1995).

While these observations may be true in a general sense, variables associated with time and space not only influence human subsistence, but are also reflected in archaeological vertebrate assemblages. To test theories relating to cultural change, data are needed from each of the time periods and biotopes found on the coast. For example, a comparison of materials from two Swift Creek sites suggests that there were subtle differences in subsistence practiced at the two sites (Reitz and Quitmyer, 1988). These differences are attributable to slightly different environments. This comparison is rare, however, because one of the limitations facing archaeologists working on the coast is the limited amount of comparable data from several localities and different time periods. Only at the Kings Bay locality (fig. 22.1; Johnson, 1978; Smith et al., 1981; Adams, 1985) are large faunal samples available that represent several time periods within a similar environmental area. These data suggest continuity in subsistence effort rather than dramatic changes through time. More limited data from the Fountain of Youth site suggest a similar conclusion (Reitz, 1991).

Additional information on coastal animal use is needed to augment the Kings Bay and Fountain of Youth studies, if only because these are mainland sites and as a result may not be representative of subsistence efforts on the Sea Islands. It is important to verify that the subsistence strategy observed at these mainland locations also prevailed on the Sea Islands. Study of the vertebrate animal remains recovered during the transect survey of St. Catherines Island, therefore, provides a rare opportunity to view subsistence through time on a Georgia Sea Island.

Although for many years archaeologists have recovered and reported faunal data from systematic surveys of various kinds, the small size of most collections precludes substantive analysis of the vertebrate evidence. Such survey data, however, could be important for planning purposes, especially if future work is anticipated in the area. Although of limited value for providing concrete answers to major anthropological questions, large numbers of otherwise small samples may be advantageous in developing hypotheses to be tested by future research. In fact, systematically recovered survey data may be one of the few sources

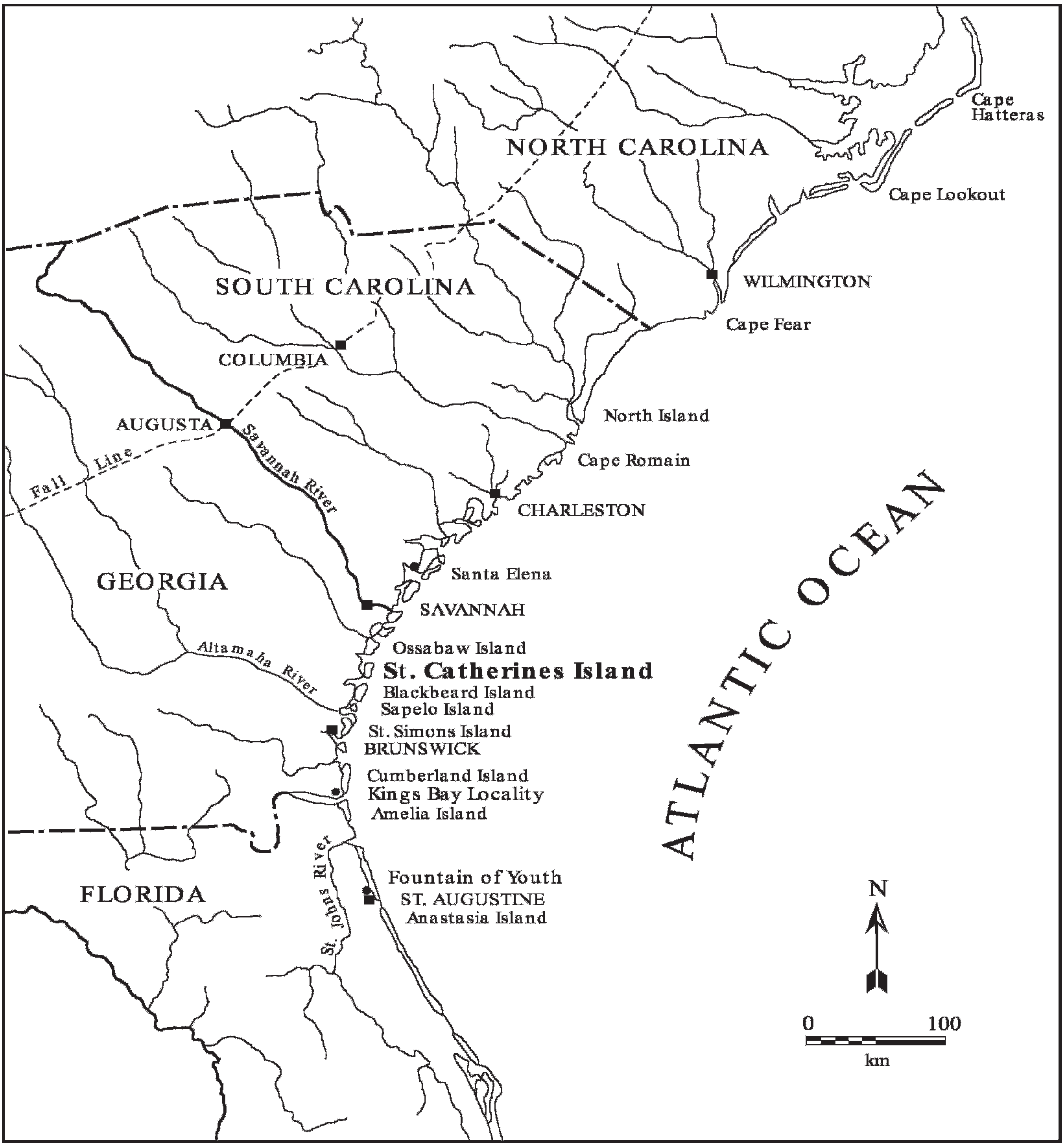


Fig. 22.1. Locations of sites mentioned in this chapter. Modern cities are indicated by blocks and archaeological sites by dots.

of information from each habitat and time period initially available for a project area if long-term research is planned. Under these circumstances, some preliminary assessment of subsistence is desirable to guide the research design, with the expectation that working models will be improved as research continues.

In the case of the St. Catherines Island transect survey, the animal remains were collected in a systematic fashion from the entire island in order to assess the island's archaeological background. These remains represent animal use throughout the entire known sequence of human occupation of St. Catherines. Thus, this seems an excellent opportunity to explore applications using results that might be of limited use separately but of considerable value in developing broad-scale, regional hypotheses. Specifically, the St. Catherines Island transect data will be used to develop hypotheses about change and stability in animal use on the island that can be tested and refined as work on the island and elsewhere continues.

## METHODS AND MATERIALS

The American Museum of Natural History initiated an Island-wide transect survey in 1977 (Thomas, 1987: 108–113). The survey followed a systematic grid designed to sample 20 percent of the island's surface through a series of east–west transects. Sites were tested with two or more 1-m-square test units. Faunal materials were recovered from these tests using 1/4-in. mesh screen.

Also included in this study are materials that were not part of the transect survey. These materials are from 9Li13, 9Li19, 9Li22, and 9Li8. These sites were excavated by Joseph R. Caldwell in the late 1960s. Caldwell's materials are included in this report of the transect survey because either the site fell within the transect grid (9Li19 and 9Li22) or because it extends the survey into the Spanish colonial period that would otherwise not be represented in the transect data. 9Li13 falls within the Spanish Mission Santa Catalina de Guale, and 9Li8 is the nearby mission village, Fallen Tree. Fallen Tree was folded into the large complex known as "Pueblo Santa Catalina de Guale" once its relationship with the Mission was recognized. Caldwell used 11/32-in. mesh screens during his excavations. A list of the sites reviewed here is provided in appendix A.

For purposes of organizing the many small samples from these sites into analytical units, they are grouped into East, Center, West, and South sample strata. In assigning sites to a stratum, the island was divided into the southern Holocene portion and a northern Pleistocene portion. The Pleistocene part of the island was further subdivided into East, Center, and West strata. East and West strata included sites that were within 500 m of the eastern or the western marshy edge of the Pleistocene part of the island. Sites classified as Center are more than 500 m inland on the Pleistocene part of the island. Sites on the Holocene portion of the island are assigned to the South stratum. The stratum to which each site is assigned is indicated in appendix A.

The St. Catherines transect data are generally discussed as aggregates of sites organized by these spatial strata and time periods rather than by individual sites. This limits some of the interpretations because the data are from several locations rather than one. To illustrate this point with an example, the tables and figures reporting the contents of Refuge-Deptford samples combine data from nine separate test sites. Species lists are reported for each of the four spatial strata, but other data are reported without reference to temporal strata or a specific site. To discuss data from each individual test site would be inappropriate because most sites yielded no more than a few specimens. On the other hand, these aggregated collections do not represent a coherent behavioral unit and the data presented here cannot be used to discuss site formation processes, butchering strategies, or redistribution systems for a specific site or time period. It is possible that skeletal remains from a carcass field dressed at one site was distributed to several other sites if such sites were contemporaneous.

There are three exceptions to this procedure. The St. Simons period collection from 9Li231 is large and is a substantial contribution to our knowledge of Late Archaic subsistence. Data from this site are discussed in greater detail in this chapter. The collections from 9Li13 and 9Li8 are also presented individually. 9Li13 falls within Mission Santa Catalina de Guale and 9Li8 is the mission pueblo at Fallen Tree. In these two cases, neither collection is very large, but the known differences between the two cultural groups are so great that it seems inappropriate to combine them. Data from Fallen Tree are further broken down into those excavated by Thomas and those excavated by Caldwell because of the difference in screen size used by the two excavators. As will be seen below, this difference in recovery method correlates with distinctions in the animals identified and the interpretations drawn from them.

The vertebrate materials were examined using standard zooarchaeological methods. Identifications were made by Nanny Carder, Gwyneth Duncan, Jennifer Freer, Kevin Roe, and David Varricchio using the comparative skeletal collection of the Zooarchaeological Laboratory, Georgia Museum of Natural History, University of Georgia. They were assisted by Lori Taylor and Emmett Walsh. Specimens of all taxa were counted and weighed to determine the relative abundance of the species identified. Cross-mending specimens were counted as single specimens. A record was made of elements represented. Age, sex, and modifications were noted when observed. Both elements represented as well as any modifications were sketched to facilitate analysis. Where preservation allowed, measurements were taken of deer elements following the guidelines established by Angela von den Driesch (1976). Measurements are presented as appendix B. The minimum number of individuals (MNI) was estimated based on paired elements and age. In most cases, MNI was estimated for the lowest taxonomic level, that is, species rather than family.

While MNI is a standard zooarchaeological quantification medium, the measure has several problems (Reitz and Wing, 2008: 205–210). MNI emphasizes the relative importance of small species compared to large ones. This is easily demonstrated by a hypothetical sample that consists of 82 catfishes and only six deer. While 82 catfishes represent a larger number of individuals, one deer might supply a substantially larger meat yield. A further problem with MNI is the inherent assumption that the entire individual was utilized at the site. From ethnographic evidence we know that this is not necessarily the case, particularly in regard to large animals and redistribution of meat (White, 1953).

MNI is influenced by the manner in which data from archaeological proveniences are aggregated during analysis. The aggregation of separate samples into one analytical collection, or the "minimum distinction" method (Grayson, 1973), allows for a conservative estimate of MNI. On the other hand, a modification of this approach is called for when analysis discerns discrete sample units. Increasing the number of analytical units generally increases the number of individuals estimated. Furthermore, some elements are simply more readily identified than others and the taxa represented by these elements may appear more significant in the species list than they were in the diet. In estimating MNI for the St. Catherines materials, remains from each test site were considered discrete analytical units, but test pits, levels, and zones within each site were combined analytically.

Biomass estimates attempt to compensate for some of the problems encountered with MNI (Reitz and Wing, 2008: 238–242). Biomass provides information on the quantity of meat supplied by the animal. In some cases, the original live weight or size of the animal also can be estimated. The predictions are based on the allometric principle that the proportions of body mass, skeletal mass, and skeletal dimensions change with increasing body size. This scale effect results from a need to compensate for weakness in the basic structural materials, in this case bone.

The relationship between body weight and skeletal weight is described by the allometric equation (Simpson et al., 1960: 397):

$$Y = aX^b$$

Many biological phenomena show the allometry described by this formula (Gould, 1966, 1971). In this equation, $X$ is the skeletal weight or a linear dimension of the specimen, $Y$ is the quantity of meat or the total live weight, $b$ is the constant of allometry (the slope of the line), and $a$ is the $Y$-intercept for a log-log plot using the method of least squares regression and the best fit line (Casteel, 1978; Wing and Brown, 1979; Reitz and Cordier, 1983; Reitz et al., 1987). A given quantity of material or a specific skeletal dimension represents a predictable amount of tissue due to the effects of

TABLE 22.1
**Allometric Values Used in the Study[a]**

| Taxa | Bone weight (kg) to body weight (kg) | | | |
|---|---|---|---|---|
| | *n* | *Y*-Intercept (*a*) | Slope (*b*) | $r^2$ |
| Mammal | 97 | 1.12 | 0.90 | 0.94 |
| Bird | 307 | 1.04 | 0.91 | 0.97 |
| Turtle | 26 | 0.51 | 0.67 | 0.55 |
| Snake | 26 | 1.17 | 1.01 | 0.97 |
| Chondrichthyes | 17 | 1.68 | 0.86 | 0.85 |
| Osteichthyes | 393 | 0.90 | 0.81 | 0.80 |
| Non-Perciformes | 119 | 0.85 | 0.79 | 0.88 |
| Siluriformes | 36 | 1.15 | 0.95 | 0.87 |
| Perciformes | 274 | 0.93 | 0.83 | 0.76 |
| Sparidae | 22 | 0.96 | 0.92 | 0.98 |
| Sciaenidae | 99 | 0.81 | 0.74 | 0.73 |
| Pleuronectiformes | 21 | 1.09 | 0.89 | 0.95 |
| | Greatest astragalus lateral length (mm) to body weight (kg) | | | |
| Artiodactyls | 14 | −6.999 | 5.499 | 0.88 |

[a] Key to abbreviations: Formula is $Y = aX^b$, where *Y* is biomass or meat weight; *X* is bone or shell weight; *a* is the *Y*-intercept; and *b* is the slope; *n* is the number of observations (Wing and Brown, 1979; Reitz and Cordier, 1983; Reitz et al., 1987).

allometric growth. Values for *a* and *b* are obtained from calculations based on data at the Florida Museum of Natural History at the University of Florida and at the Georgia Museum of Natural History at the University of Georgia. The allometric formulae used here are presented in table 22.1.

Allometry can be used to predict kilograms of meat represented by kilograms of faunal material where *X* is the archaeological specimen weight. This is a conservative estimate of biomass determined from the faunal materials actually recovered from the site. (The term "biomass" is used to refer to the results of this calculation). Biomass reflects the probability that only certain portions of the animal were used at the site, as would be the case where preserved and/or redistributed meats were consumed. It is highly likely that the meat of large-bodied animals (and their associated skeletal material) were shared within a social group so that MNI alone may not characterize the relative dietary contribution a large-bodied animal might make to a diet compared to a small-bodied one. Just as MNI is related to the aggregation of archaeological proveniences, so too is the biomass estimate. In this case, biomass is estimated for the same analytical units examined for estimating MNI. All proveniences within a site were lumped.

Allometry can also be used to predict original body size where *X* is a measured dimension of an archaeological specimen. In this case, the greatest length of the lateral half of the astragalus (GLl) described by Driesch (1976: 88) is used to estimate original body weight for deer (Reitz and Wing, 2008: 186). A problem with using the astragalus is that this element does not grow by epiphyseal fusion, so that distinguishing between adult elements and subadult ones may be difficult. The astragalus of very young animals is distinguished by a highly porous surface. Once the surface has achieved an adult appearance, it cannot be separated from those of fully matured, adult individuals. Therefore, in some cases predictions of weight and body size based on the astragalus may be for subadults rather than adults.

To summarize these data, MNI and biomass estimates are placed into faunal categories representing vertebrate class and other characteristics important to interpretation of human behavior. Two categories of domestic animals and seven categories of wild taxa are used. To compare MNI and biomass estimates among these categories, the summary tables include biomass only for those taxa for which MNI is also estimated. For example, biomass for *Corvus* spp. is used in the summaries but biomass for UID Fish is not used.

Modifications to elements represented indicate site formation processes as well as butchering methods. Modifications are classified as burns, cuts, worked, rodent gnawing, and carnivore gnawing. Burned specimens may result from exposure to fire when a cut of meat is roasted. Burns may also be inflicted if specimens are burned intentionally or unintentionally after discard. Cuts are small incisions across the surface of specimens. These marks were probably made by a knife as meat was separated from bone before or after the meat was cooked. Cuts also may be left behind if attempts are made to disarticulate the carcass at joints. Some marks that appear to be made by human tools may actually be abrasions inflicted after the bones were discarded, but distinguishing this source of small cuts requires access to higher powered magnification than was available during this study (Shipman and Rose, 1983). Worked specimens are those modified into tools, with the exception of turtle carapaces. In several cases, turtle carapace fragments had holes drilled into them. The agent responsible for this modification is not yet known, but it is assumed to be nonhuman, or at least postmortem, because in one case (a hole into a neural) the modification would be fatal to the animal if it had penetrated the carapace. Cases are also known of humans tethering turtles by means of holes drilled through peripherals, and this explanation for some of these holes cannot be dismissed on the basis of the available evidence. Worked specimens represent special cases and will be discussed in more detail below.

Gnawing by rodents and carnivores indicates that some specimens were not immediately buried after disposal. While burial would not assure an absence of gnawing, exposure of faunal remains for any length of time might encourage gnawing. Gnawing by rodents, and particularly by carnivores, would result in loss of an unknown quantity of discarded material. Rodents include both rats and mice as well as squirrels. Carnivores include such animals as opossums, dogs, foxes, raccoons, and cats. It is presumed that dogs were the primary carnivores modifying the materials, though other agents might also be responsible.

The presence or absence of certain elements in an archaeological sample may provide information on site formation processes and butchering practices. The mammalian elements represented in the survey assemblage are summarized into categories by body parts. The Head category includes all specimens associated with the cranium and mandible, except loose teeth. The presence of specimens from the head at a site may indicate either the consumption of cuts such as brains or tongue or the discard of unused refuse. Vertebrae include the atlas, axis, cervical, thoracic, lumbar, and caudal vertebrae, but not the sacral vertebrae. Forequarters include the scapula, humerus, ulna, and radius. The Forefoot category includes carpal and metacarpal specimens, which are elements that do not contain much meat and may be evidence of nearby slaughter, skinning refuse, or use of the feet for broth. Hindquarters include the innominate, sacrum, femur, patella, and tibia. The Hindfoot category includes tarsal and metatarsal specimens. The Foot category contains specimens identified only as sesamoids, metapodials, and phalanges that could not be assigned to either the Forefoot or Hindfoot categories.

The St. Catherines and Altamaha deer data are further reduced into Head, Body, and Foot categories. Head includes Crania and Teeth. Body includes Vertebra/rib, Forequarter, and Hindquarter specimens. Foot includes specimens from the Forefoot, Hindfoot, and Foot. As a point of reference, the archaeological data are compared to the distribution of these elements found in a "normal" deer skeleton. The "normal" distribution is calculated from the number of elements in each category found in a complete, undisturbed deer skeleton that serves as a standard.

Deer elements identified for 9Li13, 9Li8, and 9Li231 are summarized visually in two

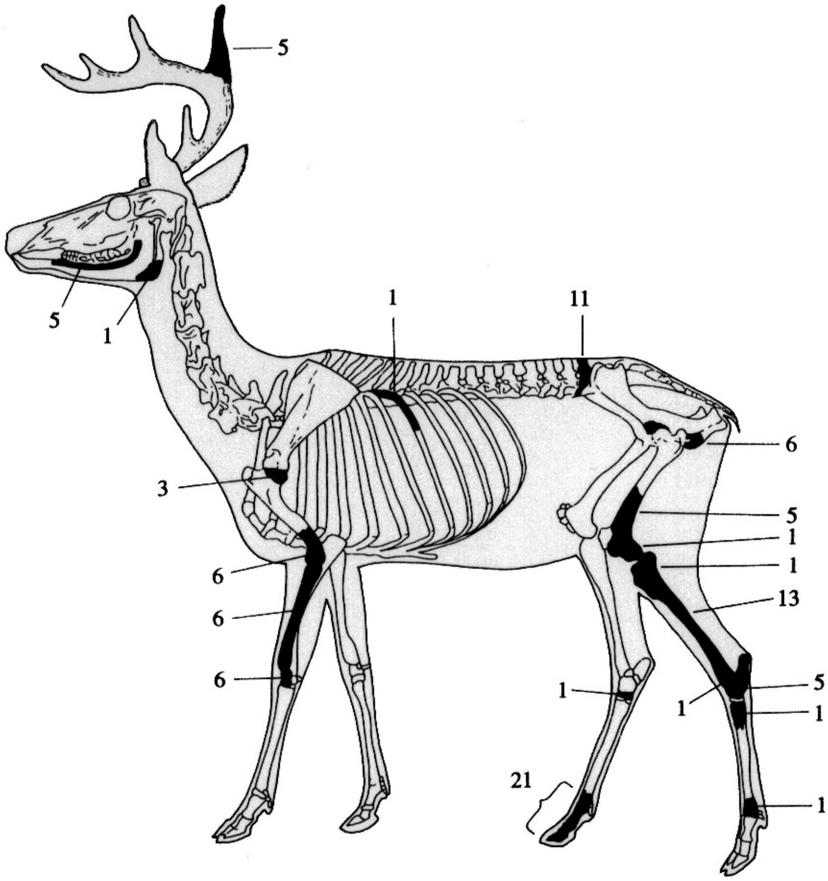


Fig. 22.2. Deer elements identified from 9Li231 (St. Simons period, St. Catherines Island transect survey). Not illustrated are 36 skull and mandible fragments and 45 teeth (NISP = 182).

ways. In figures 22.2–22.4 they are simply illustrated on a deer skeleton so as to show quickly the parts of the skeleton represented. In these figures, sesamoids, distal metapodials, and phalanges are entered on the right hind foot. This does not mean they are from the right hindquarter, but rather that the quarter was not determined. While shading of the atlas and axis is accurate, the location of other vertebrae as well as of ribs is not exact. The last lumbar location is used to indicate otherwise unidentifiable vertebrae rather than lumbar vertebrae.

To display the degree to which differential transportation of portions of the deer skeleton influenced deer remains from these three sites, the archaeological elements represented are compared to the distribution of elements in a complete, undisturbed standard deer using a log difference scale (Simpson, 1941; Reitz and Wing, 2008: 223–224). Described by George Simpson (1941; Simpson et al., 1960: 357–358), the formula is

$$d = \log_e X - \log_e Y \quad \text{or} \quad d = \log_e$$

where $d$ is the logged ratio, $X$ is the percentage of each element category in the archaeological collection, and $Y$ is the same percentage of this category in the standard, unmodified skeleton of the reference animal. The standard deer is represented by the vertical line. Values on the negative side of the standard are underrepresented and values on the positive side of the vertical line are overrepresented compared to an undisturbed, complete deer skeleton. Although the archaeological values are fragment counts and the values for the standard

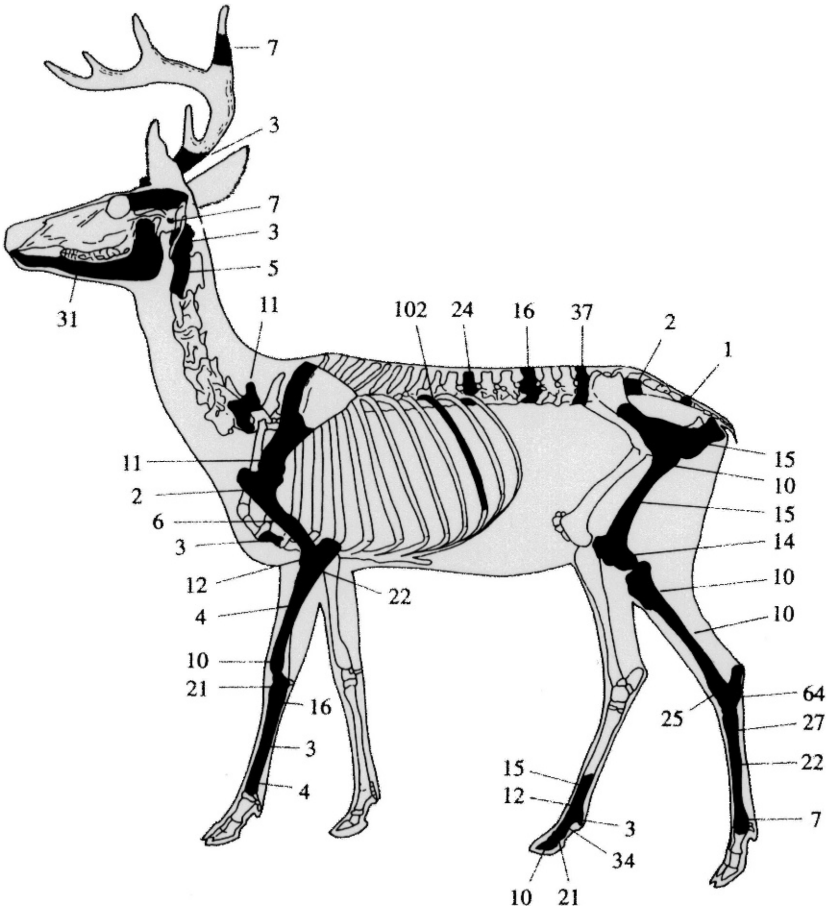


Fig. 22.3. Deer elements identified from the Fallen Tree site (Altamaha period, 9Li8; includes materials excavated by Caldwell and Thomas; see also chapter 27 for additional specimens from this site). Not illustrated are 21 skull fragments and 50 teeth (NISP = 748).

deer are whole elements, the relationships in the ratio diagrams are similar to those found in unmodified histograms.

Estimates of age at death for deer are based on observations of the degree of tooth eruption sequences (Severinghaus, 1949) and epiphyseal fusion for diagnostic elements. When animals are young, the area of growth between the shaft (diaphysis) and the proximal or distal ends of an element (the epiphysis) is not fused. This line fuses when growth is complete. Although environmental factors influence the actual age at which fusion is complete (Watson, 1978), elements fuse in a regular temporal sequence (Silver, 1970; Schmid, 1972; Gilbert, 1980; Purdue, 1983). During analysis, specimens are recorded as either fused or unfused in one of three general categories based on whether fusion occurs early in life, during the months just prior to achieving adult status, or somewhere in the middle. This is most informative for elements that either fuse early in life and are unfused in the archaeological specimen or for fused specimens that fuse late in life. Intermediate specimens are more difficult to interpret. An element that fuses by 12 months of age and is represented by a fused archaeological specimen could be from an animal that died immediately after fusion was complete or many years later. The ambiguity inherent in age grouping is somewhat reduced by recording each element under

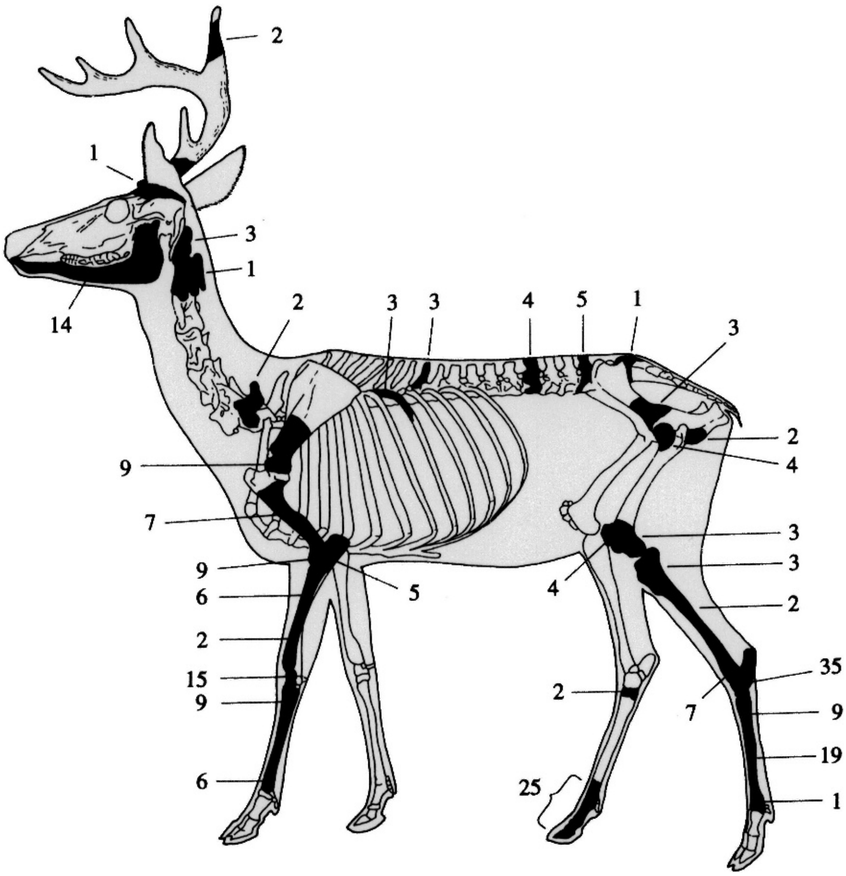


Fig. 22.4. Deer elements identified from Mission Santa Catalina de Guale (Altamaha period, 9Li13). Not illustrated are 20 skull and mandible fragments and 85 teeth (NISP = 331).

the oldest category possible. In summarizing these data, juveniles are considered to be animals that died before 20 months of age, subadults are those that died prior to 26–29 months of age, and adults are those that died after 26–42 months of age. In some cases, no indications of the age at death for an individual are observed. These indeterminate individuals were probably at least 20 months of age when they were slaughtered.

While the approximate age of death for deer may be an indication of seasonal activity in many areas, on the Georgia coast this is not necessarily the case. The coastal plain of Georgia provides a good example of the problems inherent in trying to associate osteological development with calendrical months and seasons of hunting activity. The breeding cycle is highly variable, responding to a wide range of environmental and developmental factors (Lueth, 1968; Osborne, 1976: 66; Johns et al., 1977; Richter and Labisky, 1985; Gwynn, 1986). During one study, the peak of the rutting season occurred between mid-September and the end of November on the Savannah River Plant, just below the Fall Line of the Savannah River (Payne et al., 1967: 133). Breeding occurred between late September and late December, peaking between late November and mid-December. Another study of this area found that breeding occurred from mid-September through late February, depending upon the age of the female and whether the deer were from upland or swamp locations (Johns et al., 1977: 168). A more variable range was found in the coastal zone on Cumberland and Blackbeard Islands (Osborne, 1976: 61; Miller, 1989: 43).

The gestation period for deer is 196–203 days (Golley, 1962: 201; Johns et al., 1977). Parturition dates on Cumberland Island range from May to July (Miller, 1989: 33). Fawns, therefore, may be born over a 5-month period between April and August. A fawn conceived in November might be born in April and die sometime before its 12th month of life the following April. Another fawn conceived in February might be born in August and die sometime before its 12th month the following August. Obviously an unfused distal humerus, which fuses between 12 and 20 months of age, does not necessarily indicate a spring or summer kill in either of these cases.

The sex of animals is an important indication of animal use; however, there are few osteological indicators of sex. Males can be recognized by spurs on the tarsometatarsus of Galliformes and antlers in male white-tailed deer. Females can be recognized from the absence of features such as spurs and antlers. Unfortunately, these signs are not always present in an archaeological sample. Another approach is to compare measurements of elements represented for evidence of dimensions that fall into a male or female range. In the case of deer, the presence of antler could indicate that one of the individuals represented by other specimens was a male, but the presence of antler was not considered when MNI was estimated because people could have collected the antler after it was shed.

Antlers not only provide information about sex, but they may also indicate season of death (Sauer, 1984: 84–86). Male deer develop deciduous antlers from a permanent pedicel, an extension of the frontal bone, and shed them annually along a region known as the burr (Ullrey, 1983; Sauer, 1984: 85). Ossification of the antler begins at the burr and progresses rapidly toward the tip. While antlers are developing, they are covered by a layer of skin known as velvet, which carries blood vessels and nerves to the growing bone. When the antler is fully developed, the velvet is shed. Initially antlers are highly porous and rough in texture, becoming more compact as they develop. Mature antlers are very dense and highly polished. Another sign of antler development is pearling, the amount of roughness present on the antler just above the burr. In young antlers, this area is very rough and has sharp bony spikes. In mature antlers this area is relatively smooth.

Antler development requires about 14 weeks. Development begins in approximately mid-April and is complete between September and October (Jacobson and Griffin, 1983: 19; Halls, 1984: 94; Warren et al., 1990: 53). Antler development closely follows the breeding schedule, with shedding taking place immediately after the breeding season ends (Halls, 1984: 94), though the precise calendar date varies even in the same study area from year to year (Miller, 1989: 26). Archaeologically, males that have cast their antlers may still be recognized by the pedicel, which provides information on the presence or absence of antlers when the individual died. Although cast antlers may be collected any time of the year, they are often eaten by rodents or deer (Goss, 1983: 138–139). Humans also eat antlers (Goss, 1983: 300), which probably do not survive for a long time unless they are picked up fairly soon after being cast.

For these reasons, only unshed antler can be used as evidence of seasonal activity or slaughter of male animals. Even the recovery of an unshed antler may not indicate a November–February death because the specimen may have been curated to be made into a tool sometime in the future.

Biomass, MNI, and diversity are subject to sample size bias (Casteel, 1978; Grayson, 1979; Wing and Brown, 1979: 119–120). Small samples frequently generate short species lists with undue emphasis on one species in relation to others and may be unreliable for behavioral interpretations. It is not possible to determine the nature or the extent of the bias, or correct for it, until the sample is enlarged through additional work. The impact of sample size is clearly evident in the St. Catherines collection. With few exceptions, the number of taxa recovered from a site and the number of

TABLE 22.2
**St. Catherines Island Survey: Summary of Materials**

| Phases | NISP | MNI | Wt. (g) | Biomass (kg) | Sites |
|---|---|---|---|---|---|
| Altamaha | 4128 | 89 | 10627.15 | 129.1461 | 2 |
| Irene | 4204 | 212 | 4376.07 | 60.0193 | 47 |
| Savannah | 504 | 31 | 645.58 | 10.659 | 5 |
| St. Catherines | 641 | 27 | 695.67 | 10.211 | 6 |
| Wilmington | 1442 | 65 | 1760.53 | 24.630 | 14 |
| Refuge-Deptford | 1491 | 42 | 1841.42 | 24.398 | 9 |
| St. Simons | 2560 | 120 | 1669.29 | 23.242 | 2 |

individuals estimated for a collection is related to the number of specimens.

## THE ST. CATHERINES ISLAND CHRONOLOGY

Archaeological evidence for human occupation of St. Catherines Island indicates that people have lived there for roughly 5000 years. The transect survey produced zooarchaeological evidence for each of the archaeological periods known for the island (table 22.2), but not necessarily from each stratum (table 22.3).

The earliest occupation is Late Archaic, known locally as the St. Simons period. In the St. Catherines Island chronology, the St. Simons period lasted from cal 3000 B.C. until around cal 1000 B.C. (see chap. 15). A large St. Simons collection was recovered from the West stratum and a very small sample was recovered from the East stratum (table 22.4). The collection from 9Li231 is quite large and provides useful information about Archaic subsistence on the island.

TABLE 22.3
**St. Catherines Island Survey: Distribution of Sites**

| Phases | East | Center | West | South |
|---|---|---|---|---|
| Altamaha | — | — | 2 | — |
| Irene | 12 | 4 | 21 | 10 |
| Savannah | 2 | 1 | 2 | — |
| St. Catherines | 3 | 1 | 1 | 1 |
| Wilmington | 4 | 7 | 2 | 1 |
| Refuge-Deptford | 1 | 2 | 5 | 1 |
| St. Simons | 1 | — | 1 | — |
| Total | 23 | 15 | 34 | 13 |

TABLE 22.4
**St. Catherines Island Survey: Summary of Sites**

| Phases | NISP | MNI | Wt. (g) | Biomass (kg) | Sites |
|---|---|---|---|---|---|
| Altamaha | | | | | |
| Fallen Tree | 2494 | 63 | 7173.70 | 83.848 | 1 |
| Mission | 1634 | 26 | 3453.45 | 45.298 | 1 |
| Irene | | | | | |
| East | 2385 | 97 | 2190.98 | 27.62 | 12 |
| Center | 138 | 11 | 188.90 | 3.1592 | 4 |
| West | 1295 | 78 | 1169.00 | 16.8211 | 21 |
| South | 386 | 26 | 827.19 | 12.419 | 10 |
| Savannah | | | | | |
| East | 355 | 22 | 447.39 | 7.279 | 2 |
| Center | 89 | 4 | 157.32 | 2.745 | 1 |
| West | 60 | 5 | 40.87 | 0.635 | 2 |
| St. Catherines | | | | | |
| East | 139 | 11 | 166.85 | 2.6975 | 3 |
| Center | 25 | 1 | 110.78 | 1.954 | 1 |
| West | 12 | — | 5.90 | 0.113 | 1 |
| South | 465 | 15 | 412.14 | 5.446 | 1 |
| Wilmington | | | | | |
| East | 100 | 13 | 84.78 | 1.603 | 4 |
| Center | 1148 | 44 | 1556.29 | 21.780 | 7 |
| West | 187 | 6 | 116.69 | 1.188 | 2 |
| South | 7 | 2 | 2.77 | 0.059 | 1 |
| Refuge-Deptford | | | | | |
| East | 37 | 2 | 63.19 | 1.206 | 1 |
| Center | 76 | 6 | 131.45 | 2.371 | 2 |
| West | 1368 | 31 | 1632.12 | 20.529 | 5 |
| South | 10 | 3 | 14.66 | 0.292 | 1 |
| St. Simons | | | | | |
| East | 1 | — | 0.95 | 0.025 | 1 |
| West | 2559 | 120 | 1668.34 | 23.217 | 1 |

Several Woodland sites were studied, though no single period is well represented (table 22.4). These are known locally as Refuge, Deptford, and Wilmington. Refuge refers to the Early Woodland and Deptford to the Middle Woodland. According to the St. Catherines Island chronology, these Woodland sites were occupied between cal 1000 B.C. and cal A.D. 800. Refuge and Deptford deposits are considered together because the individual Refuge and Deptford collections are very small. Refuge-Deptford collections were recovered from all four strata, but most of the materials are from the West stratum. The final Woodland occupation, during the Wilmington period, took place between cal A.D. 350 and cal A.D. 800. Animal use during the Wilmington period is best represented in the Center stratum. Wilmington was followed by the St. Catherines period (between cal A.D. 800 and cal A.D. 1300). Although more St. Catherines sites were found in the East stratum, more specimens were recovered from 9Li214, in the South stratum, than from all of the other St. Catherines sites combined.

The Mississippian occupation of coastal Georgia conventionally includes the St. Catherines, Savannah, and Irene periods (table 22.4). Five sites analyzed here contained significant quantities of Savannah ceramics, and each was dated to the "Savannah period". These collections came from the East, West, and Center strata, with the East stratum best represented.

After this analysis was completed, Thomas compared the ceramic and radiocarbon chronologies and concluded, among other things, that Savannah ceramics are fully contemporary with the St. Catherines and Irene periods, without a distinctive time period that can be labeled "Savannah" (see chap. 15).[1] This distinction was made after the present chapter was written, and whereas we acknowledge this significant change in the St. Catherines Island chronology, I have elected to retain the "Savannah period" distinction here. Only five sites are involved and this chronological distinction does not make a significant difference in the results presented here.

TABLE 22.5
**St. Catherines Island Survey: St. Simons Period–East**

| Taxa | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|
| UID mammal | 1 | | 0.95 | — | 0.025 | 100 |
| Total | 1 | | 0.95 | — | 0.025 | 100% |

In the St. Catherines Island chronology, the Irene period begins at cal A.D. 1300 and ends with the initial Spanish colonization, estimated to be A.D. 1570 (uncalibrated). Many Irene sites are present throughout the island, but no single collection is very large (table 22.4). The largest number of sites and the largest faunal samples are found in the East and West strata.

The Spanish colonial period associated with the Guale Indians and Spanish coastal missions is known as Altamaha (table 22.4). The Fallen Tree collection provides data on Indian subsistence from a mission village and the Mission Santa Catalina de Guale collection provides some indication of Spanish subsistence at a mission. The study period ends when Catholic Indians and Spaniards abandoned Mission Santa Catalina de Guale in 1680.

## St. Simons Period

St. Simons materials were recovered from two sites, 9Li231 and 9Li252 (appendix A). The 9Li252 collection contained only one mammal specimen and will not be discussed further (table 22.5). The western site, 9Li231, is a shell midden that yielded the single largest collection studied from the transect survey (table 22.6). It contained 2559 specimens weighing 1668.34 g and the remains of an estimated 120 individuals. Over 77 percent of the individuals are fishes, with the hardhead catfish (*Atriopsis felis*) contributing 68 percent of the individuals (table 22.7). In terms of biomass, however, deer (*Odocoileus virginianus*) was the prominent source of meat.

Observations were also made in terms of modifications, element distributions, age,

TABLE 22.6
**St. Catherines Island Survey: St. Simons Period–West**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UIN mammal | | 627 | — | — | 435.23 | 6.235 | 26.9 |
| *Didelphis virginiana* | Opossum | 41 | 2 | 1.7 | 56.72 | 0.996 | 4.3 |
| *Sylvilagus* spp. | Rabbit | 6 | 1 | 0.8 | 1.9 | 0.047 | 0.2 |
| *Sigmodon hispidus* | Hispid cotton rat | 1 | 1 | 0.8 | 0.05 | 0.002 | 0.01 |
| *Procyon lotor* | Raccoon | 12 | 2 | 1.7 | 10.30 | 0.215 | 0.9 |
| *Mephitis mephitis* | Striped skunk | 1 | 1 | 0.8 | 0.73 | 0.02 | 0.09 |
| *Odocoileus virginianus* | White-tailed deer | 182 | 6 | 5.0 | 761.22 | 10.312 | 44.4 |
| UID bird | | 18 | — | — | 4.91 | 0.087 | 0.4 |
| *Florida caerulea* | Little blue heron | 1 | 1 | 0.8 | 0.3 | 0.007 | 0.03 |
| *Meleagris gallopavo* | Turkey | 7 | 1 | 0.8 | 20.38 | 0.317 | 1.4 |
| *Corvus* spp. | Crow | 2 | 1 | 0.8 | 0.27 | 0.006 | 0.03 |
| UID turtle | | 171 | — | — | 49.74 | 0.433 | 1.9 |
| Kinosternidae | Musk/mud turtle family | 6 | — | — | 2.55 | 0.059 | 0.3 |
| *Kinosternon* spp. | Mud turtle | 7 | 1 | 0.8 | 2.00 | 0.050 | 0.2 |
| Emydidae | Pond turtle family | 30 | — | — | 10.54 | 0.153 | 0.7 |
| *Deirochelys reticularia* | Chicken turtle | 1 | 1 | 0.8 | 0.93 | 0.030 | 0.1 |
| *Malaclemys terrapin* | Diamondback terrapin | 59 | 5 | 4.2 | 41.60 | 0.384 | 1.7 |
| *Apalone ferox* | Softshell turtle | 1 | 1 | 0.8 | 0.3 | 0.014 | 0.06 |
| UID snake | | 12 | — | — | 3.35 | 0.047 | 0.2 |
| Colubridae | Nonpoisonous snake family | 1 | 1 | 0.8 | 0.2 | 0.003 | 0.01 |
| Viperidae | Pit viper family | 2 | — | — | 0.25 | 0.003 | 0.01 |
| *Crotalus* spp. | Rattlesnake | 3 | 1 | 0.8 | 4.35 | 0.061 | 0.3 |
| *Bufo* spp. | Toad | 1 | 1 | 0.8 | 0.04 | — | — |
| *Rana* spp. | Frog | 3 | 1 | 0.8 | 0.23 | — | — |
| Chondrichthyes | Sharks | 2 | 1 | 0.8 | 0.35 | 0.051 | 0.2 |
| Rajiformes | Rays | 8 | 1 | 0.8 | 1.58 | 0.187 | 0.8 |
| UID fish | | 350 | — | — | 50.80 | 0.711 | 3.1 |
| *Lepisosteus* spp. | Gar | 72 | 1 | 0.8 | 9.11 | 0.173 | 0.8 |
| Siluriformes | Catfishes | 43 | — | — | 2.84 | 0.054 | 0.2 |
| Ariidae | Sea catfish family | 1 | — | — | 0.20 | 0.004 | 0.02 |
| *Ariopsis felis* | Hardhead catfish | 666 | 82 | 68.3 | 110.14 | 1.737 | 7.5 |
| *Bagre marinus* | Gafftopsail catfish | 47 | 2 | 1.7 | 8.13 | 0.146 | 0.6 |
| *Cynoscion* spp. | Seatrout | 48 | 2 | 1.7 | 21.16 | 0.372 | 1.6 |
| *Pogonias cromis* | Black drum | 22 | 2 | 1.7 | 15.05 | 0.289 | 1.2 |
| *Paralichthys* spp. | Flounder | 3 | 1 | 0.8 | 0.4 | 0.012 | 0.05 |
| UID vertebrate | | — | — | — | 2.01 | — | — |
| UID crab | | 102 | — | — | 38.48 | — | — |
| Total | | 2559 | 120 | 100% | 1668.34 | 23.217 | 100% |

and sex. A small percentage of the St. Simons specimens were modified, with burning the most common modification (table 22.8). A deer metapodial shaft was grooved and an antler tip modified. The six deer individuals were represented by 182 fragments (table 22.9, fig. 22.2), including five antler fragments. Compared to a standard deer skeleton, a disproportionate number of deer teeth were recovered (table 22.10; fig. 22.5). A good correlation exists between bone density (Lyman, 1984) and postcranial elements recovered. Although it is unusual that no scapula or proximal femur fragments were identified, the most commonly identified elements had volume densities over 0.50 (Lyman, 1984). These data generally suggest that postmortem survival potential rather than butchering habits was the major influence in deter-

TABLE 22.7
**St. Catherines Island Survey: St. Simons Period Summary**

| Taxa | MNI | | Biomass | |
|---|---|---|---|---|
| | No. | % | kg | % |
| Deer | 6 | 5.0 | 10.312 | 66.8 |
| Other wild mammal | 7 | 5.8 | 1.28 | 8.3 |
| Wild bird | 3 | 2.5 | 0.33 | 2.1 |
| Turtle/alligator | 8 | 6.7 | 0.478 | 3.1 |
| Snake | 2 | 1.7 | 0.064 | 0.4 |
| Amphibian | 2 | 1.7 | — | — |
| Sharks and fish | 92 | 76.7 | 2.967 | 19.2 |
| Total | 120 | 100% | 15.431 | 100% |

TABLE 22.8
**St. Catherines Island Survey: St. Simons Period Modifications**

| Taxa | Burned | Cut | Worked |
|---|---|---|---|
| UID mammal | 12 | — | — |
| Deer | 1 | 4 | 2 |
| UID turtle | 20 | — | — |
| Musk/mud turtles | 2 | — | — |
| Pond turtles | 6 | — | — |
| Diamondback terrapin | 3 | — | — |
| UID vertebrate | 1 | — | — |
| UID crab | 1 | — | — |
| Total | 46 | 4 | 2 |

TABLE 22.9
**St. Catherines Island Survey: St. Simons Period Elements**

| Skeletal elements | Opossum | Rabbit | Raccoon | Skunk | Deer |
|---|---|---|---|---|---|
| Skull | 10 | 1 | 2 | — | 47 |
| Teeth | 8 | 4 | 4 | — | 46 |
| Vertebra/rib | 12 | — | — | — | 12 |
| Forequarter | — | — | 3 | — | 15 |
| Forefoot | — | — | — | — | 6 |
| Foot | — | — | 3 | — | 22 |
| Hindfoot | 2 | — | — | — | 7 |
| Hindquarter | 9 | 1 | — | 1 | 27 |
| Total | 41 | 6 | 12 | 1 | 182 |

TABLE 22.10
**St. Catherines Island Survey: Deer Element Summary**

| Deer skeletal element | Standard | | St. Simons | | Fallen Tree | | Mission | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Head | 63 | 23.9 | 93 | 51.1 | 119 | 15.9 | 122 | 36.9 |
| Body | 97 | 36.7 | 54 | 29.7 | 370 | 49.5 | 88 | 26.6 |
| Foot | 104 | 39.4 | 35 | 19.2 | 259 | 34.6 | 121 | 36.6 |
| Total | 264 | 100% | 182 | 100% | 748 | 100% | 331 | 100% |

mining which elements were recovered. The opossums (*Didelphis virginianus*), rabbit (*Sylvilagus* spp.), and raccoons (*Procyon lotor*) were probably adults at death, though the skunk (*Mephitis mephitis*) was a juvenile. Only seven deer specimens were unfused (table 22.11) but it was estimated that, at death, one deer was a juvenile, one was a subadult, and one was an adult (table 22.12). Three individuals were of indeterminate age though they were probably older than 29 months of age. Based on the presence of the antler fragments, one of the deer might have been a male.

Only a few measurements could be taken of St. Simons deer elements, but the specimens that could be measured contained one very large astragalus (appendix B). The al-

TABLE 22.11
**St. Catherines Island Survey: St. Simons Period Deer Epiphyseal Fusion**

| Skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | — | 2 | 2 |
| Radius, proximal | — | 2 | 2 |
| Acetabulum | — | — | – |
| Metapodials, proximal | — | 1 | 1 |
| Phalanx, proximal | 2 | 7 | 9 |
| Middle fusing | | | |
| Tibia, distal | — | 1 | 1 |
| Calcaneus, proximal | — | 1 | 1 |
| Metapodials, distal | 1 | 4 | 5 |
| Late fusing | | | |
| Humerus, proximal | 3 | — | 3 |
| Radius, distal | — | 1 | 1 |
| Ulna, proximal | — | — | – |
| Ulna, distal | — | — | – |
| Femur, proximal | — | — | – |
| Femur, distal | — | 1 | 1 |
| Tibia, proximal | 1 | — | 1 |
| Total | 7 | 20 | 27 |

lometric prediction of body size from the greatest lateral length (GLl) suggests that this animal was over 143 kg in weight. While this seems improbable, the astragalus measurement itself demonstrates this animal's large size. The greatest lateral length measured 46.2 mm. Compared to measurements of this same dimension taken from reference skeletons in the University of Georgia's Zooarchaeology Laboratory, an astragalus this size would be unusual even for animals from Michigan (table 22.13). Unfortunately, live weight is available for only one of the deer in table 22.13, GMNH #1802. This was an adult female that weighed 52 kg. The average weight of males in north Georgia is between 46 and 55 kg (Golley, 1962: 199); data on file at the Florida Museum of Natural History suggest that the body weight of deer from the coast probably ranged between 46 and 54 kg. GMNH #1802 was a fairly large animal for this area, but her astragalus is 8.2 mm smaller than the St. Simons period archaeological specimen. The Michigan comparative specimen, GMNH #126, contains the remains of several deer with no indication of age, sex, or collection location, although it is assumed that Michigan deer would generally be larger than most coastal plain deer. The St. Simons period astragalus was also larger than the Michigan specimens. Clearly the animal represented by the archaeological specimen was very large.

## Refuge-Deptford Period

The Refuge-Deptford materials were recovered from nine sites (appendix A), none of which yielded large quantities of faunal material. The combined Refuge-Deptford assemblage contained 1491 specimens and the remains of an estimated 42 individuals and weighed 1841.42 g (table 22.14). The East and South strata are represented by single sites, the Center stratum by two collections, and the West stratum by five sites (tables 22.15, 22.16, 22.17, and 22.18). One of these western sites, 9Li228, is a partial shell ring. The majority of the individuals are fishes, though no single species was more abundant than another (table 22.19). Both deer (*Odocoileus virginianus*) and turtles, especially the diamondback terrapin (*Malaclemys terrapin*), are almost as common in the assemblage. Deer and diamondback terrapin contributed most of the biomass. Five of the diamondback terrapin individuals are from 9Li228.

Observations were also made regarding modifications, element distributions, age, and sex. A small percentage of the Refuge-Deptford specimens were modified, with burning the most common modification (table 22.20). The three worked mammal specimens were shaft fragments. One of these flakes was removed in a patterned fashion, another was worked into a blunt point, and the third was smoothed at one end. All three flakes were from 9Li173. The 10 deer were represented by 181 fragments, including six antler fragments (table 22.21). The antler fragments were all from 9Li15. One raccoon was a juvenile (9Li173), three were adults (9Li15, 9Li173, and 9Li235), and two were indeterminate. Although only seven deer specimens were unfused (table 22.22), it was estimated that five deer

TABLE 22.12
**St. Catherines Island Survey: Summary of Deer by Age**

| Phases | Juvenile | Subadult | Adult | Indeterminate | Total | Sites |
|---|---|---|---|---|---|---|
| Altamaha | | | | | | |
| Fallen Tree | 3 | 10 | 4 | 11 | 28 | 1 |
| Mission | 1 | 3 | 1 | 4 | 9 | 1 |
| Irene | | | | | | |
| East | 3 | 2 | 4 | 7 | 16 | 12 |
| Center | 1 | — | 1 | 1 | 3 | 4 |
| West | 1 | 6 | 1 | 9 | 17 | 21 |
| South | 3 | 2 | 1 | 6 | 12 | 10 |
| Savannah | | | | | | |
| East | 1 | 2 | 2 | — | 5 | 2 |
| Center | 1 | 1 | 1 | — | 3 | 1 |
| West | — | — | — | — | — | 2 |
| St. Catherines | | | | | | |
| East | 1 | 1 | — | 1 | 3 | 3 |
| Center | — | — | — | 1 | 1 | 1 |
| West | — | — | — | — | — | 1 |
| South | 1 | 1 | — | — | 2 | 1 |
| Wilmington | | | | | | |
| East | — | 1 | — | 2 | 3 | 4 |
| Center | 1 | 2 | 1 | 6 | 10 | 7 |
| West | — | — | — | 1 | 1 | 2 |
| South | — | — | — | 1 | 1 | 1 |
| Refuge-Deptford | | | | | | |
| East | — | 1 | — | — | 1 | 1 |
| Center | — | 1 | — | 1 | 2 | 2 |
| West | — | 3 | — | 4 | 7 | 5 |
| South | — | — | — | — | — | 1 |
| St. Simons | | | | | | |
| East | — | — | — | — | — | 1 |
| West | 1 | 1 | 1 | 3 | 6 | 1 |
| Total | 18 | 37 | 17 | 58 | 130 | 85 |

TABLE 22.13
**St. Catherines Island Survey: Comparative Deer Measurements in Millimeters[a]**

| GMNH no. | Sex | Age | Location | Atlas GL | Ulna SDO | Astragalus GL1 |
|---|---|---|---|---|---|---|
| 34 | Female | Adult | GA, Sapelo Island | — | 28.9 | 33.5 |
| 126 | Unknown | Mixed | Michigan | — | — | 42.1 |
| 126 | Unknown | Mixed | Michigan | — | — | 42.1 |
| 126 | Unknown | Mixed | Michigan | — | — | 42.7 |
| 134 | Male | Adult | GA, Ossabaw Island | — | 27.1 | 34.5 |
| 349 | Female | Subadult | GA | 62.1 | 29.8 | 37.2 |
| 1385 | Female | Subadult | GA, Clarke Co. | 56.0 | 27.6 | 36.7 |
| 1802 | Female | Adult | GA, Clarke Co. | 63.5 | 29.5 | 38.0 |
| 2686 | Male | Adult | GA, St. Catherines Island | 65.0 | 27.0 | 35.4 |

[a] Dimensions are from Driesch (1976).

TABLE 22.14
**St. Catherines Island Survey: Refuge-Deptford Period**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 377 | — | — | 213.84 | 3.405 | 14.0 |
| UID large mammal | | 149 | — | — | 220.70 | 3.694 | 15.1 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 2.4 | 0.1 | 0.003 | 0.01 |
| *Procyon lotor* | Raccoon | 43 | 6 | 14.3 | 34.24 | 0.689 | 2.8 |
| Artiodactyl | | 12 | — | — | 8.03 | 0.174 | 0.7 |
| *Odocoileus virginianus* | White-tailed deer | 181 | 10 | 23.8 | 917.57 | 12.805 | 52.5 |
| UID bird | | 1 | — | — | 0.25 | 0.006 | 0.02 |
| *Branta canadensis* | Canada goose | 3 | 1 | 2.4 | 0.82 | 0.017 | 0.07 |
| *Meleagris gallopavo* | Turkey | 1 | 1 | 2.4 | 3.24 | 0.060 | 0.3 |
| *Alligator mississippiensis* | Alligator | 2 | 1 | 2.4 | 5.73 | — | — |
| UID turtle | | 239 | — | — | 84.74 | 0.638 | 2.6 |
| Emydidae | Pond turtle family | 122 | 1 | 2.4 | 74.65 | 0.585 | 2.4 |
| *Malaclemys terrapin* | Diamondback terrapin | 247 | 8 | 19.0 | 192.52 | 1.073 | 4.4 |
| UID snake | | 1 | 1 | 2.4 | 0.05 | 0.001 | tr |
| *Bufo* spp. | Toad | 1 | 1 | 2.4 | 0.46 | — | — |
| UID fish | | 37 | — | — | 18.83 | 0.340 | 1.4 |
| *Lepisosteus* spp. | Gar | 15 | 2 | 4.8 | 6.11 | 0.126 | 0.5 |
| Siluriformes | Catfishes | 5 | — | — | 1.4 | 0.027 | 0.1 |
| *Ariopsis felis* | Hardhead catfish | 12 | 2 | 4.8 | 4.32 | 0.083 | 0.3 |
| *Bagre marinus* | Gafftopsail catfish | 26 | 3 | 7.1 | 7.67 | 0.139 | 0.6 |
| *Cynoscion* spp. | Seatrout | 5 | 2 | 4.8 | 2.71 | 0.089 | 0.4 |
| *Pogonias cromis* | Black drum | 11 | 2 | 4.8 | 26.83 | 0.444 | 1.8 |
| UID vertebrate | | — | — | — | 15.54 | — | — |
| UID mollusk | | — | — | — | 1.07 | — | — |
| Total | | 1491 | 42 | 100% | 1841.42 | 24.398 | 100% |

were subadults at death, and five were of indeterminate age (table 22.12). Three of the subadults were probably less than 29 months of age when they died, one was between 29 and 42 months of age, and one was less than 42 months of age at death. Four of the indeterminate individuals were older than 29 months of age at death and the fifth could not be aged. One of the deer from 9Li15 was male, represented by an unshed antler fragment.

Only a few Refuge-Deptford measurements could be taken. Many of the deer are extremely large (appendix B), and as an example of the large size, measurements of the greatest length (GL) of atlas from the Zooarchaeology Laboratory reference skeletons (table 22.13) may be compared to the

TABLE 22.15
**St. Catherines Island Survey: Refuge-Deptford Period–East**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID large mammal | | 30 | — | — | 31.10 | 0.580 | 48.1 |
| *Procyon lotor* | Raccoon | 1 | 1 | 50.0 | 5.50 | 0.122 | 10.1 |
| *Odocoileus virginianus* | Deer | 6 | 1 | 50.0 | 26.59 | 0.504 | 41.8 |
| Total | | 37 | 2 | 100% | 63.19 | 1.206 | 100% |

TABLE 22.16
**St. Catherines Survey: Refuge-Deptford Period–Center**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 30 | — | — | 17.82 | 0.351 | 14.8 |
| UID large mammal | | 8 | — | — | 16.70 | 0.331 | 14.0 |
| *Procyon lotor* | Raccoon | 9 | 1 | 16.7 | 4.95 | 0.111 | 4.7 |
| Artiodactyl | | 1 | — | — | 0.20 | 0.006 | 0.3 |
| *Odocoileus virginianus* | White-tailed deer | 22 | 2 | 33.3 | 88.45 | 1.486 | 62.7 |
| UID fish | | 2 | — | — | 1.62 | 0.044 | 1.9 |
| *Ariopsis felis* | Hardhead catfish | 2 | 1 | 16.7 | 1.30 | 0.026 | 1.1 |
| *Bagre marinus* | Gafftopsail catfish | 1 | 1 | 16.7 | 0.20 | 0.004 | 0.2 |
| *Cynoscion* spp. | Seatrout | 1 | 1 | 16.7 | 0.21 | 0.012 | 0.5 |
| Total | | 76 | 6 | 100% | 131.45 | 2.371 | 100% |

archaeological specimen (appendix B). The archaeological atlas is considerably larger than the comparative specimens, particularly of GMNH #1802, which weighed 52 kg. The archaeological atlas was recovered from 9Li173, Test Pit 3. Other specimens from this test pit and from Test Pits 1, 5, and 6 were also quite large. Among these only a radius and scapula could be measured and those measurements are presented in appendix B. Allometric prediction using astragalus measurements suggests that one of the deer may have weighed about 21 kg, but it is clear that another in-

TABLE 22.17
**St. Catherines Survey: Refuge-Deptford Period–West**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 346 | — | — | 194.93 | 3.026 | 14.7 |
| UID large mammal | | 108 | — | — | 163.00 | 2.576 | 12.5 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 3.2 | 0.1 | 0.003 | 0.01 |
| *Procyon lotor* | Raccoon | 33 | 4 | 12.9 | 23.79 | 0.456 | 2.2 |
| Artiodactyl | | 11 | — | — | 7.83 | 0.168 | 0.8 |
| *Odocoileus virginianus* | White-tailed deer | 153 | 7 | 22.6 | 802.53 | 10.815 | 52.7 |
| UID bird | | 1 | — | — | 0.25 | 0.006 | 0.03 |
| *Meleagris gallopavo* | Turkey | 1 | 1 | 3.2 | 3.24 | 0.060 | 0.3 |
| *Alligator mississippiensis* | Alligator | 2 | 1 | 3.2 | 5.73 | — | — |
| UID turtle | | 238 | — | — | 84.15 | 0.616 | 3.0 |
| Emydidae | Pond turtle family | 121 | — | — | 74.23 | 0.567 | 2.8 |
| *Malaclemys terrapin* | Diamondback terrapin | 247 | 8 | 25.8 | 192.52 | 1.073 | 5.2 |
| UID snake | | 1 | 1 | 3.2 | 0.05 | 0.001 | tr |
| UID fish | | 35 | — | — | 17.21 | 0.296 | 1.4 |
| *Lepisosteus* spp. | Gar | 15 | 2 | 6.5 | 6.11 | 0.126 | 0.6 |
| Siluriformes | Catfishes | 5 | — | — | 1.4 | 0.027 | 0.1 |
| *Ariopsis felis* | Hardhead catfish | 10 | 1 | 3.2 | 3.02 | 0.057 | 0.3 |
| *Bagre marinus* | Gafftopsail catfish | 25 | 2 | 6.5 | 7.47 | 0.135 | 0.7 |
| *Cynoscion* spp. | Seatrout | 4 | 1 | 3.2 | 2.5 | 0.077 | 0.4 |
| *Pogonias cromis* | Black drum | 11 | 2 | 6.5 | 26.83 | 0.444 | 2.2 |
| UID vertebrate | | — | — | — | 15.23 | — | — |
| Total | | 1368 | 31 | 100% | 1632.12 | 20.529 | 100% |

TABLE 22.18
**St. Catherines Island Survey: Refuge-Deptford Period–South**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 1 | — | — | 1.09 | 0.028 | 9.6 |
| UID large mammal | | 3 | — | — | 9.90 | 0.207 | 70.9 |
| *Branta canadensis* | Canada goose | 3 | 1 | 33.3 | 0.82 | 0.017 | 5.8 |
| UID turtle | | 1 | — | — | 0.59 | 0.022 | 7.5 |
| Emydidae | Pond turtle family | 1 | 1 | 33.3 | 0.42 | 0.018 | 6.2 |
| *Bufo* spp. | Toad | 1 | 1 | 33.3 | 0.46 | — | — |
| UID vertebrate | | — | — | — | 0.31 | — | — |
| UID mollusk | | — | — | — | 1.07 | — | — |
| Total | | 10 | 3 | 100% | 14.66 | 0.292 | 100% |

TABLE 22.19
**St. Catherines Island Survey: Refuge-Deptford Period Summary**

| Taxa | MNI No. | MNI % | Biomass kg | Biomass % |
|---|---|---|---|---|
| Deer | 10 | 23.8 | 12.805 | 79.5 |
| Other wild mammal | 7 | 16.7 | 0.692 | 4.3 |
| Wild bird | 2 | 4.8 | 0.077 | 0.5 |
| Turtle/alligator | 10 | 23.8 | 1.658 | 10.3 |
| Snake | 1 | 2.4 | 0.001 | tr |
| Amphibian | 1 | 2.4 | — | — |
| Sharks and fish | 11 | 26.2 | 0.881 | 5.5 |
| Total | 42 | 100% | 16.114 | 100% |

TABLE 22.20
**St. Catherines Island Survey: Refuge-Deptford Period Modifications**

| Taxa | Burned | Cut | Worked | Gnawed Rodent | Gnawed Carnivore |
|---|---|---|---|---|---|
| UID mammal | 4 | 4 | — | 3 | — |
| UID large mammal | 2 | 1 | 3 | 2 | — |
| Deer | 3 | 6 | — | 7 | 1 |
| UID turtle | 33 | — | — | — | — |
| Pond turtle | 3 | — | — | 1 | — |
| Diamondback terrapin | 11 | — | — | — | — |
| Hardhead catfish | 1 | — | — | — | — |
| Gafftopsail catfish | — | 1 | — | — | — |
| Total | 57 | 12 | 3 | 13 | 1 |

TABLE 22.21
**St. Catherines Island Survey: Refuge-Deptford Period Elements**

| Skeletal elements | Rabbit | Raccoon | Deer |
|---|---|---|---|
| Skull | 1 | 13 | 43 |
| Teeth | — | 18 | 29 |
| Vertebra/rib | — | — | 39 |
| Forequarter | — | 8 | 9 |
| Forefoot | — | — | 5 |
| Foot | — | 4 | 22 |
| Hindfoot | — | — | 15 |
| Hindquarter | — | — | 19 |
| Total | 1 | 43 | 181 |

TABLE 22.22
**St. Catherines Island Survey: Refuge-Deptford Period Deer Epiphyseal Fusion**

| Skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | — | 3 | 3 |
| Radius, proximal | — | 2 | 2 |
| Acetabulum | — | — | – |
| Metapodials, proximal | — | 1 | 1 |
| Phalanx, proximal | — | 6 | 6 |
| Middle fusing | | | |
| Tibia, distal | — | — | – |
| Calcaneus, proximal | 3 | 1 | 4 |
| Metapodials, distal | 2 | 4 | 6 |
| Late fusing | | | |
| Humerus, proximal | — | — | – |
| Radius, distal | — | — | – |
| Ulna, proximal | — | — | – |
| Ulna, distal | — | — | – |
| Femur, proximal | — | — | – |
| Femur, distal | 1 | — | 1 |
| Tibia, proximal | 1 | 2 | 3 |
| Total | 7 | 19 | 26 |

dividual weighed much more than this. Although none of the fish could be measured, one of the black drum (*Pogonias cromis*) individuals recovered from 9Li173 likely weighed about 20 kg.

### Wilmington Period

Wilmington materials were recovered from 14 sites, none of which produced large amounts of material (appendix A). The combined Wilmington assemblage contained, with the remains of an estimated 65 individuals, 1442 specimen fragments weighing 1760.53 g (table 22.23). The Center stratum was represented by the largest assemblage (tables 22.24, 22.25, 22.26, and 22.27). Over 40 percent of the individuals are fishes, with the hardhead catfish (*Ariopsis felis*) more abundant than the other fishes. Black drums (*Pogonias cromis*) are also fairly common. Raccoons (*Procyon lotor*), deer (*Odocoileus virginianus*), and diamondback terrapins (*Malaclemys terrapin*) are al-

TABLE 22.23
**St. Catherines Survey: Wilmington Period**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 367 | — | — | 240.86 | 3.759 | 15.3 |
| UID large mammal | | 191 | — | — | 252.93 | 3.845 | 15.6 |
| *Procyon lotor* | Raccoon | 39 | 9 | 13.8 | 25.21 | 0.506 | 2.1 |
| *Odocoileus virginianus* | White-tailed deer | 153 | 15 | 23.1 | 862.16 | 11.846 | 48.1 |
| UID bird | | 13 | — | — | 1.44 | 0.03 | 0.1 |
| UID turtle | | 241 | — | — | 104.70 | 1.006 | 4.1 |
| *Chelydra serpentina* | Snapping turtle | 4 | 1 | 1.5 | 2.40 | 0.057 | 0.2 |
| *Kinosternon* spp. | Mud turtle | 7 | 1 | 1.5 | 3.59 | 0.074 | 0.3 |
| Emydidae | Pond turtle family | 27 | — | — | 13.59 | 0.208 | 0.8 |
| *Malaclemys terrapin* | Diamondback terrapin | 102 | 8 | 12.3 | 97.88 | 0.917 | 3.7 |
| UID snake | | 4 | — | — | 0.50 | 0.007 | 0.03 |
| *Lampropeltis* spp. | Kingsnake | 6 | 1 | 1.5 | 0.82 | 0.011 | 0.04 |
| Viperidae | Pit viper family | 56 | 1 | 1.5 | 21.25 | 0.302 | 1.2 |
| UID fish | | 61 | — | — | 26.05 | 0.445 | 1.8 |
| *Lepisosteus* spp. | Gar | 7 | 1 | 1.5 | 2.0 | 0.052 | 0.2 |
| Siluriformes | Catfishes | 4 | — | — | 0.75 | 0.015 | 0.06 |
| *Ariopsis felis* | Hardhead catfish | 11 | 7 | 10.8 | 2.85 | 0.056 | 0.2 |
| *Bagre marinus* | Gafftopsail catfish | 34 | 5 | 7.7 | 8.4 | 0.151 | 0.6 |
| *Opsanus* spp. | Toadfish | 1 | 1 | 1.5 | 0.25 | 0.01 | 0.04 |
| *Archosargus probatocephalus* | Sheepshead | 2 | 2 | 3.1 | 1.25 | 0.019 | 0.08 |
| Sciaenidae | Drum family | 5 | — | — | 10.54 | 0.222 | 0.9 |
| *Cynoscion* spp. | Seatrout | 19 | 4 | 6.2 | 3.75 | 0.110 | 0.4 |
| *Pogonias cromis* | Black drum | 82 | 6 | 9.2 | 73.17 | 0.954 | 3.9 |
| *Mugil* spp. | Mullet | 1 | 1 | 1.5 | 0.18 | 0.007 | 0.03 |
| *Paralichthys* spp. | Flounder | 4 | 2 | 3.1 | 0.7 | 0.021 | 0.09 |
| UID vertebrate | | — | — | — | 2.36 | — | — |
| UID crab | | 1 | — | — | 0.95 | — | — |
| Total | | 1442 | 65 | 100% | 1760.53 | 24.630 | 100% |

so common. Deer contributed most of the biomass (table 22.28).

Observations were also made of modifications, element distributions, age, sex, and size. A small number of the Wilmington specimens were modified, with burning the most common modification (table 22.29). There was a worked deer antler tip from 9Li233. The 15 deer are represented by 153 fragments, representing the entire skeleton (table 22.30). These included four antler tips: three from 9Li220 and one from 9Li233. Two of the raccoons were subadults (9Li209, 9Li224) and two were adults (9Li162, 9Li224). The others were indeterminate. Although only three deer specimens were unfused (table 22.31), these indicate that one individual was a juvenile at death (9Li196), three were subadults, one was an adult, and 10 were of indeterminate age at death (table 22.12). Three of the subadults were probably less than 29 months of age when they died. One of the deer individuals from 9Li220 may have been a male, as well as the deer from 9Li233 based on the presence of antler fragments. Allometric estimate of body weight from astragalus measurements suggest that these deer may have ranged in size from 36 to 52 kg (appendix B). A measurement of the smallest depth of the ulna olecranon (SDO) suggests that one of these individuals was large in comparison with the University of Georgia Zooarchaeology Laboratory reference skeletons (table 22.13). One of the two black drums (*Pogonias cromis*) found at 9Li196

TABLE 22.24

**St. Catherines Island Survey: Wilmington Period–East**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 21 | — | — | 11.12 | 0.230 | 14.3 |
| UID large mammal | | 1 | — | — | 1.62 | 0.041 | 2.6 |
| *Procyon lotor* | Raccoon | 5 | 3 | 23.1 | 5.3 | 0.118 | 7.4 |
| *Odocoileus virginianus* | White-tailed deer | 11 | 3 | 23.1 | 30.45 | 0.569 | 35.5 |
| UID bird | | 3 | — | — | 0.5 | 0.011 | 0.7 |
| UID turtle | | 34 | — | — | 17.06 | 0.212 | 13.2 |
| Emydidae | Pond turtle family | 4 | — | — | 1.3 | 0.038 | 2.4 |
| *Malaclemys terrapin* | Diamondback terrapin | 6 | 1 | 7.7 | 4.5 | 0.087 | 5.4 |
| UID fish | | 4 | — | — | 0.46 | 0.016 | 1.0 |
| *Ariopsis felis* | Hardhead catfish | 1 | 1 | 7.7 | 0.3 | 0.006 | 0.4 |
| Sciaenidae | Drum family | 5 | — | — | 10.54 | 0.222 | 13.8 |
| *Cynoscion* spp. | Seatrout | 1 | 1 | 7.7 | 0.15 | 0.010 | 0.6 |
| *Pogonias cromis* | Black drum | 2 | 2 | 15.4 | 0.60 | 0.027 | 1.7 |
| *Mugil* spp. | Mullet | 1 | 1 | 7.7 | 0.18 | 0.007 | 0.4 |
| *Paralichthys* spp. | Flounder | 1 | 1 | 7.7 | 0.3 | 0.009 | 0.6 |
| UID vertebrate | | — | — | — | 0.4 | — | — |
| Total | | 100 | 13 | 100% | 84.78 | 1.603 | 100% |

TABLE 22.25

**St. Catherines Island Survey: Wilmington Period–Center**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 343 | — | — | 227.94 | 3.484 | 16.0 |
| UID large mammal | | 190 | — | — | 251.31 | 3.804 | 17.5 |
| *Procyon lotor* | Raccoon | 34 | 6 | 13.6 | 19.91 | 0.388 | 1.8 |
| *Odocoileus virginianus* | White-tailed deer | 140 | 10 | 22.7 | 820.29 | 11.030 | 50.6 |
| UID bird | | 10 | — | — | 0.94 | 0.019 | 0.1 |
| UID turtle | | 84 | — | — | 36.87 | 0.355 | 1.6 |
| *Chelydra serpentina* | Snapping turtle | 4 | 1 | 2.3 | 2.40 | 0.057 | 0.3 |
| *Kinosternon* spp. | Mud turtle | 7 | 1 | 2.3 | 3.59 | 0.074 | 0.3 |
| Emydidae | Pond turtle family | 23 | — | — | 12.29 | 0.170 | 0.8 |
| *Malaclemys terrapin* | Diamondback terrapin | 41 | 4 | 9.1 | 41.30 | 0.383 | 1.8 |
| UID snake | | 4 | — | — | 0.50 | 0.007 | 0.03 |
| Viperidae | Pit viper family | 56 | 1 | 2.3 | 21.25 | 0.302 | 1.4 |
| UID fish | | 56 | — | — | 24.14 | 0.389 | 1.8 |
| *Lepisosteus* spp. | Gar | 7 | 1 | 2.3 | 2.0 | 0.052 | 0.2 |
| Siluriformes | Catfishes | 3 | — | — | 0.5 | 0.010 | 0.05 |
| *Ariopsis felis* | Hardhead catfish | 7 | 4 | 9.1 | 1.9 | 0.037 | 0.2 |
| *Bagre marinus* | Gafftopsail catfish | 34 | 5 | 11.4 | 8.4 | 0.151 | 0.7 |
| *Opsanus* spp. | Toadfish | 1 | 1 | 2.3 | 0.25 | 0.01 | 0.05 |
| *Archosargus probatocephalus* | Sheepshead | 2 | 2 | 4.5 | 1.25 | 0.019 | 0.1 |
| *Cynoscion* spp. | Seatrout | 18 | 3 | 6.8 | 3.6 | 0.100 | 0.5 |
| *Pogonias cromis* | Black drum | 80 | 4 | 9.1 | 72.57 | 0.927 | 4.3 |
| *Paralichthys* spp. | Flounder | 3 | 1 | 2.3 | 0.4 | 0.012 | 0.1 |
| UID vertebrate | | — | — | — | 1.74 | — | — |
| UID crab | | 1 | — | — | 0.95 | — | — |
| Total | | 1148 | 44 | 100% | 1556.29 | 21.780 | 100% |

TABLE 22.26
**St. Catherines Island Survey: Wilmington Period–West**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 3 | — | — | 1.8 | 0.045 | 3.8 |
| *Odocoileus virginianus* | White-tailed deer | 1 | 1 | 16.7 | 9.47 | 0.199 | 16.8 |
| UID turtle | | 123 | — | — | 50.77 | 0.439 | 37.0 |
| *Malaclemys terrapin* | Diamondback terrapin | 55 | 3 | 50.0 | 52.08 | 0.447 | 37.6 |
| UID fish | | 1 | — | — | 1.45 | 0.040 | 3.4 |
| Siluriformes | Catfishes | 1 | — | — | 0.25 | 0.005 | 0.4 |
| *Ariopsis felis* | Hardhead catfish | 3 | 2 | 33.3 | 0.65 | 0.013 | 1.1 |
| UID vertebrate | | — | — | — | 0.22 | — | — |
| Total | | 187 | 6 | 100% | 116.69 | 1.188 | 100% |

TABLE 22.27
**St. Catherines Island Survey: Wilmington Period–South**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| *Odocoileus virginianus* | White-tailed deer | 1 | 1 | 50.0 | 1.95 | 0.048 | 81.4 |
| *Lampropeltis* spp. | Kingsnake | 6 | 1 | 50.0 | 0.82 | 0.011 | 18.6 |
| Total | | 7 | 2 | 100% | 2.77 | 0.059 | 100% |

TABLE 22.28
**St. Catherines Island Survey: Wilmington Period Summary**

| Taxa | MNI No. | MNI % | Biomass kg | Biomass % |
|---|---|---|---|---|
| Deer | 15 | 23.1 | 11.846 | 78.5 |
| Other wild mammal | 9 | 13.8 | 0.506 | 3.4 |
| Wild bird | — | — | — | — |
| Turtle/alligator | 10 | 15.4 | 1.048 | 6.9 |
| Snake | 2 | 3.1 | 0.313 | 2.1 |
| Amphibian | — | — | — | — |
| Sharks and fish | 29 | 44.6 | 1.38 | 9.1 |
| Total | 65 | 100% | 15.093 | 100% |

TABLE 22.29
**St. Catherines Island Survey: Wilmington Period Modifications**

| Taxa | Burned | Cut | Worked | Gnawed rodent |
|---|---|---|---|---|
| UID mammal | 18 | — | — | 1 |
| UID large mammal | — | 2 | — | — |
| Deer | 4 | 8 | 1 | 2 |
| UID turtle | 9 | — | — | — |
| Diamondback terrapin | — | — | 1 | — |
| Hardhead catfish | 2 | — | — | — |
| UID crab | 1 | — | — | — |
| Total | 34 | 10 | 2 | 3 |

TABLE 22.30
**St. Catherines Island Survey: Wilmington Period Elements**

| Skeletal elements | Raccoon | Deer |
|---|---|---|
| Skull | 15 | 5 |
| Teeth | 20 | 19 |
| Vertebra/rib | — | 24 |
| Forequarter | — | 20 |
| Forefoot | — | 9 |
| Foot | 1 | 22 |
| Hindfoot | 2 | 25 |
| Hindquarter | 1 | 29 |
| Total | 39 | 153 |

TABLE 22.31
**St. Catherines Island Survey: Wilmington Period Deer Epiphyseal Fusion**

| Skeletal elements | Unfused | Fused | Total |
|---|---|---|---|
| Early Fusing | | | |
| Humerus, distal | — | 4 | 4 |
| Radius, proximal | — | 1 | 1 |
| Acetabulum | — | — | — |
| Metapodials, proximal | — | 3 | 3 |
| Phalanx, proximal | — | 6 | 6 |
| Middle Fusing | | | |
| Tibia, distal | 2 | 3 | 5 |
| Calcaneus, proximal | — | 1 | 1 |
| Metapodials, distal | 1 | 1 | 2 |
| Late Fusing | | | |
| Humerus, proximal | — | 2 | 2 |
| Radius, distal | — | 1 | 1 |
| Ulna, proximal | — | 2 | 2 |
| Ulna, distal | — | — | — |
| Femur, proximal | — | — | — |
| Femur, distal | — | — | — |
| Tibia, proximal | — | 2 | 2 |
| Total | 3 | 26 | 29 |

was very large, but the specimens could not be measured.

## St. Catherines Period

St. Catherines materials were recovered from six sites, none of which contained large amounts of material (appendix A). The combined St. Catherines assemblage contained the remains of an estimated 27 individuals, which included 641 specimens weighing 695.67 g (table 22.32). The South stratum is represented by the largest assemblage (tables 22.33, 22.34, 22.35, and 22.36), though more samples were studied from the East stratum (table 22.4). Caldwell's excavation at 9Li22 was in the East stratum. Because vertebrate remains from 9Li22 were collected using a 11/32-in. mesh rather than the American Museum of Natural History's 1/4-in. mesh, the 9Li22 collection may bias the St. Catherines period assemblage toward larger animals. The 9Li22 collection contained 80 specimens weighing 104.07 g and the remains of an estimated five individuals, two of which were deer (*Odocoileus virginianus*). The majority of the St. Catherines period individuals were deer, diamondback terrapins (*Malaclemys terrapin*), hardhead catfishes (*Ariopsis felis*), and raccoons (*Procyon lotor*), although deer contributed most of the biomass (table 22.37).

Observations were also made describing modifications, element distributions, age, sex, and size. A small percentage of the St. Catherines period specimens were modified, with burning the most common form of modification (table 22.38). There was a grooved deer metapodial shaft from 9Li178. A vulture (*Cathartes* spp.) was identified from a left proximal coracoid and a right proximal scapula, both of which were cut. This animal was from 9Li183. The six deer were represented by 63 fragments representing all parts of the animal (table 22.39). These included nine antler tips, all from 9Li214. The rabbit (*Sylvilagus* spp.) was an adult. One of the raccoons was a juvenile (9Li183) and one was a subadult (9Li22). Although only six deer specimens were unfused (table 22.40), it was estimated that two individuals were juveniles at death (9Li22, 9Li214), two were subadults, and two were of indeterminate age (table 22.12). One of the subadults was between 29 and 36 months of age at death and the second less than 36 months of age. One of the indeterminate individuals was older than 12 months at death, the second older than 29 months of age.

TABLE 22.32

**St. Catherines Island Survey: St. Catherines Period**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 135 | — | — | 78.11 | 1.360 | 13.3 |
| UID large mammal | | 36 | — | — | 37.43 | 0.734 | 7.2 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 3.7 | 0.57 | 0.016 | 0.2 |
| *Sciurus* spp. | Squirrel | 1 | 1 | 3.7 | 0.21 | 0.006 | 0.1 |
| *Procyon lotor* | Raccoon | 7 | 3 | 11.1 | 12.54 | 0.333 | 3.3 |
| Artiodactyl | | 17 | — | — | 22.79 | 0.489 | 4.8 |
| *Odocoileus virginianus* | White-tailed deer | 63 | 6 | 22.2 | 290.99 | 4.815 | 47.2 |
| UID bird | | 2 | — | — | 0.35 | 0.008 | 0.1 |
| *Cathartes* spp. | Vulture | 2 | 1 | 3.7 | 1.85 | 0.036 | 0.4 |
| UID turtle | | 134 | — | — | 62.92 | 0.676 | 6.6 |
| Kinosternidae | Musk/mud turtle family | 2 | 1 | 3.7 | 1.77 | 0.046 | 0.5 |
| Emydidae | Pond turtle family | 61 | — | — | 25.31 | 0.343 | 3.4 |
| *Malaclemys terrapin* | Diamondback terrapin | 89 | 5 | 18.5 | 141.64 | 1.057 | 10.4 |
| Colubridae | Nonpoisonous snake family | 1 | 1 | 3.7 | 0.11 | 0.001 | tr |
| *Rana*/*Bufo* spp. | Frog or toad | 2 | 1 | 3.7 | 0.26 | — | — |
| UID fish | | 19 | — | — | 3.66 | 0.053 | 0.5 |
| Siluriformes | Catfishes | 9 | — | — | 1.27 | 0.025 | 0.2 |
| *Ariopsis felis* | Hardhead catfish | 40 | 4 | 14.8 | 8.01 | 0.144 | 1.4 |
| *Bagre marinus* | Gafftopsail catfish | 16 | 2 | 7.4 | 3.23 | 0.053 | 0.5 |
| *Archosargus probatocephalus* | Sheepshead | 3 | 1 | 3.7 | 1.03 | 0.016 | 0.2 |
| UID vertebrate | | — | — | — | 1.46 | — | — |
| UID crab | | 1 | — | — | 0.16 | — | — |
| Total | | 641 | 27 | 100% | 695.67 | 10.211 | 100% |

TABLE 22.33

**St. Catherines Island Survey: St. Catherines Period–East**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 16 | — | — | 2.04 | 0.050 | 1.9 |
| UID large mammal | | 22 | — | — | 20.49 | 0.398 | 14.8 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 9.1 | 0.57 | 0.016 | 0.6 |
| *Procyon lotor* | Raccoon | 6 | 2 | 18.2 | 12.18 | 0.250 | 9.3 |
| Artiodactyl | | 8 | — | — | 8.72 | 0.185 | 6.9 |
| *Odocoileus virginianus* | White-tailed deer | 17 | 3 | 27.3 | 60.31 | 1.053 | 39.0 |
| *Cathartes* spp. | Vulture | 2 | 1 | 9.1 | 1.85 | 0.036 | 1.3 |
| UID turtle | | 15 | — | — | 16.53 | 0.207 | 7.7 |
| Kinosternidae | Musk/mud turtle family | 2 | 1 | 9.1 | 1.77 | 0.046 | 1.7 |
| Emydidae | Pond turtle family | 26 | — | — | 8.94 | 0.137 | 5.1 |
| *Malaclemys terrapin* | Diamondback terrapin | 18 | 2 | 18.2 | 31.13 | 0.317 | 11.8 |
| UID fish | | 3 | — | — | 1.69 | 0.002 | 0.1 |
| *Bagre marinus* | Gafftopsail catfish | 2 | 1 | 9.1 | 0.47 | 0.0005 | 0.02 |
| UID crab | | 1 | — | — | 0.16 | — | — |
| Total | | 139 | 11 | 100% | 166.85 | 2.6975 | 100% |

TABLE 22.34
**St. Catherines Island Survey: St. Catherines Period–Center**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID large mammal | | 14 | — | — | 16.94 | 0.336 | 17.2 |
| Artiodactyl | | 3 | — | — | 8.27 | 0.176 | 9.0 |
| *Odocoileus virginianus* | White-tailed deer | 8 | 1 | 100.0 | 85.57 | 1.442 | 73.8 |
| Total | | 25 | 1 | 100% | 110.78 | 1.954 | 100% |

TABLE 22.35
**St. Catherines Island Survey: St. Catherines Period–West**

| Taxa | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|
| UID mammal | 1 | — | — | 1.3 | 0.033 | 29.2 |
| UID turtle | 11 | — | — | 4.0 | 0.080 | 70.8 |
| UID vertebrate | — | — | — | 0.6 | — | — |
| Total | 12 | — | — | 5.9 | 0.113 | 100% |

TABLE 22.36
**St. Catherines Island Survey: St. Catherines Period–South**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 118 | — | — | 74.77 | 1.277 | 23.4 |
| *Sciurus* spp. | Squirrel | 1 | 1 | 6.7 | 0.21 | 0.006 | 0.1 |
| *Procyon lotor* | Raccoon | 1 | 1 | 6.7 | 0.36 | 0.083 | 1.5 |
| Artiodactyl | | 6 | — | — | 5.8 | 0.128 | 2.4 |
| *Odocoileus virginianus* | White-tailed deer | 38 | 2 | 13.3 | 145.11 | 2.320 | 42.6 |
| UID bird | | 2 | — | — | 0.35 | 0.008 | 0.1 |
| UID turtle | | 108 | — | — | 42.39 | 0.389 | 7.1 |
| Emydidae | Pond turtle family | 35 | — | — | 16.37 | 0.206 | 3.8 |
| *Malaclemys terrapin* | Diamondback terrapin | 71 | 3 | 20.0 | 110.51 | 0.740 | 13.6 |
| Colubridae | Nonpoisonous snake family | 1 | 1 | 6.7 | 0.11 | 0.001 | 0.02 |
| *Rana*/*Bufo* spp. | Frog or toad | 2 | 1 | 6.7 | 0.26 | — | — |
| UID fish | | 16 | — | — | 1.97 | 0.051 | 0.9 |
| Siluriformes | Catfishes | 9 | — | — | 1.27 | 0.025 | 0.5 |
| *Ariopsis felis* | Hardhead catfish | 40 | 4 | 26.7 | 8.01 | 0.144 | 2.6 |
| *Bagre marinus* | Gafftopsail catfish | 14 | 1 | 6.7 | 2.76 | 0.052 | 1.0 |
| *Archosargus probatocephalus* | Sheepshead | 3 | 1 | 6.7 | 1.03 | 0.016 | 0.3 |
| UID vertebrate | | — | — | — | 0.86 | — | — |
| Total | | 465 | 15 | 100% | 412.14 | 5.446 | 100% |

TABLE 22.37
**St. Catherines Island Survey: St. Catherines Period Summary**

| Taxa | MNI | | Biomass | |
|---|---|---|---|---|
| | No. | % | kg | % |
| Deer | 6 | 22.2 | 4.815 | 73.8 |
| Other wild mammal | 5 | 18.5 | 0.355 | 5.4 |
| Wild bird | 1 | 3.7 | 0.036 | 0.6 |
| Turtle/alligator | 6 | 22.2 | 1.103 | 16.9 |
| Snake | 1 | 3.7 | 0.001 | 0.02 |
| Amphibian | 1 | 3.7 | — | — |
| Sharks and fish | 7 | 25.9 | 0.213 | 3.3 |
| Total | 27 | 100% | 6.523 | 100% |

TABLE 22.38
**St. Catherines Island Survey: St. Catherines Period Modifications**

| Taxa | Burned | Cut | Worked | Gnawed rodent |
|---|---|---|---|---|
| UID mammal | 4 | — | — | — |
| UID large mammal | — | 1 | — | 3 |
| Raccoon | 1 | — | — | — |
| Deer | — | 6 | 1 | — |
| Vulture | — | 2 | — | — |
| UID turtle | 4 | — | — | — |
| Gafftopsail catfish | 1 | — | — | — |
| Total | 10 | 9 | 1 | 3 |

One of the deer individuals from 9Li214 might have been a male based on the identification of antler fragments. Astragalus measurements suggest that one of the deer individuals might have weighed about 40 kg.

## Savannah Period

Savannah materials were recovered from five sites, none of which contained large amounts of material (appendix A).[2] The combined Savannah assemblage contained

TABLE 22.39
**St. Catherines Island Survey: St. Catherines Period Elements**

| Skeletal elements | Rabbit | Squirrel | Raccoon | Deer |
|---|---|---|---|---|
| Skull | — | — | 1 | 11 |
| Teeth | — | — | 1 | 19 |
| Vertebra/rib | — | — | — | 4 |
| Forequarter | — | — | 2 | 5 |
| Forefoot | — | — | — | 5 |
| Foot | — | — | — | 5 |
| Hindfoot | — | — | 2 | 3 |
| Hindquarter | 1 | 1 | 1 | 11 |
| Total | 1 | 1 | 7 | 63 |

TABLE 22.40
**St. Catherines Island Survey: St. Catherines Period Deer Epiphyseal Fusion**

| Skeletal elements | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | — | 1 | 1 |
| Radius, proximal | — | 1 | 1 |
| Acetabulum | — | — | — |
| Metapodials, proximal | — | — | — |
| Phalanx, proximal | — | 4 | 4 |
| Middle fusing | | | |
| Tibia, distal | 2 | 2 | 4 |
| Calcaneus, proximal | — | — | — |
| Metapodials, distal | — | 3 | 3 |
| Late fusing | | | |
| Humerus, proximal | — | — | — |
| Radius, distal | — | — | — |
| Ulna, proximal | 1 | — | 1 |
| Ulna, distal | — | — | — |
| Femur, proximal | — | — | — |
| Femur, distal | 1 | — | 1 |
| Tibia, proximal | 2 | — | 2 |
| Total | 6 | 11 | 17 |

504 specimens, weighing 645.58 g and representing the remains of an estimated 31 individuals (table 22.41). The East stratum yielded the largest assemblage (tables 22.42, 22.43, and 22.44). The majority of the individuals are deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), diamondback terrapins (*Malaclemys terrapin*), and hardhead catfishes (*Arius felis*). Deer contributed most of the biomass (table 22.45).

Observations of modifications, element distributions, age, sex, and size were also made. A small percentage of the Savannah specimens were modified, with burning the most common form of modification (table 22.46). The eight deer were represented by 67 fragments, although cranial fragments were underrepresented (table 22.47). Cranial fragments included an unshed antler from 9Li169 and an antler tip from 9Li189. At death, one of the raccoons was a juvenile (9Li189), one was a subadult (9Li169), and four were adults. Both the rabbits (*Sylvilagus* spp.) and the mink (*Mustela vison*) were at least subadults at death. Ten deer specimens were unfused (table 22.48), indicating that two individuals were juveniles at death (9Li171, 9Li189), three were subadults, and three were adults at death (table 22.12). One of the subadult individuals was less than 29 months of age at death. Deer individuals from 9Li169 and 9Li189 may have been males based on the presence of antler fragments. The antler from 9Li169 was unshed. Although one deer was estimated to weigh about 37 kg from the greatest astragalus length, an individual from 9Li171 was quite large, as evidenced by the ulna measurements (appendix B; table 22.13).

## Irene Period

Irene materials were recovered from 47 sites, none of which contained large amounts of material (appendix A). The combined Irene assemblage (table 22.49) contained 4204 specimens of an estimated 212 individuals and weighed 4376.07 g. The East and West strata were represented by the largest assemblages (tables 22.50, 22.51, 22.52, and 22.53). Although these

TABLE 22.41
**St. Catherines Island Survey: Savannah Period**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 126 | — | — | 45.11 | 0.872 | 8.2 |
| UID large mammal | | 148 | — | — | 137.06 | 2.317 | 21.7 |
| *Sylvilagus* spp. | Rabbit | 6 | 2 | 6.5 | 2.77 | 0.066 | 0.6 |
| *Procyon lotor* | Raccoon | 26 | 6 | 19.4 | 36.79 | 0.700 | 6.6 |
| *Mustela vison* | Mink | 2 | 1 | 3.2 | 0.7 | 0.019 | 0.2 |
| Artiodactyl | | 26 | — | — | 40.04 | 0.763 | 7.2 |
| *Odocoileus virginianus* | White-tailed deer | 67 | 8 | 25.8 | 314.89 | 4.976 | 46.7 |
| UID bird | | 10 | — | — | 5.28 | 0.093 | 0.9 |
| *Branta canadensis* | Canada goose | 1 | 1 | 3.2 | 0.77 | 0.016 | 0.2 |
| *Alligator mississippiensis* | Alligator | 1 | 1 | 3.2 | 2.68 | — | — |
| UID turtle | | 15 | — | — | 4.86 | 0.107 | 1.0 |
| *Malaclemys terrapin* | Diamondback terrapin | 23 | 3 | 9.7 | 31.75 | 0.390 | 3.7 |
| Colubridae | Nonpoisonous snake family | 4 | 1 | 3.2 | 0.8 | 0.011 | 0.1 |
| *Rana*/*Bufo* spp. | Frog or toad | 1 | 1 | 3.2 | 0.5 | — | — |
| UID fish | | 9 | — | — | 0.42 | 0.017 | 0.2 |
| Siluriformes | Catfishes | 2 | — | — | 0.47 | 0.01 | 0.1 |
| *Ariopsis felis* | Hardhead catfish | 8 | 3 | 9.7 | 3.72 | 0.072 | 0.7 |
| *Bagre marinus* | Gafftopsail catfish | 12 | 2 | 6.5 | 4.0 | 0.076 | 0.7 |
| *Pogonias cromis* | Black drum | 5 | 1 | 3.2 | 2.38 | 0.074 | 0.7 |
| *Mugil* spp. | Mullet | 12 | 1 | 3.2 | 3.6 | 0.080 | 0.8 |
| UID vertebrate | | — | — | — | 6.99 | — | — |
| Total | | 504 | 31 | 100% | 645.58 | 10.659 | 100% |

TABLE 22.42
**St. Catherines Island Survey: Savannah Period–East**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 102 | — | — | 34.15 | 0.631 | 8.7 |
| UID large mammal | | 115 | — | — | 111.48 | 1.830 | 25.1 |
| *Sylvilagus* spp. | Rabbit | 6 | 2 | 9.1 | 2.77 | 0.066 | 0.9 |
| *Procyon lotor* | Raccoon | 25 | 5 | 22.7 | 32.86 | 0.610 | 8.4 |
| *Mustela vison* | Mink | 2 | 1 | 4.5 | 0.7 | 0.019 | 0.3 |
| Artiodactyl | | 20 | — | — | 33.41 | 0.619 | 8.5 |
| *Odocoileus virginianus* | White-tailed deer | 38 | 5 | 22.7 | 201.32 | 3.115 | 42.8 |
| UID bird | | 10 | — | — | 5.28 | 0.093 | 1.3 |
| *Branta canadensis* | Canada goose | 1 | 1 | 4.5 | 0.77 | 0.016 | 0.2 |
| *Alligator mississippiensis* | Alligator | 1 | 1 | 4.5 | 2.68 | — | — |
| UID turtle | | 2 | — | — | 0.76 | 0.026 | 0.4 |
| *Malaclemys terrapin* | Diamondback terrapin | 12 | 1 | 4.5 | 7.4 | 0.121 | 1.7 |
| Colubridae | Nonpoisonous snake family | 4 | 1 | 4.5 | 0.8 | 0.011 | 0.2 |
| *Rana*/*Bufo* spp. | Frog or toad | 1 | 1 | 4.5 | 0.5 | — | — |
| UID fish | | 1 | — | — | 0.2 | 0.008 | 0.1 |
| *Ariopsis felis* | Hardhead catfish | 2 | 2 | 9.1 | 1.22 | 0.024 | 0.3 |
| *Bagre marinus* | Gafftopsail catfish | 1 | 1 | 4.5 | 0.5 | 0.010 | 0.1 |
| *Mugil* spp. | Mullet | 12 | 1 | 4.5 | 3.6 | 0.080 | 1.1 |
| UID vertebrate | | — | — | — | 6.99 | — | — |
| Total | | 355 | 22 | 100% | 447.39 | 7.279 | 100% |

TABLE 22.43
**St. Catherines Island Survey: Savannah Period–Center**

| Taxa | | NISP | MNI | | Wt. (g) | Biomass | |
|---|---|---|---|---|---|---|---|
| | | | No. | % | | kg | % |
| UID mammal | | 20 | — | — | 7.61 | 0.163 | 5.9 |
| UID large mammal | | 33 | — | — | 25.58 | 0.487 | 17.7 |
| *Procyon lotor* | Raccoon | 1 | 1 | 25.0 | 3.93 | 0.090 | 3.3 |
| Artiodactyl | | 6 | — | — | 6.63 | 0.144 | 5.2 |
| *Odocoileus virginianus* | White-tailed deer | 29 | 3 | 75.0 | 113.57 | 1.861 | 67.8 |
| Total | | 89 | 4 | 100% | 157.32 | 2.745 | 100% |

TABLE 22.44
**St. Catherines Survey: Savannah Period–West**

| Taxa | | NISP | MNI | | Wt. (g) | Biomass | |
|---|---|---|---|---|---|---|---|
| | | | No. | % | | kg | % |
| UID mammal | | 4 | — | — | 3.35 | 0.078 | 12.3 |
| UID turtle | | 13 | — | — | 4.10 | 0.081 | 12.8 |
| *Malaclemys terrapin* | Diamondback terrapin | 11 | 2 | 40.0 | 24.35 | 0.269 | 42.4 |
| UID fish | | 8 | — | — | 0.22 | 0.009 | 1.4 |
| Siluriformes | Catfishes | 2 | — | — | 0.47 | 0.01 | 1.6 |
| *Ariopsis felis* | Hardhead catfish | 6 | 1 | 20.0 | 2.5 | 0.048 | 7.6 |
| *Bagre marinus* | Gafftopsail catfish | 11 | 1 | 20.0 | 3.5 | 0.066 | 10.4 |
| *Pogonias cromis* | Black drum | 5 | 1 | 20.0 | 2.38 | 0.074 | 11.7 |
| Total | | 60 | 5 | 100% | 40.87 | 0.635 | 100% |

TABLE 22.45
**St. Catherines Island Survey: Savannah Period Summary**

| Taxa | MNI | | Biomass | |
|---|---|---|---|---|
| | No. | % | kg | % |
| Deer | 8 | 25.8 | 4.976 | 76.8 |
| Other wild mammal | 9 | 29.0 | 0.785 | 12.1 |
| Wild bird | 1 | 3.2 | 0.016 | 0.2 |
| Turtle/alligator | 4 | 12.9 | 0.390 | 6.0 |
| Snake | 1 | 3.2 | 0.011 | 0.2 |
| Amphibian | 1 | 3.2 | — | — |
| Sharks and fish | 7 | 22.6 | 0.302 | 4.7 |
| Total | 31 | 100% | 6.480 | 100% |

TABLE 22.46
**St. Catherines Island Survey: Savannah Period Modifications**

| Taxa | Burned | Cut | Gnawed rodent |
|---|---|---|---|
| UID mammal | 5 | 4 | 1 |
| UID large mammal | 32 | — | — |
| Artiodactyl | 11 | — | — |
| Deer | 3 | 5 | 3 |
| Total | 51 | 9 | 4 |

TABLE 22.47
**St. Catherines Island Survey: Savannah Period Elements**

| Skeletal elements | Rabbit | Raccoon | Mink | Deer |
|---|---|---|---|---|
| Skull | — | 9 | — | 3 |
| Teeth | — | 3 | — | — |
| Vertebra/rib | — | — | — | 14 |
| Forequarter | 1 | 4 | 2 | 9 |
| Forefoot | — | — | — | 4 |
| Foot | 1 | 4 | — | 13 |
| Hindfoot | 1 | 2 | — | 8 |
| Hindquarter | 3 | 4 | — | 16 |
| Total | 6 | 26 | 2 | 67 |

TABLE 22.48
**St. Catherines Island Survey: Savannah Period Deer Epiphyseal Fusion**

| Skeletal elements | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | — | 1 | 1 |
| Radius, proximal | — | — | — |
| Acetabulum | 2 | 3 | 5 |
| Metapodials, proximal | — | — | — |
| Phalanx, proximal | — | 7 | 7 |
| Middle fusing | | | |
| Tibia, distal | 1 | 1 | 2 |
| Calcaneus, proximal | 1 | 2 | 3 |
| Metapodials, distal | 2 | — | 2 |
| Late fusing | | | |
| Humerus, proximal | 2 | — | 2 |
| Radius, distal | 1 | — | 1 |
| Ulna, proximal | — | 1 | 1 |
| Ulna, distal | — | — | — |
| Femur, proximal | — | — | — |
| Femur, distal | 1 | — | 1 |
| Tibia, proximal | — | 3 | 3 |
| Total | 10 | 18 | 28 |

are large for the time period, no single site yielded more than a few specimens. Fishes contributed 37 percent of the individuals, with the hardhead catfish (*Ariopsis felis*) more abundant than the other fishes. Raccoons (*Procyon lotor*), deer (*Odocoileus virginianus*), and diamondback terrapins (*Malaclemys terrapin*) are also common. Deer contributed most of the biomass (table 22.54).

Observations of modifications, element distributions, age, sex, and size were made. A small percentage of the Irene specimens was modified, with burning the most common modification (table 22.55). A mammal shaft fragment was modified into a point, a deer metapodial shaft was grooved and snapped, and one diamondback terrapin nuchal fragment was drilled. The mammal specimen was from 9Li212, the deer from 9Li19, and the nuchal from 9Li208. The 48 deer individuals were represented by 324 fragments representing the entire skeleton (table 22.56). These included five antler

TABLE 22.49
**St. Catherines Survey: Irene Period**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 1381 | — | — | 988.31 | 14.099 | 23.5 |
| UID large mammal | | 387 | — | — | 440.26 | 7.072 | 11.8 |
| *Sylvilagus* spp. | Rabbit | 19 | 8 | 3.8 | 11.80 | 0.261 | 0.4 |
| *Sigmodon hispidus* | Hispid cotton rat | 1 | 1 | 0.5 | 0.08 | 0.003 | tr |
| *Procyon lotor* | Raccoon | 114 | 23 | 10.9 | 137.59 | 2.455 | 4.1 |
| Artiodactyl | | 73 | — | — | 118.71 | 2.161 | 3.6 |
| *Odocoileus virginianus* | White-tailed deer | 324 | 48 | 22.6 | 1804.19 | 25.334 | 42.2 |
| UID bird | | 8 | — | — | 4.76 | 0.088 | 0.2 |
| *Anas* spp. | Duck | 2 | 2 | 0.9 | 1.34 | 0.028 | 0.1 |
| *Buteo* spp. | Hawk | 1 | 1 | 0.5 | 0.15 | 0.004 | 0.01 |
| UID reptile | | 2 | — | — | 1.48 | — | — |
| UID turtle | | 457 | — | — | 198.33 | 1.509 | 2.5 |
| *Kinosternon* spp. | Mud turtle | 29 | 8 | 3.8 | 16.39 | 0.269 | 0.6 |
| Emydidae | Pond turtle family | 94 | — | — | 50.90 | 0.616 | 1.0 |
| *Pseudemys* spp. | Pond turtle | 1 | 1 | 0.5 | 0.28 | 0.013 | 0.02 |
| *Deirochelys reticularia* | Chicken turtle | 3 | 1 | 0.5 | 31.0 | 0.316 | 0.5 |
| *Malaclemys terrapin* | Diamondback terrapin | 273 | 34 | 16.0 | 299.87 | 1.887 | 3.1 |
| Chelonidae | Sea turtle family | 5 | 1 | 0.5 | 9.8 | 0.146 | 0.2 |
| Colubridae | Nonpoisonous snake family | 1 | 1 | 0.5 | 0.01 | 0.0001 | tr |
| *Rana*/*Bufo* spp. | Frog or toad | 7 | 5 | 2.4 | 0.55 | — | — |
| UID fish | | 344 | — | — | 35.28 | 0.598 | 1.0 |
| *Lepisosteus* spp. | Gar | 4 | 2 | 0.9 | 0.31 | 0.013 | 0.02 |
| Siluriformes | Catfishes | 126 | — | — | 12.71 | 0.231 | 0.4 |
| Ariidae | Sea catfish family | 20 | — | — | 3.37 | 0.063 | 0.1 |
| *Ariopsis felis* | Hardhead catfish | 299 | 41 | 19.3 | 76.68 | 1.197 | 2.0 |
| *Bagre marinus* | Gafftopsail catfish | 158 | 16 | 7.6 | 53.73 | 0.9012 | 1.5 |
| *Archosargus probatocephalus* | Sheepshead | 10 | 3 | 1.4 | 5.27 | 0.073 | 0.1 |
| *Cynoscion* spp. | Seatrout | 2 | 2 | 0.9 | 0.22 | 0.013 | 0.02 |
| *Pogonias cromis* | Black drum | 8 | 5 | 2.4 | 22.01 | 0.437 | 0.7 |
| *Sciaenops ocellatus* | Red drum | 4 | 3 | 1.4 | 5.85 | 0.184 | 0.3 |
| *Mugil* spp. | Mullet | 10 | 4 | 1.9 | 1.47 | 0.038 | 0.06 |
| *Paralichthys* spp. | Flounder | 2 | 2 | 0.9 | 0.31 | 0.01 | 0.02 |
| UID vertebrate | | — | — | — | 26.00 | — | — |
| UID mollusk | | — | — | — | 8.16 | — | — |
| UID crab | | 35 | — | — | 8.90 | — | — |
| Total | | 4204 | 212 | 100% | 4376.07 | 60.0193 | 100% |

fragments: three from 9Li19, one from 9Li226, and one from 9Li197. The rabbits (*Sylvilagus* spp.) were all adults or indeterminate. Two of the raccoons (*Procyon lotor*) were juveniles (9Li163, 9Li192), three were subadults (9Li118, 9Li205, 9Li213), five were adults (9Li207, 9Li208, 9Li255, 9Li226, 9Li239), and the remainder were indeterminate. Thirty-nine deer specimens were unfused (table 22.57). There may have been 8 deer juveniles (9Li19, 9Li84, 9Li128, 9Li192, 9Li197, 9Li208, 9Li213), 10 subadults, 7 adults, and 23 individuals of indeterminate age at death (table 22.12). Six of the subadult deer were less than 29 months of age at death. Single deer individuals from 9Li19 and 9Li226 may have been males and one individual from 9Li197 may have been a male based on the presence of antler fragments. One of the antlers from 9Li19 was

TABLE 22.50
**St. Catherines Survey: Irene Period–East**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 903 | — | — | 735.53 | 9.999 | 36.2 |
| UID large mammal | | 48 | — | — | 29.17 | 0.548 | 2.0 |
| *Sylvilagus* spp. | Rabbit | 13 | 4 | 4.1 | 8.77 | 0.186 | 0.7 |
| *Sigmodon hispidus* | Hispid cotton rat | 1 | 1 | 1.0 | 0.08 | 0.003 | 0.01 |
| *Procyon lotor* | Raccoon | 79 | 9 | 9.3 | 86.26 | 1.453 | 5.3 |
| Artiodactyl | | 30 | — | — | 33.97 | 0.628 | 2.3 |
| *Odocoileus virginianus* | White-tailed deer | 125 | 16 | 16.5 | 709.08 | 9.674 | 35.0 |
| UID bird | | 6 | — | — | 4.0 | 0.072 | 0.3 |
| *Buteo* spp. | Hawk | 1 | 1 | 1.0 | 0.15 | 0.004 | 0.01 |
| UID reptile | | 2 | — | — | 1.48 | — | — |
| UID turtle | | 306 | — | — | 130.94 | 0.829 | 3.0 |
| *Kinosternon* spp. | Mud turtle | 17 | 4 | 4.1 | 11.25 | 0.160 | 0.6 |
| Emydidae | Pond turtle family | 43 | — | — | 23.35 | 0.261 | 0.9 |
| *Pseudemys* spp. | Pond turtle | 1 | 1 | 1.0 | 0.28 | 0.013 | 0.05 |
| *Deirochelys reticularia* | Chicken turtle | 3 | 1 | 1.0 | 31.0 | 0.316 | 1.1 |
| *Malaclemys terrapin* | Diamondback terrapin | 198 | 18 | 18.6 | 235.86 | 1.229 | 4.5 |
| Chelonidae | Sea turtle family | 5 | 1 | 1.0 | 9.8 | 0.146 | 0.5 |
| *Rana*/*Bufo* spp. | Frog or toad | 2 | 2 | 2.1 | 0.17 | — | — |
| UID fish | | 237 | — | — | 25.30 | 0.404 | 1.5 |
| *Lepisosteus* spp. | Gar | 1 | 1 | 1.0 | 0.11 | 0.005 | 0.02 |
| Siluriformes | Catfishes | 49 | — | — | 7.27 | 0.131 | 0.5 |
| *Ariopsis felis* | Hardhead catfish | 145 | 18 | 18.6 | 36.87 | 0.614 | 2.2 |
| *Bagre marinus* | Gafftopsail catfish | 128 | 8 | 8.3 | 41.92 | 0.694 | 2.5 |
| *Archosargus probatocephalus* | Sheepshead | 10 | 3 | 3.1 | 5.27 | 0.073 | 0.3 |
| *Cynoscion* spp. | Seatrout | 2 | 2 | 2.1 | 0.22 | 0.013 | 0.05 |
| *Pogonias cromis* | Black drum | 1 | 1 | 1.0 | 0.58 | 0.026 | 0.09 |
| *Sciaenops ocellatus* | Red drum | 2 | 1 | 1.0 | 3.45 | 0.097 | 0.4 |
| *Mugil* spp. | Mullet | 10 | 4 | 4.1 | 1.47 | 0.038 | 0.1 |
| *Paralichthys* spp. | Flounder | 1 | 1 | 1.0 | 0.11 | 0.004 | 0.01 |
| UID vertebrate | | — | — | — | 7.60 | — | — |
| UID mollusk | | — | — | — | 6.27 | — | — |
| UID crab | | 16 | — | — | 3.40 | — | — |
| Total | | 2385 | 97 | 100% | 2190.98 | 27.620 | 100% |

unshed. A deer calcaneus from 9Li226 was quite large but could not be measured. Allometric prediction of body weight from the astragalus suggests a size range from 17 to 52 kg. Mullet (*Mugil* spp.) from 9Li226 were large in size but could not be measured.

## Altamaha Period

The Altamaha materials are divided into an Indian component from the Fallen Tree site (in the pueblo portion of the mission) and a Spanish component from the Mission Santa Catalina de Guale proper. These two components are discussed separately.

Fallen Tree: The Fallen Tree site is contained within the Guale pueblo that formed around the mission compound. In turn, the Fallen Tree collection is represented by two fractions. One of these was excavated in 1970 by the University of Georgia using a 11/32-in. mesh and the other was recovered by the American Museum of Natural History using a 1/4-in. mesh during the Island-wide transect survey.[3]

TABLE 22.51

**St. Catherines Island Survey: Irene Period–Center**

| Taxa | | NISP | MNI | | Wt. (g) | Biomass | |
|---|---|---|---|---|---|---|---|
| | | | No. | % | | kg | % |
| UID mammal | | 13 | — | — | 2.35 | 0.057 | 1.8 |
| UID large mammal | | 64 | — | — | 70.2 | 1.207 | 38.2 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 9.1 | 0.7 | 0.019 | 0.6 |
| *Procyon lotor* | Raccoon | 6 | 2 | 18.2 | 8.55 | 0.181 | 5.7 |
| *Odocoileus virginianus* | Deer | 11 | 3 | 27.3 | 74.50 | 1.273 | 40.3 |
| UID turtle | | 17 | — | — | 8.8 | 0.136 | 4.3 |
| Emydidae | Pond turtle family | 11 | — | — | 6.7 | 0.113 | 3.6 |
| *Malaclemys terrapin* | Diamondback terrapin | 13 | 3 | 27.3 | 9.75 | 0.145 | 4.6 |
| *Ariopsis felis* | Hardhead catfish | 1 | 1 | 9.1 | 6.65 | 0.028 | 0.9 |
| *Bagre marinus* | Gafftopsail catfish | 1 | 1 | 9.1 | 0.1 | 0.0002 | 0.01 |
| UID vertebrate | | — | — | — | 0.6 | — | — |
| Total | | 138 | 11 | 100% | 188.9 | 3.1592 | 100% |

TABLE 22.52

**St. Catherines Survey: Irene Period–West**

| Taxa | | NISP | MNI | | Wt. (g) | Biomass | |
|---|---|---|---|---|---|---|---|
| | | | No. | % | | kg | % |
| UID mammal | | 309 | — | — | 166.04 | 2.619 | 15.6 |
| UID large mammal | | 217 | — | — | 243.59 | 3.698 | 22.0 |
| *Sylvilagus* spp. | Rabbit | 5 | 3 | 3.8 | 2.33 | 0.056 | 0.3 |
| *Procyon lotor* | Raccoon | 8 | 5 | 6.4 | 12.12 | 0.248 | 1.5 |
| Artiodactyl | | 22 | — | — | 43.44 | 0.784 | 4.7 |
| *Odocoileus virginianus* | White-tailed deer | 87 | 17 | 21.8 | 472.16 | 6.709 | 39.9 |
| UID bird | | 2 | — | — | 0.76 | 0.016 | 0.1 |
| *Anas* spp. | Duck | 1 | 1 | 1.3 | 0.95 | 0.019 | 0.1 |
| UID turtle | | 121 | — | — | 54.23 | 0.459 | 2.7 |
| *Kinosternon* spp. | Mud turtle | 4 | 1 | 1.3 | 0.55 | 0.021 | 0.1 |
| Emydidae | Pond turtle family | 40 | — | — | 20.85 | 0.242 | 1.4 |
| *Malaclemys terrapin* | Diamondback terrapin | 58 | 12 | 15.4 | 50.81 | 0.440 | 2.6 |
| Colubridae | Nonpoisonous snake family | 1 | 1 | 1.3 | 0.01 | 0.0001 | tr |
| *Rana*/*Bufo* spp. | Frog or toad | 5 | 3 | 3.8 | 0.38 | — | — |
| UID fish | | 106 | — | — | 9.85 | 0.188 | 1.1 |
| *Lepisosteus* spp. | Gar | 3 | 1 | 1.3 | 0.20 | 0.008 | 0.5 |
| Siluriformes | Catfishes | 77 | — | — | 5.44 | 0.100 | 0.6 |
| Ariidae | Sea catfish family | 20 | — | — | 3.37 | 0.063 | 0.4 |
| *Ariopsis felis* | Hardhead catfish | 153 | 22 | 28.2 | 33.16 | 0.555 | 3.3 |
| *Bagre marinus* | Gafftopsail catfish | 29 | 7 | 9.0 | 11.71 | 0.207 | 1.2 |
| *Pogonias cromis* | Black drum | 6 | 3 | 3.8 | 19.81 | 0.355 | 2.1 |
| *Sciaenops ocellatus* | Red drum | 1 | 1 | 1.3 | 0.63 | 0.028 | 0.2 |
| *Paralichthys* spp. | Flounder | 1 | 1 | 1.3 | 0.2 | 0.006 | 0.04 |
| UID vertebrate | | — | — | — | 10.91 | — | — |
| UID crab | | 19 | — | — | 5.5 | — | — |
| Total | | 1295 | 78 | 100% | 1169.00 | 16.8211 | 100% |

TABLE 22.53
**St. Catherines Survey: Irene Period–South**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 156 | — | — | 84.39 | 1.424 | 11.5 |
| UID large mammal | | 58 | — | — | 97.30 | 1.619 | 13.0 |
| *Procyon lotor* | Raccoon | 21 | 7 | 26.9 | 30.66 | 0.573 | 4.6 |
| Artiodactyl | | 21 | — | — | 41.30 | 0.749 | 6.0 |
| *Odocoileus virginianus* | White-tailed deer | 101 | 12 | 46.2 | 548.45 | 7.678 | 61.8 |
| *Anas* spp. | Duck | 1 | 1 | 3.8 | 0.39 | 0.009 | 0.1 |
| UID turtle | | 13 | — | — | 4.36 | 0.085 | 0.7 |
| *Kinosternon* spp. | Mud turtle | 8 | 3 | 11.5 | 4.59 | 0.088 | 0.7 |
| *Malaclemys terrapin* | Diamondback terrapin | 4 | 1 | 3.8 | 3.45 | 0.073 | 0.6 |
| UID fish | | 1 | — | — | 0.13 | 0.006 | 0.05 |
| *Pogonias cromis* | Black drum | 1 | 1 | 3.8 | 1.62 | 0.056 | 0.5 |
| *Sciaenops ocellatus* | Red drum | 1 | 1 | 3.8 | 1.77 | 0.059 | 0.5 |
| UID vertebrate | | — | — | — | 6.89 | — | — |
| UID mollusk | | — | — | — | 1.89 | — | — |
| Total | | 386 | 26 | 100% | 827.19 | 12.419 | 100% |

The Fallen Tree collection recovered by the American Museum contained 212 specimens weighing 213.55 g and represented the remains of an estimated 13 individuals (table 22.58). A pig (*Sus scrofa*) and a chicken (*Gallus gallus*) were identified in the collection. Neither of these animals made a major contribution to the diet. The majority of the individuals are fishes, with the hardhead catfish (*Ariopsis felis*) more abundant than the other fishes. Raccoons (*Procyon lotor*) and deer (*Odocoileus virginianus*) are also common, contributing most of the biomass (table 22.59).

The Fallen Tree collection recovered by the University of Georgia contained the remains of an estimated 50 individuals, with 2282 specimens that weighed 6960.15 g (table 22.60). Pig (*Sus scrofa*) and chicken (*Gallus gallus*) were also identified in the UGA portion from Fallen Tree, but an assessment of their contribution to the diet indicates it was very low. The most significant difference between the American Museum and the University of Georgia's collections is in the quantity of fish recovered. In the UGA fraction, 54 percent of the individuals were deer and only 12 percent of

TABLE 22.54
**St. Catherines Island Survey: Irene Period Summary**

| Taxa | MNI No. | MNI % | Biomass kg | Biomass % |
|---|---|---|---|---|
| Deer | 48 | 22.6 | 25.334 | 75.4 |
| Other wild mammal | 32 | 15.1 | 2.719 | 8.1 |
| Wild bird | 3 | 1.4 | 0.032 | 0.1 |
| Turtle/alligator | 45 | 21.2 | 2.631 | 7.8 |
| Snake | 1 | 0.5 | 0.0001 | tr |
| Amphibian | 5 | 2.4 | — | — |
| Sharks and fish | 78 | 36.8 | 2.8662 | 8.5 |
| Total | 212 | 100% | 33.5823 | 100% |

TABLE 22.55
**St. Catherines Island Survey: Irene Period Modifications**

| Taxa | Burned | Cut | Worked | Gnawed | |
|---|---|---|---|---|---|
| | | | | Rodent | Carnivore |
| UID mammal | 87 | 14 | 1 | 5 | 2 |
| UID large mammal | 7 | 4 | — | — | — |
| Rabbit | — | 1 | — | — | — |
| Raccoon | 4 | 3 | — | — | — |
| Artiodactyl | 2 | 2 | — | — | — |
| Deer | 9 | 19 | 1 | 3 | 6 |
| UID bird | 1 | — | — | — | — |
| Duck | 1 | — | — | — | — |
| UID turtle | 10 | — | — | — | — |
| Pond turtles | 5 | — | — | — | — |
| Diamondback terrapin | 8 | 1 | 1 | — | — |
| UID fish | 1 | — | — | — | — |
| Catfishes | 2 | 1 | — | — | — |
| Hardhead catfish | 3 | — | — | — | — |
| Gafftopsail catfish | 1 | — | — | — | — |
| Flounder | 1 | — | — | — | — |
| UID vertebrate | 6 | 1 | — | — | — |
| UID crab | 1 | — | — | — | — |
| Total | 149 | 46 | 3 | 8 | 8 |

the individuals were fishes. This undoubtedly reflects the role screen size plays in determining composition of coastal species lists. Deer contributed 94 percent of the biomass estimated for the UGA collection (table 22.61).

A small percentage of the specimens from both Fallen Tree collections was modified, with cuts the most common modification (table 22.62). Five specimens were worked, four of which were polished UID Mammal

TABLE 22.56
**St. Catherines Island Survey: Irene Period Elements**

| Skeletal elements | Rabbit | Raccoon | Deer |
|---|---|---|---|
| Skull | 5 | 45 | 35 |
| Teeth | — | 30 | 64 |
| Vertebra/rib | 3 | 3 | 28 |
| Forequarter | 4 | 26 | 38 |
| Forefoot | — | — | 18 |
| Foot | — | 2 | 66 |
| Hindfoot | 1 | 1 | 43 |
| Hindquarter | 6 | 7 | 32 |
| Total | 19 | 114 | 324 |

TABLE 22.57
**St. Catherines Island Survey: Irene Period Deer Epiphyseal Fusion**

| Skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early Fusing | | | |
| Humerus, distal | 2 | 6 | 8 |
| Radius, proximal | — | 6 | 6 |
| Acetabulum | — | 3 | 3 |
| Metapodials, proximal | — | 3 | 3 |
| Phalanx, proximal | 12 | 14 | 26 |
| Middle Fusing | | | |
| Tibia, distal | 1 | 4 | 5 |
| Calcaneus, proximal | 4 | 4 | 8 |
| Metapodials, distal | 8 | 9 | 17 |
| Late Fusing | | | |
| Humerus, proximal | 1 | 1 | 2 |
| Radius, distal | 2 | 2 | 4 |
| Ulna, proximal | 3 | 1 | 4 |
| Ulna, distal | — | — | — |
| Femur, proximal | 3 | — | 3 |
| Femur, distal | 2 | 3 | 5 |
| Tibia, proximal | 1 | — | 1 |
| Total | 39 | 56 | 95 |

TABLE 22.58
**St. Catherines Survey: Fallen Tree (Thomas)**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 69 | — | — | 20.95 | 0.407 | 10.8 |
| UID large mammal | | 41 | — | — | 51.07 | 0.906 | 24.1 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 7.7 | 0.81 | 0.022 | 0.6 |
| *Procyon lotor* | Raccoon | 4 | 2 | 15.4 | 3.38 | 0.079 | 2.1 |
| Artiodactyl | | 19 | — | — | 30.13 | 0.564 | 15.0 |
| *Sus scrofa* | Pig | 2 | 1 | 7.7 | 3.93 | 0.090 | 2.4 |
| *Odocoileus virginianus* | White-tailed deer | 5 | 1 | 7.7 | 61.49 | 1.071 | 28.4 |
| *Gallus gallus* | Chicken | 1 | 1 | 7.7 | 0.31 | 0.007 | 0.2 |
| UID turtle | | 28 | — | — | 15.92 | 0.202 | 5.4 |
| *Chelydra serpentina* | Snapping turtle | 1 | 1 | 7.7 | 0.1 | 0.007 | 0.2 |
| *Kinosternon* spp. | Mud turtle | 1 | 1 | 7.7 | 0.23 | 0.012 | 0.3 |
| Emydidae | Pond turtle family | 10 | — | — | 8.68 | 0.135 | 3.6 |
| *Malaclemys terrapin* | Diamondback terrapin | 5 | 1 | 7.7 | 9.11 | 0.139 | 3.7 |
| UID fish | | 6 | — | — | 0.54 | 0.018 | 0.5 |
| *Ariopsis felis* | Hardhead catfish | 18 | 3 | 23.1 | 5.14 | 0.094 | 2.5 |
| *Cynoscion* spp. | Seatrout | 1 | 1 | 7.7 | 0.25 | 0.014 | 0.4 |
| UID vertebrate | | — | — | — | 1.51 | — | — |
| Total | | 212 | 13 | 100% | 213.55 | 3.767 | 100% |

fragments and one of which was a deer ulna modified into an awl.

While pigs were represented by very few specimens in the Fallen Tree collections, deer specimens were very abundant. The pigs were represented by four cranial fragments and three lower leg specimens. Deer were represented by elements from the entire skeleton (table 22.63, fig. 22.4). Elements from the body contributed 50 percent of the fragments identified (table 22.10), while cranial fragments contributed only 16 percent of the fragments identified as deer. Elements from the head are underrepresented compared to a standard deer skeleton (table 22.10; fig. 22.5) and elements from the body and foot are somewhat more common.

Evidence for age and sex was observed in the Fallen Tree collections. One of the raccoons was a subadult and one an adult. The others were of indeterminate age. Ninety-

TABLE 22.59
**St. Catherines Island Survey: Fallen Tree Summary (Thomas)**

| Taxa | MNI No. | MNI % | Biomass kg | Biomass % |
|---|---|---|---|---|
| Domestic mammal | 1 | 7.7 | 0.09 | 5.9 |
| Domestic bird | 1 | 7.7 | 0.007 | 0.5 |
| Deer | 1 | 7.7 | 1.071 | 69.8 |
| Other wild mammal | 3 | 23.1 | 0.101 | 6.6 |
| Wild bird | — | — | — | — |
| Turtle/alligator | 3 | 23.1 | 0.158 | 10.3 |
| Snake | — | — | — | — |
| Amphibian | — | — | — | — |
| Sharks and fish | 4 | 30.8 | 0.108 | 7.0 |
| Total | 13 | 100% | 1.535 | 100% |

TABLE 22.60
**St. Catherines Island Survey: Fallen Tree (Caldwell)**

| Taxa | | NISP | MNI No. | MNI % | Wt. (g) | Biomass kg | Biomass % |
|---|---|---|---|---|---|---|---|
| UID mammal | | 1050 | — | — | 1489.46 | 18.868 | 23.6 |
| *Sylvilagus* spp. | Rabbit | 1 | 1 | 2.0 | 0.48 | 0.014 | 0.02 |
| *Sciurus* spp. | Squirrel | 5 | 2 | 4.0 | 2.02 | 0.05 | 0.06 |
| *Procyon lotor* | Raccoon | 84 | 7 | 14.0 | 125.02 | 2.029 | 2.5 |
| Artiodactyl | | 20 | — | — | 38.57 | 0.704 | 0.9 |
| *Sus scrofa* | Pig | 5 | 1 | 2.0 | 17.96 | 0.354 | 0.4 |
| *Odocoileus virginianus* | White-tailed deer | 743 | 27 | 54.0 | 4859.57 | 54.694 | 68.3 |
| UID bird | | 5 | — | — | 7.41 | 0.132 | 0.1 |
| Anatidae | Duck family | 1 | — | — | 0.95 | 0.019 | 0.02 |
| *Anser* spp. | Goose | 3 | 1 | 2.0 | 2.12 | 0.04 | 0.05 |
| *Gallus gallus* | Chicken | 2 | 1 | 2.0 | 2.1 | 0.04 | 0.05 |
| Rallidae | Rails | 1 | 1 | 2.0 | 0.3 | 0.007 | 0.01 |
| UID turtle | | 129 | — | — | 101.99 | 0.701 | 0.9 |
| *Kinosternon* spp. | Mud turtle | 6 | 1 | 2.0 | 3.9 | 0.079 | 0.1 |
| Emydidae | Pond turtle family | 85 | — | — | 171.98 | 0.995 | 1.2 |
| *Malaclemys terrapin* | Diamondback terrapin | 19 | 1 | 2.0 | 15.7 | 0.2 | 0.3 |
| *Crotalus* spp. | Rattlesnake | 1 | 1 | 2.0 | 0.88 | 0.0001 | tr |
| UID fish | | 23 | — | — | 7.49 | 0.151 | 0.2 |
| Siluriformes | Catfishes | 4 | — | — | 0.86 | 0.017 | 0.02 |
| Ariidae | Sea catfish family | 3 | — | — | 0.61 | 0.012 | 0.01 |
| *Ariopsis felis* | Hardhead catfish | 21 | 4 | 8.0 | 11.02 | 0.195 | 0.2 |
| *Archosargus probatocaphalus* | Sheepshead | 2 | 1 | 2.0 | 1.7 | 0.026 | 0.03 |
| *Pogonias cromis* | Black drum | 69 | 1 | 2.0 | 54.95 | 0.754 | 0.9 |
| UID vertebrate | | — | — | — | 43.11 | — | — |
| Total | | 2282 | 50 | 100% | 6960.15 | 80.0811 | 100% |

TABLE 22.61
**St. Catherines Island Survey: Fallen Tree Summary (Caldwell)**

| Taxa | MNI No. | MNI % | Biomass kg | Biomass % |
|---|---|---|---|---|
| Domestic mammal | 1 | 2.0 | 0.354 | 0.6 |
| Domestic bird | 1 | 2.0 | 0.04 | 0.1 |
| Deer | 27 | 54.0 | 54.694 | 93.5 |
| Other wild mammal | 10 | 20.0 | 2.093 | 3.6 |
| Wild bird | 2 | 4.0 | 0.047 | 0.1 |
| Turtle/alligator | 2 | 4.0 | 0.279 | 0.5 |
| Snake | 1 | 2.0 | 0.0001 | tr |
| Amphibian | — | — | — | — |
| Sharks and fish | 6 | 12.0 | 0.975 | 1.7 |
| Total | 50 | 100% | 58.4821 | 100% |

TABLE 22.62
**St. Catherines Island Survey: Fallen Tree Modifications (Caldwell and Thomas)**

| | | | | Gnawed | |
|---|---|---|---|---|---|
| Taxa | Burned | Cut | Worked | Rodent | Carnivore |
| UID mammal | 3 | 19 | 4 | 10 | 17 |
| UID large mammal | — | 3 | — | — | — |
| Rabbit | — | 1 | — | — | — |
| Raccoon | — | 5 | — | 4 | 4 |
| Artiodactyl | — | 3 | — | — | 1 |
| Deer | 8 | 48 | 1 | 16 | 33 |
| UID bird | — | 1 | — | — | — |
| UID turtle | 1 | 1 | — | — | — |
| Mud turtle | — | — | — | 1 | — |
| Pond turtles | — | 1 | — | — | — |
| Total | 12 | 82 | 5 | 31 | 55 |

four of the deer specimens were unfused (table 22.64). Three of the deer individuals were juveniles at death, 10 were subadults, and four were adults. Age at death was indeterminate for 11 of the deer individuals (table 22.12). One of the deer individuals was a male, represented by an unshed antler and a large portion of the frontal. One of the raccoons was a male and one of the pigs was a female.

Mission Santa Catalina de Guale: The only Mission collection analyzed here was recovered by Caldwell using a larger screen than was used during the American Museum of Natural History's transect survey (the more comprehensive excavations at Mission Santa Catalina de Guale are discussed in Reitz, in press). The Mission sample contained 1634 specimens that weighed 3453.45 g and that represented the remains of an estimated 26 individuals (table 22.65). These included two pigs (*Sus scrofa*). The majority of the individuals are deer (*Odocoileus virginianus*), which also contributed most of the biomass (table 22.66).

Observations were made of modifications and element distributions. A small percentage of the Mission specimens were modified, with burns the most common modification (table 22.67). The worked deer specimen was a grooved metacarpal. The two pig individuals were represented by 20 fragments and the nine deer individuals were represented by 331 fragments (table 22.68, fig. 22.4). These included two antler fragments and one unshed antler. Elements from the head and foot were

TABLE 22.63
**St. Catherines Island Survey: Fallen Tree Elements (Caldwell and Thomas)**

| Skeletal elements | Rabbit | Squirrel | Raccoon | Pig | Deer |
|---|---|---|---|---|---|
| Skull | 1 | — | 28 | 1 | 69 |
| Teeth | — | — | 29 | 3 | 50 |
| Vertebra/rib | — | — | 2 | — | 202 |
| Forequarter | 1 | 1 | 18 | — | 67 |
| Forefoot | — | — | — | — | 44 |
| Foot | — | — | 3 | 2 | 95 |
| Hindfoot | — | — | 3 | 1 | 120 |
| Hindquarter | — | 4 | 5 | — | 101 |
| Total | 2 | 5 | 88 | 7 | 748 |

TABLE 22.64
**St. Catherines Island Survey: Fallen Tree Epiphyseal Fusion, Deer (Caldwell and Thomas)**

| Deer skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | 2 | 9 | 11 |
| Radius, proximal | — | 13 | 13 |
| Acetabulum | — | 10 | 10 |
| Metapodials, proximal | — | 42 | 42 |
| Phalanx, proximal | 10 | 48 | 58 |
| Middle fusing | | | |
| Tibia, distal | 9 | 19 | 28 |
| Calcaneus, proximal | 7 | 6 | 13 |
| Metapodials, distal | 22 | 9 | 31 |
| Late fusing | | | |
| Humerus, proximal | 2 | — | 2 |
| Radius, distal | 5 | 6 | 11 |
| Ulna, proximal | 5 | 1 | 6 |
| Ulna, distal | — | 1 | 1 |
| Femur, proximal | 13 | 3 | 16 |
| Femur, distal | 8 | 2 | 10 |
| Tibia, proximal | 11 | 3 | 14 |
| Total | 94 | 172 | 266 |

TABLE 22.65
**St. Catherines Island Survey: Mission Period**

| Taxa | | NISP | MNI | | Wt. (g) | Biomass | |
|---|---|---|---|---|---|---|---|
| | | | No. | % | | kg | % |
| UID mammal | | 644 | — | — | 180.87 | 2.829 | 6.2 |
| UID large mammal | | 373 | — | — | 784.42 | 10.595 | 23.4 |
| *Procyon lotor* | Raccoon | 39 | 4 | 15.4 | 62.08 | 1.081 | 2.4 |
| Artiodactyl | | 72 | — | — | 197.25 | 3.059 | 6.8 |
| *Sus scrofa* | Pig | 20 | 2 | 7.7 | 122.15 | 1.987 | 4.4 |
| *Odocoileus virginianus* | White-tailed deer | 331 | 9 | 34.6 | 1964.28 | 24.204 | 53.4 |
| UID bird | | 3 | — | — | 0.73 | 0.015 | 0.03 |
| cf. *Mycteria americana* | Wood stork | 1 | 1 | 3.8 | 0.72 | 0.015 | 0.03 |
| *Branta canadensis* | Canada goose | 3 | 1 | 3.8 | 2.45 | 0.046 | 0.1 |
| Passeriformes | Song birds | 1 | 1 | 3.8 | 0.02 | 0.001 | tr |
| UID turtle | | 36 | — | — | 20.70 | 0.241 | 0.5 |
| Emydidae | Pond turtle family | 8 | — | — | 7.11 | 0.118 | 0.3 |
| *Malaclemys terrapin* | Diamondback terrapin | 58 | 1 | 3.8 | 50.40 | 0.437 | 1.0 |
| *Bufo* spp. | Toad | 1 | 1 | 3.8 | 0.16 | — | — |
| UID fish | | 25 | — | — | 26.88 | 0.424 | 0.9 |
| *Lepisosteus* spp. | Gar | 3 | 1 | 3.8 | 2.56 | 0.063 | 0.1 |
| Ariidae | Sea catfish family | 1 | — | — | 0.20 | 0.004 | tr |
| *Ariopsis felis* | Hardhead catfish | 7 | 1 | 3.8 | 1.61 | 0.031 | 0.1 |
| *Bagre marinus* | Gafftopsail catfish | 1 | 1 | 3.8 | 0.78 | 0.016 | 0.04 |
| *Cynoscion* spp. | Seatrout | 2 | 1 | 3.8 | 0.34 | 0.018 | 0.04 |
| *Pogonias cromis* | Black drum | 1 | 1 | 3.8 | 0.59 | 0.026 | 0.06 |
| *Scianops ocellatus* | Red drum | 3 | 1 | 3.8 | 3.00 | 0.088 | 0.2 |
| UID vertebrate | | — | — | — | 16.71 | — | — |
| UID mollusk | | — | — | — | 7.05 | — | — |
| UID crab | | 1 | — | — | 0.39 | — | — |
| Total | | 1634 | 26 | 100% | 3453.45 | 45.298 | 100% |

TABLE 22.66
**St. Catherines Island Survey: Mission Period Summary**

| Taxa | MNI | | Biomass | |
|---|---|---|---|---|
| | No. | % | kg | % |
| Domestic mammal | 2 | 7.7 | 1.987 | 7.1 |
| Domestic bird | — | — | — | — |
| Deer | 9 | 34.6 | 24.204 | 86.4 |
| Other wild mammal | 4 | 15.4 | 1.081 | 3.9 |
| Wild bird | 3 | 11.5 | 0.062 | 0.2 |
| Turtle/alligator | 1 | 3.8 | 0.437 | 1.6 |
| Snake | — | — | — | — |
| Amphibian | 1 | 3.8 | — | — |
| Sharks and fish | 6 | 23.1 | 0.242 | 0.9 |
| Total | 26 | 100% | 28.013 | 100% |

somewhat more abundant than postcranial fragments, and elements from the body were underrepresented compared to a standard deer skeleton (table 22.10; fig. 22.5). While elements from the foot were more common in the Mission collection than in the standard skeleton, phalanges may actually have been underrepresented. Generally, the densest specimens (Lyman, 1984) are more common than ones that are less dense. However, in some instances, such as the femur shaft, this is not the case. These data may indicate that sometimes elements from the entire carcass were discarded at the Mission, but often the phalanges were removed elsewhere.

Observations were also made of age and sex. One of the raccoons (*Procyon lotor*) in the Mission collection was an adult and the others were of indeterminate age. One of the pigs was a juvenile and the other was indeterminate. Twenty-seven deer specimens were unfused (table 22.69). There may have been one juvenile deer, three subadults, one adult, and four indeterminate deer individuals at death (table 22.12). The subadults were less than 29 months of age at death. One of the deer fragments was an unshed antler, suggesting that one individual was a male. Twelve of the deer astragali are from males and 11 from females (Purdue and Reitz, 1993), suggesting that both males and females were hunted with equal frequency.

The Fallen Tree and Mission Santa Catalina de Guale collections contained 217 deer specimens that could be measured (appendix B). Based on allometric estimates

TABLE 22.67
**St. Catherines Island Survey: Mission Period Modifications**

| Taxa | Burned | Cut | Worked | Gnawed | |
|---|---|---|---|---|---|
| | | | | Rodent | Carnivore |
| UID mammal | 23 | 2 | — | — | — |
| UID large mammal | 13 | 4 | — | — | — |
| Raccoon | 2 | 1 | — | — | — |
| Artiodactyl | 1 | 5 | — | — | — |
| Deer | 11 | 22 | 1 | 1 | 1 |
| Diamondback terrapin | 1 | — | — | — | — |
| UID vertebrate | 7 | 1 | — | — | — |
| UID crab | 1 | — | — | — | — |
| Total | 59 | 35 | 1 | 1 | 1 |

TABLE 22.68
**St. Catherines Island Survey: Mission Period Elements**

| Skeletal elements | Raccoon | Pig | Deer |
|---|---|---|---|
| Skull | 15 | 4 | 37 |
| Teeth | 5 | 12 | 85 |
| Vertebra/rib | — | 1 | 21 |
| Forequarter | 9 | 1 | 38 |
| Forefoot | — | — | 30 |
| Foot | 3 | 1 | 27 |
| Hindfoot | 1 | 1 | 64 |
| Hindquarter | 6 | — | 29 |
| Total | 39 | 20 | 331 |

from the astragalus dimension GLl, deer might have ranged in size from 19 to 69 kg. Ulna measurements also suggest the presence of a large individual. The black drum from the Mission was quite large but no specimen could be measured.

## DISCUSSION

The results of this study of vertebrate remains recovered during the St. Catherines Island transect survey contrast with what is found elsewhere along the Georgia Bight. Particularly noteworthy is the prominent role deer played in the island diet. This is the most unexpected result of the transect study and one that is difficult to explain based on present knowledge. The likely explanations probably relate to recovery technique and population dynamics of deer on St. Catherines Island.

Screen size is known to discriminate against the recovery of fishes, particularly the small fishes found in other coastal collections, and to encourage recovery of large fragments of large animals such as deer. In samples where flotation was used, deer are sometimes not recovered at all and fishes may contribute more than 80 percent of the vertebrate individuals (Reitz and Quitmyer, 1988; Quitmeyer and Reitz, 2006).

However, it is unlikely that a 1/4-in. screen alone is responsible for the prominence of deer in the survey samples (tables 22.70 and 22.71). The impact of using a 1/4-in. screen rather than a 1/8-in. screen elsewhere along the coast generally increases the percentage of deer from 1–3 percent of the individuals to approximately 10 percent of the individuals. The larger screen size usually reduces the percentage of fishes from around 80 percent of the individuals to approximately 60 percent of the individuals. For example, in Mississippian contexts at the sites of Bourbon Field and Kenan Field on Sapelo Island, deer comprised no more than 11 percent of the vertebrate individuals (Crook, 1978a; Reitz, 1982b). In the 1/4-in. samples from the prehispanic St. Johns component (A.D. 800–contact) at the Kings Bay site, deer comprised 9 percent of the vertebrate individuals (Smith et al., 1981: 508–511). In the Spanish colonial San Marcos occupation at this same site, deer contributed only 6 percent of the individuals (Smith et al., 1981: 508–511). Most of the materials from 16th-century St. Augustine were recovered with 1/4-in. screen, and deer constituted 3 percent of the individuals (Reitz and Scarry, 1985).

Of the prehispanic samples studied from the St. Catherines Island transect survey,

TABLE 22.69
**St. Catherines Island Survey: Mission Period Epiphyseal Fusion, Deer**

| Deer skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | 2 | 9 | 11 |
| Radius, proximal | — | 6 | 6 |
| Acetabulum | — | — | — |
| Metapodials, proximal | — | — | — |
| Phalanx, proximal | 1 | 8 | 9 |
| Middle fusing | | | |
| Tibia, distal | 1 | 6 | 7 |
| Calcaneus, proximal | 7 | 4 | 11 |
| Metapodials, distal | 4 | 7 | 11 |
| Late fusing | | | |
| Humerus, proximal | 2 | — | 2 |
| Radius, distal | 1 | 1 | 2 |
| Ulna, proximal | 1 | 2 | 3 |
| Ulna, distal | — | — | — |
| Femur, proximal | 2 | 1 | 3 |
| Femur, distal | 2 | 1 | 3 |
| Tibia, proximal | 4 | 1 | 5 |
| Total | 27 | 46 | 73 |

TABLE 22.70
**St. Catherines Island Survey: Summary of MNI%**

| Taxa | Mission Santa Catalina de Guale (JRC[a]) | Fallen Tree (JRC[a]) | Fallen Tree (DHT[b]) | Irene Period | Savannah Period | St. Catherines Period | Wilmington Period | Refuge-Deptford Period | St. Simons Period |
|---|---|---|---|---|---|---|---|---|---|
| Domestic mammal | 7.7 | 2.0 | 7.7 | — | — | — | — | — | — |
| Domestic bird | — | 2.0 | 7.7 | — | — | — | — | — | — |
| Deer | 34.6 | 54.0 | 7.7 | 22.6 | 25.8 | 22.2 | 23.1 | 23.8 | 5.0 |
| Other wild mammal | 15.4 | 20.0 | 23.1 | 15.1 | 29.0 | 18.5 | 13.8 | 16.7 | 5.8 |
| Wild bird | 11.5 | 4.0 | — | 1.4 | 3.2 | 3.7 | — | 4.8 | 2.5 |
| Turtle/alligator | 3.8 | 4.0 | 23.1 | 21.2 | 12.9 | 22.2 | 15.4 | 23.8 | 6.7 |
| Snake | — | 2.0 | — | 0.5 | 3.2 | 3.7 | 3.1 | 2.4 | 1.7 |
| Amphibian | 3.8 | — | — | 2.4 | 3.2 | 3.7 | — | 2.4 | 1.7 |
| Sharks and fish | 23.1 | 12.0 | 30.8 | 36.8 | 22.6 | 25.9 | 44.6 | 26.2 | 76.7 |
| Total MNI | 26 | 50 | 13 | 212 | 31 | 27 | 65 | 42 | 120 |

[a] Joseph R. Caldwell, excavator.
[b] David Hurst Thomas, excavator.

TABLE 22.71
**St. Catherines Island Survey: Summary of Biomass%**

| Taxa | Mission Santa Catalina de Guale (JRC[a]) | Fallen Tree (JRC[a]) | Fallen Tree (DHT[b]) | Irene Period | Savannah Period | St. Catherines Period | Wilmington Period | Refuge-Deptford Period | St. Simons Period |
|---|---|---|---|---|---|---|---|---|---|
| Domestic mammal | 7.1 | 0.6 | 5.9 | — | — | — | — | — | — |
| Domestic bird | — | 0.1 | 0.5 | — | — | — | — | — | — |
| Deer | 86.4 | 93.5 | 69.8 | 75.4 | 76.8 | 73.8 | 78.5 | 79.5 | 66.8 |
| Other wild mammal | 3.9 | 3.6 | 6.6 | 8.1 | 12.1 | 5.4 | 3.4 | 4.3 | 8.3 |
| Wild bird | 0.2 | 0.1 | — | 0.1 | 0.2 | 0.6 | — | 0.5 | 2.1 |
| Turtle/alligator | 1.6 | 0.5 | 10.3 | 7.8 | 6.0 | 16.9 | 6.9 | 10.3 | 3.1 |
| Snake | — | tr | — | tr | 0.2 | 0.02 | 2.1 | tr | 0.4 |
| Amphibian | — | — | — | — | — | — | — | — | — |
| Sharks and fish | 0.9 | 1.7 | 7.0 | 8.5 | 4.7 | 3.3 | 9.1 | 5.5 | 19.2 |
| Total biomass | 28.01 | 58.48 | 1.54 | 33.58 | 6.48 | 6.52 | 15.09 | 16.11 | 15.43 |

[a] Joseph R. Caldwell, excavator.
[b] David Hurst Thomas, excavator.

only those from the St. Simons period conform to what was expected based on data from nearby coastal settings and considering screen size (tables 22.70 and 22.71). In most respects the St. Simons period collection is similar to the Late Archaic collection from the St. Simons Shell Ring on St. Simons Island excavated by Rochelle Marrinan (1975), if allowances are made for recovery technique. Marrinan's materials were recovered using flotation techniques, and the recovered sample contained the remains of an estimated 1384 vertebrate individuals. Deer constituted 0.7 percent of the vertebrate individuals and fishes 90.1 percent in the St. Simons Shell Ring sample. The St. Catherines Island St. Simons period collection, therefore, is much as one would expect a 1/4-in. Late Archaic collection from such a site to be.

The Refuge-Deptford, Wilmington, St. Catherine, Savannah, and Irene samples are remarkably similar to one another. With the exception of the unusual abundance of deer in these assemblages, the range of taxa identified in the Woodland and Mississippian samples is very similar to what is found elsewhere along the coast at sites of these time periods (Reitz, 1982a, 1988a; Reitz and Quitmyer, 1988). Deer and estuarine animals were the primary resources used. The main difference found in the overall pattern is in the Wilmington assemblage, where the percentage of turtles is lower and the percentage of fishes is higher than in the other Woodland and Mississippian assemblages. Even with this difference, however, the Wilmington assemblage appears more in line with the other Woodland and Mississippian assemblages than with the Archaic or Spanish Colonial ones. While the percentages of other wild mammals, turtles, and fishes appear to covary, deer constituted between 22 percent and 26 percent of the individuals in the samples from all five time periods (table 22.70). The biomass contributed by deer is also stable between 74 percent and 80 percent (table 22.71). Considering the wide range in sample sizes and the large number of sites contributing data to this summary, this degree of homogeneity is unexpected.

The Spanish colonial component is interesting in that it suggests a change in Indian use of the island's resources as well as adaptation on the part of the Spanish friars and soldiers (tables 22.70 and 22.71). In neither case was this change based on extensive use of domestic animals. The University of Georgia's Fallen Tree data and the Mission collection were recovered with 11/32-in. screen, which clearly increased the evidence for deer. The impact of this larger screen is clear when the UGA and American Museum data from Fallen Tree are compared. The University of Georgia data indicate that native use of deer may have increased as part of the missionization process and the AMNH data suggest the reverse. It seems likely that the American Museum data more accurately reflect the subsistence effort at Fallen Tree than do the University of Georgia data.

The American Museum evidence could indicate that the biomass formerly obtained from venison was now acquired from a combination of venison and domestic animals. Mission Indians did raise European-introduced chickens and pigs (tables 22.70 and 22.71). Deer, pig, and chicken combined to contribute 76 percent of the Fallen Tree biomass in the AMNH sample, well within the range provided by deer during the preceding Woodland and Mississippian periods (table 22.71). Thus, this change may not have represented a dietary hardship. However, to the extent that hunting and venison were important aspects of the social and economic life of the Guale Indian community, the replacement of venison with other meats may have represented a social stress if not an actual nutritional hardship.

As with the pre-Hispanic use of deer, the degree of reliance upon deer by Native Americans during the Spanish mission period is also unusual in coastal areas of Spanish Florida. Work at the mission village associated with Nombre de Dios at St. Augustine and at other mission sites has not shown a significant change in Indian subsistence practices before and after colonization (Reitz, 1990, 1991, 1993, 1995, 1999). Likewise, data from the Kings Bay site and elsewhere suggest that Indian subsistence efforts away from missions were largely unaltered (Reitz, 1995; Smith et al., 1981: 508, 515). In the coastal examples (Nombre de Dios and the Kings Bay site), however, deer were minor components of the pre-Hispanic diet.

Wild resources dominate the collection from Mission Santa Catalina de Guale (tables 22.70 and 22.71). Deer may have contributed over 86 percent of the meat consumed by the friars and/or soldiers stationed there. This amount of venison represents a substantial change in the Spanish diet from that practiced either in Spain or in the Caribbean. The amount of deer estimated for the Mission is much greater than that identified in collections from 16th-century St. Augustine (3% of the individuals) and Santa Elena (4% of the individuals) (Reitz and Scarry, 1985: 68; Scarry and Reitz, 1990). The percentage of fishes estimated in the Mission collection is also substantially lower than in St. Augustine collections, where fishes contributed an estimated 68 percent of the individuals and 24 percent of the biomass. In collections from Santa Elena, fishes may have contributed about 64 percent of the individuals and 33 percent of the biomass. The quantity of wild bird individuals is actually higher than what is found in other Spanish Florida collections, though the biomass contributed by wild birds in the Mission collection is lower (Reitz and Scarry, 1985: 68).

Another important product of the transect survey was that the size of deer on the island declined through time (Purdue and Reitz, 1993). This observation is based on research that first distinguishes between the sexes (Purdue, 1987). Females formed 50 percent of the studied materials and both males and females declined in size. Deer on islands are often dwarfs compared to their mainland counterparts. It is possible that the large size of deer in the St. Simons period reflects the young age of the island itself. When the shell ring was occupied, the island was roughly 400 years old and deer may have had access to the mainland. Over time, deer on the island became increasingly isolated from the mainland. Regional climate change is another possibility because mainland deer also show a decrease in body size. Mainland deer are generally larger than island deer throughout the study period except for the very earliest deposits dating to 3000 B.P. (Purdue, 1980; Purdue and Reitz, 1993). This reduction in deer body size is likely related to both of these phenomena. By the time Spaniards arrived on the island, the individual deer were small and distinct from their mainland relatives.

The heavy use of deer on the island and the decline in body size may indicate that one of the explanations for the reduction in the size of deer is hunting pressure. The relationships between hunting pressure and body size of deer are complex, and data from specific sites are insufficient to examine this possibility in detail. However, 42 percent of the deer individuals from the transect sites are juveniles or subadults. More information about the carrying capacity of the island over the past 4000 years and the ability of deer herds on the island to support a culling effort that included large numbers of young animals would be helpful in further exploring this topic. As the number of deer hunted over time may actually have increased during the Spanish mission period, the assumption must be made that deer were able to support this hunting pressure. It seems likely that the deer population may have experienced reduced adult body size and altered reproductive habits as a response to intense hunting. This, in combination with less favorable post-Pleistocene climate, might have impacted deer populations in other locations such that they did not represent a viable resource base for coastal populations in most locations. It remains to be seen why St. Catherines Island was an exception.

These data do not suggest that there were major differences in the use of animal resources related to locational strata. Finer screen recovery techniques would permit us to see if small fishes were used, while larger samples from each stratum might be helpful in distinguishing among the strata. It seems likely that, for example, different fish species or different size classes of the same species were present in the waters off the southern tip of the island compared to the protected western marshes or the open eastern shoreline. However, it appears that most locations on the island shared equally in all of the island's resources, with locations in the center of the island using more deer than those on the western and eastern margins. Fish (and perhaps turtles) may have been more commonly discarded at sites closer to the western or eastern edges of the island. This distinction may have had more to do with redistribution and discard patterns of deer and fish refuse than with actual diet.

Generally, it was not possible to examine transportation and butchering decisions related to the use of deer carcasses because of the decision to lump data from test sites into strata. However, it is possible to explore this question for the St. Catherines shell ring and for the Spanish occupation. It appears that similar transportation and distribution decisions were made at all three sites. In general, elements from the entire skeleton are represented, suggesting that the entire carcass was returned to each site. Elements from the Foot category may have been left in hides and discarded elsewhere or used as tools such as fishing hooks, especially at the shell ring. There does not appear to be a major difference between the Fallen Tree pueblo and the Spanish Mission compound in elements represented, unless deer heads were specifically given by Native Americans to the Mission.

Vertebrates are not the best seasonal indicators. By and large, throughout the occupation of the island, only animals that are present throughout the year are common. This is characteristic of animal use at many coastal locations, where generalist species are preferred and animals with highly specific seasonal or habitat preferences are ignored. Not many animals are exclusively cold weather markers in this area. In spite of the fact that many vertebrates identified in coastal sites are not markedly seasonal in their behavior, combinations of some vertebrate characteristics may suggest some change in resource use through time. It should be noted that the absence of a seasonal marker can in no way be interpreted as evidence that the site was unoccupied at that time (Reitz and Wing, 2008: 260–266). Too many factors, including simple human choice, might preclude recovery of a seasonal marker from a site that was, nonetheless, occupied during the season for which no evidence is recovered. Seasonal evidence must be positive evidence. As with most research, negative evidence is not helpful.

One of the most common markers of seasonal activity is the condition of deer antlers and age at death. The presence of unshed antlers could indicate a November–February death and might also indicate cool weather activity at the site. Fawns may be born between April and August on the coast. Recovery of elements that fuse before 12–18 months indicates use of juvenile animals, though it is difficult to tell whether the animal died during its 5th–6th month of life in the fall–winter months or during its 10th–12th month of life the following spring. An animal born in August could still be a juvenile the following summer. Unshed antlers might indicate a fall–winter occupation and a juvenile deer might indicate one in spring–summer.

Other coastal animals whose activity is somewhat more seasonal in occurrence are sharks and members of the sea catfish family (Ariidae). While sharks and sea catfishes may be present on inland sites throughout the year, they are both abundant in warm weather and are rare in cold weather.

Table 22.72 indicates the sites from which unshed antlers, sharks, sea catfishes, or juvenile individuals were identified. No site contained all four possible seasonal markers: unshed antler, shark or sea catfish remains, and juvenile deer. However, two pre-Hispanic sites, 9Li19 and 9Li231, contained three of these four markers, as did the Mission (9Li13) and Fallen Tree. Far more common to the sites were sea catfish remains and juvenile deer individuals. In the cases of 9Li171 and 9Li189, the unfused acetabular fragments suggest very young, perhaps newborn individuals. This evidence may indicate late summer/early fall deaths. In the cases of 9Li22, 9Li128, 9Li8, 9Li196, 9Li213, and 9Li214, evidence was provided

TABLE 22.72
**Presence of Unshed Antlers, Sharks, Sea Catfishes, and Juvenile Deer**

| Site | Unshed antler | Sharks | Sea catfishes | Juvenile deer |
|---|---|---|---|---|
| Altamaha | | | | |
| 9Li8 | X | — | X | X |
| 9Li13 | X | — | X | X |
| Irene | | | | |
| 9Li202 | X | — | X | X |
| 9Li84 | — | — | — | X |
| 9Li128 | — | — | — | X |
| 9Li190 | — | — | X | — |
| 9Li192 | — | — | X | X |
| 9Li197 | — | — | X | X |
| 9Li206 | — | — | X | — |
| 9Li207 | — | — | X | — |
| 9Li208 | — | — | X | X |
| 9Li255 | — | — | X | — |
| 9Li213 | — | — | — | X |
| 9Li216 | — | — | X | — |
| 9Li222 | — | — | X | — |
| 9Li226 | — | — | X | — |
| 9Li241 | — | — | X | — |
| 9Li244 | — | — | X | — |
| Savannah | | | | |
| 9Li409 | X | — | X | — |
| 9Li171 | — | — | — | X |
| 9Li189 | — | — | X | X |
| 9Li199 | — | — | X | — |
| St. Catherines | | | | |
| 9Li200 | — | — | — | X |
| 9Li165 | — | — | X | — |
| 9Li214 | — | — | X | X |
| Wilmington | | | | |
| 9Li196 | — | — | X | X |
| 9Li198 | — | — | X | — |
| 9Li201 | — | — | X | — |
| 9Li209 | — | — | X | — |
| 9Li215 | — | — | X | — |
| 9Li220 | — | — | X | — |
| 9Li221 | — | — | X | — |
| Refuge-Deptford | | | | |
| 9Li173 | — | — | X | — |
| 9Li15 | X | — | X | — |
| St. Simons | | | | |
| 9Li231 | — | X | X | X |

by deciduous lower third premolars. Resorption of the jaw around this tooth was observed in New York state animals at 11–12 months and replacement occurred by 20 months (Severinghaus, 1949). Although it is not known at what age resorption and tooth replacement occurs on the Georgia coast, specimens in the Zooarchaeology Laboratory at the University of Georgia show eruption of the adult premolar to be complete around 18 months. All of the archaeological deciduous premolars appear

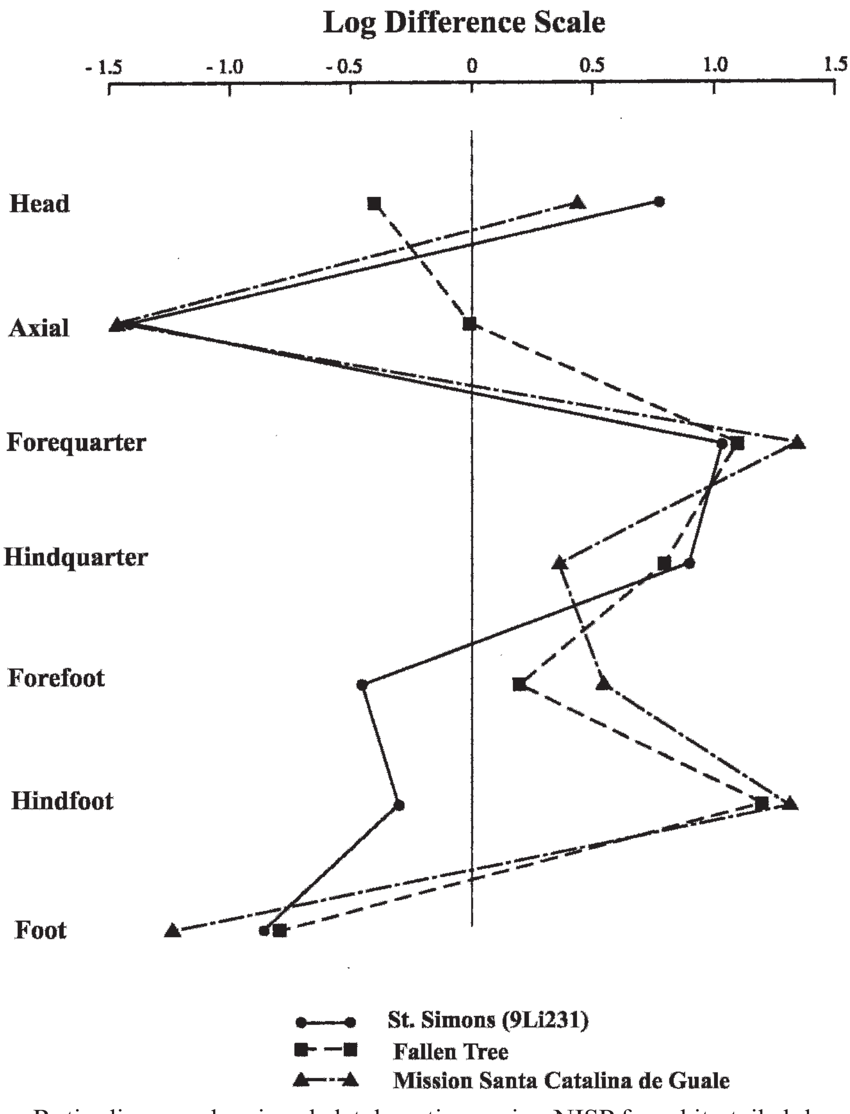


Fig. 22.5. Ratio diagram showing skeletal portions using NISP for white-tailed deer (*Odocoileus virginianus*) from the transect survey on St. Catherines Island. The "standard", undisturbed deer skeleton is represented by the vertical line. Positive values indicate the skeletal portion is more abundant compared to the standard and negative values indicate the skeletal portion is underrepresented.

to be both fully erupted and worn. For these sites, the juvenile individuals may have died well into their first year of life, perhaps late in their second summer or early in their second fall.

These data indicate the ambiguous nature of evidence for seasonality in vertebrate materials from the Georgia coast, especially when the preservational biases against recovery of juvenile specimens is considered (Maltby, 1982). Many sites had animal remains captured during the warm part of the year, though these may have been the remains of fishes consumed at other times. Based on these markers, at least one Refuge-Deptford site, one Savannah site, and one Irene site were occupied during both the cool and warm parts of the year. In a study of increment structures in the cementum of white-tailed deer from this area, Daniel Weinand (1997, 2001) found evidence in the deer teeth that hunting was year-round, although with a noticeable hiatus during the late summer. Given the stable subsistence strategy evidenced by these transect materials, perhaps this is the best evidence we have for pre-Hispanic deer hunting strategies as well.

Vertebrate data are more helpful when combined with invertebrate evidence and chapters 17, 18, and 20 present a wealth of seasonal information regarding the season of capture of hard clams (*Mercenaria* sp.) from sites across St. Catherines Island.

## SOME HYPOTHESES

The primary objective of the transect zooarchaeological study was to develop hypotheses to be tested through further research on St. Catherines Island and elsewhere. The hypotheses that appear to be indicated by these results are as follows:

ARCHAIC PERIOD SUBSISTENCE FOCUSED ON MARINE RESOURCES ALMOST EXCLUSIVELY: During subsequent occupations, use of marine resources was more variable. The same suite of resources was used during all time periods.

AFTER THE ARCHAIC PERIOD, CONTINUITY RATHER THAN CHANGE WAS CHARACTERISTIC OF VERTEBRATE USE ON THE ISLAND: Differences reflecting special site-related activities and histories specific to individual sites was probably more significant than broader temporal or spatial variables. Greater individual variation should be expected among sites within the same time period than between time periods.

OCCUPATION OF THE ISLAND WAS NOT SEASONAL DURING ANY PART OF THE OCCUPATIONAL SEQUENCE: Some sites may be seasonally occupied to target a specific resource, while others were occupied throughout the year.

ACCESS TO THE ISLAND'S VERTEBRATE RESOURCES WAS SHARED BY ALL ON THE ISLAND: Differences in animal use based on locational strata was minimal except at special activity locations.

SPECIAL ACTIVITY SITES WERE PRIMARILY FISHING OR TURTLING STATIONS LOCATED ON THE EXPOSED SOUTHERN AND EASTERN SHORELINES THAT WERE ONLY USED DURING FISHING TRIPS: No sites of this nature were identified in the transect survey samples in this study but they should exist on the island. Subtle, nonquantifiable aspects of the many small samples reviewed here hinted that such sites did exist. Most of the island's resources were accessible from any part of the island, but some spots were undoubtedly better for the capture of specific animals at specific points in time. It is these locations that would have been seasonally occupied. These might be claimed by specific lineages, though this probably cannot be tested using faunal data. It will be necessary to use fine-screen recovery techniques to test this hypothesis. Much of the evidence for seasonal use of fisheries will be provided by finding small individuals of species otherwise present only as large individuals.

DEER WERE SOMEWHAT MORE FREQUENTLY USED AT SITES IN THE CENTER OF THE ISLAND COMPARED TO THE MARSH OR SEAWARD SIDES: Fish, and perhaps turtles, may have been more commonly discarded at sites closer to the western or eastern edges of the island. It is unlikely that deer were often processed at special activity hunt sites.

WILD BIRDS WERE RARELY USED EXCEPT DURING THE SPANISH OCCUPATION

SMALL MAMMALS SUCH AS OPOSSUM, RABBIT, AND ESPECIALLY RACCOON WERE IMPORTANT SECONDARY RESOURCES: Their noctural habits and the ability to capture them with energy-efficient traps made them ideal for this role. Use of these small mammals, all of which are garden raiders, increases through time as an adjunct to an increase either in limited cultivation of small garden crops or of tended wild stands attractive to these animals. Macro- and microbotanical data will be needed to test this hypothesis.

DEER BODY SIZE CHANGED SUBSTANTIALLY OVER TIME WITH LARGER DEER PRESENT IN THE ARCHAIC PERIOD THAN IN SUBSEQUENT ONES: This change was most likely due to an increased use of island deer populations by humans combined with a general post-Pleistocene change in climate and environment.

THE USE OF DEER DECLINED SOMEWHAT IN THE MISSION PERIOD AS DOMESTIC ANIMALS BECAME MORE COMMON: Domestic animals, however, did not supplant the traditional Guale subsistence strategy, and the changes are limited. As is true at other mission sites, there was no massive alteration of traditional subsistence strategies among the Guale.

THERE WAS SUBSTANTIAL CHANGE IN THE USE OF ANIMALS BY SPANIARDS AT SANTA CATALINA DE GUALE AS THEIR DIET CHANGED TO INCLUDE LOCALLY AVAILABLE WILD FOODS, ESPECIALLY DEER AND FISH: Because of the delay in publishing the Island-wide survey data, we can test whether the transect data accurately anticipate tests of some of these hypotheses with additional vertebrate material. In the intervening years, a large quantity of animal material has been studied from Fallen Tree and Santa Catalina de Guale (Dukes, 1993; Reitz and Duncan, 1993; Weinand and Reitz, 1995; Pavao and Reitz, 1998). Additional Irene data also are available (Dukes, 1993; chap. 23, this volume). This information will be published in subsequent volumes; however, it can be briefly summarized here with reference to these hypotheses.

As hypothesized, the Native American Fallen Tree pueblo collection contains only limited quantities of pig and chicken (Dukes, 1993; Weinand and Reitz, 1995; chap. 27, this volume). Four areas of the pueblo have been studied and these show considerable variation on a community-wide level. These differences are attributed to differences in activity areas excavated, differences in subsistence strategy during the pueblo's occupation, differences in social groups' access to these resources, and to changes in the relationship with the adjacent Mission. Guale subsistence was influenced by the Spanish presence only to a limited degree (chap. 32, this volume; tables 22.70 and 22.71). The most marked change is in the use of wild birds, which increases substantially in the pueblo materials. These are not new species of birds, there are simply more of them in the pueblo samples. This could be evidence that Spanish firearms were used to hunt birds.

Further work at Mission Santa Catalina de Guale (Reitz and Duncan, 1993) supports the conclusion that deer and fishes were the primary animals consumed within the compound. Animals of European origin contributed 15 percent of the individuals and 17 percent of the biomass in the samples from the Eastern Plaza Complex of the Mission. Pigs contributed 2 percent of the individuals and 12 percent of the biomass while chickens contributed 13 percent of the individuals and 5 percent of the biomass. This provides additional evidence for the creolization of Spanish foodways rather than maintenance of Spanish traditions on the island. Those Iberian habits had long since been abandoned at St. Augustine and they were not revived on St. Catherines Island.

## SOME LINGERING QUESTIONS

As with any fruitful research, the St. Catherines Island transect survey study raises more questions about human use of the island and about the island itself than it answers. For instance:

- If the subsistence strategy changed between the Archaic and the Woodland, why did that occur?
- Why was Woodland and Mississippian subsistence unchanged for such a long time? During these time periods, why would subsistence on St. Catherines Island periods be so different from that practiced elsewhere?
- Were deer on the island really larger and more abundant than deer elsewhere on the coast? Would this account for the contrast in vertebrate assemblages between St. Catherines Island and other coastal locales?
- Did mission Indians replace deer with domestic animals? Was this a voluntary choice or one forced upon them as they attempted to meet Spanish demands, either for venison or for attendance at daily religious rituals?

Each question is important to consider if we are to understand human use of the coastal setting—not just on St. Catherines Island, but elsewhere as well. Although the Island-wide survey generated hundreds of small, individually inadequate samples from many test sites across St. Catherines Island, taken together, they provide a sound base upon which to direct further studies.

## NOTES

1. Three of the "Savannah" components (9Li169, 9Li189, and 9Li227) are presently considered to belong to the Irene period; the other two "Savannah" components (9Li171 and 9Li230) now correlate with the St. Catherines period.

2. As noted earlier, the five "Savannah" period components discussed here are correlated with the St. Catherines or Irene periods elsewhere in this monograph.

3. As noted previously, vertebrate remains recovered from the American Museum block excavations at Fallen Tree (during the mid-1980s) are discussed in chapter 26.

# CHAPTER 23. ARCHAEOLOGICAL SITES RECORDED IN THE SHORELINE SURVEY

Chester B. DePratter, Greg Paulk, and David Hurst Thomas

This chapter describes 84 additional sites located on St. Catherines Island during DePratter's 1977 shoreline survey, which was conducted in collaboration with James Howard, as part of a large-scale archaeological survey of the entire Georgia coastline (see also DePratter and Howard, 1977, 1980, 1981).

The shoreline survey of St. Catherines Island focused on selected Holocene beach ridge segments and hammocks; all sites encountered were recorded and mapped relative to the coastal geomorphologic features evident locally. DePratter and Howard used this archaeological survey strategy to document rates of deposition and erosion on beach dunes along the margins of the various barrier islands along the Georgia coastline. The oldest archaeological sites are, of course, found on the oldest beaches, and the more recent dunes contain the more recent archaeological sites.

DePratter directed the shoreline survey of St. Catherines Island in March and April 1977, covering the major Holocene exposures of the island. At the time, a crew from the American Museum of Natural History was excavating at the Seaside burial mounds (see chap. 24), and selected crew members accompanied DePratter throughout his survey. In this way, American Museum archaeologists became thoroughly familiar with DePratter's survey and recording methods, and these procedures were adapted to the subsequent systematic American Museum survey (already described in chap. 20).[1]

Table 23.1 lists the characteristics of each site, while figures 23.1 through 23.3 plot their distribution. Table 23.2 provides the sherd counts from DePratter's shoreline survey.

9Li53 (AMNH-304): This site consists of an area of crushed shell extending 6 m along the shoreline. It is located 20 m south of 9Li52, in transect L-6 (see chap. 20). No cultural materials were recovered.

9Li54 (AMNH-305): This site consists of two small shell surface scatters along the southern tip of a Holocene dune ridge. One scatter lies 1 m from the end of the ridge and the second is 19 m to the northeast. No cultural materials were recovered and, as a result, this site was not tested.

9Li56 (AMNH-307): This site is a small area of crushed and whole burnt shell, 3 m long with a maximum thickness of about 30 cm. No cultural materials were encountered.

9Li58 (AMNH-309): This site is a small area of crushed shell, scattered within a 1-m area exposed on the surface of a dissected terminal Holocene ridge. The shell scatter is roughly 6 m north of the end of the ridge, which is flanked by tidal meadows. The vegetation along the ridge consists of scrub oak and cedar, with an understory of saw palmetto and rush grass in the lower dissecting depressions. No cultural materials were recovered, and the shell deposit might be quite recent.

9Li60 (AMNH-311): This site consists of crushed shell on the summit of a small peninsula. Only 70–80 oyster shell fragments were noted, all concentrated within a 2-m area. The shell deposit is situated about 45 m from the southern tip of the peninsula, part of a Holocene dune ridge projecting into the tidal marsh and bordered on the east by a meadow corridor opening to the north into Back Creek–McQueen marshes. The peninsula is comprised of a high dune that runs north–south along the eastern side of the site; the elevation of the dune decreases toward the south and along the northwest.

TABLE 23.1
**Characteristics of the $n = 84$ Sites Recorded during the Shoreline Survey**[a]

| Site | Elevation (m) | Soil type | Major component | Minor component | Geomorphic surface |
|---|---|---|---|---|---|
| 9Li53 | 1.0 | Casper | — | — | Southern Beach Ridge Complex |
| 9Li54 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li60 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li61 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li62 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li63 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li64 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li65 | 1.5 | Fripp-Duckston | Deptford | — | Southern Beach Ridge Complex |
| 9Li66 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li67 | 3.0 | Fripp-Duckston | Irene | — | Southern Beach Ridge Complex |
| 9Li69 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li70 | — | Foxworth | — | — | Southern Beach Ridge Complex |
| 9Li71 | — | Foxworth | — | — | Southern Beach Ridge Complex |
| 9Li72 | — | Foxworth | — | — | Southern Beach Ridge Complex |
| 9Li73 | — | Foxworth | Refuge | — | Southern Beach Ridge Complex |
| 9Li74 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li75 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li76 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li77 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li78 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li79 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li81 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li82 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li83 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li85 | 0.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li86 | 0.5 | Fripp-Duckston | Irene | — | Southern Beach Ridge Complex |
| 9Li88 | 1.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li89 | 1.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li90 | 1.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li92 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li93 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li94 | — | Fripp-Duckston | Altamaha | Irene | Southern Beach Ridge Complex |
| 9Li95 | — | Fripp-Duckston | Recent | — | Southern Beach Ridge Complex |
| 9Li96 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li99 | — | Fripp-Duckston | Irene | — | Southern Beach Ridge Complex |
| 9Li100 | 0.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |

TABLE 23.1
(*Continued*)

| Site | Elevation (m) | Soil type | Major component | Minor component | Geomorphic surface |
|---|---|---|---|---|---|
| 9Li101 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li102 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li103 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li104 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li105 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li106 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li107 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li108 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li109 | 1.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li110 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li111 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li112 | 1.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li113 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li115 | 1.5 | Bohicket-Capers | — | — | Southern Beach Ridge Complex |
| 9Li119 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li120 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li121 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li122 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li125 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li126 | 1.5 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li127 | 3.0 | Fripp-Duckston | Irene | — | Southern Beach Ridge Complex |
| 9Li129 | 2.0 | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li130 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li131 | — | Fripp-Duckston | — | — | Southern Beach Ridge Complex |
| 9Li132 | — | Fripp-Duckston | Irene | — | Southern Beach Ridge Complex |
| 9Li133 | — | Rutledge | Deptford | — | Island Core (western) |
| 9Li135 | — | Fripp-Duckston | — | — | Island Core (western) |
| 9Li136 | — | No map plot | — | — | Island Core (western) |
| 9Li138 | — | Foxworth | St. Simons | Refuge/Deptford/Wilmington | Island Core (eastern) |
| 9Li140 | — | Foxworth | — | — | Island Core (eastern) |
| 9Li141 | — | Foxworth | Irene, Deptford | — | Island Core (eastern) |
| 9Li142 | — | Foxworth | — | — | Southern Beach Ridge Complex |
| 9Li143 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li144 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li146 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li147 | — | Mandarin | Historic | — | Southern Beach Ridge Complex |

TABLE 23.1
*(Continued)*

| Site | Elevation (m) | Soil type | Major component | Minor component | Geomorphic surface |
|---|---|---|---|---|---|
| 9Li148 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li150 | — | Mandarin | Historic | — | Southern Beach Ridge Complex |
| 9Li151 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li152 | — | Mandarin | Irene | — | Southern Beach Ridge Complex |
| 9Li153 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li154 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li155 | — | Mandarin | Irene | — | Southern Beach Ridge Complex |
| 9Li156 | — | Mandarin | Historic | — | Southern Beach Ridge Complex |
| 9Li157 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li158 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li159 | — | Mandarin | — | — | Southern Beach Ridge Complex |
| 9Li161 | — | Mandarin | St. Simons | — | Southern Beach Ridge Complex |

[a] Sites subsequently tested as part of the island-wide transect survey are listed in table 20.1.

The vegetation is oak and cedar, with a saw palmetto understory. No cultural materials were recovered.

9Li61 (AMNH-312): This site, located on the same peninsula as 9Li60, is situated on a dune summit 145 m from the southern tip. The shell deposit measures 10 m × 5 m, and a single grit- and sand-tempered sherd was recovered from the surface, in an exposed sandy area that contained a sparse scatter of oyster and clam shell fragments.

9Li62 (AMNH-313): This small isolated area (1 m in diameter) of crushed shell is 10–15 cm thick. No other shell was located nearby, though 9Li51 is only 25 m away.

9Li63 (AMNH-314): The site lies along the eroding shoreline of a Holocene ridge, and the peninsula widens at this point, with the higher dune ridge due east. The site occupies a lower terracelike ridge with cedar, wax myrtle, and an understory of saw palmetto. This small oyster shell lens, about 10 cm thick, is buried beneath 20–30 cm of sand along the eroding bank. No cultural materials were recovered.

9Li64 (AMNH-315): This site consists of (at least) six different shell middens scattered along the eastern shoreline of a Holocene-age beach ridge. The peninsula is comprised of a high dune running north–south along the western side; it decreases in elevation toward the south and east. The site occupies a lower terracelike area vegetated with mixed oak, hickory, and wax myrtle, with an understory of saw palmetto.

These middens occur along a 60-m area that includes the western shoreline where additional small shell scatters are presumably associated with the middens. The eastern shoreline borders a marsh meadow, and tidal marsh borders the peninsula on the west. Further probing in the dense palmetto stands of the interior might locate more associated middens.

Thirty small, unidentifiable sherds were recovered.

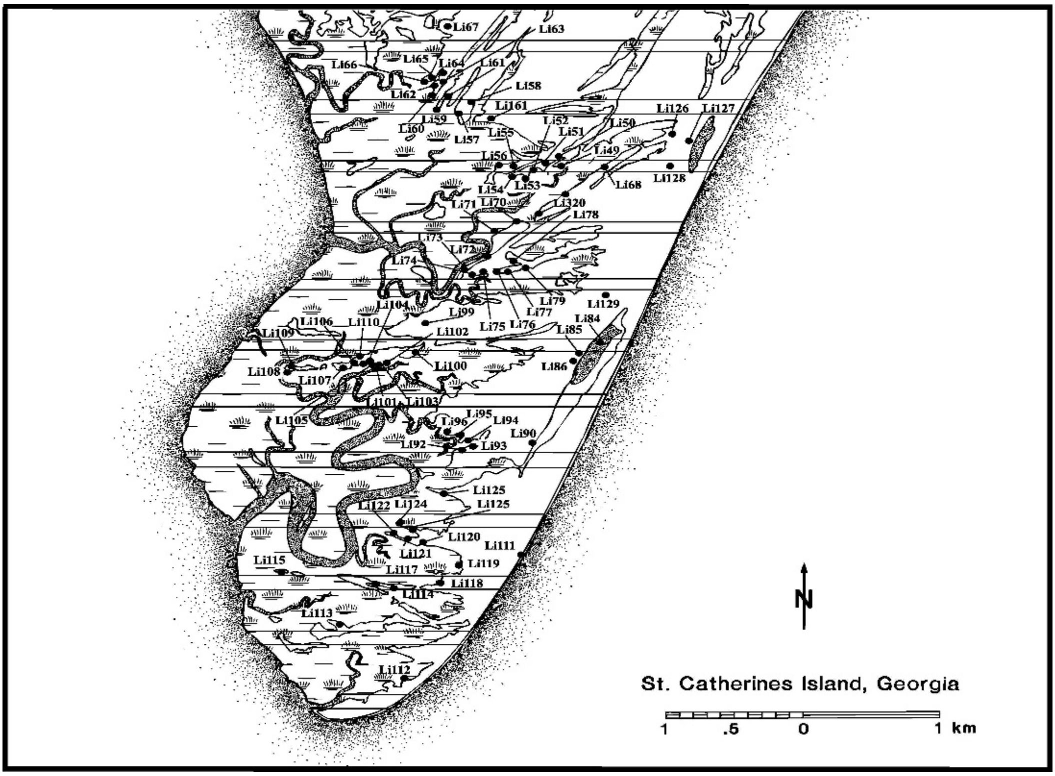


Fig. 23.1. Archaeological sites recorded in the shoreline survey on the southern end of St. Catherines Island.

9Li65 (AMNH-316): 9Li65 is a discontinuous shell midden along the marsh shoreline. The site occupies a low, terracelike dune surface adjoining a higher dune to the immediate west. This point forms the western opening of a narrow marsh meadow. Five distinct surface and buried areas of shell are situated on this Holocene dune. Vegetation is similar to that growing at 9Li64, with the addition

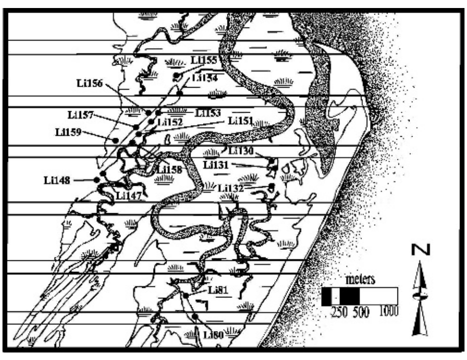


Fig. 23.2. Archaeological sites recorded in the shoreline survey along McQueens Inlet, St. Catherines Island.

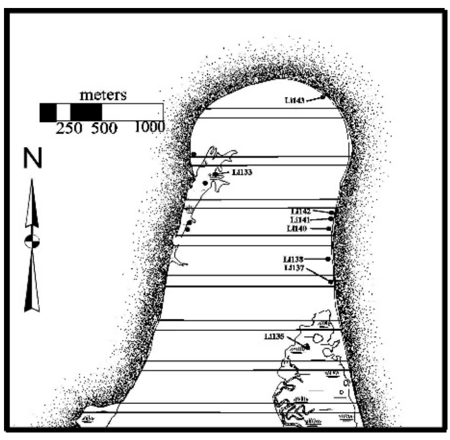


Fig. 23.3. Archaeological sites recorded in the shoreline survey on the northern end of St. Catherines Island.

of cabbage palms and an open, level area covered with grasses.

Five Deptford Check Stamped sherds were recovered, in addition to five sand-tempered sherds.

9Li66 (AMNH-317): This site consists of a generally continuous midden plus three distinct individual midden concentrations. The site is located along the tip of a low peninsula that rises in elevation and forms a dominant Holocene dune ridge occupying the western shoreline; it has been dissected into eastern and western lobes. The eastern lobe contains the blanket midden, which is 10–30 cm thick shell, exposed for 19 m along the eastern and southern shoreline. This lobe is covered with small oak, cedar, yaupon, and saw palmetto. A small embayment of meadow grass separates the two lobes, and the three middens are located on the western extension. Two midden heaps are 5 and 3 m in diameter, and 20 cm thick. The rest of the deposit, about 10 cm thick, is exposed along the shoreline.

A single clay-tempered plain sherd was recovered (as were six unidentifiable small sherds).

9Li67 (AMNH-318): This site is about 100 m in diameter and contains 20–25 individual midden heaps that generally measure 4–6 m in diameter and reach 20–50 cm in height. Site 9Li67 lies just outside of the southeastern boundary of Camel New Ground Field, due west of the northern end of South Beach Road. It occupies a Pleistocene-age promontory, which is surrounded by marsh on three sides and transitional with Holocene terrain to the east. Vegetation includes hickory, bay, cedar, cabbage palm and oak, with an open understory of saw palmetto, grasses, and yucca.

The recovered ceramic assemblage consists of two grit and sand, complicated stamped sherds and one sand-tempered potsherd.

9Li69 (AMNH-320): This site stands on the tip of a peninsula, cut by a tidal creek. Intermittent shell scatter, without discrete concentrations, extends along the northwest edge for about 30 m and also extends inland up to 10 m in places. The site is buried by 20 cm of sand in some areas.

9Li70 (AMNH-321): This small site consists of a very sparse scatter of oyster shell fragments on a 15-m stretch along the northwest margin of a peninsula. No buried shell or cultural materials were located.

9Li71 (AMNH-322): This two-part site occurs on a small hammock in the marsh adjacent to a small creek. One part is a shell concentration that extends 2 m along the edge of the hammock; shell appears to extend 1–2 m inland and may be 20–30 cm thick. The second part is a surface scatter of shell that extends 5–6 m along the edge of the hammock. No cultural materials were encountered.

9Li72 (AMNH-323): This site consists of three small areas that may not actually be associated with one another. The northeastern concentration is 10–15 m long. The second is a small shell scatter only 2 m in diameter. The third concentration consists of a semi-buried shell midden, 1 m in diameter, buried 10 cm below the surface.

9Li73 (AMNH-324): This site covers the northwestern end of a peninsula that stretches along a creek. The site consists of a discontinuous shell midden that extends about 200 m along the northwestern edge of the peninsula. In places, the midden reaches a thickness of between 30 and 50 cm, along a shoreline exposure of 40–50 m. The inland extent varies between 10 and 20 m from the northwestern shoreline, although shell does not appear to extend across the entire peninsula.

Considering the extent of the disturbed shell concentration, the quantity of ceramics is surprisingly sparse. Wilmington materials occur in the southwestern part of the site, while sand-tempered sherds are present in the northwestern segment of the site.

TABLE 23.2

**Ceramics from the Beachline Survey**[a]

| | Li61 | Li64 | Li65 | Li66 | Li67 | Li73 | Li76 | Li86 | Li94 | Li99 | Li108 | Li127 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha Line Block Stamped | — | — | — | — | — | — | — | — | 13 | — | — | — |
| Grit, incised | — | — | — | — | — | — | — | — | — | — | — | 1 |
| Grit-tempered, stamped | — | — | — | — | — | — | — | — | 5 | 1 | — | 1 |
| Grit-tempered, plain | — | — | — | — | — | — | — | 4 | 36 | 1 | — | — |
| Grit-tempered, linear stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit-tempered, check stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit-tempered, burnished exterior | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit and clay, stamped | — | — | — | — | — | — | — | 1 | — | — | — | — |
| Grit and clay | — | — | — | — | — | — | — | — | — | 1 | — | — |
| Grit and sand | 1 | — | — | — | — | — | — | — | — | — | — | — |
| Grit and sand, complicated stamped | — | — | — | — | 2 | — | — | — | — | — | — | — |
| Grit and sand, stamped | — | — | — | — | — | — | — | — | 28 | — | — | — |
| Sand and grit, stamped, reed punctated rim | — | — | — | — | — | — | — | — | 2 | — | — | — |
| Sand-tempered | — | — | 5 | — | 1 | — | — | 1 | — | — | — | — |
| Sand with clay, plain | — | — | — | — | — | — | — | — | — | 2 | — | — |
| Sand and clay | — | — | — | — | — | 4 | — | — | — | — | — | — |
| Sand and clay with grit | — | — | — | — | — | — | — | — | — | — | — | — |
| Clay, plain | — | — | — | 1 | — | — | — | — | — | — | — | — |
| Clay, stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Clay and grit, burnished interior and exterior | — | — | — | — | — | — | — | — | — | — | — | — |
| Wilmington Plain | — | — | — | — | — | — | — | — | — | — | — | — |
| Wilmington Linear Incised | — | — | — | — | — | — | — | — | — | — | — | — |
| Possible St. Johns, shell scraped | — | — | — | — | — | 2 | — | — | — | — | — | — |
| Deptford Check Stamped | — | — | 5 | — | — | — | — | — | — | — | — | — |
| Deptford Check Stamped (?) | — | — | — | — | — | — | — | — | — | — | — | — |
| Deptford Linear Check Stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| St. Simons Plain | — | — | — | — | — | — | — | — | — | — | — | — |
| St. Simons (?) | — | — | — | — | — | — | — | — | — | — | — | — |
| Refuge, misc. | — | — | — | — | — | 8 | — | — | — | — | — | — |
| Small sherds | — | 30 | — | 6 | — | 1 | 1 | 3 | 4 | — | 10 | — |
| Misc. European historic | — | — | — | — | — | — | — | — | — | — | — | — |

TABLE 23.2
(*Continued*)

| | Li129 | Li131 | Li132 | Li133 | Li136 | Li138 | Li140 | Li141 | Li150 | Li152 | Li155 | Li161 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Altamaha Line Block Stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit, incised | — | — | — | — | — | — | — | 1 | — | — | 1 | — |
| Grit-tempered, stamped | — | — | — | — | — | — | — | — | — | 2 | — | — |
| Grit-tempered, plain | — | — | — | — | — | — | — | 6 | — | — | — | — |
| Grit-tempered, linear stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit-tempered, check stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit-tempered, burnished exterior | — | — | 1 | — | — | — | — | — | — | — | — | — |
| Grit and clay, stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit and clay | — | — | — | — | — | — | 5 | 3 | — | — | — | — |
| Grit and sand | — | — | — | — | — | — | — | 1 | — | — | — | — |
| Grit and sand, complicated stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Grit and sand, stamped | — | — | — | — | — | — | — | — | — | — | — | — |
| Sand and grit, stamped, reed punctated rim | — | — | — | — | — | — | — | — | — | — | — | — |
| Sand-tempered | 1 | — | — | — | — | — | — | — | — | — | — | — |
| Sand with clay, plain | — | — | — | — | — | — | — | — | — | — | — | — |
| Sand and clay | — | — | — | — | — | — | — | — | — | — | — | — |
| Sand and clay with grit | — | — | — | — | — | — | — | 2 | — | — | — | — |
| Clay, plain | — | — | — | — | — | 1 | — | — | — | — | — | — |
| Clay, stamped | — | — | — | — | — | — | 7 | — | — | — | — | — |
| Clay and grit, burnished interior and exterior | — | — | — | — | — | — | — | — | — | — | — | — |
| Wilmington Plain | — | — | — | — | — | 3 | — | — | — | — | — | — |
| Wilmington Linear Incised | — | — | — | — | — | 1 | — | — | — | — | — | — |
| Possible St. Johns, shell scraped | — | — | — | — | — | — | — | — | — | — | — | — |
| Deptford Check Stamped | — | — | — | 1 | — | — | — | — | — | — | — | — |
| Deptford Check Stamped (?) | — | — | — | — | — | — | — | 2 | — | — | — | — |
| Deptford Linear Check Stamped | — | — | — | — | — | 2 | — | — | — | — | — | — |
| St. Simons Plain | — | — | — | — | — | 3 | — | — | — | — | — | — |
| St. Simons (?) | — | — | — | — | — | 3 | — | — | — | — | 2 | — |
| Refuge, misc. | — | — | — | — | — | 4 | — | — | — | — | — | — |
| Small sherds | 4 | 5 | — | 6 | — | 12 | 146 | — | — | — | — | — |
| Misc. European historic | — | — | — | — | — | — | — | 27 | 3 | — | — | — |

[a] Sites subsequently tested as part of the Island-wide transect survey are listed on table 20.1.

The ceramic assemblage contains four sand and clay sherds, two possible St. Johns (shell-scraped), and eight Refuge sherds.

9LI74 (AMNH-325): This small shell concentration is approximately 1 m in diameter, and the scatter extends along the adjacent exposed bank. No cultural materials were recovered.

9LI75 (AMNH-326): This small lens of shell (4 m long, 10–20 cm thick, buried 20–30 cm below the surface) is exposed in an eroding profile to the east of 9Li174. No cultural materials were recovered.

9LI76 (AMNH-327): This two-part site is located on the southern tip of the peninsula. One concentration is restricted to a crushed shell scatter, 1 m in diameter. The second concentration is a 2-m-long, 10-cm-thick exposed shell scatter along an eroding bank. A single nondiagnostic sherd was recovered.

9LI77 (AMNH-328): This small shell scatter is 1.5 m in diameter, extends 2.5 m inland from the shoreline, and is buried 15 cm below the surface. It is 25 m east of 9Li76. No cultural materials were recovered.

9LI78 (AMNH-329): Two small shell areas were recovered on top of a dune in the interior of the peninsula. Both were buried 20–30 cm below the surface (one is 8 m in diameter, the other 6 m). No cultural materials were recovered.

9LI79 (AMNH-330): A small shell midden is adjacent to the old, fill-in creek channel along the south side of the peninsula. The shell concentration is just 50 cm in diameter.

9LI81 (AMNH-332): This site consists of two shell deposits located on the northern tip of a peninsula adjacent to the western fork of Cracker Tom Creek. One deposit is a large shell concentration that extends 24 m along the northeastern tip of the peninsula. The shell is exposed along the shoreline and extends inland about 6 m, where it is mostly buried. The second concentration is located on the northwestern shoreline, where it extends 20 m north–south and 4 m inland. The peninsula is dissected and forms an island on which sites 9Li80 and 9Li81 are located. The island-peninsula is probably a remnant of a Holocene ridge that has been reshaped by the meanderings of Cracker Tom Creek. Erosion has claimed the northern end of the hammock. The terrain is generally low and dissected by oxeye corridors. Vegetation is yaupon, oak, cabbage palm, cedar, and palmetto.

No cultural materials were recovered.

9LI82 (AMNH-333): This site is a small oyster shell concentration eroding out of the end of a Holocene ridge peninsula. Fifteen shells were exposed in a 2-m section of the shoreline profile, 10–20 cm below the present surface. No cultural materials were recovered.

9LI83 (AMNH-334): This area of crushed shell, about 1 m in diameter, is eroding from the shoreline of a Holocene ridge at the northern end of a high ridge. Probing indicates only a small amount of additional shell. The site lies about 85 m northwest of 9Li82. Vegetation includes sculptured oak, yaupon, wax myrtle, cabbage palm, with a dense understory of saw palmetto. No cultural materials were recovered.

9LI85 (AMNH-336): This site, a buried oyster shell midden exposed in the bank of a borrow area, lies to the west of Jungle Road and 135 m south of 9Li84. Buried beneath 20–30 cm of sterile sand, the shell extends 3 m along the cut profile and about 3 m inland. Shell is also scattered down the slope on the road, and it is unclear how much of the site was removed for road fill. The site lies atop a Holocene dune ridge vegetated with shrub and palmetto. Flag Pond is 10 m to the east of Jungle Road, and the strip between road and pond is vegetated by wax myrtle and palmetto. The next dune ridge to the west of 9Li85 is vegetated with oak forest.

No cultural materials were recovered.

9Li86 (AMNH-337): This site lies along the western side of Jungle Road, approximately150 m south of 9Li85. Shell deposits extend intermittently for 100 m and to the neighboring Holocene dune ridge to the west. At least 14 distinct middens are present. Flag Pond lies 10 m to the east. The ceramic assemblage includes four grit-tempered (plain) sherds, one grit and clay (stamped) sherd, and one sand-tempered sherd.

9Li88 (AMNH-339): This site, a buried shell midden 6 m in diameter, is located on the western side of Jungle Road and 130 m south of 9Li87. Located on a Holocene dune ridge, 9Li88 is buried 5 m below the surface, with very little shell exposed along the edge of the road. No cultural materials were recovered.

9Li89 (AMNH-340): Situated 40 m south of 9Li88 along the western side of Jungle Road, site 9Li89 is a small shell midden, about 5 m in diameter and buried 5–20 cm below the surface. No cultural materials were recovered.

9Li90 (AMNH-341): This historic site has a partially intact chimney (with several irregular tabby blocks and an iron cross-piece) and a scatter of 19th century glass and ceramics. Approximately 120 m to the south is the short causeway across the creek that drains Flag Pond. Four grit-tempered (one stamped) sherds were recovered.

9Li92 (AMNH-343): This site is located about 100 m northeast of the northernmost point of 9Li91. It extends 8 m along the eroding shoreline and 4–5 m inland. The midden is 10–20 cm thick and buried 10–30 cm below the surface.

9Li93 (AMNH-344): This lens of shell is exposed in the bank profile, about 2 m long and buried 20 cm below the surface. It extends about 1 m inland, with a 1-m-wide surface scatter located 7 m to the northeast.

9Li94 (AMNH-345): This three-part site is located on a peninsula across the creek from 9Li91. One surface scatter lies along the slope of a low ridge and is 4 m in diameter; part of this concentration reaches 30–40 cm in thickness. A second concentration is 3 m in diameter, 25 cm thick, with a surface shell scatter and numerous sherds located immediately to the west. The third area contains a light shell scatter, but a heavy concentration of pottery.

The ceramic assemblage ($n$ = 88) contains 13 Altamaha Line Blocked sherds in addition to an assortment of grit- and grit-and-sand-tempered sherds.

9Li95 (AMNH-346): This site consists of shell that extends 45 m along the south shoreline of a peninsula near the margins of Flag Pond. No concentration of midden could be found, and probing failed to located subsurface midden. Some tarpaper nearby might indicate a very recent age.

9Li96 (AMNH-347): A small area of shell is located on the point of a peninsula to the west of 9Li94. No cultural materials were recovered.

9Li99 (AMNH-350): This large site was found on the inland ridge to the west of 9Li98. It contains perhaps 200 shell heaps and concentrations. Little is exposed because of the dense vegetation and 10–15-cm-deep humus that covers the site. The five recovered sherds show a variety of grit, grit-and-clay, and sand-with-clay tempering.

9Li100 (AMNH-351): Sites 9Li100 through 9Li110 are located on Jones Hammock, an elongated marsh island that has been eroded and contained by the upper reaches of Brunsen Creek. The hammock is a portion of a recurved Holocene age spit and was previously connected to the southern face of the larger peninsula known as Jones Oaks. The site is a thin lens of shell (5–10 cm thick), buried 20–40 cm below the present surface; it extends only 2–3 m inland and 10 m along the shoreline, about 100 m from the eastern tip of the hammock.

No cultural materials were recovered.

9Li101 (AMNH-352): This site is located on Jones Hammock and runs 180 m along the southern shoreline that was eroded by a tributary of Brunsen Creek. The shell deposits are not continuous, but rather occur intermittently in exposed concentrations and surface scatters. The shell is concentrated along the shoreline and extends inland only 2–3 m. The western end of the shell deposit and shoreline is interrupted by a dune meadow slough that runs to the east.

No cultural materials were recovered.

9Li102 (AMNH-353): This site is a partially buried midden area about 10 m in diameter. The shell deposit is located on the northern edge of a former slough that runs behind 9Li101 (and may be associated with this larger site). No cultural materials were recovered.

9Li103 (AMNH-354): This small shell midden is about 6 m in diameter and is exposed on the surface of the southern shoreline of Jones Hammock. The site is located along the northern entrance to the meadow slough, 40 m from the end of 9Li101. Site 9Li103 is 110 m from 9Li102 and 33 m from 9Li104. No cultural materials were recovered.

9Li104 (AMNH-355): This 4-m-long shell scatter is exposed along the southern shoreline of Jones Hammock, roughly 33 m west of 9Li103. The deposit is 5–10 cm and 20–30 cm below the surface. No cultural materials were recovered.

9Li105 (AMNH-356): This elongated shell midden, 25 m long × 6 m wide, is located inland from the southern shoreline of Jones Hammock. The deposit is buried 10–20 cm below the surface, situated between 9Li104 and 9Li106. No cultural materials were recovered.

9Li106 (AMNH-357): This shoreline site stretches 40 m along the southern side of Jones Hammock. The deposits occur as both concentrated middens and thin shell scatters, and stretch 2–6 m inland. The middens are 20–30 cm thick, with portions buried 10–30 cm below the present surface. An isolated 1-m-wide shell concentration, located 30 m to the west, is also included in 9Li106. No cultural materials were recovered.

9Li107 (AMNH-358): This shoreline site consists of a 112-m-long shell deposit exposed along the southern side of Jones Hammock. Intermittent shell deposits occur in scatters and midden concentrations, all extending only 1–2 m inland. The western end of the site is 80 m from the end of the main body of the hammock. No cultural materials were recovered.

9Li108 (AMNH-359): Sites 9Li108 and 9Li109 are both located on the western end of a narrow segment of Jones Hammock that is separated from the main body by creek and tidal erosion. This site consists of a very thin shell scatter at the western end of the hammock, spread across an area 40 m × 6–8 m wide. Ten small, unidentifiable sherds were recovered.

9Li09 (AMNH-360): This surface shell scatter, only 5 m in diameter, is located on the dissected northwestern end of the western segment of Jones Hammock. It is probably associated with the 9Li108 scatter. No cultural materials were recovered.

9Li110 (AMNH-361): This exposed shell midden, 2 m in diameter, is located along the northern shoreline of the main body of Jones hammock, directly across the interior from the eastern end of 9Li106. No cultural materials were recovered.

9Li111 (AMNH-362): Shell from this site was eroding from a bank adjoining the beach, 1/2–3/4 miles south of Beach Road. The shell deposit is 2 m long, 10–15 cm thick, and buried 20–30 cm below the surface; it extends less than 1 m inland. Since this site was recorded in 1977, the entire dune ridge that contained 9Li111 has eroded away. No cultural materials were recovered.

9Li112 (AMNH-363): This small midden extends along a 5-m exposure in the bank of an "island" comprised of a series of Holocene dune ridges. The deposit was 5 cm thick, buried 0–15 cm below the surface. It was since eroded or buried by washover sediments, and none of its original integrity remains. No cultural materials were recovered.

9Li113 (AMNH-364): This site consists of two shell concentrations buried on Holocene deposits, 15 m inland from the shoreline. The first is 2–3 m in diameter, 30 cm below the surface, and 10–20 cm thick. The second is 10–15 m in diameter and 20–30 cm below the surface, positioned some 15 m southeast of the first deposit. This Holocene dune ridge runs east–west to the beach. This spit is recorded as Beacon Drive Strip on the 1929 Keys map. Vegetation is oak and cabbage palm, with an understory of saw palmetto and grasses. The shoreline is spotted with cedars and fringed with rush and rack.

No cultural materials were recovered.

9Li115 (AMNH-366): This site is located on the western end of a remnant ridge just to the southeast of the major bend in Brunsen Creek. The dissected east–west ridge remnant appears as twin hammocks, and in 1977 was being eroded on all exposures. Todd Creek floods and drains the tidal marsh to the south. The upland vegetation includes small oak, cedar, cabbage palm, and yaupon, with an understory of patchy saw palmetto, yucca, and large prickly pear.

The site begins 22 m east of the western tip of the hammock and continues for 48 m. Most of this large shell midden is buried, but several concentrations are exposed on the surface and along the eroding southern shoreline. Despite the large exposure, no ceramics were found on the surface.

9Li119 (AMNH-370): This small shell midden (2 m in diameter) occurs along the lower slope of a Holocene dune ridge that runs east–west. A large marsh meadow embayment borders the site to the south and is partitioned into smaller coves by many small ridges and/or ridge fragments. No cultural materials were recovered.

9Li120 (AMNH-371): Probing indicates that this partially buried shell deposit is 11 m long, 6–8 m wide, and 10–15 cm below the surface. The site is located on the southern exposure of a Holocene ridge that is vegetated with live oak, cabbage palm, yaupon, and a dense understory of saw palmetto. Marsh embayments lie north and south of the ridge, which is fringed along the shoreline by a wide band of rush and oxeye. No cultural materials were recovered.

9Li121 (AMNH-372): This shell scatter is 5 m in diameter, with small amounts of shell buried beneath the surface. The site is located along the southern shoreline of the south ridge system, vegetated with oak, cedar, cabbage palm, and a dense understory of saw palmetto. A major tributary of Brunsen Creek floods and drains the large marsh abayment south of the peninsula, and a marsh meadow occupies the area between the north and south forks. No cultural materials were recovered.

9Li122 (AMNH-373): This site is 33 m long and 2–3 m wide, with the surface shell most heavily concentrated along the southern margin of the peninsula. Probing indicates that inland deposits are buried 10–30 cm below the surface. The site is located at the western terminus of the south work of the peninsula recorded as the South Brunsen Strip. The peninsula is part of a Holocene ridge system, dissected at its western end. A major tributary of Brunsen Creek lies 12 m south of the dissected ridge and is slowly claiming the shoreline. No cultural materials were recovered.

9Li125 (AMNH-376): This buried shell midden has been exposed by erosion along the southern shoreline of a peninsula. The exposed shell measures 12 m along the shoreline, probably indicating that the shell extends 2–3 m inland, is 10–25 cm thick, and is buried 20–30 cm below the surface. Marsh embayments lie north and south of the ridge where meadow and tidal marsh are flooded and drained by small tributaries of Brunsen Creek. No cultural materials were recovered.

9Li126 (AMNH-377): This disturbed shell scatter is located on the south side of Beach Road, about 500 m west of South Beach. The deposit appears as an area of concentrated shell, 20 m in diameter. Shell is also scattered 20–30 m along the road due to road fill borrowing. No cultural materials were recovered.

9Li127 (AMNH-378): This site is located on the northern side of the South Beach Road, at the intersection of Beach Pond. It is a shell concentration 7 m in diameter, and a borrow pit profile suggests a thickness of 20–30 cm. The site includes a small scatter of shell on the slope of a dune south of the road, indicating that the site remains in situ (rather than being hauled in for road fill). Part of this site was probably removed for use in causeway construction along Beach Pond. Two grit-tempered sherds (one incised, the other stamped) were recovered.

9Li129 (AMNH-380): This site lies northwest of Flag Pond on the eastern side and scattered on the surface of Jungle Road. The open scrub habitat consists of mixed wax myrtle, cabbage palm, saw palmetto, and grasses. The shell concentration, exposed in the side of a barrow pit, measures 10 m long × 1–3 m wide, with a thickness of 10–15 cm. The shell deposit and associated barrow pit are located on a Holocene dune slope on the east side of the road. The roadbed is shell covered for a length of 23 m, although probing indicates that no buried shell deposit is present and we therefore assume that the scatter is associated with the disturbed midden to the north. One sand-tempered and four unidentifiable sherds were recovered.

9Li130 (AMNH-381): This site is a shell midden strip along the northwest shoreline of a small island. It begins 18 m southwest of the northern tip of the island and extends 16 m along the edge of the marsh, extending 2–5 m inland. The densest concentration of shell midden reaches 10–20 cm in thickness. No cultural materials were located.

9Li131 (AMNH-382): This site consists of two concentrations. The first is 8 m long shell, 5–6 m wide, and possibly reaches a depth of 30–40 cm deep in places. The second locus is an area of mostly buried shell, about 15 m in diameter. Some shell was noted between the two areas. All of the inland shell heaps in 9Li131 might be connected. Five small, unidentifiable sherds were recovered.

9Li132 (AMNH-383): This site covers the entire small island and measures roughly 80 m north–south × 40 m east–west. Shell was present along most of the shoreline, but the heaviest shell concentration extends along the southern end of the island. The eastern 40 m of the entire southern shoreline has exposed shell midden, 20–40 cm thick. In some areas, the shell is composed entirely of *Mercenaria.* A single grit-tempered (burnished exterior) sherd was recovered.

9Li133 (AMNH-384): This site is located on a small peninsula at the north end of St. Catherines Island, near a small tributary of Walburg Creek. A heavy shell concentration (30–40 cm thick) extends in 12 m exposure to both margins of the shoreline. One Deptford Check Stamped sherd and six small, unidentifiable ceramic fragments were recovered.

9Li135 (AMNH-386): This scatter of shell extends 30–40 m along the northern margin of a marsh island. A small concentration also extends along the northwestern margins. No cultural materials were recovered.

9Li136 (AMNH-112): This site occurs on a low ridge of sand near the center of an island to the northeast of 9Li135. In 1977, DePratter found a tagged pine tree indicating that we previously recorded this site as AMNH-112. The site contained only small, unidentifiable sherds.

9Li138 (AMNH-387): This shoreline "site" consists of scattered sherds along the bluff, without associated shells. The sherd scatter occurs in several discrete areas, across a distance of nearly 500 m along the eroding bluff. The ceramic assemblage ($n = 28$) contains six St. Simons, four Refuge, two Deptford Linear Check Stamped, and four Wilmington sherds.

9Li140 (AMNH-200 Upper): Site 9Li140 is located in a sand blowout about 75 m north of the road. Composed of a sherd concentration approximately 17 m in diameter, we first recorded this site in 1975. The ceramic assemblage ($n = 158$) contains grit-and-clay and clay (stamped) sherds.

9Li141 (AMNH-388): This site is located in a sand blowout approximately 20 m long. The materials appear to be originating from an area slightly lower (perhaps 1 m) from the present surface. Several chert flakes were encountered with a ceramic assemblage ($n = 42$) that contains two Deptford Check Stamped and several grit-tempered sherds.

9Li142 (AMNH-389): This blowout is 30 m north of 9Li141. It consists of a scatter on the slope, weathering out of a small shell lens in the bluff, approximately 30 cm across. No cultural materials were recovered.

9Li143 (AMNH-399): This site extends about 100 m across the southeastern shoreline of the peninsula. The concentrated shell occurs at the southern end of the site. No cultural materials were recovered.

9Li144 (AMNH-400): This site consists of two loci. The first consists of crushed shell across an area 5 m long, 5 m wide, and roughly 3–4 m from the shoreline. A midden was also found in the adjacent shoreline (5–6 m long, extending 2 m inland) with no shell in between the two areas. The second loci is 15 m to the north, a shell concentration about 5 m in diameter that extends into the marsh. No cultural materials were recovered.

9Li146 (AMNH-391): This small surface scatter of shell, 1 m in diameter, is located on the northeastern corner of a small point, without subsurface evidence. No cultural materials were recovered.

9Li147 (AMNH-392): This area of shell is located around the pilings of the standing boathouse and dock. The shell was mostly crushed and in the causeway. The shell concentration covers an area 22 m long × 10 m wide, and probably results from the late 19th/early 20th century oyster boiler set up and used here. No ceramics were recovered, and 9Li147 probably dates to the historic period (although precontact deposits could be buried underneath).

9Li148 (AMNH-393): This small site is eroding from the bank along an 8-m extension that is 10–20 cm thick and 20–30 cm below the modern surface. It extends 2–3 m inland. Another small buried shell concentration was recorded 20 m to the north and measures 2 m in diameter and 10–20 cm thick. No cultural materials were recovered.

9Li150 (AMNH-395): This small concentration of broken shell was recorded on a small point of land. It extends 2 m along the shoreline and does not extend inland. Twenty-two meters north of this area is another surface shell scatter that extends 4–5 m. The ceramic assemblage consists of mostly 19th century wares in addition to three small, unidentifiable aboriginal sherds.

9Li151 (AMNH-396): This area of whole and crushed shell extends about 6 m along the cut bank, but does not extend inland. No cultural materials were recovered.

9Li152 (AMNH-397): Site 9Li152 extends 20 m around a point, with a maximum inland extension of 6 m (less along the site margins). The shell visible in the bank is 10–20 cm thick. Much shell has eroded into the marsh. Two grit-tempered, stamped sherds were recovered.

9Li153 (AMNH-398): This shell scatter occurs 6–7 m along the shoreline, without distinct concentrations. Part of the shell deposit is buried and extends 2–3 m inland. No cultural materials were recovered.

9Li154 (AMNH-399): This site consists of several small shell concentrations, extending along the shoreline for more than 35 m and extending inland for 1–2 m. No cultural materials were recovered.

9Li155 (AMNH-402): This site occupies an entire island that is composed of two dune segments. The southwestern tip of the island is comprised of a solid shell peninsula, 30–50 cm thick, with plenty of exposed shell but little pottery. The rest of the island is covered with sporadic shell scatter. Only occasionally are shell concentrations exposed along the shoreline. Considerable shell (including mussel) has eroded into the marsh from the southwest peninsula.

A single grit-tempered, incised sherd was found fully exposed on the surface at the heaviest shell concentration; this sherd may not date the main occupation of the site.

9Li156 (AMNH-403): This site consists of two loci. The first small shell scatter, 6 m long and a couple of meters wide, occurs along the northwestern shoreline of the peninsula and is directly opposite 9Li152. No buried shell or associated cultural materials were located.

A second shell concentration, 3 m in diameter, is located 22 m to the southwest. Some recent glass was found nearby.

9Li157 (AMNH-404): This two-part site was found along the northwestern shoreline of the main peninsula. The first area is a scatter about 4 m long that extends 1–2 m inland. The second part, 24 m to the southwest, occurs 10 m along the shoreline and extends 1–2 m. No cultural materials were recovered.

9Li158 (AMNH-405): This area of crushed shell occurs on a small dune ridge, measuring 6 m long and 2–3 m wide. No cultural materials were recovered.

9Li159 (AMNH-406): This shell concentration, less than 1 m in diameter and 10 m thick, is 75 m to the south of 9Li158. No cultural materials were recovered.

9Li161 (AMNH-408): This site occupies the southern slope of a Holocene dune that extends 125 m along South Beach Road and runs the entire length of the site. The site is 5–15 m wide and occurs on both sides of the road. Shell is buried 10–30 cm below ground surface. Two St. Simons sherds were recovered.

## NOTE

1. DePratter located several sites that also fell into the subsequent AMNH transect survey; these sites have already been described in chapter 20.

# CHAPTER 24. THE MORTUARY ARCHAEOLOGY OF ST. CATHERINES ISLAND

David Hurst Thomas

Setting aside the various cemeteries from the plantation period and later, we now know the exact location of 13 aboriginal burials mounds, one isolated precontact midden burial, and the Spanish-period cemetery at Mission Santa Catalina de Guale. We can also estimate the location of four additional mounds (all of them excavated by C.B. Moore in the late 19th century); although we cannot pinpoint the precise location of these mortuary facilities, it is possible to estimate their whereabouts within a few hundred meters. Additional mortuary sites on St. Catherines Island have undoubtedly disappeared altogether (and, we hope, a few may still await discovery).

This chapter begins with a review of the bioarchaeological record, with emphasis placed on defining the spatial and temporal distribution of mortuary behavior on St. Catherines Island. Toward the end of the chapter, we discuss the various bioarchaeological techniques that Larsen and his colleagues employed on the St. Catherines Island remains, with special attention paid to assumptions and implications. This methodologically oriented discussion is important because it situates the period-by-period synthesis in chapter 32.

We must note that the discussion to follow changes, in some respects, previously published descriptions and analyses of our own excavations. This is especially true with respect to the "Refuge-Deptford Mortuary Complex" (Thomas and Larsen, 1979) and "the St. Catherines Phase Mortuary Complex" (Larsen and Thomas, 1982). In both studies, we made the (unwarranted) assumption that $^{14}C$ determinations on marine and terrestrial samples were directly comparable. We now understand that this assumption was incorrect, and we have gone to lengths in chapter 13 to develop protocols that address the reservoir effects involved in dating marine samples. Because these new protocols modify the previously published $^{14}C$ dates, it is necessary to reevaluate our previous results.

## MOUNDS ON THE NORTH END

### Marys Mound (9Li20; AMNH-108)

Marys Mound is a low, circular mound that today is located in the large open field ("North Pasture") on the north end of St. Catherines Island (between AMNH transects B-1 and C-6). This area was logged between 1938 and 1943 and cleared in the early 1950s by bulldozing and repeated burning to create a permanent grazing area for cattle. The modern vegetation is mostly longleaf and slash pine, with a grass cover of Bermuda, spangle grass, and purple broomsage.

The mound is named by local tradition, which suggests it served as the burial site of Mary Musgrove, an important figure in the early history of the Georgia colony (Todd, 1981; see also Thomas et al., 1978: 213–218). Mary Musgrove and her husband, the Rev. Thomas Bosomworth, lived on St. Catherines Island in the 1760s; however the exact location of Mary's burial remains unknown. In 1784, Capt. Hugh McCall wrote that Thomas Bosomworth "took possession of, and resided on St. Catherines Island, where Mary died sometime after, and he married his chambermaid. Finally, the remains of this trio were deposited in the same graveyard on this island, for which they had so long contended" (McCall, 1811–1816: 165). White's *History of Georgia* notes only that "tradition designated the spot where the Bosomworths were buried" (1854: 22). When C. B. Moore worked on St. Catherines Island (in 1897), he remarked on "a somewhat larger [mound] which, being a valued land mark, we did not touch" (Moore 1897: 89), located somewhere on the north end of the island.

We believe that Moore's "valued land mark" is Marys Mound. The site has been intermittently explored by treasure hunters, and we obtained two whole vessels (a St. Catherines Burnished Plain jar and a Savannah Cord Marked bowl) said to have been recovered from Marys Mound sometime in the 1930s (Larsen and Thomas, 1982: 288).

The University of Georgia began fieldwork at Marys Mound in 1970, excavating a 10 foot × 60 foot trench along the east–west axis of the mound. They subsequently dug another trench along the north–south axis, that measured approximately 10 feet × 20 feet. A brief preliminary report was prepared (Caldwell, 1970) to supplement the available field notes and sketches. We excavated at Marys Mound during May 1977 and May 1978, and we opened a series of contiguous 2 × 2 m units.

Based on a synthesis of all available evidence, we believe that Marys Mound was constructed in three stages (after Larsen and Thomas, 1982: 276–281). On the premound surface, we recovered a few sherds from the Refuge and Deptford periods. A single $^{14}$C date was processed on charcoal from within the primary humus:

(UGA-1687, charcoal): 1250 ± 70 B.P.
cal A.D. 660–960

Sometime later, a large, pentagonal, log-lined pit was excavated through the primary humus. The floor of this premound pit was paved with sherds from four reconstructable pots: a St. Catherines Cord Marked jar, a Savannah Fine Cord Marked bowl, a large St. Johns Plain vessel, and a small Sarasota Incised jar. St. Catherines and Savannah series are commonly found on St. Catherines Island, but the other two vessels, tempered with diatomaceous earth, were imported from Florida. The ceramics from this premound pit suggest that mound construction began at a time when both Savannah and St. Catherines ceramics were in use. Referring to the previous discussion of the St. Catherines Island chronology, we can suggest a date of cal A.D. 1000–1300 (the period of overlap between $^{14}$C dates associated with both St. Catherines and Savannah ceramics).

Although the pentagonal pit contained no human remains, an adjacent pit contained four interments: Burial 1 (a female, age 35–39), Burial 2 (a preadult, age about 13 years), Burial 3 (a child, age about 4 years), and Burial 4 (remains unavailable for study). A weakly developed humus zone indicates that some time elapsed before the mound was constructed (fig 24.2).

Subsequently, a large shell feature apparently borrowed from a nearby shell midden (Stratum IIIa) was laid across the premound pits. George R. Clark II determined that hard clams contained therein were harvested in the "late fall" and "late spring" (in Larsen and Thomas, 1982: 338–339). A total of 127 sherds were recovered from the shell feature: 28 percent of the diagnostics dated to the Savannah period, 40 percent belong to the St. Catherines period, and 31 percent are St. Johns ceramics. No human remains were placed within this feature, though Burials 5 (an adult female) and 6 (a child, age 2 years with cut marks on the cranium) were placed on top of the shell deposit.

A single radiocarbon date was processed from this shell feature:

(UGA-1685, *Crassostrea*): 1090 ± 60 B.P.
cal A.D. 1160–1400

Both the premound pit and the overlying shell feature contain both Savannah and St. Catherines ceramics; radiocarbon date UGA-1685 confirms that this shell was collected during the St. Catherines period.

A circular sand mound was then constructed over these features. The mound fill contained only 15 potsherds, ranging in age between the Refuge and St. Catherines periods.

In our previous discussion (Larsen and Thomas, 1982: 273), we concluded that Marys Mound was constructed "during the terminal phase of the St. Catherines period, probably during the late twelfth or early thirteenth century A.D." After recalibrating the available $^{14}$C dates with the protocols discussed in chapter 13, we still agree with this conclusion. Whereas we have found evidence that the geomorphic surface beneath Marys Mound was utilized during the Refuge-Deptford and Wilmington (and perhaps St. Catherines) periods, we conclude that the premound mortuary activities and subsequent mound-building episode took place entirely during the St. Catherines period (at a time when Savannah ceramics were also being utilized). We found no evidence of subsequent usage of Marys Mound.

### Moore's "Low Mounds at the North-end"

C. B. Moore excavated two low, previously undisturbed mounds, about 50 yards apart "in pine woods, about 1 mile in an easterly direction from the main landing" (1897: 89). These sites have not been assigned State of Georgia numbers, and the location of these two mound sites is presently unknown.

By all accounts, the "main landing" in the 1890s was in the same place as today, near the large bend in Walburg Creek on the northwestern margin of St. Catherines Island. Larson (1998: 38) suggests that Moore's North-end mounds were likely located on the east side of the Island, probably in the Seaside area (see below) overlooking the marsh and headwater of the tidal creek that cuts across the beach and empties into the ocean at Black Hammock.

While this could certainly be true, we think Moore (1897: 89) provided another useful clue, writing about the third "valued" mound, noted above. We believe that this third mound was Marys Mound, which, in the view of many locals, was the final resting place of Mary Musgrove. While subsequent excavations have not supported this suggestion, such strongly held beliefs could certainly have convinced C. B. Moore to leave the "valued land mark" untouched.

If this supposition is true, then Moore's "Low Mounds at the North-end" must have been located in North Pasture, roughly 500 m inland from the modern shoreline. We have plotted both options on figure 24.1.

Regardless of the specific location, we know that in the smaller mound (measuring 35 cm high and 11 m in diameter), Moore found a "few fragments of decaying human cranium" (Moore, 1897: 89). His exploration of the larger mound (measuring 13 m in diameter and 0.9 m high) "was without result" (Moore, 1897: 89). Although we agree with Larson (1998: Appendix) that no reliable estimate of cultural affiliation is possible, the similarities of the mounds to the Seaside and Cunningham groups lead us to suggest that, perhaps, the two North-end mounds date to the Refuge-Deptford (or perhaps Wilmington) periods.

## THE SEASIDE MOUND GROUP

### Seaside Mound I (9Li26; AMNH-107)

Two burial mounds are located along the eastern margin of Seaside field, overlooking the extensive salt marsh fringed by Black Hammock.

The University of Georgia excavated approximately 40 $m^3$ of fill at Seaside I in August 1970. According to Smith (1970), Seaside I was 55–60 feet in diameter when encountered in 1970 and the mound was surrounded by the faint impression of a borrow pit. University of Georgia field notes also mention a depression in the top of the mound, indicating that Seaside I was previously trenched. In his summary of Seaside Mound I (to AMNH), Caldwell (1970) defined a new phase he termed Deptford I, with a date of about 300 B.C., noting that "this is the earliest occurrence of a burial mound on the Georgia Coast."

We returned to this site in January 1977 and excavated an additional 64 $m^3$ (fig. 24.3. Both excavations were described in Thomas and Larsen (1979: 84–99).

Mortuary activities began at Seaside I when several premound pits were dug into the primary humus (which were burned, perhaps deliberately). A single grave pit contained Burial 3 (a bundle, head to the west) and Burial 4, plus an infant burial (not assigned a number); none of these remains were available for bioarchaeological study. A nearby premound pit contained three supine interments: Burial 6 (adult), Burials 6–7 (at least two adults, one male, and one subadult). Burial 10 (an adult male) was found extended in a elongated pit. Burial 14 (adult male) was found

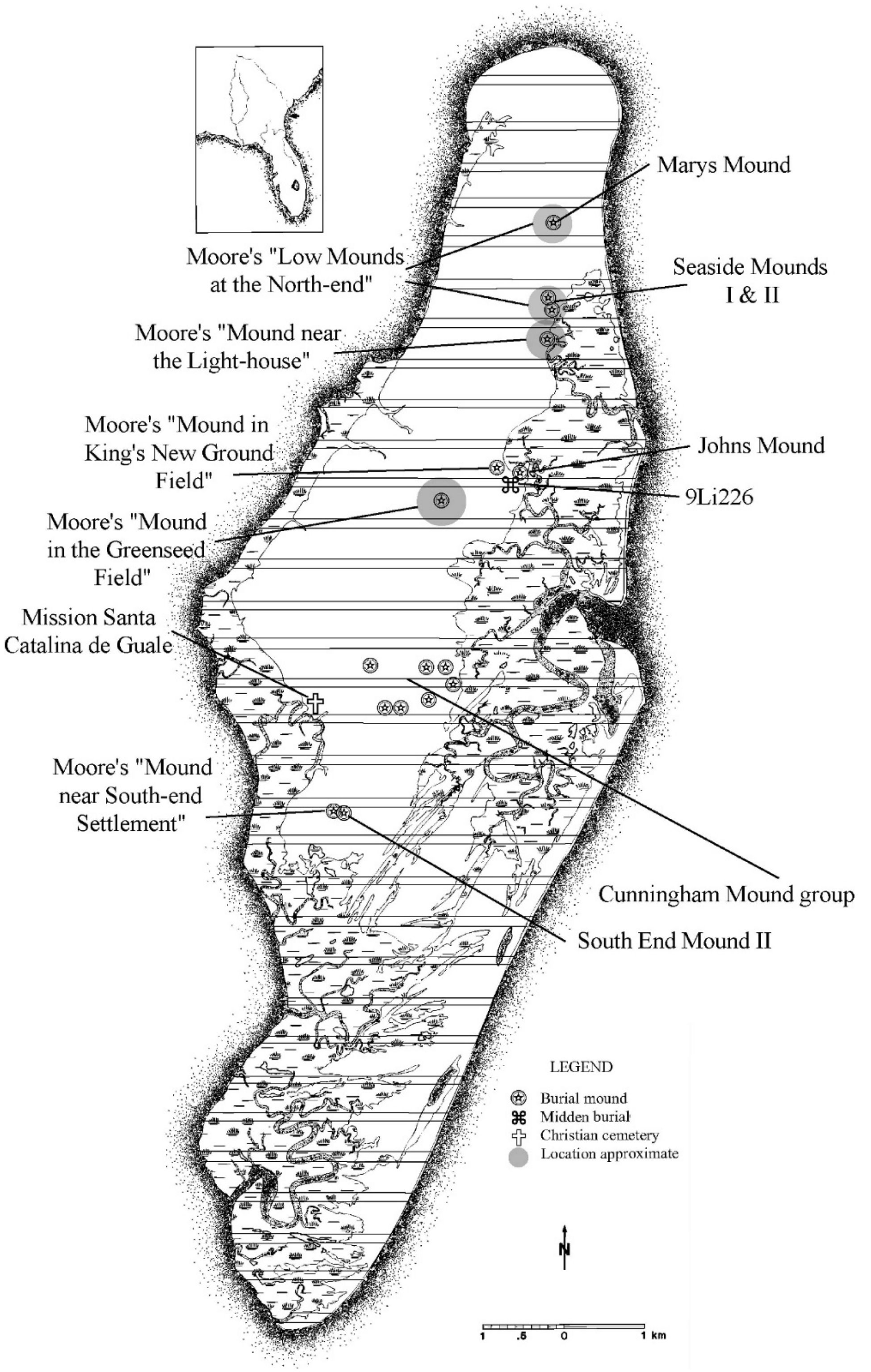


Fig. 24.1. The location of known aboriginal mortuary sites on St. Catherines Island.

Fig. 24.2. The master profile of Marys Mound, as it appeared during the American Museum of Natural History excavations in May 1978. The break in the Shell Lens (Stratum IIIa) reflects earlier explorations by the University of Georgia.

supine in a log-lined pit. Burial 15 consisted of a crania from one subadult and one adult).

Several nonburial pits were also found on the premound surface at Seaside I, including Feature 5, a small platform with at least four postholes and sand steps on the east end. Two $^{14}$C dates were processed on oyster shell from Feature 2, a pit dug through the primary humus:

(UGA-SC3, *Crassostrea*): 2740 ± 220 B.P.
cal 1210–120 B.C.
(UGA-104, *Crassostrea*) 2220 ± 100 B.P.
cal 780–260 B.C.

Although these dates differ significantly from one another, both fall into the range of the Refuge-Deptford period.

A sand mound was then erected over these features, and a weakly developed secondary humus developed. Several intrusive pits were then excavated into the mound fill of Seaside I, with four intrusive burials (all adults) added. The most significant of these was Feature 3 (a large pit containing Burial 5), which was covered by several parallel logs; a ramp apparently encircled the southern end of the logs. Charcoal from one log has been $^{14}$C dated to:

(UGA-112, charcoal): 1430 ± 115 B.P.
cal A.D. 400–880

UGA-112 dates to the middle of the Wilmington period.

The University of Georgia encountered a large, postmound midden concentration containing Wilmington period ceramics (Feature 15) along the southern margin of Seaside I. Remains of an adult (Burial 5) were contained within the midden, and associated oyster shell midden was $^{14}$C dated:

(UGA-1826, *Crassostrea*): 1240 ± 60 B.P.
cal A.D. 510–770

This radiocarbon date places Feature 15 in the middle of the Wilmington period.

Fig. 24.3. Seaside Mound I during excavations in January 1977 (facing to the northeast).

Excluding the Feature 15 ceramics, the Seaside I ceramic assemblage consists of 180 sherds, virtually all of the sherds spanning the Refuge I-Deptford II interval. We conclude that Seaside Mound I was constructed and utilized exclusively during the Refuge-Deptford periods. A postmound, Wilmington-age shell midden on the southern margin of Seaside I contained an adult burial; this assessment agrees with previous estimates (Thomas and Larsen, 1979: 84–99).

### Seaside Mound II (9Li62; AMNH-106)

While working at Seaside I, we conducted an informal survey of the surrounding area, mapping several shell middens and discovering a second mound 130 m to the southeast.[1] Seaside II covered about 300 $m^2$, stood 90 cm tall, and was fringed by two distinct borrow areas. Our crews excavated here in January and March of 1977, excavating approximately 50 $m^3$ of mound fill (Thomas and Larsen, 1979: 99–108; see fig. 24.4).

Seasides I and II display a very similar stratigraphic history. The premound surface at Seaside II contained a number of small pits and oyster shell middens. Shell from Feature 1 (a shell-filled pit) was $^{14}C$ dated to the Refuge-Deptford period:

(UGA-1552, *Crassostrea*): 2730 ± 70 B.P.
cal 810–430 B.C.
(UGA-1553, *Crassostrea*): 3040 ± 70 B.P.
cal 1210–830 B.C.

These dates are significantly different at the 95 percent confidence level.

The premound surface was then burned, and several adults were interred into this surface. One of these interments, Burial 13, was a bundle burial containing three adult females. All of these assorted features were covered by mound fill.

Several intrusive burials were then added to Seaside II, all but one of them adults. Burial 8 was a bundle burial containing a cremation, an adult, and a male subadult (age about 18 years). Charcoal associated with Burial 8 was radiocarbon dated to the Irene period:

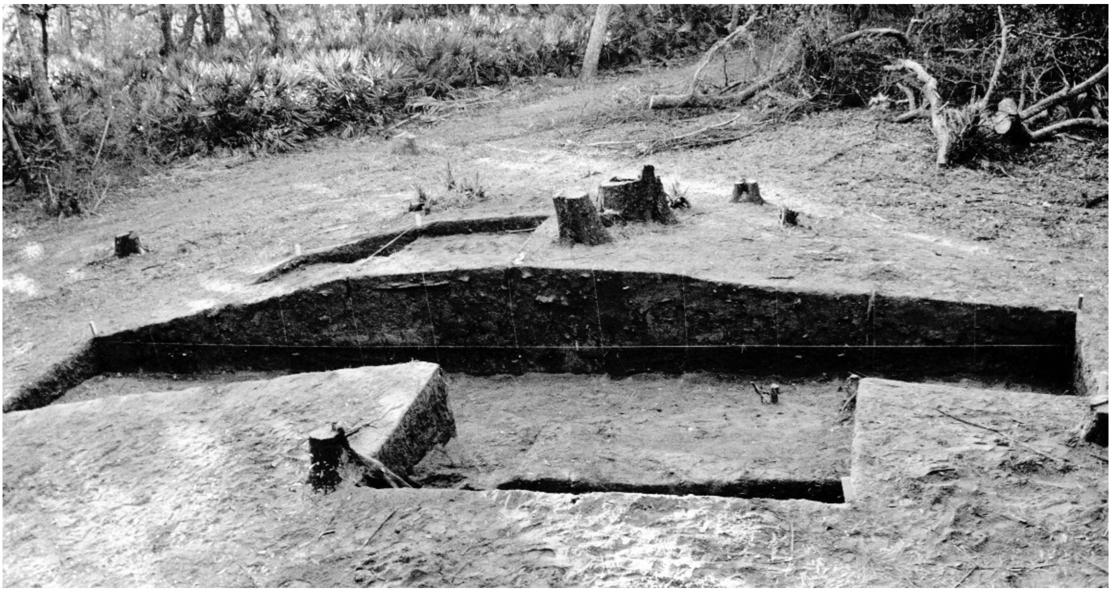

Fig. 24.4. Seaside Mound II during excavations in January 1977 (facing east).

(UGA-1556, charcoal): 450 ± 70 B.P.
cal A.D. 1330–1640

The ceramic assemblage recovered at Seaside II ($n = 74$) contains almost exclusively Deptford and Refuge period sherds (with single Wilmington and St. Simons sherds also recovered).

We conclude that Seaside Mound II was constructed and utilized during the Refuge-Deptford periods. At least one intrusive bundle burial was added during the Irene period; this assessment agrees with the previous appraisal (Thomas and Larsen, 1979: 99–109).

### Moore's "Mound near the Light-house" (9Li7)

C. B. Moore excavated a low, symmetrical sand mound located "in the border of the woods, in view of the sea, about one-half mile in a southeasterly direction from the landing, near the site of the projected light-house" (1897: 89). From the ca. 1890 map of St. Catherines Island, we know that during Moore's visit, the prospective site for a light-house was located near Seaside Field.[2]

Plotting out these directions, we think that 9Li7 was almost certainly located near the eastern windrow bordering Seaside Field, perhaps on the elevated point overlooking Black Hammock. Today, this area is covered with a thick stand of longleaf pine (and known locally as "Lovers Lane"); in Moore's time, Seaside Field was an open, fallow agricultural field with a clear ocean view across McQueen Marsh and Middle Beach. There is no record of a lighthouse ever having been built here, but this certainly would have been a choice location for such a purpose (see also Larson, 1998).

Immediately below the surface, Moore discovered several "decayed bits of human bone," including a "pocket of calcined bone", from at least two adults and one subadult (Moore 1897: 98). Elsewhere, he located two deeply buried graves, with at least one individual buried on its back with flexed knees.

Although one cannot assign cultural affiliation with any certainty (see Larson, 1998: 72), we note the similarity of 9Li7 to mounds in the Cunningham and Seaside groups, and we think it likely that the "Mound near the Light-house" was constructed during the Refuge-Deptford (or perhaps Wilmington) periods.

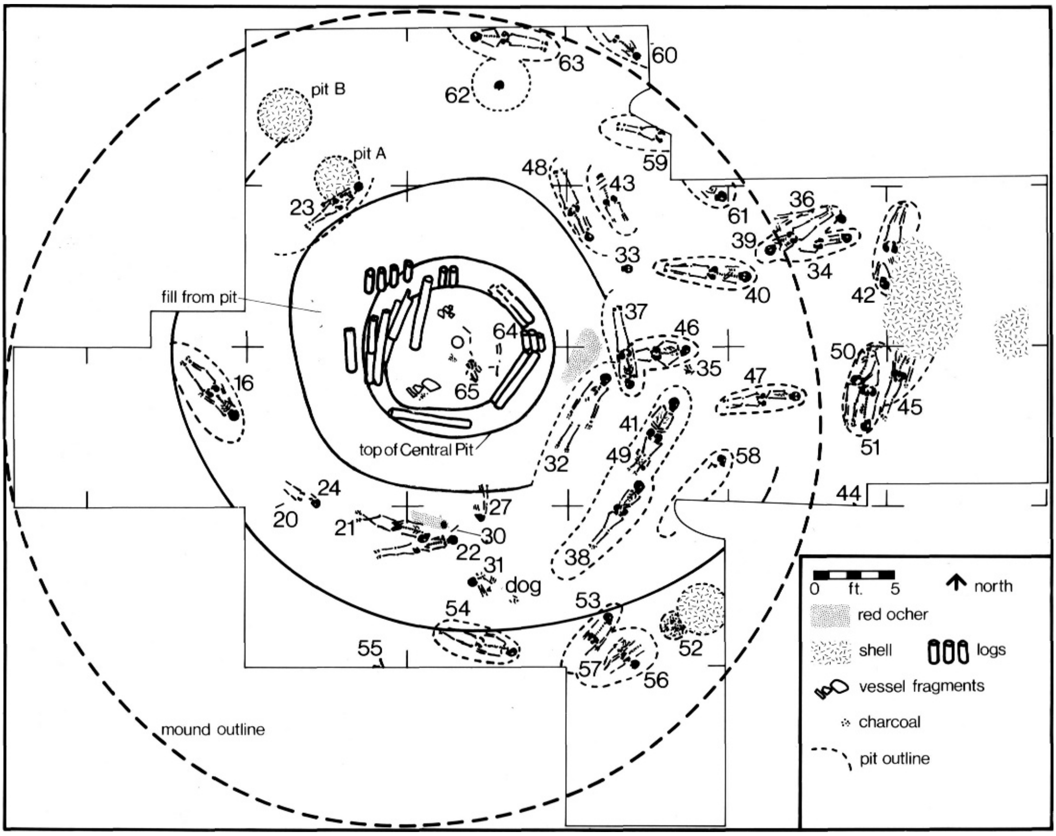


Fig. 24.5. Map of the Stage I construction at Johns Mound (after Larsen and Thomas, 1982: fig. 20).

## KING NEW GROUND FIELD

Three mortuary sites are known from King New Ground Field, located along the eastern margin of St. Catherines Island and fronting McQueens Inlet. C. B. Moore excavated his "Mound in King's New Ground Field" (Moore 1897: 81–86), Joseph Caldwell excavated Johns Mound (Caldwell, 1971; Larsen and Thomas, 1986), and we encountered an isolated midden burial at 9Li226. Each burial site is described below.[3]

### Johns Mound (9Li18; AMNH-110)

Johns Mound is a low sand mound, originally 1.5 m high, located just outside the eastern periphery of King New Ground Field (fig. 24.5). This site was entirely excavated by the University of Georgia, under the direction of Joseph R. Caldwell (Caldwell, 1970), who named the site in honor of Mr. John Toby Woods (then Superintendent of St. Catherines Island). The artifacts and human remains were analyzed and reported by Larsen and Thomas (1982).

The premound surface at Johns Mound contained several St. Simons period ceramics, and field notes describe Pit B as a "fiber-tempered pit". Two additional premound pits contain strictly St. Catherines period potsherds. A Central Pit was excavated through the premound surface (fig. 24.6). The pit itself was about 3.5 m in diameter, with fill forming a distinct ring around its margins. This feature was then lined with logs, and a $^{14}C$ date, processed on charcoal from one of these logs, dates to the St. Catherines period:

(UGA-61, charcoal): 900 ± 60 B.P.
cal A.D. 1020–1250


Fig. 24.6. Johns Mound during the University of Georgia excavations in the "Old Cemetery" (looking northeast).

A St. Catherines Burnished Plain vessel was found near the Central Pit, along with two bone pins and a lump of red ocher. A partially disarticulated child burial (aged 3 to 5 years) was found on the floor of the Central Pit, along with several unarticulated adult bones (fig. 24.5). The Central Pit penetrated a preexisting shell midden, perhaps containing the fiber-tempered ceramics found scattered throughout the mound fill. The Central Pit was filled, and a number of burials were added in the fill.

Several human burials (adult males and females) were then placed along the periphery of the Central Pit (termed by Caldwell, 1970, the "Old Cemetery"). Additional adult burials were then interred, with some of the grave pits extending into the spoil dirt from the Central Pit, which was then covered with more logs. The mound fill was then added across the entire premound ar-

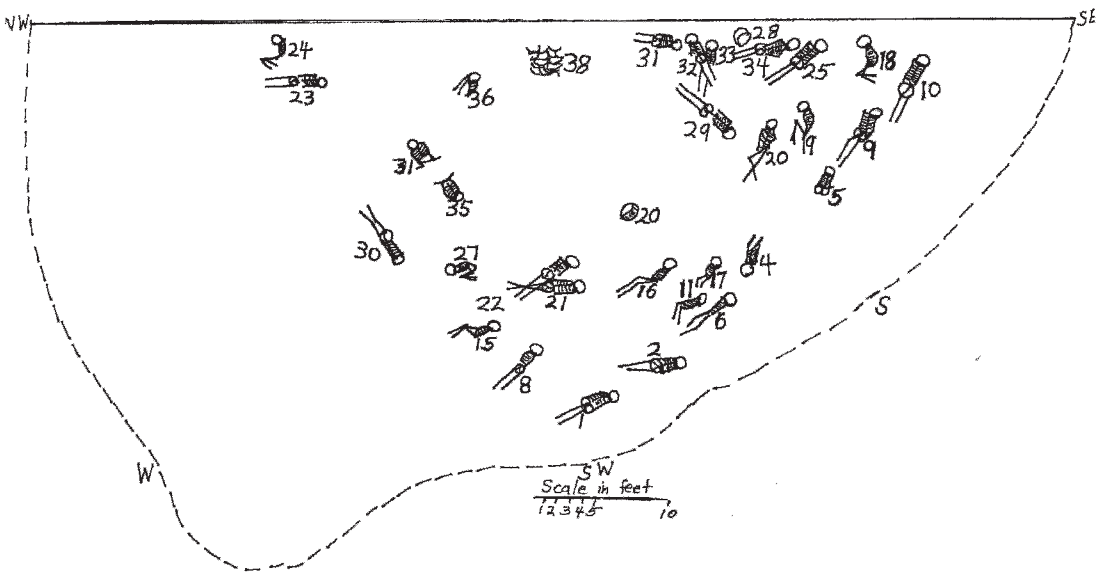


Fig. 24.7. C.B. Moore's excavations in the "mound in King's New Ground Field" (after Moore, 1897: fig. 51).

ea, followed by subsequent intrusive interments and bundle burials.

At this point, a shell layer was constructed in the central portion of Johns Mound, including the Central Pit. Similar to Marys Mound, this shell cap measures roughly 15 m across and in places reaches 1 m in depth. A single $^{14}C$ date was processed on oyster shells from the shell cap (a date statistically indistinguishable from the $^{14}C$ processed on one of the logs in the Central Pit):

(UGA-64, *Crassostrea*): 1190 ± 60 B.P.
cal A.D. 960–1230

Later, a cone-shaped depression was scooped out in the shell cap (roughly centered over the now-buried Central Pit), and a burial added inside the depression (along with a St. Catherines period bowl). Additional mound fill was then added, in a number of constructional subphases, across this entire area. Several intrusive burials were added into this fill, associated with Savannah and later potsherds.

In a previous discussion (Thomas and Larsen, 1979: 273), we concluded that Johns Mound was constructed "during the terminal phase of the St. Catherines period, probably during the late twelfth or early thirteenth century A.D." After having recalibrated the available $^{14}C$ dates from Johns Mound, we believe that this conclusion remains valid. But we should must also reiterate that some of the 70 human burials were intrusive at Johns Mound, interred in post-St. Catherines period times (as evidenced by the presence of Irene Plain, Irene Complicated Stamped, and Altahama Incised vessels, as well as the partial remains of a domestic pig).

## Moore's "Mound in King's New Ground Field" (9Li5)

Moore excavated a burial mound not far from Johns Mound, located within the shell middens of King New Ground Field (fig. 24.7). The site was repeatedly disturbed by antebellum agriculture, for the mound was only 22 in. high when Moore located it, barely discernable above ground surface (Moore, 1897: 81).

Although excavating only the southwestern half of the mound, Moore exposed and mapped 38 burials; projecting this total to the (unexcavated) northern half, this is nearly the same number of individuals encountered in nearby Johns Mound. Moore

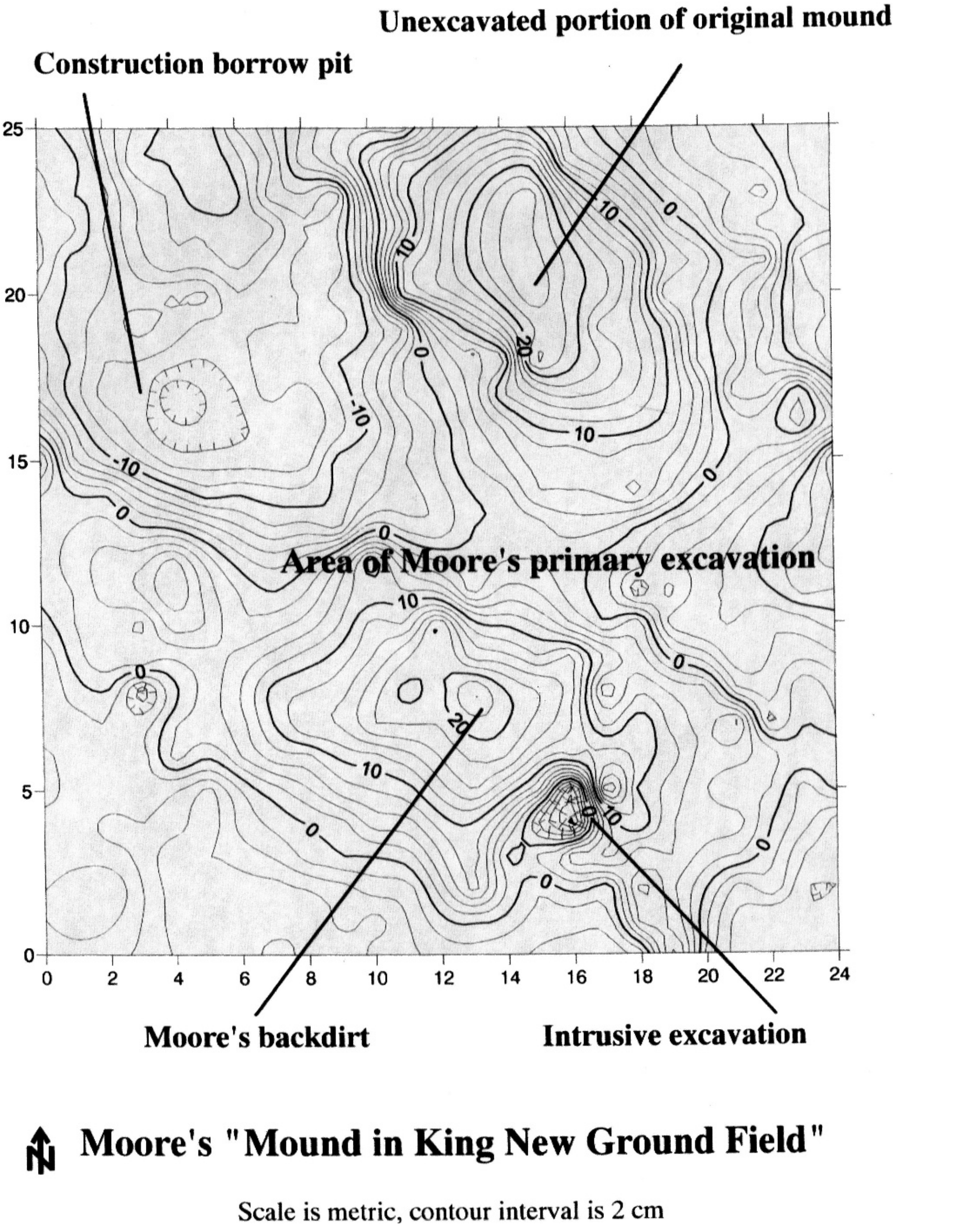


Fig. 24.8. Map of Moore's "mound in King's New Ground Field" as it appeared in July 2003 (courtesy of Mr. Royce Hayes).

mapped seven burials in the Central Pit, including adults (male and females) and a child (roughly 10–11 years of age). In addition, he encountered numerous intrusive primary and bundle burials and calcined bone concentrations. Unlike Johns Mound, though, Moore's "Mound in King's New Ground Field" contained remarkably few grave goods.

In 1969, Caldwell commented that "on the basis of Moore's account, we formerly believed that the mound in King New Ground Field was used during the Wilmington period. [Based on the UGA excavations at Johns Mound] We now believe it equally likely to have belonged to the St. Catherine's period. It certainly belonged to one or the other." We agree with Larson's (2001: 72) suggestion that this mound was probably constructed and utilized during the Woodland period, and the comparison with nearby Johns Mound suggests that Moore's mound likely dates to the St. Catherines period.

As noted elsewhere (Thomas et al., 1978: 174), Moore's locational descriptions are imprecise and difficult to follow. Because of this, the whereabouts of Moore's excavations have been something of a mystery to archaeologists working more recently on St. Catherines Island. University of Georgia field notes indicated that Joseph R. Caldwell searched for Moore's excavations in King New Ground Field (and Greenseed Field), without success. Our crews also searched for Moore's "Mound in King's New Ground Field."

Aware of our efforts, Mr. Royce Hayes (Superintendent of St. Catherines Island) took on the challenge in August 2002, when he conducted his own systematic transect survey in the target area. Near the junction of the primary road through King New Ground and the spur leading to the 19th century oyster boiler (discussed in chap. 13), Hayes successfully located the remnants of Moore's "Mound in King's New Ground Field". With the help of Timothy Keith-Lucas (of the University of the South), Hayes returned a week later to map the locality. This map (reproduced here as fig. 24.8) shows the original borrow pit (from which mound fill was removed), the unexcavated northeastern half of the mound, Moore's backdirt, and a much later pothunter's pit. We visited the site with Hayes in September 2003 and agree that this site is, indeed, the mound that Moore excavated in 1897 (but this supposition still needs to be confirmed by test excavations and stratigraphic mapping).

The rediscovery of the "Mound in King's New Ground Field" not only establishes its exact location (relative to Johns Mound and the numerous middens throughout the area), but also leaves the northeastern sector intact because Moore only excavated half of the mound.

### Midden Burial at 9Li226 (AMNH-498) by Clark Spencer Larsen

This large Irene period site extends across the eastern boundary ditch of King New Ground Field (transect F-1; see discussion in chap. 20). During test excavations at 9Li226, the remains of a partial skeleton were exposed in Test Pit II (24.30 cm). None of the remains were articulated, indicating their complete disturbance prior to discovery. On-site study of the burial and midden matrix suggests that the disturbance occurred well before the test excavation, perhaps during the prehistoric occupation of St. Catherines Island. Similarity in size, color, texture, and maturity of the bones imply that the remains are from one individual. Despite the disturbed nature of this interment, the bones are in excellent condition.

The bones that were recovered from this locality include mostly hand, foot, and vertebral skeletal elements. The collection can be summarized as follows: left talus, left foot navicular, right second cuneiform, left second and third metatarsals, proximal foot phalanx, left and right scaphoids, left lunate, right triquetral, left and right capitates, left and right first, second, third, and fifth metacarpals, left fourth metacarpal, eight proximal hand phalanges, four intermediate hand phalanges, five terminal hand phalanges, left and right patellae, and fragments of ribs, cervical vertebrae, and thoracic vertebrae.

These remains are most likely those of an adult because all epiphyses show complete fusion. Osteoarthritic marginal lipping on the sternal end of one rib and on one thoracic vertebral body indicate that the individual was not a young adult at the time of death. It is not possible to positively determine gender because of the incomplete nature of the individual's skeleton. The bones are robust, however, and suggest that the individual may have been a male.

### Moore's "Mound in the Greenseed Field" (9Li6)

Moore (1897: 86–89) completely excavated this mound, which appears to be very similar to 9Li5, Johns and Marys Mounds, with surrounding borrow pits and very little shell (except for the deliberately constructed shell lens). Most of the burials are primary, extended interments. A total of 28 burials were exposed, including three contained in the large Central Pit. Larson (1998: 72) estimates that 9Li6 probably dates to the Woodland period.

Over the years, several investigators have searched for Moore's "Mound in Greenseed Field", so far without success.

## THE CUNNINGHAM MOUND GROUP

Seven aboriginal mounds are known from the Island center, in the general vicinity of Cunningham Field (Thomas and Larsen, 1979). Each was designated by the name of the nearest antebellum field (see fig. 24.9).

### McLeod Mound (9Li47; AMNH-105)

Not long after we began working on the island, Mr. John Toby Woods (then Superintendent of St. Catherines Island) showed us a seven-mound mortuary complex centered on Cunningham Field, located in the southern part of the Pleistocene island core (Thomas and Larsen, 1979). The northernmost of these, McLeod Mound, is immediately north of the McLeod Field boundary ditch. Between November 1975 and May 1976, our crews excavated approximately 100 $m^3$ of McLeod Mound fill (roughly 40% of the site).

McLeod Mound was erected atop a primary humus zone, and we processed two $^{14}C$ determinations on charcoal from this surface:

(UCLA-1997E, charcoal): 3250 ± 60 B.P.
cal 1680–1410 B.C.
(UGA-1557, charcoal): 2660 ± 60 B.P.
cal 970–560 B.C.

Although the earlier date (UCLA-1997E) falls into the St. Simons period, we found no fiber-tempered ceramics at McLeod Mound. This suggests that perhaps this date could have processed on older charcoal lying on the ground surface. UGA-1557 dates to the early Refuge period.

Several pits were dug into this primary humus, including a large, 6-m Central Pit, which was excavated, then filled and covered with a ring of potsherds, oyster, and clam shells. Then the Central Pit was expanded to the north, and five individuals (all adult females) were buried within. Two $^{14}C$ dates are available on the hard clams from the shell feature within this Central Tomb:

(UGA-1554, *Mercenaria*): 2760 ± 70 B.P.
cal 850–460 B.C.
(UGA-1555, *Mercenaria*): 2290 ± 80 B.P.
cal 340 B.C.– A.D. 80

These dates are significantly different at the 95 percent level. Assuming that these clams were harvested shortly before their inclusion in the Central Tomb, these dates place this construction during the Refuge-Deptford periods (see fig. 24.10).

A small sand mound was then erected over the Central Tomb and UGA-1256 dates charcoal contained within the mound fill:

(UGA-1256, charcoal): 1840 ± 70 B.P.
cal A.D. 20–380

We now think that this charcoal likely resulted from another burning of the primary humus and was subsequently included in the mound fill.

In Part III of this series, we will discuss the interrelationship between the bioarchae-

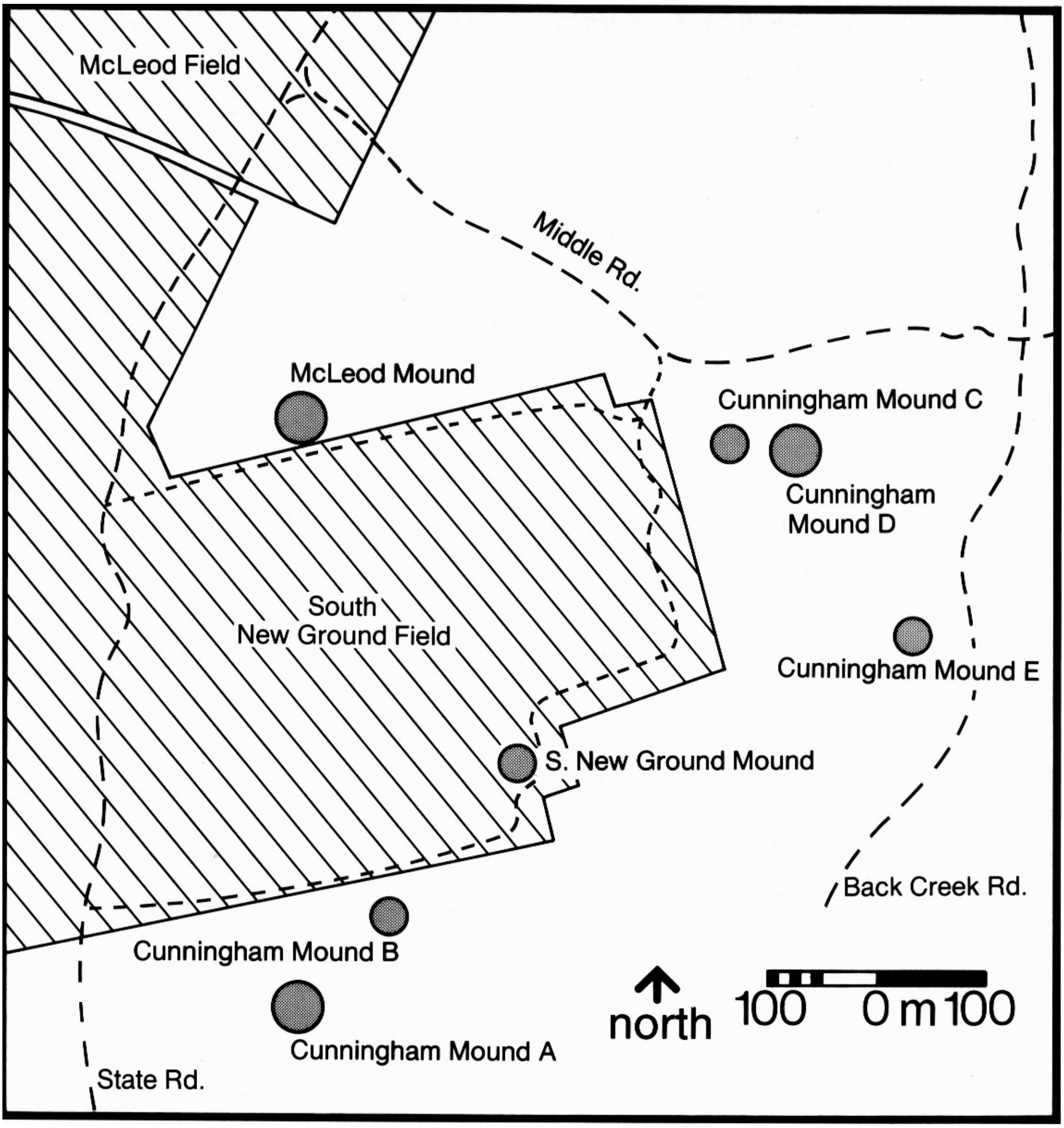


Fig. 24.9. The Cunningham Mound group on St. Catherines Island (after Thomas and Larsen, 1979: 3).

ological analysis of the mortuary remains against the dynamics of sea-level change, shifting resource distributions, and the adoption of maize cultivation. Although stable isotope analysis provides useful insights into aboriginal diets on St. Catherines Island, we decided in 2006 to update the stable isotope analysis with new techniques and an expanded sample and AMS control dating on key bone samples.[4]

At this writing, the stable isotope samples are still being processed, but we have received some of the new AMS radiocarbon dates, including the following four $^{14}C$ dates from McLeod Mound (see also table 13.4):

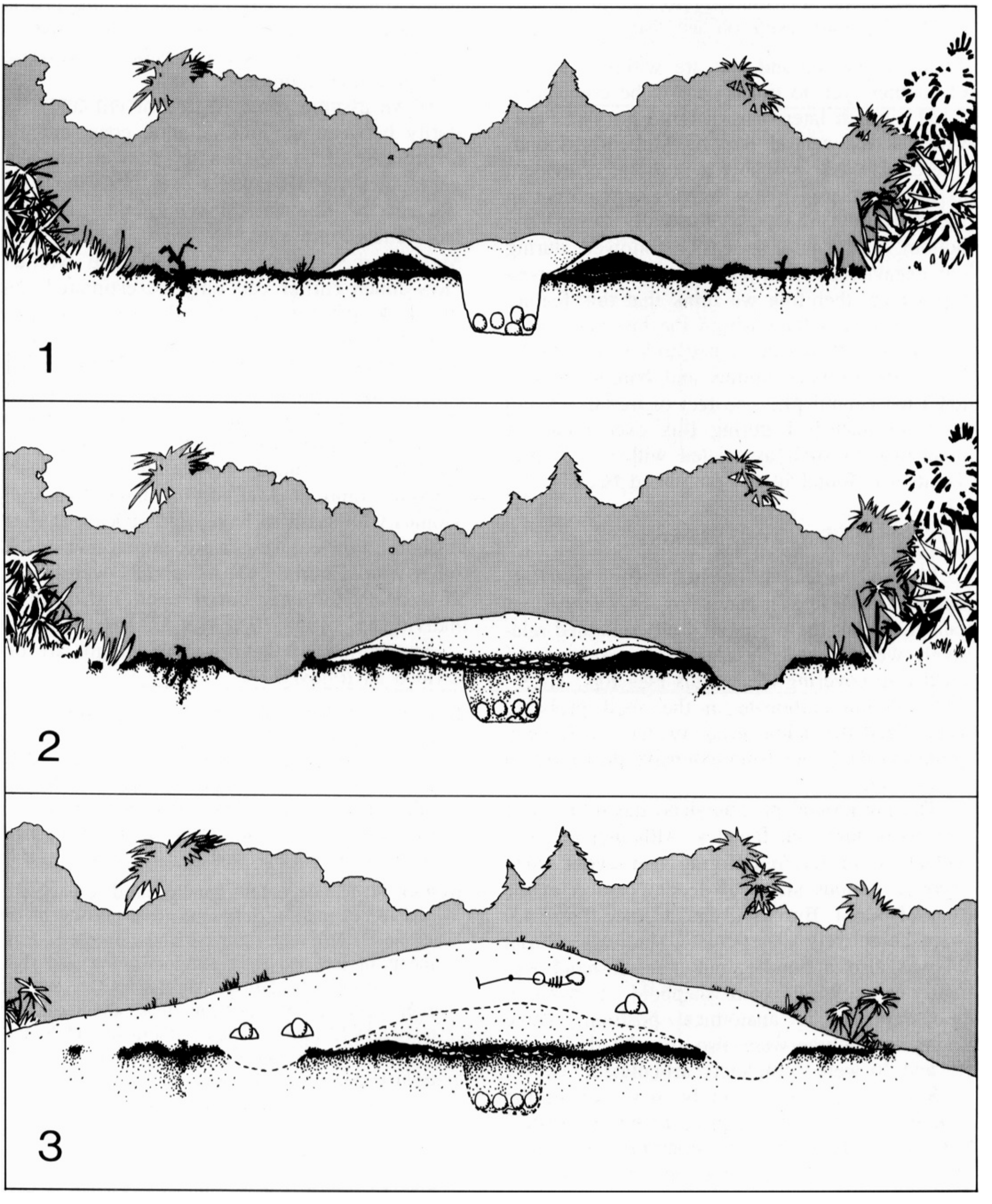


Fig. 24.10. Stages of mound construction at McLeod Mound (after Thomas and Larsen, 1979:10).

(Beta-223515 [AMS], burial 14):
1500 ± 50 B.P. cal A.D. 430–650
(Beta-223516 [AMS], burial 15):
1580 ± 50 B.P. cal A.D. 490–600
(Beta-223517 [AMS], burial 16):
1430 ± 50 B.P. cal A.D. 540–670
(Beta-223518 [AMS], burial 17):
1640 ± 50 B.P. cal A.D. 260 – 540

These four new $^{14}C$ dates have some important behavioral and bioarchaeological implications (which are discussed in detail in chap. 32). For now, we concentrate strictly on the chronostratigraphic significance of the new AMS dates from McLeod Mound.

These four AMS dates were processed on individuals from within Central Tomb at McLeod Mound. It now seems clear that McLeod Mound was erected after the death of all five individuals buried in the Central Tomb. This means that the radiometric age of the demise of the burial 16 (Beta-223517 [AMS], burial 16) cal A.D. 540–670 provides a *terminus post quem* for the erection of McLeod Mound, which must have post-dated this event.

Nearly 500 potsherds were recovered during our McLeod Mound excavations, all of them found as inclusions in the fill and therefore not deliberate grave goods. Ninety-seven percent of the recovered sherds can be attributed to the Refuge-Deptford period. This ceramic assemblage indicates that the construction of McLeod Mound disturbed an archaeological site from the Refuge-Deptford period.

The available ceramic and $^{14}C$ evidence placed the construction of McLeod Mound as sometime after cal A.D. 540–670, likely during the Wilmington period; this interpretation differs from earlier temporal estimates (Thomas and Larsen, 1979: 23–49).

### Cunningham Mound A (9Li43; AMNH-100)

Cunningham Mound A, the largest mortuary structure in the Cunningham Field mound group, stood about 75 cm high, with a footprint of about 400 $m^2$ (Thomas and Larsen 1979: 49–54). Between November 1975 and January 1977, our crews excavated approximately 80 $m^3$ of deposit, leaving 200 $m^3$ unexcavated.

Prior to erecting the mortuary mound, the primary humus was fired and cleared, then several pits were excavated through the burned humus. We processed three $^{14}C$ dates on the outer portions of two burned, upright stumps that presumably were killed in the process of clearing the site:

(UGA-1254, charcoal): 2970 ± 80 B.P.
cal 1400 – 980 B.C.
(UCLA-1997C, charcoal): 2150 ± 60 B.P.
cal 370–50 B.C.
(UGA-1560, charcoal): 1860 ± 70 B.P.
cal A.D. 10–340

Each of these dates is statistically different from the others at the 95 percent level and each falls into the Refuge-Deptford interval. This evidence suggests that Cunningham Mound A could not have been constructed prior to cal A.D. 10–340.

Sometime after clearing the area, a large central pit was created in the sterile substratum; the stratigraphy of this central pit closely resembles that present in nearby McLeod Mound. This feature was covered with a sand mound, and we took $^{14}C$ on charcoal from the central pit fill:

(UGA-1562, charcoal): 3410 ± 80 B.P.
cal 1890–1520 B.C.

UGA-1562 dates to the St. Simons period. Because of the care with which we took these samples, we cannot explain the broad range in ages.

Only three potsherds, all Oemler Complicated Stamped, were recovered from the fill.

We conclude that Cunningham Mound A was constructed and utilized during the Refuge-Deptford period (and this agrees with our earlier assessment in Thomas and Larsen, 1979: 49–54).

### Cunningham Mound B (9Li44; AMNH-101)

About 125 m to the northeast of 9Li43 lies Cunningham Mound B. Crews from the American Museum of Natural History excavated here between March 1975 and March 1977, removing 25 percent of the estimated 200 $m^3$ of mound fill.

The construction sequence parallels that documented at McLeod and Cunningham A mounds. Two premound pits were excavated through the primary humus, which was dated by two $^{14}C$ determinations:

(UGA-1008, charcoal): 2160 ± 70 B.P.
cal 380–40 B.C.
(UCLA-1978, charcoal): 2500 ± 60 B.P.
cal 790–420 B.C.

These dates are statistically different at the 95 percent level and both $^{14}C$ dates fall into the Refuge-Deptford interval.

Charcoal from a concentration on the primary humus was dated, rendering two statistically indistinguishable $^{14}$C determinations:

(UGA-1007, charcoal): 1870 ± 60 B.P.
cal A.D. 10–260
(UGA-1684, charcoal): 1850 ± 60 B.P.
cal A.D. 30–340

These dates are statistically the same at the 95 percent level. The weighted mean of UGA-1007 and UGA-1684 is cal A.D. 40–310, which dates to the Refuge-Deptford period.

Cunningham Mound B lacked a central pit, and no human remains were recovered. The fill contained only a single Oemler Complicated Stamped potsherd. We believe that all mortuary activity took place at Cunningham Mound B during the Refuge-Deptford period (a conclusion that mirrors our earlier discussion; Thomas and Larsen, 1979: 54–57).

### Cunningham Mound C (9Li45; AMNH-103)

We excavated nearby Cunningham Mound C between November 1975 and May 1977, removing one-quarter of the estimated 100 m$^3$ of mound fill.

We found that two premound pits were excavated through the primary humus, one of which contained fiber-tempered ceramics and dated the late St. Simons–early Refuge interval:

(UGA-1686, charcoal): 3010 ± 60 B.P.
cal 1370–1050 B.C.

The primary humus zone was burned, and charcoal recovered from this stratigraphic unit dates to the Refuge-Deptford periods:

(UGA-1253, charcoal): 2380 ± 80 B.P.
cal 780–230 B.C.

We think that Cunningham Mound C was constructed shortly thereafter. Two-thirds of the potsherds recovered from the mound fill date to the Refuge-Deptford period.

An intrusive pit was subsequently excavated into Cunningham Mound C, a fire built within, probably in preparation for interring Burial 1. Charcoal from this pit dates to the Wilmington period (which accounts for 20% of the recovered potsherds):

(UCLA-1997A, charcoal): 1410 ± 60 B.P.
cal A.D. 530–770

We recovered the remains of five individuals from Cunningham Mound C. There was no evidence of subsequent usage, and because of this we believe that Cunningham Mound C was utilized exclusively during the Refuge-Deptford period.

### Cunningham Mound D (9Li46; AMNH-104)

In March and May of 1976, we excavated about 40 percent of the estimated 80 m$^3$ of mound fill at Cunningham Mound D and recovered the remains of five individuals. The ceramic assemblage ($n$ = 56) consisted almost entirely of Refuge Plain and Refuge Simple Stamped sherds.

Two $^{14}$C dates were processed on charcoal from the premound primary humus:

(UGA-1255, charcoal): 2810 ± 60 B.P.
cal 1120–830 B.C.
(UCLA-1997D, charcoal): 1430 ± 60 B.P.
cal A.D. 440–710

Although UGA-1255 falls within the Refuge-Deptford interval, UCLA-1997D is surprisingly late, dating to the subsequent Wilmington period. In our previous discussion, we attributed this site to the Refuge-Deptford interval (Thomas and Larsen, 1979: 65–75), but based on UGA-1255 we now believe that the aboriginal usage of this site took place during the Wilmington period.

Cunningham Mound D is located about 200 m away from Middle Settlement, one of the three main antebellum enclaves known to exist on St. Catherines Island. In addition to the aboriginal evidence discussed here, we also encountered two slave interments that dated ca. A.D. 1800 in Cunningham Mound D (see Thomas et al., 1977).

### Cunningham Mound E (9Li28; AMNH-109)

Cunningham Mound E was initially tested by Joseph Caldwell and his crew from the University of Georgia, and they removed roughly 9 $m^3$, presumably sometime during the early 1970s. The American Museum of Natural History continued testing here in November 1976 and January 1977.

Two $^{14}C$ dates are available from the premound humus:

(UGA-1559, charcoal): 1440 ± 60 B.P.
cal A.D. 440–690
(UGA-1561, charcoal): 1430 ± 60 B.P.
cal A.D. 440–710

These dates are statistically the same at the 95 percent level; their weighted average is cal A.D. 540–670, which suggests that Cunningham Mound E was likely constructed during the early Wilmington period. This interpretation differs from our previous assessment (in Thomas and Larsen, 1979: 75–78).

One (intrusive) burial was encountered, although not a single potsherd was recovered from the fill.

### South New Ground Mound (9Li12; AMNH-102)

We excavated South New Ground Mound between March 1976 and May 1977, and removed roughly 25 $m^3$ of fill (Thomas and Larsen, 1979: 78–83). Although the site was disturbed in the past, we found that the stratigraphy of South New Ground Mound echoed that of the nearby mounds in Cunningham Field.

Two $^{14}C$ dates were processed on charcoal contained in the premound humus:

(UGA-1688, charcoal): 1890 ± 60 B.P.
cal 40 B.C.–A.D. 320
(UGA-1689, charcoal): 2155 ± 60 B.P.
cal 380–50 B.C.

These dates are statistically different at the 95 percent level, and both fall into the Refuge-Deptford interval.

We encountered one interment and one residual clay-tempered plain potsherd. We attribute the entire usage of this site to the Refuge-Deptford period (a conclusion that agrees with our earlier assessment in Thomas and Larsen, 1979: 78–83).[5]

### Mission Santa Catalina de Guale (9Li274)

As noted in chapters 12 and 19, one of the overarching objectives of the Island-wide survey of St. Catherines Island was to pinpoint the location of Mission Santa Catalina de Guale, and we have already discussed that survey and the resulting excavations (see Thomas, 1987, 1988; Larsen, 1990). Our excavations recovered a minimum of 431 individuals from the cemetery at Mission Santa Catalina de Guale. Chapter 30 discusses the bioarchaeological analysis of these remains, which were reburied inside the church at Mission Santa Catalina de Guale (fig. 24.11).

## THE SOUTH END MOUND GROUP

### South End Mound I (9Li3; AMNH-114)

In May 1979, while we were excavating in the Cunningham Field mound group, Mr. John Toby Woods, Jr. informed us that he had found what appeared to be another of Moore's excavations. When Mr. Woods showed us the spot, located about 3/4 miles north of South End Settlement, at the end of an open field on the high ground on the western side of the island we quickly agreed with his assessment. At this point, Moore's "Mound Near South-End Settlement" looked more like a doughnut than a mound, with backdirt splayed outward around the original mound footprint. In our own records, we denoted this site as "South End Mound I" (9Li3, AMNH-114).

We excavated here between November 1979 and May 1981. We discovered that Moore apparently did not save any of the human burials he exposed, and our limited test excavations suggested that the bulk of these human remains were still buried within the disturbed mound fill. In fact, realizing that the AMNH "Burial A" corresponded with Moore's Burial 22, we decided to conduct more intensive excavations at South End Mound I. Sponsored by Purdue University and the American Museum, Larsen returned to excavate South End Mound I between 1991 and 1993. He recovered 26 of the 50 individuals previous-

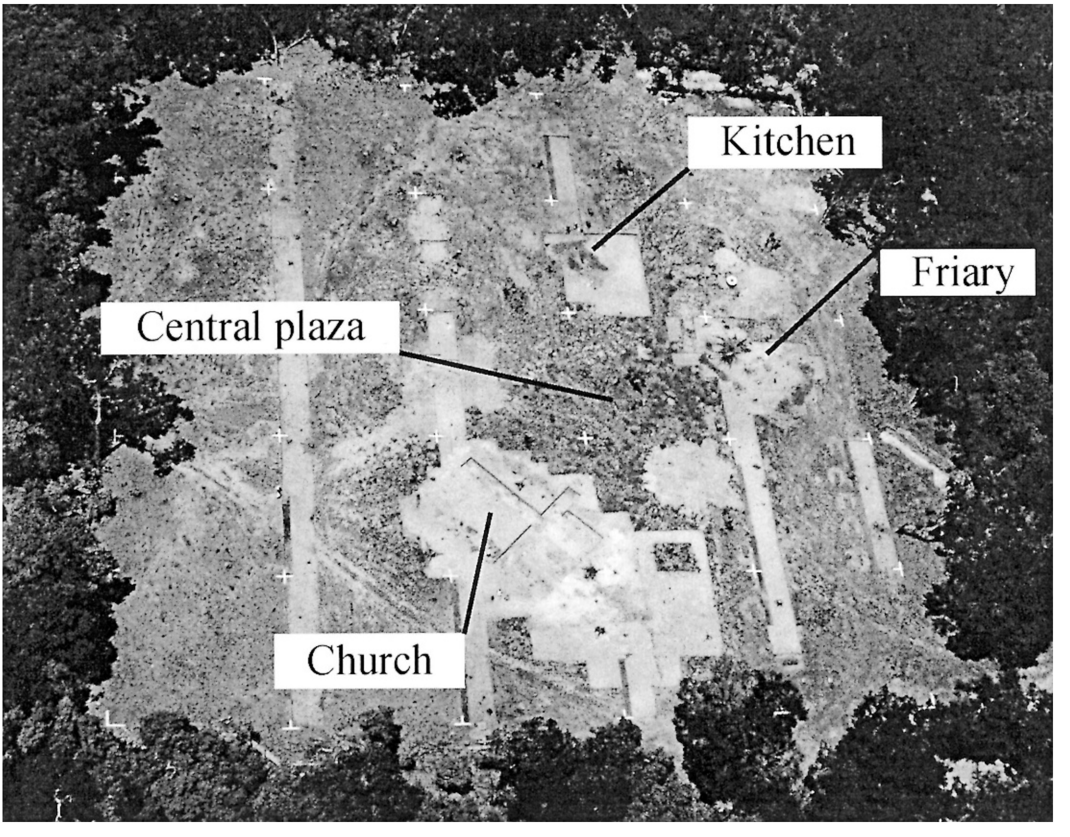


Fig. 24.11. Low-level aerial view of Mission Santa Catalina de Guale.

ly exposed by Moore and conducted a variety of bioarchaeological analyses on these remains (as discussed in Larsen, 2002).

Moore reported that the mound originally measured 3 feet high and 68 feet in diameter (Moore, 1897: 161; fig. 24.12). His excavation of the mound exposed 50 burials and recovered a significant quantity of grave goods. The central part of the mound was comprised of an oyster shell layer 2 feet thick and 10–20 feet across. Moore noted the absence of a central pit and the presence of occasional cremated remains. The majority of burials were flexed, with the head oriented toward the south; Moore also excavated four urn burials, one of which is illustrated in chapter 14.

This was the richest mound Moore encountered on St. Catherines Island, and he included a cross-sectional view of one of the burials as the color frontispiece of his 1897 publication (as did Larsen, 2002). Moore's report strongly suggests that this site was used almost entirely during the Irene Period. A number of grave goods were described, including a soapstone pendant, a large number of shell beads, some ceramic pipes, and several parts of decomposed rattles. The six ceramic vessels (donated to various museums) were reexamined and are described elsewhere (Larsen and Thomas, 1986).

### South End Mound II (9Li273; AMNH-121)

After Mr. Woods showed us the location of Moore's "Mound Near South-End Settlement", we surveyed the surrounding area for additional mortuary sites. We found one, located only 38 m east of 9Li114. We labeled this relatively undisturbed site South End Mound II (9Li273; AMNH-121).

We excavated at 9Li273 in November 1979, March–May 1980, and May 1981

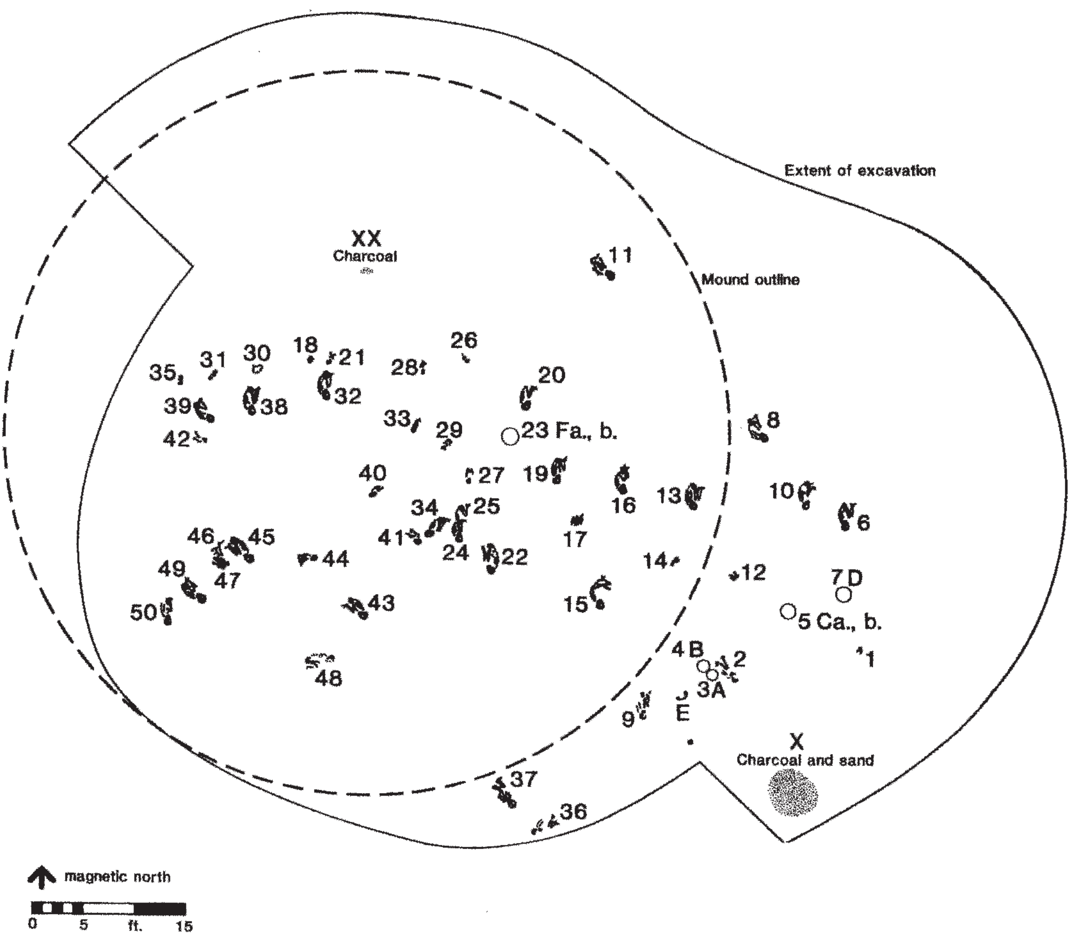


Fig. 24.12. Moore's excavation map of the "mound near South-end Settlement" (after Moore, 1897: fig. 49).

(Larsen and Thomas, 1986). We found that the premound humus was littered with numerous St. Catherines period potsherds, indicating that mound construction could not predate A.D. 1000 or so. Sometime thereafter, a central pit (roughly 6 m in diameter) was excavated, inside of which were found two cremations and a mass grave with the remains of at least 15 individuals. Grave goods included a perforated copper sheet, worked galena, a river otter mandible, and a polished stone pendant. Prehistoric copper has rarely been reported from archaeological sites of this area, and as far as we know this is the first occurrence of galena in coastal Georgia.

In addition to being burned, the central pit was covered with an irregular, artificially raised platform made of recycled shell midden (that contained strictly St. Catherines period ceramics). Two $^{14}C$ determinations were processed on shell contained in this stratum:

(UGA-3458, *Crassostrea*): 1260 ± 80 B.P.
cal A.D. 820–1200
(UGA-3459, *Crassostrea*): 1040 ± 70 B.P.
cal A.D. 1060–1340

These dates are statistically the same at the 95 percent level; their weighted average is cal A.D. 1030–1260. Thus, the ceramic and radiocarbon evidence agree that the shell lens covering the Central Pit dates to the St. Catherines period.

Mound fill was added and South End Mound II roughly assumed its modern configuration; this fill contained a few redeposited St. Catherines period ceramics. A large charcoal chunk located within the fill was dated:

(UGA-3460, charcoal): 2140 ± 170 B.P
cal 760 B.C.–A.D. 240

Given the stratigraphic and cultural associations, sample UGA-3460 seems much too ancient (perhaps this charcoal derived from a previous burn that became incorporated within the mound fill).

Two additional intrusive pits (presently undated) were excavated into South End Mound II. A weakly developed humic zone then formed atop the mound, and fill accumulated along the southern margin of the mound. A piece of charcoal contained within this fill was dated:

(UGA-3461, charcoal): 230 ± 70 B.P.
cal A.D. 1490–1950

This event almost certainly represents backdirt from the excavation of an antebellum boundary ditch that cut the southeastern and southwestern margins of the mound.

We conclude that South End Mound II was constructed and utilized almost entirely during the St. Catherines period, with construction techniques roughly equivalent to those employed at Johns and Marys Mounds, two contemporary mortuary sites on St. Catherines Island.

## BIOARCHAEOLOGICAL ANALYSIS

To sum up, various mortuary excavations during the past century have recovered the remains of over 725 individuals. More than 90 percent of these remains were analyzed by Clark Spencer Larsen and his colleagues (see Larsen, 1982, 1990, 2001; Larsen et al, 2001). Tables 24.1 summarizes the available mortuary evidence from St. Catherines Island.

The final section of this chapter will summarize the various bioarchaeological techniques employed by Larsen and his colleagues to analyze these remains. In chapter 30, this information is synthesized with additional geomorphological and archaeological data reported elsewhere in this monograph.

### Stable Isotope Ratios

Analysis of stable isotopes plays a critical role in our understanding of ancient diets on St. Catherines Island. As Larsen and his colleagues (2001: 71) have pointed out, "the shifts in stable isotope ratios of carbon and nitrogen for St. Catherines Island provide one of the most detailed pictures of dietary change for this region … and for North America in general." Before presenting these results (chap. 30) in full, it is worthwhile to say a word about the theoretical and procedural underpinnings of this particular technique.

As discussed in chapters 6–9, multiple lines of evidence suggest that throughout the 5000 years of human occupation on St. Catherines Island, all populations have exploited the abundant local marine resources, including fish, clams, oysters, crabs, and shrimp. They also collected terrestrial foodstuffs such as hickory nuts, acorns, berries, and edible roots. Deer and other land mammals were also consumed throughout the archaeological sequence (see chaps. 22 and 27, this volume). Some of these aboriginal populations also produced and consumed agricultural products.

As a result, stable isotope analysis plays a vital role in our understanding of ancient diets on St. Catherines Island. Throughout the aboriginal occupation of St. Catherines Island, all populations have exploited the abundant natural resources, both marine and terrestrial, and in later times, some also produced and consumed agricultural products. Maize is not a common find among archaeological sites on the Georgia coast, and therefore the absence of maize does not necessarily indicate a lack of maize-based agricultural subsistence. Recognizing these limitations inherent in recovered archaeological data, stable isotope analysis can provide a means for assessing the importance of maize.

TABLE 24.1
**Excavated Aboriginal Mortuary Sites on St. Catherines Island**

| Name | Number | AMNH no. | Burial no. | Age | Reference |
|---|---|---|---|---|---|
| Marys Mound | 9Li20 | AMNH-108 | 6 | Savannah | Larsen and Thomas, 1982 |
| "Low Mounds at the North-end" | — | — | — | Early/Middle Woodland (?) | Moore, 1896: 175; Larson 1998 |
| Seaside I | 9Li26 | AMNH-107 | 15+ | Refuge-Deptford /Wilmington | Thomas and Larsen, 1979 |
| Seaside II | 9Li62 | AMNH-106 | 14+ | Refuge-Deptford/Irene | Thomas and Larsen, 1979 |
| "Mound near the Light-house" | 9Li7 | — | 5+ | Woodland period (?) | Moore, 1897: 89 |
| Johns Mound | 9Li18 | AMNH-110 | 70+ | St. Catherines/Savannah | Larsen and Thomas, 1982: 292–324 |
| "Mound in King's New Ground Field" | 9Li5 | — | 38+ | Woodland period (?) | Moore, 1897: 167–172 |
| Midden burial | 9Li226 | AMNH-498 | 1 | Irene | This volume, chapter sites |
| "Mound in the Greenseed Field" | 9Li6 | — | 28+ | Woodland period (?) | Moore, 1897: 86–89 |
| McLeod Mound | 9Li47 | AMNH-105 | 20 | Refuge-Deptford | Thomas and Larsen, 1979: 23–49 |
| Cunningham Mound A | 9Li43 | AMNH-100 | 1 | Refuge-Deptford | Thomas and Larsen, 1979: 49–54 |
| Cunningham Mound B | 9Li44 | AMNH-101 | 0 | Refuge-Deptford | Thomas and Larsen, 1979: 54–57 |
| Cunningham Mound C | 9Li45 | AMNH-103 | 5 | Refuge-Deptford/Wilmington Intrusive Wilmington pit (burial 1) | Thomas and Larsen, 1979: 57–65 |
| Cunningham Mound D | 9Li46 | AMNH-104 | 5 | Refuge-Deptford | Thomas and Larsen, 1979: 65–75 |
| Cunningham Mound E | 9Li28 | AMNH-109 | 1 | Refuge-Deptford | Thomas and Larsen, 1979: 75–78 |
| South New Ground Mound | 9Li12 | AMNH-102 | 1 | Refuge-Deptford | Moore 1897: 81; Thomas and Larsen, 1979: 78–83 |
| Mission Santa Catalina de Guale | — | — | 432 | Mission period | Thomas, 1987; Larsen, 1990 |
| "Mound near South-end Settlement" (South End Mound I) | 9Li3 | AMNH-114 | 50+ | Irene | Moore, 1897: 75–81; Larsen and Thomas, 1986: 5–21; Larsen, 2002 |
| South End Mound II | 9Li273 | AMNH-121 | 15+ | St. Catherines | Larsen and Thomas, 1986: 21–41 |

As we pointed out in our discussion of radiocarbon dating on St. Catherines Island (chap. 13), carbon is found in both stable and unstable isotopes; these are essentially the same molecule, with differing numbers of neutrons in the nucleus. One stable form, $^{12}C$, makes up about 99 percent of the world's carbon. While also stable, $^{13}C$ accounts for only about one percent. The unstable isotope, $^{14}C$, most familiar to archaeologists because of its important implications for dating technology, is extremely rare.

The $\delta^{13}C$ value of bone collagen is influenced by the photosynthetic pathways of the plant foods involved and the differential inclusion of various marine resources. With regard to photosynthesis, researchers have established that some kinds of plants differentially absorb these carbon isotopes (e.g., Vogel, 1980; O'Leary, 1981; van der Merwe, 1982, Schoeninger et al., 1983, 1990). The first such "pathway", discovered in experiments with algae, spinach, and barley, converts atmospheric carbon dioxide into a compound with three carbon atoms. This so-called $C_3$ pathway is characteristic of sugar beet, radish, pea, and wheat; along the Georgia coast, most plants consumed by aboriginal peoples belong to the $C_3$ pathway. A second pathway converts carbon dioxide from the air into a complex compound with four carbon atoms. This $C_4$ pathway includes many plants from arid and semiarid regions, such as maize, sorghum, and millet—the cereal staples of the Americas and Africa. A third CAM pathway (an acronym for "crassulacean acid metabolism") exists in succulents, such as cactus.

These findings are relevant for reconstructing past diets since human bone reflects the isotopic ratios of various plants ingested. By determining the ratios of carbon (and sometimes nitrogen) isotopes contained in bone collagen, bioarchaeologists can reconstruct the dietary importance of various economic plants and animals, using the $\delta^{13}C$ value of bone collagen has become a proxy for estimating the relative degree of maize consumption (e.g., Vogel and van der Merwe, 1977; Buikstra et al., 1987).

Some problems arise in places like St. Catherines Island because carbon isotopes are insufficient for distinguishing between maize and marine foods (Schoeninger et al., 1990: 84). Marine fish and mammals have $\delta^{13}C$ values that fall between the two extremes represented by the food chains involving plants in the $C_3$ and $C_4$ pathways (Schoeninger and DeNiro, 1984; Schoeninger et al., 1983; Norr, 2004). This means that in places where maize (or other $C_4$ plants) are not ingested, then the $\delta^{13}C$ values in human bone collagen provide a proxy reflecting the inclusion of marine foods (Tauber, 1981; Schoeninger et al., 1983; Sealy and van der Merwe, 1986). In environments like St. Catherines Island, however, where maize was introduced into diets already dominated by marine foods, the carbon isotope values no longer distinguish the key dietary components. "Identical bone collagen $\delta^{13}C$ values could be produced from a diet of 90 percent marine food and 10% $C_3$-based food as well as a diet of 50 percent maize and 50 percent $C_3$-based food. For this reason, it is not possible to use $\delta^{13}C$ values, in isolation, to monitor the introduction of maize into the Georgia coast" (Schoeninger et al., 1990: 84).

Fortunately, monitoring nitrogen isotope ratios provides a way to clarify this situation. Controlled laboratory and field studies have demonstrated that the ratio between $^{15}N$ and $^{14}N$ isotopes in animal tissue reflects (with appropriate transformations) the $^{15}N/^{14}N$ ratio ingested as food (Wada and Hattori, 1976; DeNiro and Epstein, 1981). These findings indicate that in many parts of the world, including the Georgia coast (Schoeninger and DeNiro, 1984; Norr, 1995; Schoeninger, 1995; Hutchinson et al., 1998), the average $\delta^{13}N$ values between marine and terrestrial organisms differ by about 10‰ (parts per thousand). "Thus, if the nitrogen isotope ratio becomes less positive through time (indicating increasing dependence on terrestrial foods), or remains constant *but* the carbon isotope ratio become more positive through time, then it can be concluded that maize has been included as a diet item" (Schoeninger et al., 1990: 84). In other

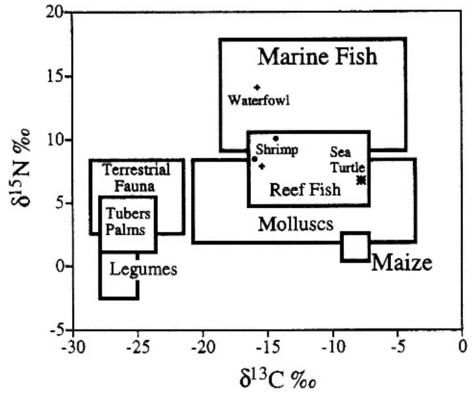


Fig. 24.13. Middle-range expectations for carbon and nitrogen isotope ratios in major foods eaten by humans in the circum-Caribbean region (after Larsen et al., 2003: fig. 3.1).

words, for aboriginal populations of coastal Georgia where, at least during the historic period, marine resources and maize were both consumed, the combined ratio of carbon and nitrogen isotopes (expressed as bivariate plots) provides a way to estimate human diet.

Before stable isotopes can be used to reconstruct human dietary change on St. Catherines Island, it is necessary to first develop the middle-range theory linking specific isotopic ratios with the plants and animals involved (e.g., DeNiro and Epstein, 1978; Keegan and DeNiro, 1988; Schoeninger et al., 1990; Hutchinson et al., 1998; Norr, 2004). Investigators began by classifying modern plants according to the appropriate photosynthetic pathway, then measuring the carbon and nitrogen isotopic ratios. Due to the variability observed among living plants, average isotopic ratios were used as estimates. Appropriate isotope ratios are required for the various meat sources as well, since the aboriginal inhabitants of St. Catherines Island almost certainly also ate meat. These results were less satisfactory because of the difficulty in estimating the percentage of $C_3$ and $C_4$ plants consumed by these long-dead herbivores. Figure 24.13 summarizes the middle-range expectations of carbon and nitrogen stable isotope ratios for plant and animal food sources available to residents of St. Catherines Island (after Larsen et al., 2001: fig. 3.1; see also Hutchinson et al., 1998).

Stable isotope results are available from 50 human bone samples recovered from nine mortuary contexts on St. Catherines Island and these data have been published elsewhere (see Schoeninger et al., 1990; Hutchinson et al., 1998; Larsen et al., 2001).

In brief, stable isotope analysis suggested that during the Deptford period, St. Catherines Islanders pursued a broad-spectrum subsistence pattern based on hunting terrestrial animals, gathering wild plants, and consuming various marine resources. Larsen et al. (2001: 71–72) succinctly summarize the results for this early prehistoric sample as "no maize". Larsen (2001: 29; 2001: 72) concludes that by the St. Catherines period, the isotope data provide "unequivocal" evidence of "maize inclusion". The limited evidence from the Irene periods (South End Mound I) indicates "intensive use of maize" (see also Schoeninger et al., 1990; Larsen et al., 1992; Hutchinson et al., 1998). Human bone samples from the Spanish period on St. Catherines Island display a marked shift in both carbon and nitrogen ratios, which undoubtedly reflect significant increase in maize consumption by the Guale people living at Mission Santa Catalina de Guale.

These, then, are the general trends evident from stable isotope analysis. The detailed contextual specifics are considered in the period-by-period discussion in this volume (chap. 30).

## Some Implications of Increased Maize Consumption (and Other Stressors)

Analysis of stable isotope ratios leaves little doubt of an increased dependency on maize on St. Catherines Island. A host of additional bioarchaeological techniques chronicle the health-related consequences of this shift, which conform to the currently well-established pattern of diet and demographic change that resulted in an overall decline in health of many precontact Native American groups (Walker, 1985, 2001: 277).

Maize, an incomplete protein, is deficient in certain essential amino acids; this deficiency contributes to poor growth during juvenile years. Larsen and his colleagues describe a synergistic relationship that developed with the high-maize diet, in which "malnourished people are more susceptible to infection, and people with an infection have a worsened nutritional status" (Larsen et al., 2001: 75). A maize-based diet is known to inhibit iron absorption, in some cases leading to iron deficiency anemia. Additionally, this type of diet can become "a predisposing factor to dental caries and poor oral health in general" (Larsen et al., 1991: 74), and a contributing factor to conditions such as porotic hyperostosis and cribra orbitalia (Hutchinson and Larsen, 2001; Simpson, 2001). Larsen (1990: 13) has tallied up the stress factors that come into play with an increasing dependence on maize agriculture: increase in nonspecific bone infection, increase in dental caries, decrease in degenerative joint disease (osteoarthritis), decrease in craniofacial, tooth, and postcranial size, decrease in skeletal robusticity and bone strength, decrease in body size and stature.

Increased maize consumption is only one kind of "stress" that can create responses in human hard tissue. Generalized biological stress is a behavioral impact that cannot be directly observed in archaeological skeletal populations. Past nutritional deficiencies, however, can be inferred from the pattern and severity of the effects of stress on individuals, as well as the distribution of that stress on the contemporary population. So viewed, the degree of physiological disruption depends on both the severity of environmental stressors and the adequacy of host response.

A range of cultural factors—technological, social, and even ideological—can dampen the effect of stress on human populations. A particular nutritional constraint can, for instance, be overcome by technological changes that broaden (or intensify) the subsistence base, social modifications that effectively distribute food to those in need, or an ideology that rewards and reifies sharing. Likewise, culture can increase stress. Intensifying agricultural production is known to increase the potential for nutritional deficiencies and infectious disease, and a reliance on single crops makes populations vulnerable to drought-induced crop failure and protein inadequacies. When insufficiently buffered, stress creates physiological havoc by disrupting growth, decreasing fertility and fecundity, triggering (or intensifying) disease, and in some cases, causing death.

The human skeleton retains evidence of stress in several ways: As some investigators put it, "Bone provides a 'memory' of past events and the behavior of its cells up to the point of the individual's death." Numerous methods exist for evaluating the ways in which environmental stress affects the growth, maintenance, and repair of the long bones.

Past nutritional deficiencies can be inferred from the pattern and severity of the effects of stress on individuals, as well as from the distribution of that stress on the contemporary population. One particularly useful technique for monitoring physiological stress is the analysis of dental hypoplasias, or growth arrest lines that form from birth through six years of age. Hypoplasias are often evident from gross examination, although some investigators also look at enamel cross sections. Not only does the presence of hypoplasias betray the presence of environmental stress, but their size can also be measured, allowing estimates of the duration of metabolic stress to be made.

In their study of enamel hypoplasias, Hutchinson and Larsen (1990) examined 228 dentitions from St. Catherines Island. While consideration of specific evidence will appear in the period-by-period discussion, the hypoplasia study found that the proportion of individuals affected by enamel hypoplasias increased through time on St. Catherines Island, and the width of these hypoplastic defects likewise increased through time. Hutchinson and Larsen (1990: 50) interpreted these results to mean "either an increase of duration of stress, or an increase in the severity of stress events, or a combination of both." A subsequent reexamination and expansion of these results (Hutchinson and Larsen, 2001: 198–199) reinforced the conclusion that "the transition from a lifeway based on foraging to one based at least in part on maize agriculture occasioned relative greater metabolic stress than did the transition in lifeway associated with the arrival of European and the establishment of mission centers. A second explanation is that the late prehistoric populations were under increased stress for other reasons, such as intrapopulation conflict, scarce resources, or internal strife.'' (see also Larsen and Hutchinson, 1992).

Analysis of the structure of limb bones from St. Catherines Island indicates a complex history. Ruff et al. (1984) found that the postcranial skeleton became progressively less robust during the precontact period, a trend that reflects a decline in both body size and body strength. Furthermore, this progression likely reflects changes in behavior and dietary conditions involved in the transition from foraging to part-time maize agriculture.

The stable isotope results are thus complimented by the analysis of stress responses in the St. Catherines Island populations. The human skeleton retains evidence of stress in several ways and numerous methods exist for evaluating the way in which environmental stress affects the growth, maintenance, and repair of the long bones. These methods include analysis of dental hypoplasias, biomechanical analysis, microscopic examination of dentition, reconstruction of ancient demographic profiles, and stable isotope analysis. In subsequent chapters, we rely heavily on the bioarchaeological evidence to reconstruct patterns of dietary intake (particularly the ingestion of domesticated plants, specifically maize), epidemics, food shortages, and nutrition over the past 5000 years on St. Catherines Island.

## NOTES

1. University of Georgia field notes also mention finding a second mound in the general vicinity, indicating they had encountered Seaside Mound II as well.

2. The lighthouse was never built. Based on documentation preserved in the John Bonner Archives, we know that on March 3, 1893, the Savannah-based Light House Board approved an expenditure of $20,000 for construction on St. Catherines Island, and an appropriate site was selected near Seaside Field. When Mr. John L. Rauers (then owner of St. Catherines Island), however, demanded additional compensation, the Light House Board initiated a condemnation case to acquire title through the United States Courts. Over the next decade, several court hearings took place until finally, on April 1, 1905, the Light House Board elected to discontinue condemnation proceedings, and the project was soon abandoned altogether.

3. Some disparity exists here between Moore's use of ''King's New Ground Field'' and our usage as ''King New Ground Field.'' Throughout our St. Catherines Island research, we have relied on the names recorded on the circa 1890s antebellum field maps (see chaps. 1 and 5).

4. We gratefully acknowledge the assistance of Dennis Blanton and the administration of Fernbank Museum of Natural History (Atlanta) for their help in making the necessary specimens available to us for additional analysis.

5. We suspect that ''South New Ground Mound'' is Moore's ''Mound near Middle Settlement'', excavated as part of his Island-wide reconnaissance in the fall and winter of 1897. Moore trenched this mound ''in various directions … [but] without result'' (1897: 81). Finding no burials, Moore dismissed the site as ''domiciliary''.

# CHAPTER 25. THE ARCHAEOLOGY OF MEETING HOUSE FIELD (9LI21)

David Hurst Thomas

with contributions by Michael A. Russo and Rebecca Saunders

Lewis Larson recorded the Meeting House Field site on August 11, 1959, assigning the number 9Li5 in the Georgia Historical Commission records. On the Georgia Archaeological Site Form, Larson mapped the site as a 2–3-acre Wilmington period occupation, situated in the open pastureland "about ¼ mile from marsh edge around old saw mill … near a large saw dust pile." Located in a fallow field, the archaeological deposit was an "evenly scattered blanket of shell over a flat area back from the marsh." Larson also recorded a Lamar occupation (then designated as 9Li6) "about 500′ along marsh edge … [situated] between two arms of the marsh, due west of 9Li-5." These two sites were subsequently combined into a single designation (9Li30) in the Georgia Archaeological Site File records.

During the summer of 1969, Joseph Caldwell and his University of Georgia field crew recorded the "Sawmill Site" (designated by him as 9Li21), which corresponds to Larson's site 9Li5. Caldwell's field notes indicate that his crew made three separate surface collections from 9Li21 that summer. Caldwell termed the pottery "protohistoric, one of the 'Lamaroid' assemblages found on the island." Caldwell also noted that Woodrow Rogers had previously made a small test excavation in one of the numerous shell middens evident along the western shoreline.[1] In 1975, we returned to this same site, designating it "Meeting House Field, AMNH-203."

## OBJECTIVES

We decided to excavate at Meeting House Field in 1975 to provide an occupational counterpart to the mortuary excavations being planned for elsewhere on the island. Our initial objective was largely chronological: (1) We were anxious to recover a sample of late prehistoric ceramics from this site, accompanied by charcoal and shell samples for $^{14}C$ dating and (2) we were also in the early stages of our long-term study of seasonality in *Mercenaria*, and we wanted to recover a controlled series of relevant zooarchaeological samples.

At the time, we felt that these discrete middens were likely associated with buried structural remains (in the nonshell area of the site). We reasoned that if we could adequately control the macro- and microchronology at Meeting House Field and if the site had a relatively short period of aboriginal occupation, then perhaps we could work from the discarded shell heaps to the house foundations that might be nearby. We never tested this notion at the site, however, and after the 1975 testing, we shifted our excavations to mortuary contexts and concentrated on designing the Island-wide transect sampling strategy.

In 1988, as part of our archaeological research effort on St. Catherines Island, Rebecca Saunders returned to Meeting House Field (Saunders and Russo, 1988). Our previous research suggested to her that the 9Li21 "might be useful in a research project designed to study pottery change during the Mission period. … [T]he ceramic assemblage from [this] late Irene period site would provide the necessary baseline data from which to study change during the subsequent Mission period. The site needed to be a single component site to avoid confounding the study with transitional attributes. In addition, the site could not be a seasonal or special purpose site that might not contain a full range of pottery forms or decorative attributes. Finally, the location of the site on the same island as the next contexts considered, those from the Mission Santa Catalina, helped to control for variability in stylistic attributes between major drainages observed by Caldwell (1971) along the Georgia Coast" (Saunders, 2000a: 61).

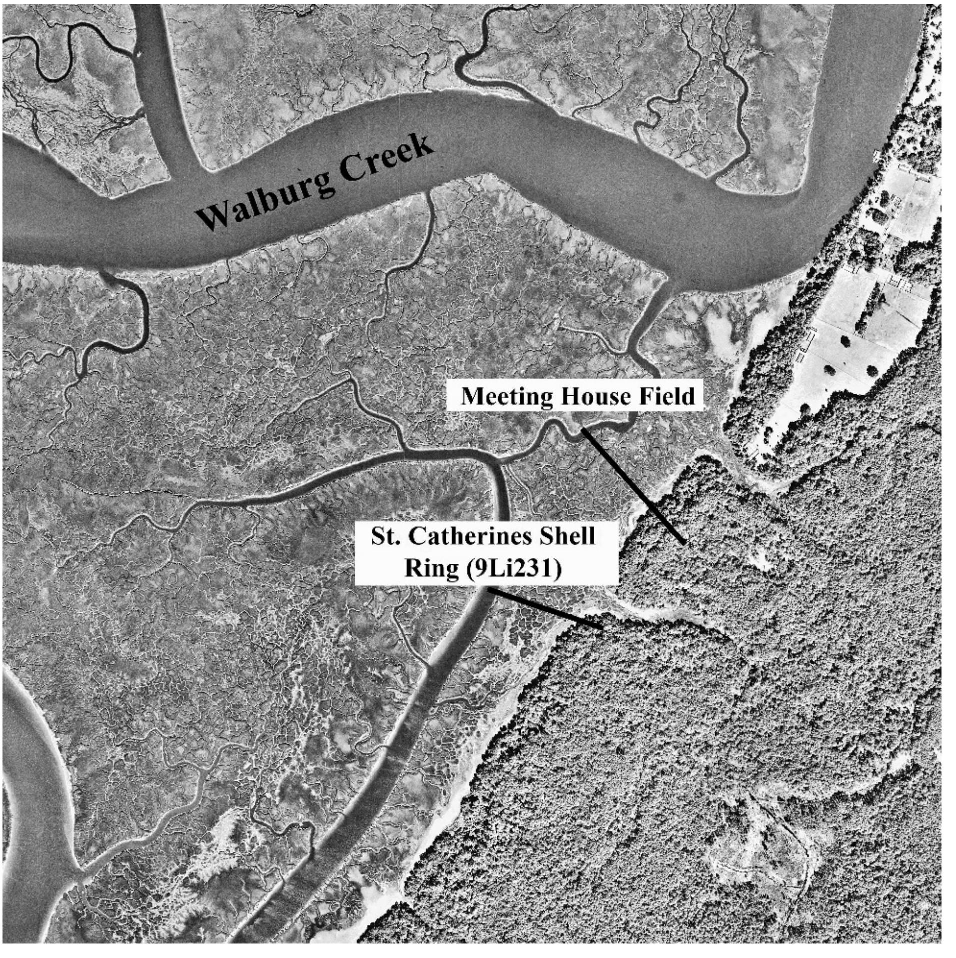


Fig. 25.1. Aerial photograph showing the location of Meeting House Field (9Li21) relative to Walburg Creek, St. Catherines Shell Ring (9Li231), and the animal pastures that today serve as part of the Wildlife Conservation Society facility (upper right in the aerial photograph). Note the antebellum field boundary that surrounds Meeting House Field on three sides; the archaeological middens occur throughout the plowed field and along the undisturbed marsh margin.

Saunders executed a comprehensive program of site mapping and testing; she also utilized the Meeting House Field assemblages in her doctoral dissertation (Saunders, 1992). Michael Russo (Saunders and Russo, 1988; Russo, 1991) analyzed impressed odostomes (*Boonea impessa*) and *Mercenaria* recovered during Saunders' excavations at Meeting House Field. Subsequently, Joel Dukes analyzed the vertebrate faunal remains from Meeting House Field as part of his M.A. thesis project at the University of Georgia (Dukes, 1993; see also chap. 27, this volume).

## METHODS: MAPPING

The 1975 explorations concentrated on the relatively discrete and undisturbed shell middens located outside the boundaries of Meeting House Field (see fig. 25.1), because the shell middens within the field margins were leveled and disturbed by antebellum agricultural activities. In the initial 1975 sketch map, we assigned each shell concentration a lettered designation and numbered each subsequent test pit. Richard Gubitosa prepared a plane table and alidade map and assigned a letter designation to each of the visible midden concentrations (fig. 25.2).

Rebecca Saunders worked at Meeting House Field between November 20 and December 1, 1988 with a crew numbering between four and seven persons (Saunders and Russo, 1988). They began by mapping the plowed area inside Meeting House Field proper and, after establishing a transit station (labeled 0N, 0W, see fig. 25.2), the survey team ran a baseline roughly parallel to the field boundary ditch. This primary baseline initially extended 100 m to the south and 180 m north before the sightline was blocked by trees. The southern baseline was eventually extended to the creek bank with the transit, but a hand compass was used to orient the grid north of 180N 0W.

Saunders placed pin flags at 10-m intervals along this line, and east–west lines were shot by transit in order to establish a 10-m grid system across the area to be mapped. The survey team of four spread across the 10-m interval, with crew members positioned on either end of the group taking compass readings. Because all visible relief was destroyed during antebellum agricultural activities, the presence of surface middens was established by probing and marking with pin flags. These were used to plot the distribution of buried shell concentrations as the survey line moved eastward. The buried midden concentrations were further defined by additional probing and working from known concentrations outward to determine the margins, which were pin-flagged and ultimately mapped. In some places (such as Middens 1 and 24), the midden boundaries were difficult to define, which suggested that repeated plowing mixed several once distinct middens.

Toward the end of the 1988 field season, the survey team attempted to define the eastern boundary of the Meeting House Field site (near the large sawdust pile previously noted by Lewis Larson and Joseph Caldwell). In this direction, the middens were more sporadic, but it is clear that the archaeological deposits continue for at least 250 m to the east; informal surface survey suggested that the actual boundary might extend twice that distance, with some of the easternmost middens retaining some of their original topography. According to Saunders and Russo (1988), "The most interesting feature located during this last phase of probing was an area distinguished by its lack of shell. Just east of the 100E line no shell was encountered on any of the six transects tested for 50 m further east; midden deposits resumed after 50 m. This non-shell area may be a plaza, a feature of most Creek and Creek-related cultures of the early historic period."

The resulting map provides a generalized picture of the plowed portion of Meeting House Field. Coverage in the central, 500 × 100 m area was complete (except for the field ditch itself and the area between Middens 7 and 9, which was only partially probed). The initial (1975) map of the westernmost, unplowed area may have missed one or more midden concentrations, and because the map was prepared without probing, the relative sizes of the middens in this area may not accurately reflect their subsurface extent.

During the winter of 1990, Joseph Jimenez began a detailed topographic map of the Meeting House Field site. Using a Leitz Total Station SET 4A and Leitz SDR24 data collector, he established a new datum point and collected topographic data within 20 × 20 m blocks. This procedure was completed in anticipation of more intensive remote sensing investigations, which have not yet taken place.

## METHODS: EXCAVATION

Our field crews tested 5 of the 13 middens present along the western extension of the site (located in the portion of the site undisturbed by antebellum agriculture). Excavations were conducted in 1 × 1 m test pits, with 10-cm levels; all fill was screened through 1/4-in. mesh screens.

Midden B is a shell midden measuring 15 m east–west × 7 m north–south. The eastern margin had been cut by the antebellum field boundary; we excavated a 2 × 1 m unit to a depth of 100 cm. Midden D is a small oyster shell mound measuring about 3 m in diameter. The first 1 × 1 m test unit

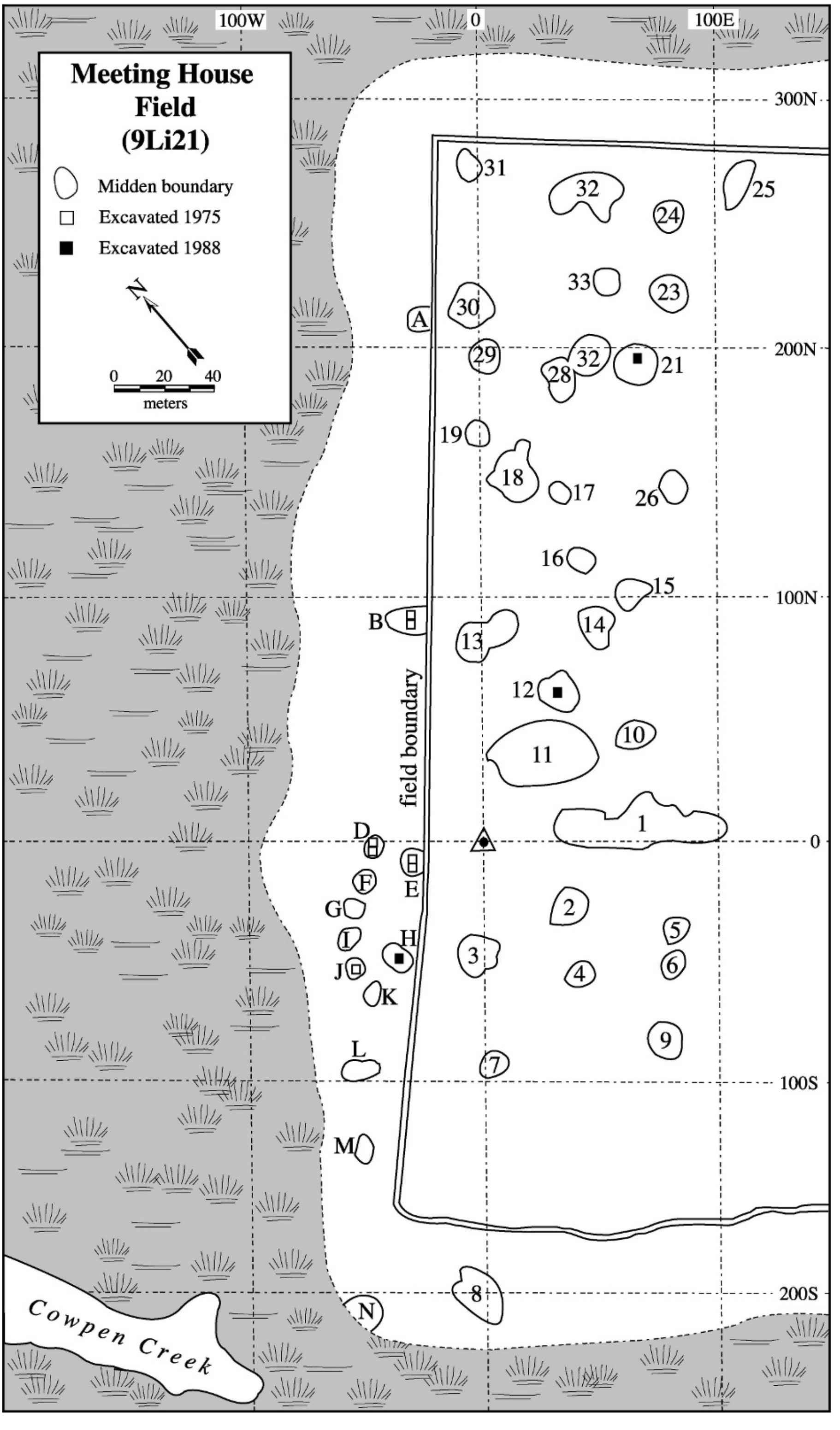


Fig. 25.2. Distribution of shell middens at Meeting House Field (9Li21; after Saunders, 2000a: fig. 5.2).

was excavated to a depth of 70 cm and Test Pit 2 (also 1 × 1 m) reached a depth of 80 cm below surface. Midden E measures 10 m east–west and 15 m north–south; the eastern part of Midden E is cut by the antebellum ditch. A portion of the extreme northern end had been previously disturbed (presumably by Mr. Rogers, as mentioned above). The initial 1 × 2 m control pit was excavated to a depth of 110 cm below surface; a second 1 × 2 m was also excavated to a depth of 110 cm below surface. Midden J is a circular shell midden measuring 2–3 m in diameter, into which a 1 × 1 m unit was excavated to a depth of 80 cm below surface.

In her mapping operation of 1988, Saunders noted that, whereas the midden area inside the field boundary was heavily disturbed by plowing, two areas (Middens 12 and 21) retained some measure of visible relief. Saunders believed that these middens might retain some internal integrity, and because of this she selected them for testing.

The 1988 excavations were conducted in 2 × 2 m squares, positioned on the highest portion of the midden and oriented to conform to the topographic outlines. Line-level depths were taken relative to the highest corner of the unit, where 50 × 50 cm column samples were taken as well. Column samples were also taken from the 1975 excavation units (which were not backfilled). These column samples were water-screened through nested 1/2-, 1/16-, and 1/36-in. screens. Michael Russo analyzed the *Boonea impressa* recovered from this water-screening operation (see below), but the remaining column samples remain unanalyzed (and these are presently curated at the Florida Museum of Natural History).

Saunders also excavated 2 × 2 m excavations units in the previously untested Middens H and M (located in the undisturbed western portion of the site) using 1/2- and 1/4-in. screens; they also took 50 × 50 cm column samples from the newly excavated units and from the exposed sidewalls of the units excavated in 1975. The column samples were water-screened in 1/2-, 1/16-, and 1/36-in. screens and column samples were taken.

All excavations in 1988 were conducted in arbitrary 10-cm levels, and the recovered fill was sifted through nested 1/2- and 1/4-in. screens. All whole clams, clam umbos, and terminal edges were saved, as was a sample of 100 whole oysters (from every other level). Oyster and charcoal samples were collected for $^{14}C$ dating.

Seeking buried domestic structures, the 1988 excavation team opened four additional 1 × 2 m units between Middens C and E. Due to time constraints, however, only one level was completed in each unit, not reaching a depth that was sufficient to locate any subsurface architectural features.

## STRATIGRAPHY AND FEATURES

In general, the midden matrix at Meeting House Field consists mostly of whole and broken oyster shell, with occasional clam, stout tagulus, ribbed mussel, and whelk shells present. Excavation proved to be straightforward, with some areas, particularly in the larger middens, possessing a matrix of almost entirely shell and very little soil. Stratigraphic differences were difficult to define and features were quite rare. Only a single feature was recorded during the 1988 season, a possible posthole or root/rodent disturbance extending 55 cm into sterile sand beneath Midden 21. A small burned clay lump was recovered from this feature.

## RADIOCARBON DATING

Charcoal and shell samples were routinely collected for $^{14}C$ dating during the 1975 excavations at Meeting House Field, and we processed two samples (UGA-1009 and UGA-1010; see table 13.4).

Thomas returned to Midden E at Meeting House Field in April 1987 to obtain paired oyster shell–charcoal samples, in the attempt to define a local ‘‘reservoir effect’’, which at the time was viewed as a major obstacle of fully understanding the cultural chronology of St. Catherines Island. Most of the previously sampled charcoal came from the north and west corners of Control Unit I (in Midden E). The sidewalls had slumped considerably since the 1975

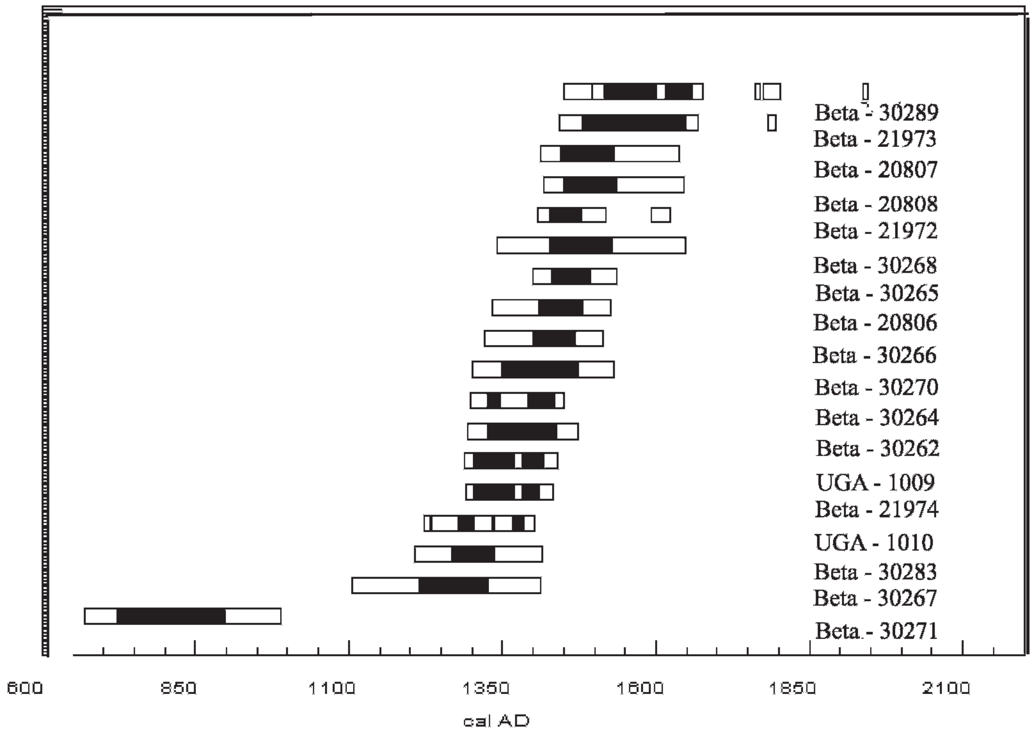


Fig. 25.3. Individual probability distributions for the 18 available radiocarbon dates from Meeting House Field; raw data are listed on table 13.3.

excavation, so we cleared a new 50-cm-wide exposure along the western exposure. The surface of the mound had been previously recorded as 25 cm below datum. New oyster shell samples were collected at 30–35 cm, 60–70 cm, and 80–90 cm below datum.

Saunders collected additional $^{14}C$ samples from each midden excavated during the 1988 season, and radiocarbon determinations were processed on samples recovered from Middens 12, 21, H, and N.

We now have 18 radiocarbon dates from Meeting House Field (listed in table 13.4), and these results were standardized according to the protocols developed in chapter 13.[2] The probability distributions of the individual dates are plotted in figure 25.3 and the pooled probability distribution appears in figure 25.4.[3] The remaining 17 dates define a probability distribution, with one-sigma limits ranging between cal A.D. 1300 and cal A.D. 1520 and two-sigma limits of cal A.D. 1190–1670.[4] This distribution is slightly bimodal, but the distinction is not statistically significant. The confidence limits of this probability distribution corresponds almost precisely with the limits of the Irene period as defined in the St. Catherines Island chronology.[5]

In chapter 15, we noted that two of the Meeting House Field dates (Beta-21973 and Beta-30269) might overlap with the Spanish contact period. Date Beta-21973 was processed on charcoal removed from a dense concentration encountered in the northern portion of Control Pit 1 (level 40–50 cm). Fieldnotes from March 24, 1975, indicate the possibility of an intrusive pit excavated from the surface. Beta-30269 was processed on charcoal recovered from "an undisturbed Irene period midden adjacent to the tidal marsh, 20–30 cm below surface" (Field notes, 11/28/88).

Absolutely no artifacts of European manufacture were recovered during our excavations, and because of this we believe that these two dates likely fall within the

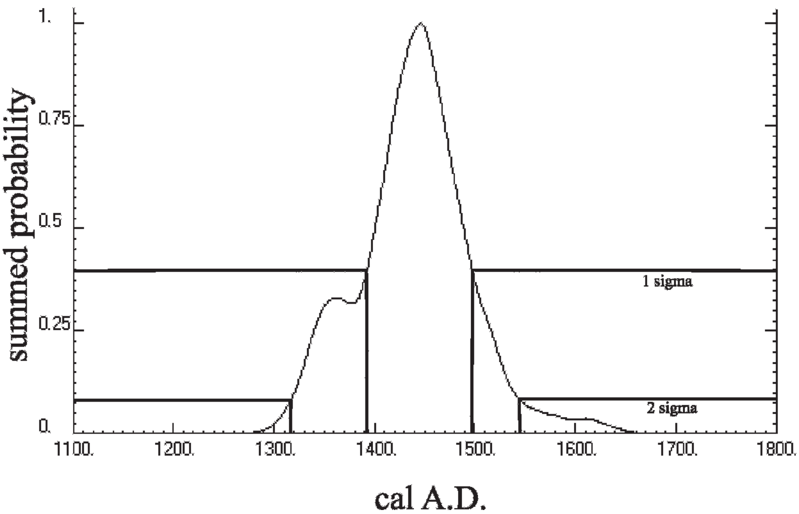


Fig. 25.4. Overall probability distribution for the $n = 18$ radiocarbon dates from Meeting House Field.

overall probability distribution of the Irene period. We will subsequently treat the Meeting House Field occupation as dating entirely to the pre-A.D. 1580 era, uncalibrated.

## MATERIAL CULTURE[6]

### Aboriginal Ceramics

The various excavations at Meeting House Field produced a ceramic assemblage of 2453 aboriginal sherds, all of which can be attributed to the Irene period. This assemblage has been discussed elsewhere (Saunders, 2000a: 68–69, appendix A) and will not be further considered here.

### Sherd Hones

Saunders and Russo (1988) note that a great many of the sherds recovered from Meeting House Field had been reused as hones. Of the 51 ceramic hones so identified, 30 were constructed of sand-tempered sherds and the rest were grit tempered. This evidence might be seen as supporting the contention by Caldwell and McCann (1941: 53) and Larson (1984: 67) that woodworking (or perhaps bone awl manufacture) was more prevalent during the Savannah and Irene periods than during previous time periods. We also note, however, the relatively large number of sherd hones (abraders) recovered from the Refuge-Deptford burial mounds on St. Catherines Island (Thomas and Larsen, 1979).

### Ceramic Pipes

Several smoking pipe fragments were recovered at Meeting House Field. A plain, unburnished elbow pipe was found in Midden H (Level 6). It is complete, except for a small piece of the rim. The paste of the pipe is sand with some grit, and the clay is micaceous. A small heel is present where the abbreviated stem meets the bowl. The interior of the pipe is not burned or sooted, indicating that it may never have been used.

A second pipe, found in Level 3 of Midden M is more elaborate (illustrated in Saunders, 2000a: fig. 5–4); the stem and the top of the bowl are missing. The paste contains sand and mica, and the surface is highly burnished. The incised decoration is a zoomorphic motif that appears to be a bird, rendered in the style of the Southeastern Ceremonial Complex (SECC). A long, beaklike design is incised on the bowl and a curved clay strip (beneath the bowl) perhaps indicating a mouth (Saunders, 2000a: 63). Although half of bird's eye is missing, it is "weeping", but it does not appear to be forked (Emerson, 1989: 75–76) Wavy lines extend downward from the eye, embellishing a pronounced spur at the base of the bowl. The incising may represent the eagle warrior (see Larson 1958b: 428; Cook and Pearson, 1989). Larson (1958b: 420) argued that the ca. 1.3 mm-wide incising may be too wide for McIntosh Incised, but it was clearly incised after the vessel dried. Similar iconography is most common on the Piedmont during the Savannah Period (Hally and Rudolph, 1986: 59) and lasting into the early 17th century (Smith, 1989: 146). On the Georgia Coast, SECC symbolism appears to be restricted to the Irene period, and the Meeting House Field specimen certainly conforms to this generalization.

Another molded and incised pottery fragment—perhaps a pipe fragment—was recovered from Midden M (Level 4). The decorations appear to depict a bird's tail with incised feathers. The paste is micaceous, sandy clay, but the surface is not burnished.

In April 1984, Mr. Royce Hayes found a Euro-American kaolin pipe fragment (28.1/4086) on the surface at Meeting House Field. A significant portion of the stem and bowl are intact, although the end of the stem is broken off, and the front upper half and the upper rear rim of the bowl are chipped off; this is the most complete kaolin pipe yet recovered from St. Catherines Island. The bowl is 21.53 mm in diameter and the bore diameter is 4/64 in. In addition to burn marks, there are possible carbonaceous incrustations (burned residue of the smoking material) in the chamber orifice of the bowl. The outer left portion of the pipe is also blackened, though it is uncertain if this coloration is a result of fire.

### Other Artifacts

A loaf-shaped pottery eccentric was found in Midden H (Level 1). Flattened on one side, this object has a deep groove formed in one end. Two shallower grooves (which could be unintentional) cross below the deeper groove on the same surface. The piece was casually manufactured, with a thumb (?) print evident on the flattened side. Although it weighs only 14.4 g, the grooves suggest that it was somehow tied or suspended, perhaps as a net or other fishing weight.

Three broken hammerstones (28.0/13, 28.0/32, and 28.0/36) were recovered in the Meeting House Field excavations, and a single flake was found in the Midden B deposit.

Several whelks were recovered from the middens at Meeting House Field. All were examined for evidence of deliberate breakage and microwear. Only one, 28.3/2976 (*Busycon carica*) was positively identified as having been utilized as a tool, perhaps as an awl.

Table 25.1 describes the four shell beads recovered in the excavations at Meeting House Field.

## ESTIMATING SEASONALITY AT MEETING HOUSE FIELD

In this section, we detail the available evidence regarding season of occupation at the Meeting House Field site. This subject has been previously considered in some detail by Michael Russo and Rebecca Saunders in an unpublished, preliminary report describing their 1988 research conducted at Meeting House Field (under the auspices of the American Museum of Natural History). Most of Saunders' research has been published elsewhere (esp. Saunders, 1992, 2000a) and relevant sections are cross-referenced in this chapter. Russo (1991) has published his estimates of seasonality in oyster collections by employing measurements of impressed odostome (*Boonea impressa*) recovered during the 1988 excavations at Meeting House Field. As indicated in Table 25.2, his analysis of *Boonea* from Middens E, H, M, 12, and 21 found that oyster collection took place primarily during the fall, with summer as a secondary collection period (Russo, 1991: 219).

Russo's correlative study of seasonality in *Mercenaria* at Meeting House Field has never been published. We find considerable merit in this pioneering analysis and because this study has been cited in literature (e.g., Quitmyer et al., 1997; Saunders,

TABLE 25.1
**Shell Beads from Meeting House Field (All Recovered from Midden E)**

| Catalog No. | Site | Level | Shell type | Diameter (mm) | Length (mm) | Form | Perforation | Finishing characteristics |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 28.3/4596 | Meeting House Field 9Li21 | 7 | — | 5.2 | 2.0 | short bicone | hourglass, wobbly, off center | ground |
| 28.3/4595 | Meeting House Field 9Li21 | 7 | — | 4.4 | 2.7 | short barrel, wedge profile | hourglass, wobbly, off center | ground |
| 28.3/4593 | Meeting House Field 9Li21 | 8 | bivalve | 20.2–19.3 | 7.0 | rough blank | hourglass, very wobbly | not ground |
| 28.3/4594 | Meeting House Field 9Li21 | 9 | bivalve | 16.7–11.0 | 3.0 | rough blank | hourglass broken while drilling? | not ground |

2000a, 2000b: 35; Reitz, chap. 22, this volume), we have, in consultation with Drs. Russo and Saunders, reproduced below their 1988 analysis with only minor editorial changes. The artwork has been redrawn to correspond with the format of this volume.

Following the Russo and Saunders analysis, we recast their results by employing the modern *Mercenaria* control sample from St. Catherines Island (unavailable to them at the time of their analysis). In this way, we can express Russo and Saunders' seasonality study in terms fully compatible with the results and protocols developed in chapter 17.

## QUAHOG (*MERCENARIA MERCENARIA*) SEASONALITY AT MEETING HOUSE FIELD

MICHAEL A. RUSSO AND REBECCA SAUNDERS[7]

It has been known for years that quahogs along with other bivalves grow by accreting new shell along the ventral margin or terminal edges of their valves and that the rate of growth is subject to periodic and seasonally predictable changes in water temperature. These changes in growth rate are reflected in the ventral margin and umbonal region of the quahog shell when it is cross sectioned as seen in alternating layers of translucent (T) and opaque (O) growth. Translucent growth increments represent periods of slow growth and opaque increments represent periods of fast growth. For purposes of refining analysis, each growth stage can be subdivided into three phases. The $T_1$ phase represents the initial start, or first third, of the translucent growth period, the $T_2$ the second third, and the $T_3$ the last third when the translucent growth phase of the quahog is complete or near completion. Similar divisions are applied to the opaque phase: $O_1$, $O_2$, $O_3$ (Quitmyer et al., 1986).

### THE MODERN CONTROL SAMPLE FROM KINGS BAY (GEORGIA)

On the basis of studies from Kings Bay, Georgia (Quitmyer et al., 1986), a pattern of seasonal changes in growth rings of quahogs has been outlined. The data collected

TABLE 25.2
**Estimated Season of Oyster Collection at Meeting House Field, Based on Size Measurements of Odostomes (*Boonea impressa*) Collected during the 1988 Excavations (after Russo, 1991, table 2)**

| Midden | Level | Collection period | Archaeological sample size |
|---|---|---|---|
| E | 4 | October–November | 494 |
| H | 3 | September–October, July | 98 |
| H | 6 | September–November, May–June | 319 |
| H | 8 | October–November, May–June | 119 |
| M | 3 | October–November | 104 |
| M | 5 | October–November | 91 |
| 12 | 2 | October–November | 92 |
| 21 | 2 | May–June, October–November, July–August | 89 |
| 21 | 2 | October–November | 209 |
| 21 | 6 | October–November | 289 |

in 1983 and 1984 from Kings Bay have been redefined to six seasons of quahog growth:

| | |
|---|---|
| $T_1$ | Early spring = April, May |
| $T_{1-2}$ | Late spring = June |
| $T_2$ | Summer = July, August, September, October |
| $T_3$ | Fall = November, December |
| $O_1$ | Winter = January, February, March |
| $O_1$, $O_2$, $O_3$ | Late winter/early spring = January through May |

These groupings of months into seasons are nontraditional, reflecting groupings in which specific phases of quahog growth are similar and not easily separated from month to month within each season (fig. 25.5). For the months of early spring, the $T_1$ phase of growth is found in over 80 percent of the quahogs. In winter, nearly 50 percent of the quahogs are in the $O_1$ phase while 30 percent are in the $T_3$ phase and less significant, with important numbers also in the $O_2$ and $O_3$ phases. In summer, nearly all quahogs are in the $T_3$ phase, while in the late spring and fall just 50–60 percent of quahogs are in the $T_3$ phase. A sixth descriptive season termed "late winter/early spring" refers to the period when most $O_2$ and $O_3$ phase growth occurs. The period in which this growth occurs is rapid, and modern collections have not yet coincided with that short period of growth in which quahogs in these phases represent the primary mode. These phases occur from January through May, though they are most common from February to April (Quitmyer et al., 1986).

Grouping these modal peaks reveals the distinct differences in seasonal phases of growth. Since summer, late spring, and fall all exhibit $T_3$ peaks, the principal method to distinguish among them is through the identification of their most significant trailing tail. Summer is distinguished by nearly 100 percent quahogs in the $T_3$ phase with no distinctive asymmetry observable in the tails, while late spring has a substantial percentage in the $O_3$ $T_2$ phase, and fall has a nearly equal percentage of quahogs in the $O_1$ phase (fig. 25.5). Tracing the growth of quahogs through 1 year reveals that the translucent phase of growth begins in early spring when most quahogs are in the $T_1$ phase. Growth proceeds rapidly, so that by late spring most quahogs have gone through the $T_1$ and $T_2$ phase and are into the $T_3$ phase. In summer nearly all quahogs have reached the $T_3$ phase of growth. By fall a nearly equal percentage of quahogs have proceeded into the $O_1$ phase of growth, while entry into the $O_1$ phase slowly continues throughout the winter. Passage through the $O_2$ and $O_3$ phases is brief and occurs mostly in late winter and into early spring, when the life cycle begins anew and enters into the $T_1$ phase again.

## Analyzing *Mercenaria* Seasonality at Meeting House Field

The significance of recognizing growth phases in archaeological quahog assemblages is apparent. The large presence (over

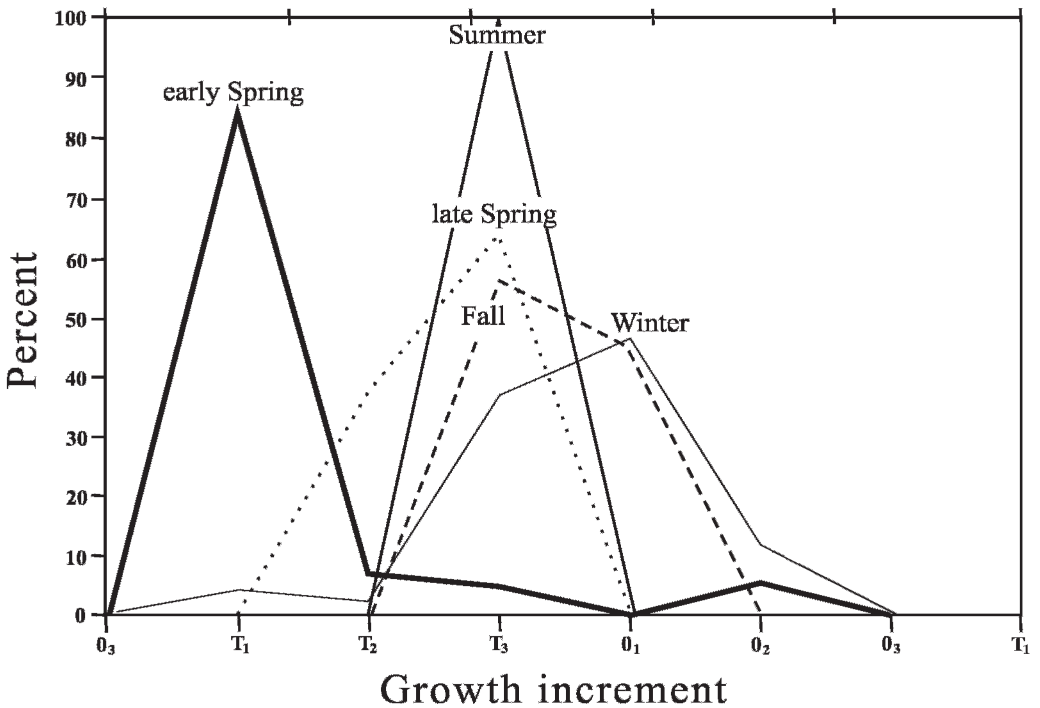


Fig. 25.5. Growth increments for the Kings Bay control sample (1983–1984) of *Mercenaria mercenaria* (data from Quitmyer et al., 1986); $n = 270$.

5%) of quahogs in the $O_2$ and $O_3$ phases indicates the collection of at least some quahogs during a very short time in the late winter/early spring. Other seasons can be retrodicted by comparing the line graph exhibited from quahogs in archaeological assemblages to those predicted from known growth patterns of modern collections. Such comparisons have been made from a variety of proveniences from Meeting House Field (figs. 25.6–25.10). Just as the proposed seasons for clam phases do not fit our traditional definitions of the four seasons, we should not necessarily expect that inhabitants of Meeting House Field exploited quahogs within the confines of our traditionally conceptualized or arbitrarily defined quahog seasons. Consequently, when comparing seasonal growth lines from modern collections to those lines from archaeological assemblages, the best fit lines often cut across our arbitrarily defined seasons to include a number of seasons or partial seasons. Similarly, archaeological assemblages often exhibit shorter term collections than seasons best defined by monthly growth curves or yearly growth curves (defined here by a line representing the equal collection of quahogs throughout the year).

Potentially, monthly or seasonal collections can be combined in an infinite number of ways to produce an infinite number of possible growth phase line graphs. For our analysis we assumed that, given similar growth phase lines and equal fit, the most parsimoniously described line was the best line to describe season of collection. For example, in any particular quahog feature exhibiting 100 percent $T_3$ phase clams, we assume the most parsimonious retrodiction would be that the quahogs were collected during the summer rather than that only O–$T_3$ quahogs were collected throughout the year. To narrow the infinite number of possible monthly and seasonal combinations we assumed that within each month of each season an equal number of quahogs were collected. When seasons were combined to obtain a best fit line we assumed

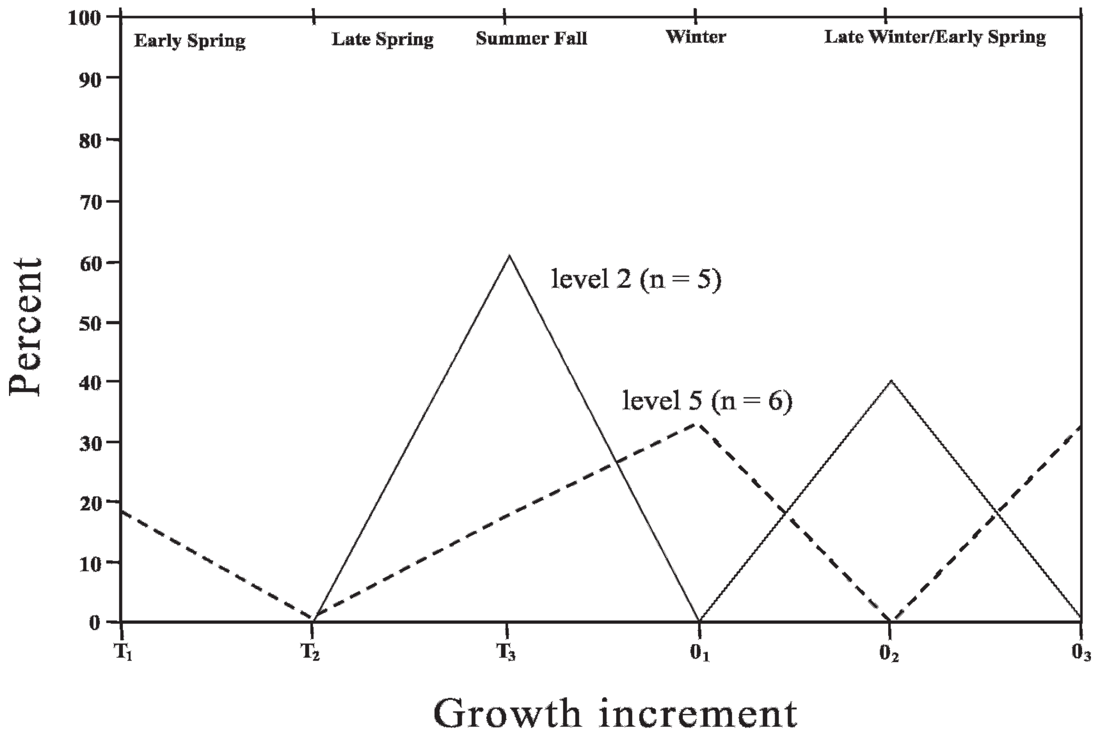


Fig. 25.6. Growth increments for *Mercenaria mercenaria* recovered from Midden 12 at Meeting House Field.

that within each season (not each month of each season) an equal number of quahogs were collected.

For example, if we suggest that a line best fits a summer growth pattern, we assume that in each of the five months of summer as defined by us, an equal number of quahogs were collected even though individual monthly or even daily collections between July and October would exhibit similar growth lines. Since we cannot separate July growth lines from October growth lines, we assume that the clams were collected sometime in summer from July to October, equally in each month. In another example, if we retrodict a summer/fall collection, we assume that an equal number of quahogs were collected in summer and in fall, not in each month of summer and each month of fall. Since there are 4 months in summer and only 2 in fall, if we assumed an equal collection each month it would yield a growth line that emphasizes twice as many summer collections as fall collections. Although unequal collections throughout the year were probably practiced by the Meeting House Field inhabitants, we assume equal collections for the sake of parsimony. When growth lines do not fit the retrodictions well, however, unequal collection is assumed to have occurred and the growth line is described qualitatively.

The quahog seasonal analysis of Meeting House Field proveniences is presented in graphic (figs. 25.6–25.10) and tabular form (table 25.3). Since the defined seasons of oyster and quahog are not synonymous, table 25.2 presents the seasonal data of oyster and quahog in terms of comparable months. Greater or lesser amounts of $O_2$ and $O_3$ were present prehistorically than with modern samples. As more modern samples are collected in shorter intervals, we should be able to pinpoint those short-lived times when $O_2$ and $O_3$ phases are the dominant mode in the growth phase. Until then, we know only that $O_2$ and $O_3$ phases most commonly occur sometime during late

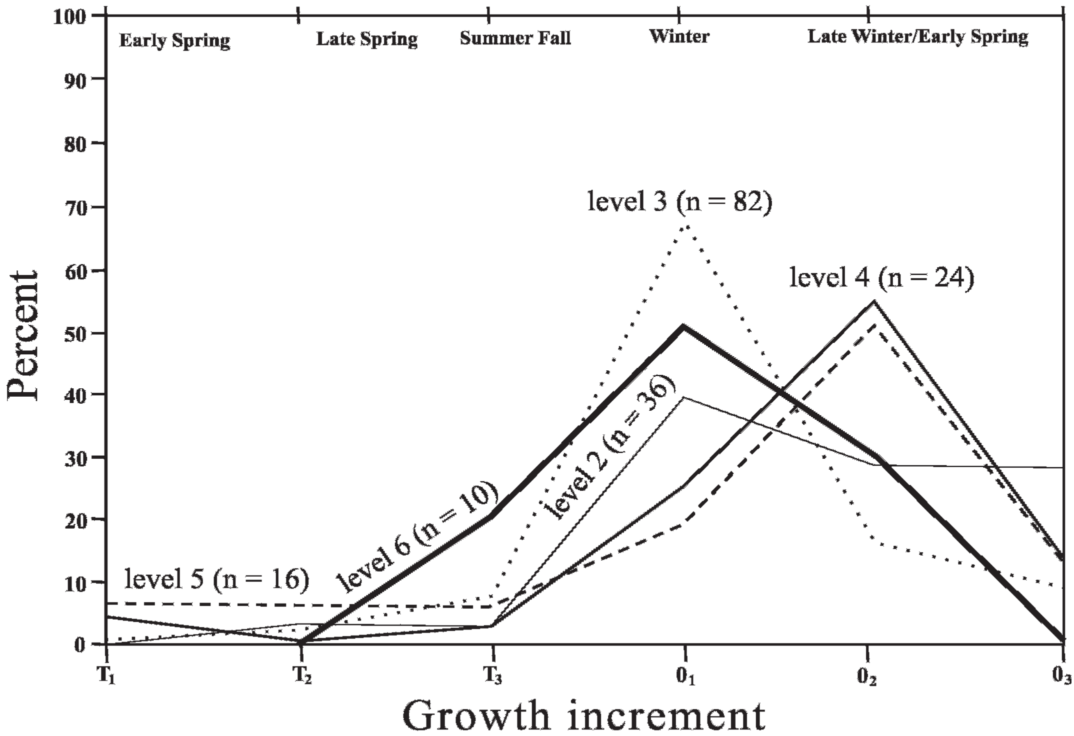


Fig. 25.7. Growth increments for *Mercenaria mercenaria* recovered from Midden 21 at Meeting House Field.

winter and early spring. In all graphs, the season of collection is indicated by the modal peak's occurrence below the particular season listed at the top of the graph. Care should be taken when interpreting the seasonality of the quahog data, however. In a number of proveniences, sample sizes are small (see sample size data on graphs). Although the seasons indicated usually agree well with larger samples in adjacent proveniences and suggest that the samples may be representative, often the small samples do not yield normal growth phase frequency curves. This suggests that those samples may be too small for definitive interpretations. Although a listing of seasons is placed at the top of each graph corresponding to the position at which seasonal modal peaks occur, the shape of the growth phase frequency curve is also important in interpreting the seasons of quahog collection. As such, the shape of the frequency curves was also referred to in the interpretation of the graphs in figure 25.10.

### Seasonal Subsistence Patterns at Meeting House Field

Analyses of seasonal indicators were undertaken to determine whether Meeting House Field was occupied year-round or whether it might have been a special-purpose site occupied on a seasonal basis. Due to the cost of determining seasonality of vertebrate remains and the limited data available on seasonal indicators in other molluscan species, quantitative seasonality studies have come to rely on a single species, quahog, to establish the season(s) of site occupation. It is possible that different molluscan species were utilized at different times of the year, and that the use of a single species to establish site seasonality could result in a skewed interpretation of seasons of occupation. This study was originally devised to compare the season of death of two estuarine species using three species of oyster, impressed odostome, and quahogs, with schlerochronological analysis of oyster abandoned.

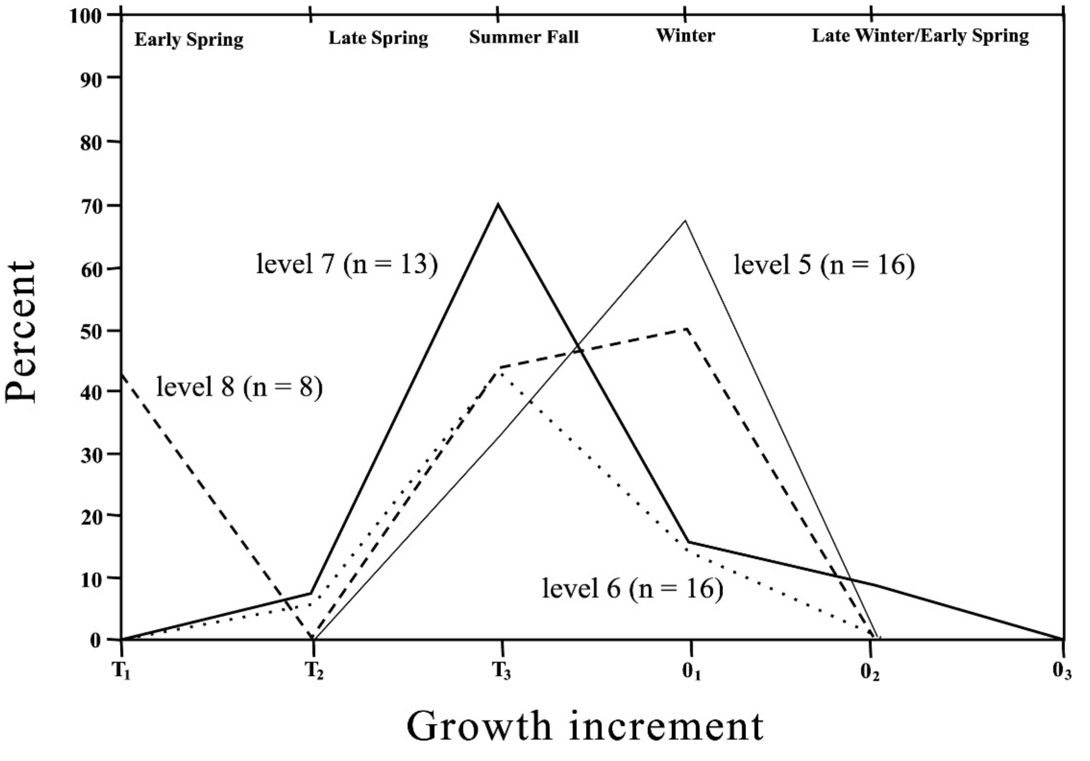


Fig. 25.8. Growth increments for *Mercenaria mercenaria* recovered from Midden H at Meeting House Field (see also fig. 25.9).

Samples were chosen on the basis of the abundance of quahogs within each provenience; odostomes were analyzed from those levels in which relatively large numbers of quahogs were recovered. Analysis of two species from the same provenience was undertaken to determine if the two most important shellfish resources were collected in the same season. In addition, we chose to examine several vertical columns from a few middens rather than single samples from areally dispersed middens to get some idea of the representativeness of a single sample and to view any possible diachronic change in seasonal occupation in a single midden.

Midden E: Only one provenience, Level 4, was analyzed for oyster seasonality. This was one of the first samples screened, and odostomes were sorted from it to get an idea of the abundance of odostomes and to assess the possibilities of subsampling. Not enough quahogs were recovered from Midden E to pursue analysis for this midden. Odostomes from Level 4 indicate that oysters were collected in the fall, from October to November.

Midden H: The three levels analyzed for oyster seasonality suggest that oyster collection was periodic and predictable throughout the deposition of midden material. Oysters were collected in the summer and fall months, from May to November, but collections were not continuous and were unequally distributed among months. Quahogs were collected in the same summer and fall months as oyster during the deposition of Levels 1, 3, 4, 7, and 8; in addition, quahogs were also collected during winter months, from December to March.

These data suggest that during the deposition of Midden H, the site was probably occupied throughout the year, with oyster collection occurring mostly in the summer and fall and quahog collection occurring

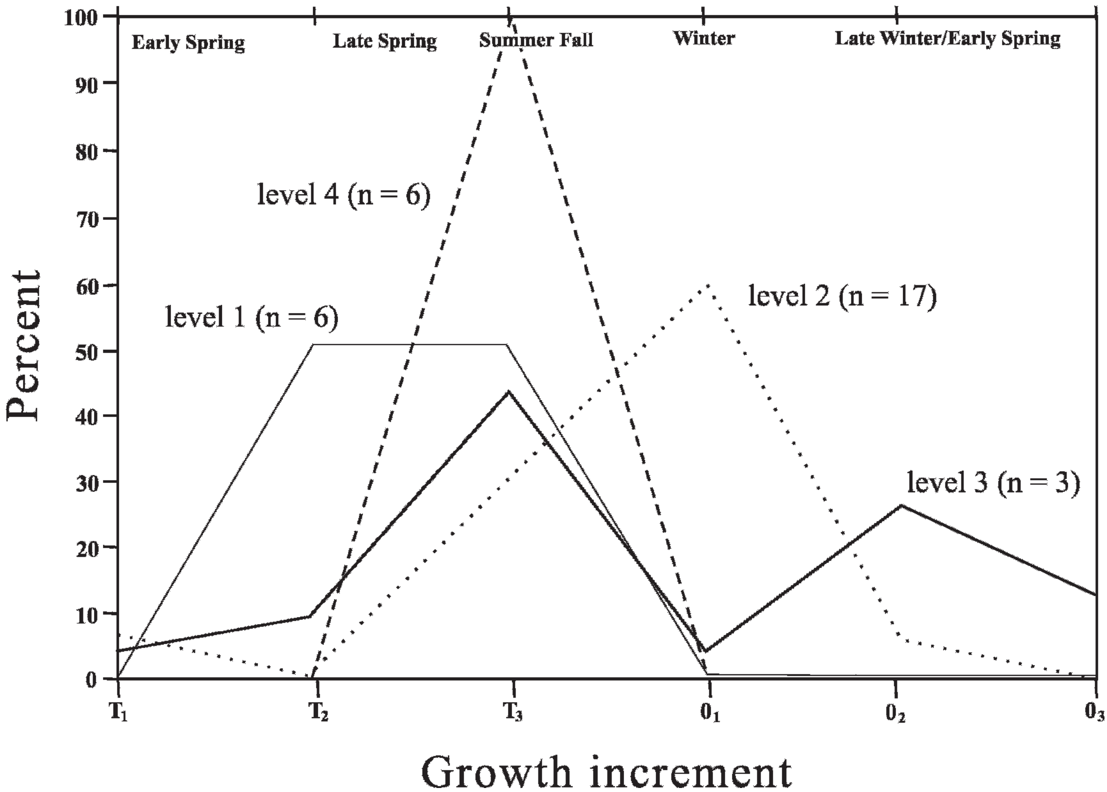


Fig. 25.9. Growth increments for *Mercenaria mercenaria* recovered from Midden H at Meeting House Field (see also fig. 25.8).

during a longer period of time, from summer to winter. Oyster was the dominant shellfish in the midden in all levels and, contrary to the prevailing models that suggest a principal reliance on shellfish during the coolest months, we can conclude that summer and fall periods were the time when most shellfish deposited in the midden were collected, with lesser amounts collected during the rest of the year.

Data from the vertical series in Midden H also indicate that a single provenience from a midden may be insufficient to describe all seasons of collection of specific resources. While the odostome assemblage from a single level exhibited a seasonal collection similar to those in the other two samples from the midden, the eight quahog samples varied in seasonality from level to level. This underscores the fact that criteria for sample adequacy may need to include the number of samples studied as well as the more traditional concerns with sample size.

Midden M: Two oyster and four quahog samples were analyzed for season of deposition. Like Midden H, oysters were collected earlier in the year, in the fall, while quahogs were collected sometime in winter or spring. Unlike Midden H, warm weather collection of either oysters or quahogs was not indicated. This may indicate that occupation was less frequent and more seasonal than found in Midden H.

Midden 12: Oysters and quahogs from Level 2 were collected in the fall, with lesser amounts of quahog collected later in the winter and spring months. Level 3 indicates that the quahog were collected in winter and spring months. Like the middens above, oyster seems to have been collected during fall months while quahog was collected during winter/spring months. Sample sizes for quahog from Midden 12

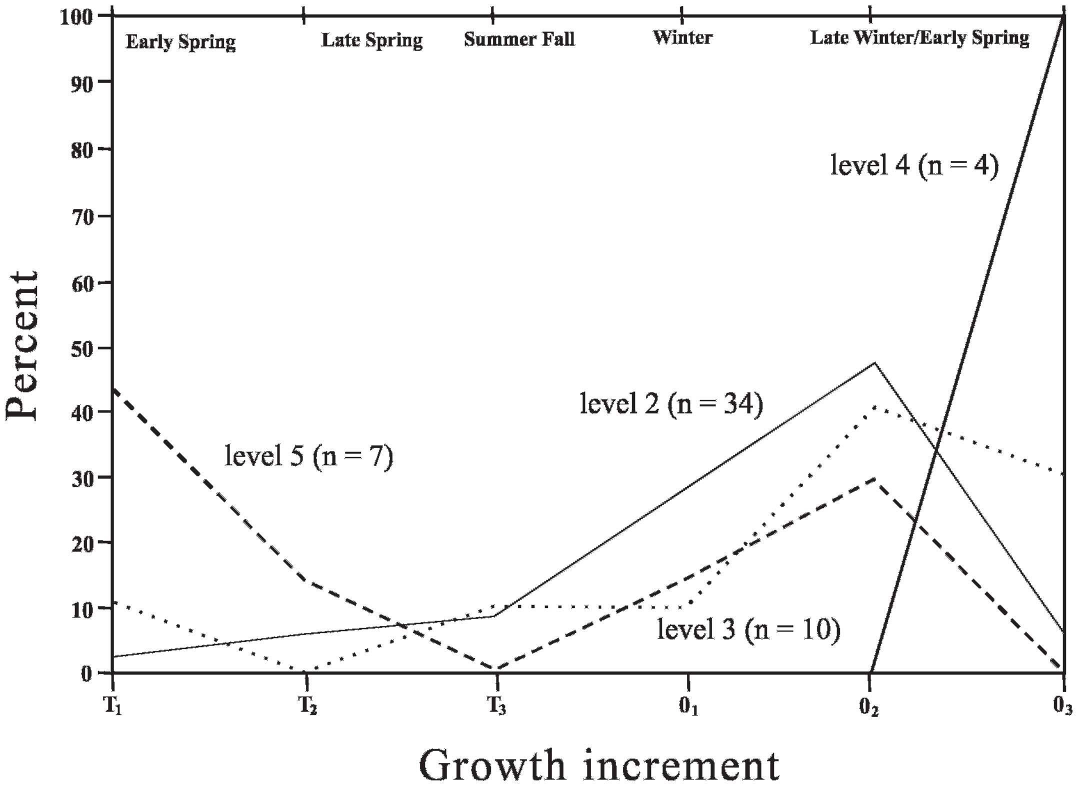


Fig. 25.10. Growth increments for *Mercenaria mercenaria* recovered from Midden M at Meeting House Field.

were small, however, and definitive statements on seasonality of exploitation of the hard clam cannot be made.

MIDDEN 21: The three samples of *Boonea* from Midden 21 indicate that oyster was collected in the warm weather months from spring to fall, with fall represented in all three samples and spring and summer in one. Quahog was collected in the colder weather months from January to March, and occasionally into May. Taken together, the seasonal data from Midden 21 suggest that these materials result from a year-round occupation.

### SUMMARY

On the whole, the data from Meeting House Field may indicate year-round site occupation, though the evidence for summer occupation is limited. These limitations make it impossible to describe summer occupation as a usual practice at Meeting House Field, but the vertebrate faunal analysis will doubtless clarify this situation (see chap. 27, this volume). Of particular interest is the marked seasonality of exploitation of the molluscs studied, with primary emphasis on oyster collection in the fall and quahog collection in the winter and spring (though both species were collected in varying amounts throughout the year). Reasons for the emphasis on different species during different seasons cannot be predicted by the mollusk's life cycle. What is made evident by the Meeting House Field analyses is that reliance on a single species to establish season of site occupation may result in biased interpretations.

## AN EVALUATION OF SEASONALITY AT MEETING HOUSE FIELD

We have included Russo and Saunders' 1988 study of *Mercenaria* seasonality be-

TABLE 25.3
**Season of Capture at Meeting House Field**[a]

| Midden | Level | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ | Total |
|---|---|---|---|---|---|---|
| 12 | 2 | 2 | 0 | 0 | 3 | 5 |
| 12 | 3 | 2 | 2 | 1 | 1 | 6 |
| 21 | 2 | 24 | 10 | 0 | 2 | 36 |
| 21 | 3 | 68 | 7 | 3 | 4 | 82 |
| 21 | 4 | 19 | 3 | 1 | 1 | 24 |
| 21 | 5 | 11 | 2 | 1 | 2 | 16 |
| 21 | 6 | 8 | 0 | 0 | 2 | 10 |
| H | 1 | 0 | 0 | 0 | 6 | 6 |
| H | 2 | 11 | 0 | 1 | 5 | 17 |
| H | 3 | 5 | 2 | 1 | 9 | 17 |
| H | 4 | 0 | 0 | 0 | 6 | 6 |
| H | 5 | 6 | 0 | 0 | 3 | 9 |
| H | 6 | 8 | 0 | 0 | 8 | 16 |
| H | 7 | 3 | 0 | 0 | 10 | 13 |
| H | 8 | 1 | 0 | 3 | 3 | 7 |
| M | 2 | 26 | 2 | 1 | 5 | 34 |
| M | 3 | 5 | 3 | 1 | 1 | 10 |
| M | 4 | 0 | 4 | 0 | 0 | 4 |
| M | 5 | 3 | 0 | 3 | 1 | 7 |
| Total | — | 202 | 35 | 16 | 72 | 325 |

[a] Data from Saunders and Russo, 1988, figs. 10–14.

cause it reports a significant piece of previously unpublished research. In the above study, Russo and Saunders calibrated the zooarchaeological samples from Meeting House Field study with the best available control data at the time, from Kings Bay, Georgia (Quitmyer et al., 1986). Previously (chap. 13), we likewise compared our St. Catherines Island control with the expanded dataset available from Kings Bay (Quitmyer et al., 1997), noting the similarity in patterning from the two locales (separated by only about 75 km). Although the hard clams from Kings Bay formed opaque shell increments between November and May, most of this growth took place between December and March. The St. Catherines Island control sample reflects a similar fast-growth interval (from mid-December through mid-June), but the inadequacies of our sample made it difficult to define a shorter phase of concentrated growth within this range. In addition, the clams growing at Kings Bay add translucent increments throughout the entire year, although slow growth increments are particularly evident between April and November. A somewhat more circumscribed pattern is evident in the St. Catherines Island sample, in which slow growth increments are entirely absent between mid-December and mid-April. This disparity may be due to sampling vagaries or difference in microhabitat between the two locales. These minor differences aside, we feel that the overall patterning in the Kings Bay and St. Catherines Island *Mercenaria* is entirely comparable.

That said, we thought it worthwhile to compare Russo's zooarchaeological data directly with the modern control data from St. Catherines Island. To do this, we have collapsed the six incremental stages from Russo's $n = 325$ *Mercenaria* from Meeting House Field into the four major subdivisions developed in chapter 17: $O_{1-2}$, $O_3$, $T_1$, and $T_{2-3}$. We then synthesized Russo's data in graphic form, to compare the zooarchaeological data from Meeting House Field with the control profile for modern *Mercenaria* (figs. 25.11 and 25.12).[8]

With these data, it is possible to reassess Russo's midden-by-midden seasonal assessments against the modern St. Catherines Island control sample.

MIDDEN H: Russo concluded that this midden deposited throughout the year, with oyster collection taking place largely during the summer and fall and *Mercenaria* collected from summer to winter. Comparison with the modern control samples from St. Catherines Island (figs. 17.4 and 25.12) confirms that *Mercenaria* from Midden H were collected almost entirely between June/July and February/March.

MIDDEN M: Russo concluded that at Midden M, oysters were collected in the fall, while quahogs were harvested sometime in winter or spring; neither species of shellfish was collected during times of warm weather. Comparison with the control data from St. Catherines Island suggest that *Mercenaria* from Midden M were collected virtually year-round.

MIDDEN 12: Despite the small sample sizes, Russo concluded that oysters were harvested during the fall months and *Mercenaria* were collected during the winter and spring months. A comparison

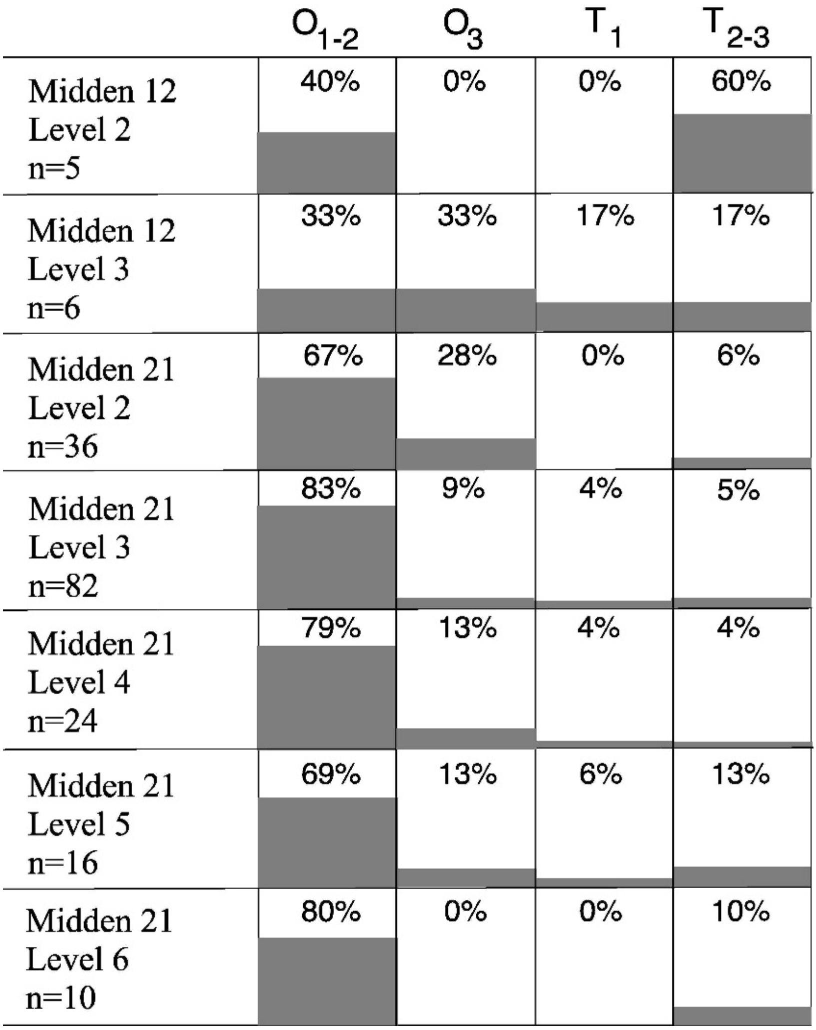


Fig. 25.11. Distribution of incremental stages observed in *Mercenaria mercenaria* recovered from Middens 12 and 21 at Meeting House Field.

with the control samples from St. Catherines Island suggest a collection date of mostly July/August through May/June.

MIDDEN 21: Russo concludes that Midden 21 represents a year-round occupation, with oysters collected mostly during the warm weather (spring to fall) and quahog harvested in the colder weather months (January to March, and occasionally into May). Comparison with the St. Catherines Island control sample likewise suggests that these *Mercenaria* were collected primarily between December/January and February/March.

We can see that, overall, Russo's findings change very little when arrayed against data now available from the St. Catherines Island control sample. This result is hardly surprising, given the close fit between the control samples subsequently obtained from Kings Bay and St. Catherines Island.

This comparison also highlights an important point made by Russo (cited above): By relying strictly on the data obtained from studies of single species (such as *Mercenaria*), we can readily underestimate the overall seasonal pattern. Ancillary data available from Russo's (1991)

| | $O_{1-2}$ | $O_3$ | $T_1$ | $T_{2-3}$ |
|---|---|---|---|---|
| Midden H Level 1 n=6 | 0% | 0% | 0% | 100% |
| Midden H Level 2 n=17 | 65% | 0% | 6% | 29% |
| Midden H Level 3 n=17 | 29% | 12% | 6% | 53% |
| Midden H Level 4 n=6 | 0% | 0% | 0% | |
| Midden H Level 5 n=9 | 67% | 0% | 0% | 33% |
| Midden H Level 6 n=16 | 50% | 0% | 0% | 50% |
| Midden H Level 7 n=13 | 23% | 0% | 0% | 77% |
| Midden H Level 8 n=7 | 14% | 0% | 43% | 43% |
| Midden M Level 2 n=34 | 76% | 6% | 3% | 15% |
| Midden M Level 3 n=10 | 50% | 30% | 10% | 10% |
| Midden M Level 4 n=4 | 0% | 100% | 0% | 0% |
| Midden M Level 5 n=7 | 43% | 0% | 43% | 14% |

| | | | | |
|---|---|---|---|---|
| Annual n=325 | 62% | 11% | 5% | 22% |

Fig. 25.12. Distribution of incremental stages observed in *Mercenaria mercenaria* recovered from Middens H and M at Meeting House Field.

study of *Boonea* significantly enhances our understanding of site use at Meeting House Field. We must be mindful of this when assessing the *Mercenaria*-derived seasonal estimates employed throughout the island-wide survey.

## NOTES

1. Saunders (2000a: 61) suggests that Joseph Caldwell excavated in Midden E at Meeting House Field. We are unaware of any evidence suggesting that Caldwell worked at Meeting House Field (beyond the surface collections mentioned above); we attribute the previous excavation in Midden E to disturbance by Mr. Rogers (mentioned in Caldwell's notes).

2. In the following discussion, we will exclude date Beta-30271 (a determination on clam shell recovered from Midden 21), which dates to cal A.D. 680–980 (the Wilmington–St. Catherines period transition). Because we recovered no ceramics from these time periods, we consider this date to be an outlier; it will be discarded from the ensuing discussion.

3. These results differ somewhat from those of Saunders (2000a: 62–67), who analyzed the same $^{14}C$ determinations discussed in this chapter. Saunders applied a uniform correction for fractionation of 420 years to compensate for the lack of $^{12}C/^{13}C$ ratios in some dates from Meeting House Field; she also applied a local reservoir correction of $-5 \pm 20$ years, noting that "whether these corrections and calibrations produce a more accurate shell date than the raw count is open to question" (2000a: 62). Per the discussion in chapter 13, we now believe that more precise calibration procedures are available.

4. In this discussion, we are ignoring a small portion of the overall probability distribution (cal A.D. 750–A.D. 880), which accounts for only 3.1 percent of the total area under that distribution.

5. We must note, of course, that Meeting House Field contributed a disproportionately high number of Irene period dates (17 of 24), so a correspondence to the period boundaries is hardly unexpected.

6. In places, this section draws upon information presented by Saunders and Russo (1988).

7. From a draft originally written in 1988.

8. We have excluded the single sample from Midden E.

# CHAPTER 26. THE ARCHAEOLOGY OF FALLEN TREE (9LI8)

J. ALAN MAY

WITH CONTRIBUTIONS BY ELLIOT BLAIR, PETER FRANCIS, LORANN S.A. PENDLETON, MATTHEW SANGER, AND DAVID HURST THOMAS

The Fallen Tree site (9Li8) is located on the western edge of St. Catherines Island (fig. 26.1).[1] Tidal marsh extends for miles along the western, northwestern, and southwestern margins of the site, which is situated on a slight elevation overlooking Wamassee Creek, the tidal creek draining this portion of the western marsh. Average elevation of the site is slightly more than 2 m above mean high tide. The surface water table is within 2.5 m of the present surface, but water was not encountered during excavation.

Erosion of the western face of the site due to tidal fluctuations is a significant problem. Caldwell (1971) placed a 5 foot × 10 foot excavation unit in a shell midden near the western edge of the site. The unit was approximately 2 m east of Wamassee Creek. Today, erosion has narrowed that distance to less than 1 m. In the absence of bank stabilization, more of the site will be soon lost. The naming of this site and the more obvious impacts of erosion are not coincidental.

A small freshwater creek runs along the northern boundary of the site, separating the Fallen Tree midden from Mission Santa Catalina de Guale. Prior to the recent lowering of the water table due to industrial expansion along the Georgia coast, this small freshwater creek served as the outfall of an artesian well located approximately 1/4 mile inland at what is now Wamassee Pond. Several small shell middens are located along this creek, with artifacts eroding from the banks for a distance of approximately 100 m inland from its confluence with Wamassee Creek.

The site area is currently a fallow pasture, used for cattle grazing as recently as 1975. Since that time, the Edward John Noble Foundation has removed these cattle to promote a restoration of native vegetation. The site area was probably cultivated during the mid 1800s when Sea Island cotton was the main crop on St. Catherines, but references to old field maps do not support this hypothesis. However, an old field boundary east of the site was discovered in 1984 using false color infrared photography from a low flying helicopter.

In addition to grasses (Poaceae) and sedges (*Carex* sp.), other extant plant communities on the site include pine (*Pinus* sp.), oak (*Quercus* sp.), cedar (*Juniperus* sp.), grape (*Vitis* sp.), and palmetto (*Sabal palmetto*).

## LOCATING LARSON'S EXCAVATIONS AT FALLEN TREE

Archaeological investigations at Fallen Tree site began with excavations conducted by Lewis H. Larson in 1959. Initially, large pieces of pottery were found along a small freshwater creek that flows into Wamassee Creek, and, with the cooperation of Mr. John Toby Woods (then Superintendent of St. Catherines Island), Larson undertook excavations in several areas (Lewis Larson, personal commun., 1985). A large block excavation unit was placed on the south side of the freshwater creek approximately 150 m east of Wamassee Creek (fig. 26.1). Recovered materials included Spanish olive jar and majolica, iron fragments, glass fragments, and late prehistoric ceramics (as described in Brewer, 1985), as well as iron artifacts and glass beads. The pottery assemblage from this excavation contains many large rim and body sherds. Botanical remains were also recovered, including wood charcoal, nutshell, corn, and peach pits.

Aware of our research on St. Catherines Island, Dr. Larson generously transferred the entire assemblage recovered in 1959 to the Edward John Noble Foundation. Using the unit proveniences written on the stored artifact bags, we could reconstruct the grid

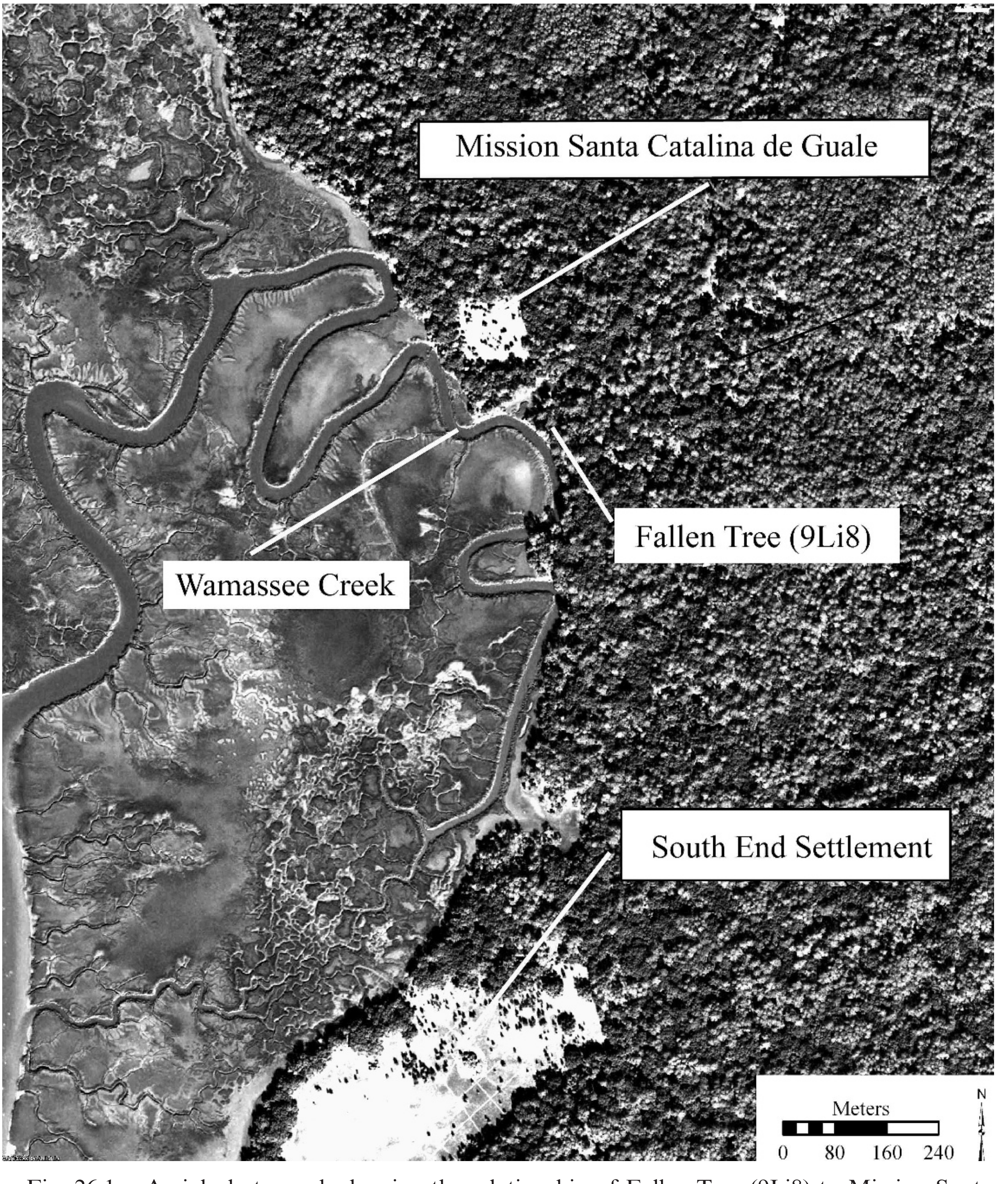


Fig. 26.1. Aerial photograph showing the relationship of Fallen Tree (9Li8) to Mission Santa Catalina de Guale.

plan of his excavation. The exposure consisted of one large block of 36 five-foot squares and a second area consisting of 2 five-foot squares, totaling 950 $ft^2$. All units were excavated to the base of the midden, but because these depths were not recorded on the level bags, we do not know the exact end depth of each excavation unit.

The location of Larson's 1959 squares was impossible to determine from the unit

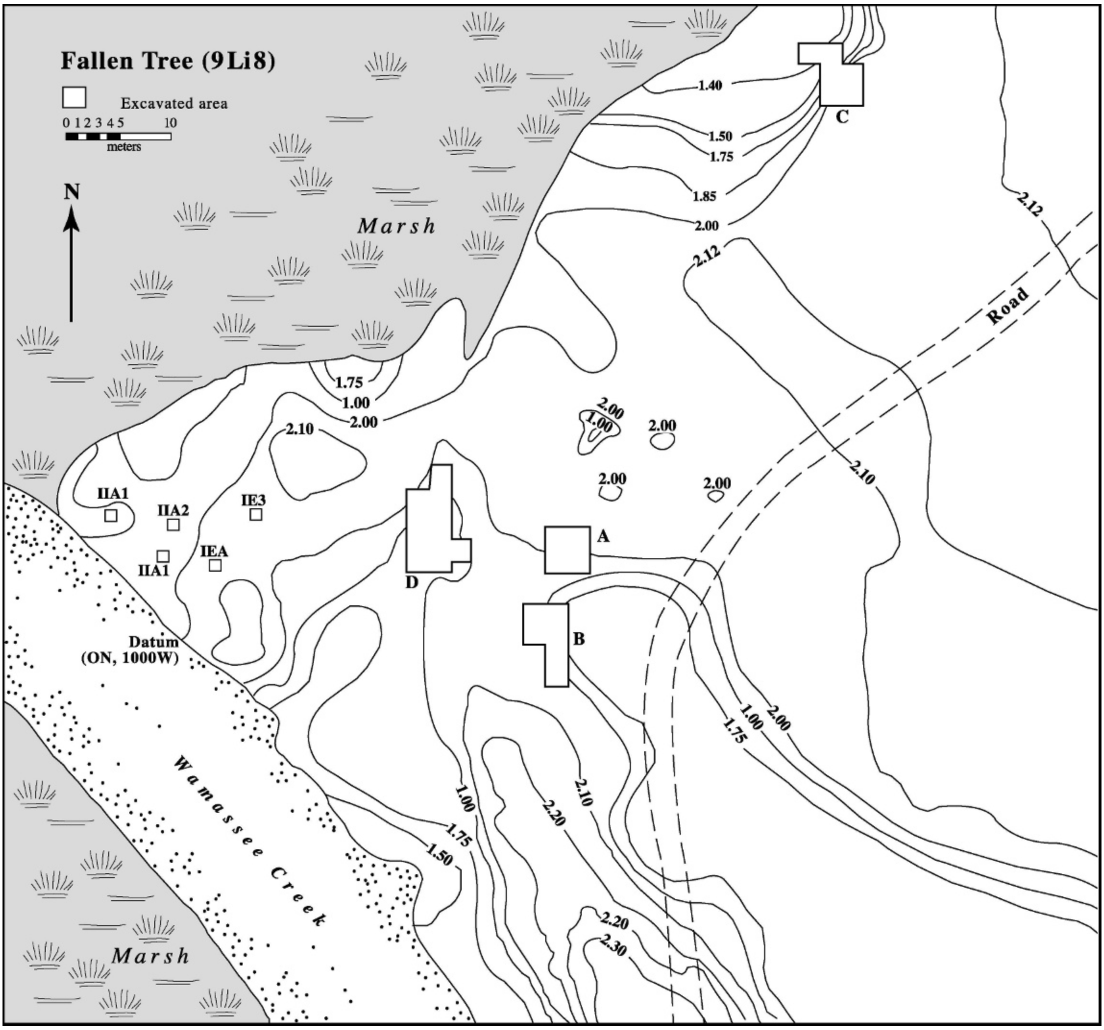


Fig. 26.2. Fallen Tree site map.

information on artifact storage boxes. During the summer of 1983, Mr. Woods visited the island and we asked him about the location of Larson's excavations. Woods indicated that he assisted Larson by backfilling the large block excavation mechanically using a front loader. The block excavation had remained open for a period of some months, and at least some of the profiles had begun to collapse when Woods started backfilling. It is probable that during the course of backfilling additional profiles were collapsed under the weight of the vehicle. Woods pointed to an open area adjacent to the freshwater creek draining into Wamassee Creek (fig. 26.2) and an old corduroy road section in the freshwater creek. He recalled that the square was several feet deep and "not far" from the corduroy road, between the creek and a field road.

In 1983, there was no indication from the surface and surrounding vegetation that the area had been disturbed, but it contained less of the saw palmetto and other scrub vegetation that was common closer to Caldwell's squares and the edge of Wamassee Creek. A limited survey of the area with a proton magnetometer was inconclusive, but it seemed to have fewer anomalies than the areas surveyed to the west. One additional test was to overlay a reconstructed map of the block excavation in the area that Mr. Woods had pointed out and look for a reasonable contact between excavated and unexcavated soil. Time and labor was the principal limiting factor in hand excavating squares or trenches for the edge of the block excavation.

We had access to a tractor with backhoe attachment and gasoline-powered sifting screens to speed the job. Measuring tapes were laid out on the ground in the area of the hypothesized block location in the directions of magnetic north–south and east–west. Surveyor flags were used to further define the outline of the block excavation in order to excavate a series of short trenches oriented north–south to bisect the walls of the block if present. Additionally, all excavated fill was screened for presence or absence of artifacts. The absence of artifacts is of itself not an indication of an excavated area, but our excavations disclosed the contact between excavated and unexcavated soils (as indicated by color and textural changes associated with disturbed soil). We believe that we have indeed located Larson's 1959 block excavation and confirmed Mr. Woods' identification of the area.

Joseph R. Caldwell (1971) conducted additional excavations at Fallen Tree and adjacent areas with an emphasis on chronology and ceramic description (see chap. 20). During this period, Caldwell conducted survey and excavation at several locations on St. Catherines Island. Surface collections were made and seven units were excavated near the juncture of the freshwater creek and Wamassee Creek, including the Fallen Tree site. The ceramic material recovered by Caldwell (previously curated at the University of Georgia) was also included in this ceramic analysis.[2]

## SURVEY AND EXCAVATION METHODS

In 1980, the Fallen Tree site and its immediate surroundings were examined and tested with randomly placed 1 × 1 m squares in 20-m blocks as part of the survey to locate the Mission Santa Catalina de Guale (Thomas, 1987). These survey blocks are a part of a larger 100-m-square grid system used to provenience artifacts and sites from the Island-wide transect survey (discussed elsewhere in this volume). Figure 26.2 depicts this system across the Mission proper and the Fallen Tree midden area. Round concrete pads with brass plates mark the corners of these 100-m squares. One of these pads, inscribed 0 North, 100 West (0N100W) is located in Caldwell's (1971) excavation adjacent to Wamassee Creek (fig. 26.3).

With the rediscovery of the Spanish Mission Santa Catalina de Guale, we thought that further investigation of Fallen Tree was desirable. The initial goal of these excavations was to establish the temporal relationship between the Fallen Tree site and the Mission proper. If the two sites were contemporaneous, then the European plant cultigens and ceramic complexes found at the Mission should also be found at Fallen Tree. Given this goal, one of the objectives of the first excavations was to determine if identifiable ethnobotanical remains were preserved.

The area excavated and described by Caldwell was gridded using an AMNH concrete datum (0N, 100W) as site datum on a 2-, 10-, and 20-m interval. All reference points are north and east of this AMNH datum and that includes square designations as well.

### February, 1983: Limited Testing

In the first season (February 1983), five 1 × 1 m squares—IE3, IE4, IIA1, IIA2, and IIA3—were excavated. These units were designated by the system employed in the search for Mission Santa Catalina; Quad (100 m on a side) I or II for the AMNH metric grid, "A" through "Z" for the smaller 20-m squares within the quad, and 1, 2, 3, and so forth for the individual test pits, of data recovery within stratified sampling units (Thomas, 1987). Each unit was excavated in 10-cm levels and screened through 1/8-in. screens. In addition, an 8-liter sample of soil matrix from the southeast quadrant

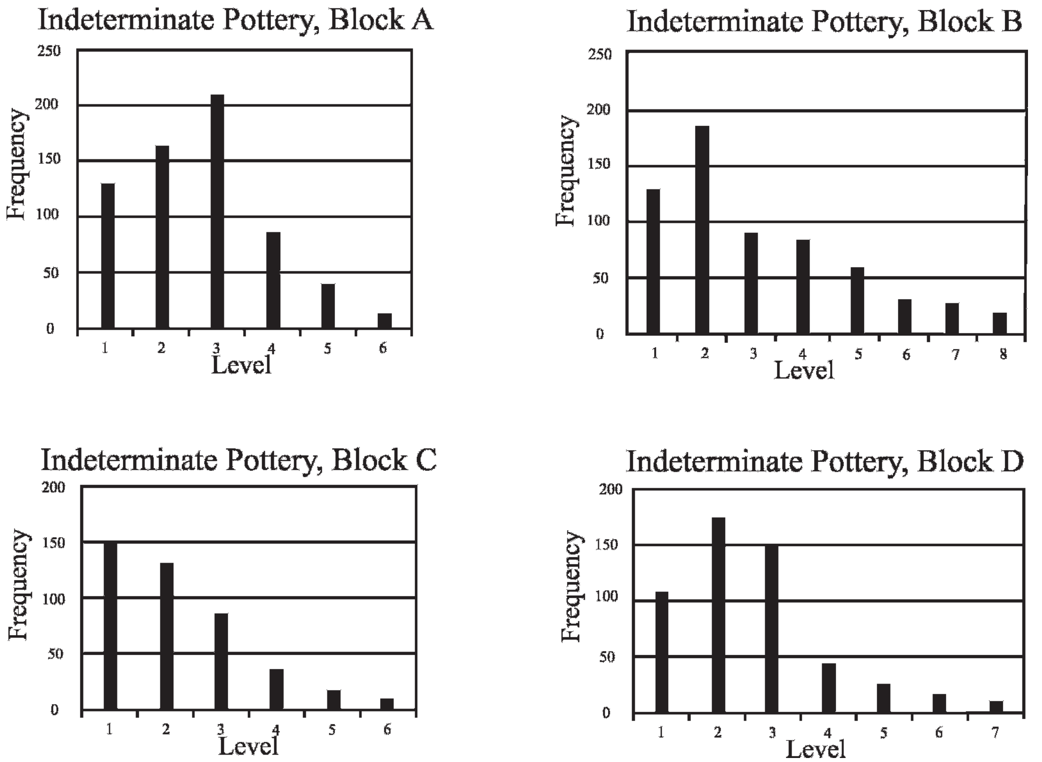


Fig. 26.3. Distribution of small sherds (> 2 cm in diameter) across the excavation units at Fallen Tree.

of each level was removed for water flotation to recover small faunal and botanical remains. This sample is approximately 5 percent of the volume of each level.

As mentioned above, the goal of this initial testing was to determine whether ethnobotanical remains were preserved, and the recovery of seeds, corncob, and peach pit fragments prompted further excavations in June of 1983 (May, 1983, 1985). We also recovered a large sample of prehistoric ceramic fragments, smoking pipe fragments, bone tools, stone tools, and historic glass and metal fragments. The seeds, corncob, and peach pit fragments were recovered from flotation samples taken from each excavated level (May, 1983)

## Summer, 1983: Survey and Testing

Excavation objectives for the summer of 1983 were expanded to include a proton magnetometer survey, a search for activity areas, and a search for evidence of structures. Additional subsistence and ceramic data were to be recovered as well. The results of the magnetometer survey were examined and used to direct the subsequent excavation strategy.

The success of this preliminary testing program at Fallen Tree defined the following objectives for the summer of 1983: search for Larson's 1959 excavation units, search for evidence of structures, expand excavations to recover a larger ceramic sample and additional float samples, and the use of proton magnetometry. These expanded excavations began in early June 1983 and lasted 8 weeks. Excavation units were located on the basis of magnetometer survey (that began in early June 1983 and lasted 2 weeks).

As noted above, each 100-m square was further divided into a 20-m survey grid for the purpose of placing test squares and larger block excavations. These 20-m squares were the basis for a detailed proton magnetometer survey to identify anomalies for excavation and identification. The area surrounding both Caldwell's and Larson's excavations were sufficiently large that using remote sensing to fine-tune the excavation strategy for structures, features, and botanical remains was both efficient and nondestructive, reducing the need to mechanically strip large areas of the site to expose features.

May directed the survey of eighteen 20-m square blocks with a portable and base station proton magnetometer on a 2-m interval resulting in 1800 data points and magnetometer values. Maps were generated at the University of South Carolina using the SYMAP program to scale, filter, and generate multiple maps of the magnetometer values. Rough maps were drawn and special, (i.e. "big") hits were examined in the field. Several potentially promising areas were examined and ruled out because these "hits" were the product of surface metal: wire, broken agricultural implements, and modern debris. Four of the remaining areas were further examined with a split spoon soil auger.

As a result of the magnetometer survey, a 2-m grid was used to carefully probe the soil for buried features. This portion of the site had been in pasture for years and ground visibility was less than 10 percent. Within each of the four areas probed, marine shell or darkly stained soil was encountered and marked with flags to facilitate placement of excavation squares. The depth of artifact concentrations and shell deposits were carefully recorded to further assist with fine tuning the excavation strategy within each of the four blocks.

Four excavation blocks (see fig. 26.2) consisting of several 2-m squares were laid out on the basis of "hits" generated by the magnetometer survey and are designated "A" through "D". Excavation units within the Fallen Tree site blocks: A, B, C, and D are 2-m squares and designated by their southeastern corner provenience. Plotted artifacts and features within these squares are measured north and west of this corner unless otherwise noted, and elevations are relative to the site datum (0N, 100W): at an assumed 2-m above mean high tide. With noted exceptions, all squares were excavated in 10-cm levels to a depth where no cultural materials were recovered.

All excavated material from the surface through a zone of leaf litter and sod in the first level was screened through 6.4 mm (1/4-in.) hardware cloth. The remaining matrix in these first and subsequent levels was screened through 3.3 mm (1/8-in.) hardware cloth by gasoline-powered mechanical sifters. Excavated feature fill was saved for water flotation.

Lithics, prehistoric and historic ceramics, historic glass, metal, faunal, and botanical remains were initially sorted at the screens with final sorting completed in the laboratory on St. Catherines Island. Flotation and preliminary sorting of faunal and botanical material was accomplished on the island as well. The sampling and sorting of light and heavy flotation fractions took place at the University of North Carolina at Chapel Hill.

### February, 1985: Expanded Excavations

An additional season of 2 weeks, in February of 1985, was conducted to further explore areas of feature concentrations, particularly Block B, and to follow data patterns delimited by the analysis of artifacts recovered during the 1983 field season. Excavation and recovery techniques were the same for all three seasons.

## ARCHAEOLOGICAL STRATA

When we arrived at Fallen Tree, there was little to indicate what was lying beneath the sod and saw palmetto. We could see several oyster, clam, and mussel shell concentrations on the surface, as well as the partly eroded soil profile adjacent to Wamassee Creek. An examination of earlier excavation field notes revealed that artifacts and features were plentiful. But we did not know whether the site contained any internal stratification, we did not know how deep to excavate before encountering features that we believed would indicate original ground surfaces, nor did we know where in the soil column that we would encounter postholes or postmolds. Therefore, our strategy was to excavate in arbitrary 10-cm levels until we became more knowledgeable of the internal strata, if present.

### February, 1983: Limited Testing

During the first season, we focused our efforts in the obvious shell concentrations to test our ideas about preservation and the abundance of artifacts. During the profiling of the Quad I and Quad II 1 × 1 m squares, IIA1, IIA2, IIA3, IE3, and IE4, we were able to discern at least four soil/cultural layers from the profiles. The first layer with a thickness of about 6 cm was that of leaves, sod, and roots along with some artifacts. The second layer was that of a shell midden matrix that varied in depth across the five squares excavated: 24 cm in IIA1, 20 cm in IIA2, 16 cm in IIA3, 24 cm in IE3, and 30 cm in IE4. The next layer was relatively undisturbed yellow-tan sand with some mottling and not many artifacts. This layer was found usually within 40 to 50 cm of the surface. The majority of artifacts from the initial excavation season were recovered from the shell midden matrix. Bone preservation within the shell midden matrix was good and a number of aboriginal pipe fragments, aboriginal ceramic sherds, and contact era artifacts were recovered from the first three 10-cm levels (compare with fig. 26.4 from the second excavation season).

In addition to recovering ceramic, lithic, metal, and glass artifacts, we also sampled each excavation level for plant remains. Faunal remains were plentiful, and we expected to recover numerous plant remains as well by means of water flotation; see below for a discussion of recovery techniques and identified remains. Eight-liter soil samples were taken from each level in the southeastern corner for water flotation, and all feature fill was floated after large shells, artifacts, daub, and so forth was removed. Many of the soil samples from the first season were processed before closing the excavations on March 4, 1983.

The unprocessed floatation samples were stored for later processing, and a log of processed and unprocessed samples was maintained in the field, with sample bags cross-checked for accuracy and completeness. We noted charred corncobs and wood charcoal during excavation. When possible, charcoal concentrations were noted and treated as separate loci from the general level fill. If warranted, these loci were given feature numbers within each square. If loci boundaries were not clear of if the soil matrix was not distinguishable from the surrounding matrix, then a locus within a level would not be given a feature number. This was also the case for organic stains that had no depth or sharp contact with the surrounding soil. Internal stratigraphy was not obvious in the shell midden matrix, that is, we could not distinguish individual dumping episodes.

These first season squares are generally characterized as having dark organic soil with oyster shell, deer bone (both burned and unburned), wood charcoal, occasionally charred corncobs, and artifacts. We prepared to return for a second season of excavation in early June of 1983 to follow any leads pertaining to the presence or absence of postmolds/postholes indicating structures and/or areas of cultural activity.

### Summer, 1983: Survey and Testing

We returned to Fallen Tree site in early June 1983 to open up several large block excavations between some of the shell midden concentrations that we observed and dug in the first season. To determine exactly where to dig, we spent the first 2 weeks of the season conducting a magnetometer survey of most of the site from the datum (0N, 100W) north and east. We covered an area of a bit more than a hectare from 0N100W to 0N2E in 20-m blocks. Additionally, we used an Oakfield split-spoon soil probe to establish the presence and depth of the shell midden matrix identified during the first season.

Four excavation blocks were laid out with transit and tapes and labeled "A" through "D". Because we were again work-

TABLE 26.1
**Concordance of Excavation Blocks and Unit Squares**

| Block | A | B | C | D | 1 × 1 |
|---|---|---|---|---|---|
| Unit | 5N36E | 11N23E | 50N62E | 0N34E | IE3 |
| | 5N38E | 11N25E | 50N64E | 0N36E | IE4 |
| | 6N37E | 13N25E | 52N62E | 2S34E | IIA1 |
| | 7N36E | 5N23E | 52N64E | 2S36E | IIA2 |
| | 7N38E | 5N25E | 54N60E | 4S36E | IIA3 |
| | — | 6N27E | 54N62E | 6S36E | — |
| | — | 7N23E | — | — | — |
| | — | 7N25E | — | — | — |
| | — | 7N36E | — | — | — |
| | — | 9N23E | — | — | — |
| | — | 9N25E | — | — | — |

ing in an area with less than 10 percent surface visibility, we excavated in 10-cm levels. Excavation squares within each block were 2 m on a side unless otherwise noted. Level sheets and feature forms were maintained as well as continuing the practice of collecting an 8-liter soil sample for flotation from the southeast quadrant of each square. Light and heavy flotation fractions were processed in the field when possible and backlogs were kept to a minimum. A builder's level was used daily to maintain vertical control and again the site datum of 0N, 100W was used. All grid coordinates for dug squares are measured relative to this point so that square 5N, 36E in Block A is 5 m north and 36 m east of AMNH grid coordinate 0N, 100W (making it 5N, 64W, Quad I, AMNH grid).

A concordance of excavated blocks and squares is presented in table 26.1. Not all squares were dug to the same depth, and completion was determined by the simple presence/absence of cultural material. A general description of soil conditions, artifacts recovered, and features for each block follow.

## February, 1985: Expanded Excavations

Most of the fall and early winter of 1983 was spent in the preliminary sorting and classifying of the thousands of pottery fragments and other classes of artifacts recovered during the summer of 1983. Additionally, we left the site with the intent of continuing some of the squares opened in Block B, where there seemed to be quantitatively more features and artifacts. We were given an additional opportunity to return to the site in February of 1985, with a crew of between four and six, and finished the squares started during the second season.

We started squares north of 7N25E, Block B in search of postholes or postmolds because that was a major task of the 1983 season: to find evidence of structures between the shell middens. The presence of shell midden in 11N25E was a bit of a surprise, because there was no surface indication of its presence and our "model" suggested discrete shell middens and a shell-free zone in between. Two more squares were opened at 11N23E and 9N23E. During this season Features B-7 and B-8 were isolated and excavated. Square 13N25E was opened to completely expose Feature B-8. Seven squares were opened in this short season and 8.8 $m^3$ of archaeological deposits were excavated. Block B was backfilled on February 24, 1985, and profiles were lined with plastic sheeting before backfilling.

Block A: Excavations in Block A are notable for the paucity of features and abundance of artifacts. More aboriginal smoking pipe fragments were recovered from squares in this block than any other excavated. There were no formally described features for this block, but several soil stains of amorphous shape and contact

TABLE 26.2
**Distribution of Block B Features at Fallen Tree**

| Unit | Level | Feature | Type of feature | Contents |
|---|---|---|---|---|
| 5N23E | 3 | Locus 1 | Dark stain | Charred corn, bone, shell |
| 9N23E | 3 | Locus 1 | Thin shell concentration | Amorphous cluster of shell |
| 9N23E | 3 | Locus 2 | Thin shell concentration | Amorphous cluster of shell |
| 5N25E | 3 | B-1 | Dark stain | Charred corn |
| 7N25E | 2 | B-1 | Dark stain | Charred corn |
| 6N27E | 4 | B-2 | Dark gray stain | Shell, bone, charcoal |
| 6N27E | 5–6 | B-2 | Dark stain | Shell, bone, charcoal |
| 6N27E | 7 | B-2 | Dark stain | Shell, charcoal |
| 7N25E | 2–5 | B-3 | Shell concentration | Shell, bone |
| 7N25E | 2–5 | B-4 | Dark stain with partial clay outline | Shell, bone |
| 7N25E | 3 | B-4 | Dark stain | Charcoal, shell fragments, pottery |
| 7N25E | 4 | B-4 | Clay circular outline of dark stain | Charcoal, shell fragments, pottery |
| 5N25E | 3–5 | B-5 | Dark stain | Charcoal flecks, cob fragments |
| 7N25E | 5 | B-5 | Shell and bone concentration | — |
| 9N25E | 3 | B-6 | Shell concentration | Shell, bone |
| 11N23E | 2 | B-7 | Shell concentration | Shell, bone |
| 11N23E | 2–3 | B-7 | Shell concentration | Shell, corncob, bone |
| 11N25E | 2–3 | B-7 | Shell concentration | Oyster shell, fine ash |
| 7N23E | 1–3 | B-8 | Shell concentration | Shell, bone |

were identified. The most frequent artifact class recovered was pottery of both the contact and precontact variety. There was moderate variation in relief in this block, with surface elevations in all of the squares varying between 0.0 cm and +11.0 cm above datum.

A copper aglet was recovered from square 5N36E, Level 3, but was found in the screen and therefore could not be associated with any of the stains identified in the field notes. Charcoal flecks were common in Level 3 for all of the squares of Block A, and the highest pottery counts were found in this level (with the exception of 7N38E, Level 2, which was higher). Generally, the soils in this block were loose and dry relative to the other blocks, with a great deal of root disturbance in the upper levels.

Block B: Ten 2-m squares were excavated in Block B, more than any other block (table 26.2). This was due in part to the presence of a number of shell and midden concentrations beginning in Level 2. As in Block A, several dark stains were identified beneath what is a probable plow zone in the first two 10-cm levels. In squares 5N23E and 9N23E, dark stains filled with shell, animal bone, and charred corncob fragments were present. In each case these stains were amorphous shaped and edges were poorly defined compared with the other eight features identified. There was some variation in relief in this block, with surface elevations in all of the squares fluctuating between −6.0 cm and −17.0 cm below datum.

Soils throughout this block are characterized as gray sandy loam with little in the way of organics in the level fill. Roots and duff make up the first 6–8 cm of Level 1, and some charcoal flecks have been found as deep as Level 6 in square 6N27E. Level 3 appears to contain the most artifacts and features; see below for a discussion of features. Pottery is the most frequently recovered artifact class in this block.

Block C: Six 2-m squares were excavated here to uncover features associated with activity areas or structures. Two of the six were dug deeper than Level 4 because of the presence of features (see below). More soil mottling was noted in these squares than on any of the other blocks, suggesting increased bioturbation or soil mixing. A number of tree roots and root-disturbed zones were noted on level sheets. There was little variation in relief in this block, with surface elevations in all of the squares varying between +2.0 cm and +6.0 cm above datum.

As with Block B, Block C, Level 3, contains the most artifacts, pottery, by level. Square 52N62E also has the most features (see below) as well as the greatest diversity of artifact classes, that is, not only more pottery but also more of the other categories of finds: lithics and historic ceramics for this block. Feature density is low for this block, but this is not totally unexpected considering the placement of the block compared with shell midden concentrations. The greatest amount of soil disturbance is in the top two layers, suggesting a plow zone.

BLOCK D: Six 2-m squares were dug in this block. The upper two levels were found to be heavily disturbed. The only feature identified in this block was found beginning in Level 3. Two soils stains were identified in Level 1 of 2S36E and 4S36E, respectively. The upper levels of this block contained a large quantity of charcoal in the general fill of each level, perhaps indicating that fields were burned between recent crop rotations. There was little variation in relief in this block, with surface elevations in all of the squares varying between −2.0 cm and −8.0 cm below datum.

The soil matrix found in this block is very similar to that of the other blocks, with the exception of the presence of the yellow silty sand similar to that described for some of the 1-m squares. Additionally, pottery was found much deeper in this block than in any of the others. For example, pottery was recovered from square 2S34E, Level 7, in addition to organic staining, bone, and charcoal. Nothing was found at this level in square 0N36E, Level 6, located just a few meters to the north. This presence of pottery suggests that activity was decreasing from south to north in this block. Pottery was also found in Level 6 of squares 4S36E and 6S36E. Also a single chert flake of bifacial reduction was recovered from Level 6 of 6S36E. No features were identified at this level (see below).

1 × 1 m SQUARES: These squares produced a lower average count of artifacts and artifact classes than did the block squares. The organic content of the soil as evidenced by the presence of charcoal and a waxy/greasy texture was higher in the upper layers of these squares as well. The shell midden matrix was generally denser in these squares than in the block squares. Pottery was found throughout all levels, with higher concentrations in the upper levels. Charred corncobs, nut shells, and seeds were also recovered and weighted.

No obvious stratigraphy was noted in any of these squares, but four zones were identified in the drawn profiles. The top zone of leaf litter and grass roots is less than 10 cm thick for the most part. The second zone consists of a thick layer of oyster and mussel shell ranging in depth from 20 cm to almost 40 cm in one square. The third zone is characterized as transitional with the shell density dropping significantly, artifact density decreasing, and soil colors shifting from browns and grays to tans and yellows. No features were identified in this zone. Finally, the bottom of most squares contained a gray or tan sandy loam with few or no artifacts and little organic material in the soil matrix.

The upper three layers of these squares are generally organic rich and dark sandy loams. The organic content increases in the shell midden levels and drops rapidly beneath this zone. Colors change from gray or brown to tan or yellow in these squares. Unlike the lower levels of the block excavations that are gray to brown, these light-colored sandy loams contain fewer organic materials. Perhaps these are more weathered soils. No unmodified stone was recovered from any of these squares.

A great quantity of the recovered pottery was too small to include in a formal analysis of surface treatment, vessel form, and so forth. In figure 26.4, however, it was counted and graphed to be interpreted in conjunction with feature descriptions included below. With the exception of Block A, the greatest concentration of very small fragments occurs in the upper two levels. In other similar areas of the Southeast, this disturbance is due to modern agricultural practices. The presence of these small fragments deeper in the soil column may be attributed to bioturbation in the form of roots and animal burrows. The distribution may also indicate areas of high foot traffic in the context of intrasite activity areas. During the excavation of these blocks no obvious footpaths in the form of linear compact features were identified.

Occasionally, unfired clay was noted in association with soil stains or nonshell features, but none was found in general level fill (i.e., having been tracked in). It is interesting to note that in Block A there is an inverse relationship between the features in Level 3 (none) and quantity (large) of pottery less than 2 cm in diameter. The large number of smoking pipe fragments recovered in this block far outnumber quantities recovered from other blocks, thereby suggesting a possible meeting or conclave area of the site. No worked shell was recovered from Block A, although a copper aglet was. Four of the 29 glass beads were recovered from Block A as well. A single bone awl was recovered from the same level and square as the copper aglet.

Excavation unit squares were not all dug to the same level across or within the blocks; because of this, average counts per level were used in figure 26.4. For example, all of the fragments from Level 1 of Block A were added and then divided by five, the number of squares that were dug for that level. The resulting average of 126 fragments was then plotted with the remaining levels in the block. This methodology was used to assess the remaining blocks.

## ARCHAEOLOGICAL FEATURES

A number of features were identified, mapped, and photographed during our excavations. Most consisted of isolated oyster shell concentrations, corncob concentrations, or dark organic soil stains. We were disappointed that the few postholes or postmolds did not provide direct evidence for the presence of structures. Most features were filled with artifact, faunal, and ethnobotanical assemblages. The following tables and descriptions include each of the excavation blocks containing features and loci, that is, areas that were observed in the general matrix and noted at the time of excavation. These were subsequently determined to be natural or a product of the excavator's technique.

### Block B

Two loci and eight features were identified during the excavations in Block B (table 26.2). The determination of whether something in a level was given a feature number was determined by both content and concentration. Several areas within the block were designated loci to distinguish them from features either because of an absence of a clear contact with the surrounding soil or a lack of distinguishing artifacts. Locus 1, 5N23E was a round stain containing charred corn, bone, and shell, but was less than 10 cm thick with a poorly defined boundary. Locus 1, 9N23E was a very thin shell concentration with an irregular shape, but had a thickness of 10 cm. No artifacts or other material distinguished these areas from the surrounding level fill and they were therefore not designated features.

Feature B-1 (5N25E, Level 3 and 7N25E, Level 2): A round feature that contains charred corncob fragments. It is 12–19 cm below the ground surface and is 9–11 cm thick. It is $10 \times 15$ cm across with clear edges vertically and horizontally. A number of intact cob fragments were removed for analysis.

Feature B-2 (level 4–7, 6N27E): A roughly oval pit beginning deep in the soil column: 36–41 cm below the ground surface. It is characterized as a dark organic stain containing shell, bone, and charcoal and is 16 cm thick. Outside of this feature in the lower levels artifact density drops off quickly. The soil at the bottom of Level 7 is mottled with very few artifacts.

Feature B-3 (7N25E, beginning in Level 2 and ending in Level 5): This feature is 33 cm thick and begins 24 cm below the surface. The primary contents of this feature are oyster shell, clam shell, and bone.

TABLE 26.3
**Distribution of Block C Features at Fallen Tree**

| Unit | Level | Feature | Type of feature | Contents |
|---|---|---|---|---|
| 50N62E | 2 | C-1 | Shell concentration | Shell, bone, large piece of iron |
| 50N64E | 2 | C-1 | Shell concentration | Shell, bone |
| 52N62E | 1 | C-1 | Shell concentration | Charcoal, bone |
| 52N64E | 1–3 | C-1 | Shell and charcoal concentration | Shell, bone |
| 54N60E | 2 | C-1 | Dark stain | Shell, bone |
| 54N62E | 4 | C-1 | Dark stain | Shell |
| 52N62E | 2 | C-2 | Shell concentration | Shell, charcoal, and deer bone |
| 52N62E | 3 | C-2 | Shell concentration | Shell, bone |
| 52N62E | 3 | C-2 | Dark stain | Shell, charcoal, bone |
| 52N62E | 6 | C-2 | Dark stain | Pottery, bone |
| 54N62E | 3 | C-2 | Dark stain | Pottery, bone, shell |
| 54N62E | 3 | C-2 | Red brown stain | Bone |

FEATURE B-4 (7N25E, begins in Level 2 and ends in Level 5 [67 cm below datum]): Feature 4 is unique in that it has a distinct clay outline with a dark organic stain within. The size of this feature is 30 × 50 cm and is 20 cm thick. Pottery, shell fragments, and charcoal were recovered. It may have been used at one point as a daub-processing pit.

FEATURE B-5 (Level 3 of square 5N25E, ending in Level 5 of both 5N25E and 7N25E): A dark organic stain containing shell and bone fragments. The feature was first identified at 30 cm below the ground surface and extends to a depth of 67 cm below datum or 53 cm below the surface. This round pit feature is 25 cm across with flecks of charcoal and charred corncob fragments.

FEATURE B-6 (19N25E, Level 3): A small oval shell concentration. This feature occurs 18 cm below the ground surface and is 9 cm thick.

FEATURE B-7 (11N23E and 11N25E beginning near the base of Level 2 in both squares): This feature is a relatively large shell concentration, 1.5 m × 50 cm, containing oyster and clam shell, fine ash, bone, and corncob fragments. The feature first appears at the base of the duff and root zone of Level 1, 3–6 cm below the surface. The ground surface here is 11 cm below datum and the bottom of the feature was encountered at 33 cm below datum or 27 cm thick.

FEATURE B-8 (10 cm below the surface in square 7N23E): An irregularly shaped pit that contains nutshell fragments, shell, deer bone, and a piece of metal. The feature is 28 cm thick and contains a number of whole oyster and clam shells. Additionally, a chert interior flake was recovered from general level fill from the vicinity of this feature.

## BLOCK C

FEATURE C-1 (square 50N62E, Level 2): A large, irregular pit in association with a large piece of iron in a shell concentration (table 26.3). The shape and size of the pit (1.0 m × 1.2 m) suggest it functioned as a trash pit. It contained a large quantity of shell and animal bone as well as a piece of granite in Level 4 of square 54N62E. Deer bone was also recovered from this feature, and charcoal fragments were noted.

FEATURE C-2 (50N62E, Level 2; 52N62E, Level 3 [although a portion of the feature may have been exposed in the bottom of Level 2], extends to bottom of Level 6): A dense shell feature with a surrounding dark organic stain. In Level 4, this feature is a dark stain with dense oyster shell, clam shell, and horse mussel, bone, and pottery. Bone and pottery continue to be recovered to 59 cm below the surface.

## BLOCK D

Only one feature and two loci were identified for the entire Block D area (table 26.4).

TABLE 26.4
**Distribution of Block D Features at Fallen Tree**

| Unit | Level | Feature | Type of feature | Contents |
|---|---|---|---|---|
| 0N34E | 3 | D-1 | Shell concentration | Charcoal, bone, concretions |
| 0N34E | 4 | D-1 | Shell concentration | Shell, bone |
| 0N34E | 5 | D-1 | Shell concentration | Shell, bone |
| 2S34E | 6–7 | D-1 | Dark stain | Pottery, bone, charcoal |
| 2S36E | 1 | Locus 1 | Dark stain | Shell fragments, pottery |
| 4S36E | 1 | Locus 1 | Dark stain | Pottery, metal, pipe bowl fragments |

FEATURE D-1 (0N34E, Levels 3–5, 2S34E beginning in Level 6): Two irregular organic stains (also identified in squares 2S36E and 4S36E, Level 1). These stains were observed immediately beneath the duff root zone of Level 1 and may be associated with the modern agricultural practice of field burning between plantings. Both stains were found 6 cm below the surface and both were 12 cm or less in thickness. There was no obvious internal stratigraphy and the maximum dimension was 1.13 m (north–south) × 58 cm (east–west) when Level 3 of 0N34E was completed. The approximate center of the feature was 72 cm south of the north wall of the square and 34 cm east of the west wall. The feature was first identified 25 cm beneath the ground surface in this square. Large quantities of shell, charcoal, animal bone, pottery, and "concretions" were recovered. No corncob fragments were recovered from this feature or this block. The maximum depth of the feature occurred in 2S34E, Level 7 at −98 cm below the surface or −100 cm below datum. The maximum thickness was 49 cm.

## 1 × 1 m SQUARES

Identifying features within the shell midden matrix of the 1–m squares was difficult, but with the reduction of shell in the lower levels (particularly Level 3 and below), shell concentrations and organic stains became easier to identify. Pottery was found in all levels and was not a good criteria for identifying features. In the lower levels, presence–absence criteria worked reasonably well to indicate possible features (table 26.5). The distinctive contents also helped reveal features in the lower levels of the five 1-m squares excavated.

All three features identified were irregular in shape with relatively poor definition. Features 1 in both IE3 and IIA2 were identified 30 cm below the ground surface and both were identified by their appearance and artifact content. Feature 1, IIA2 contained shell, pottery, and a wrought nail. It was 21 cm thick and was contained entirely in the 1-m square. Feature 1, IE3 was a shell concentration only 10 cm thick and may have represented the single dumping event of a meal. Animal bone was also recovered from this feature. Charred corncobs were recovered from this feature as well as a small glass bead and worked bone awl.

## DISCUSSION

During our initial season at Fallen Tree in February of 1983, the main objective was

TABLE 26.5
**Distribution of 1 × 1 m Square Features at Fallen Tree**

| Unit | Level | Feature | Type of feature | Contents |
|---|---|---|---|---|
| IE3 | 4–5 | 1 | Shell concentration | Shell, bone |
| IE3 | 4–6 | 1 | Dark brown stain | Charred corn, bone awl, shell bead |
| IE4 | 2–4 | 1 | Shell concentration | Shell, bone |
| IIA2 | 3–5 | 1 | Dark gray stain | Shell, wrought nail, pottery |

to recover a variety of artifact classes that had been described for the site by earlier excavators (Larson in 1959, Caldwell in the late 1960s, and the AMNH in the late 1970s). Additionally, we wanted to test the idea that charred plant remains would be preserved in the shell midden portions of the site and perhaps in less hospitable environments lacking shellfish remains. With a bit of luck we hoped to discover the evidence of structures that had eluded Caldwell. Our first season demonstrated that both artifacts and botanical remains, not to mention faunal remains, were present and in good quantity.

The second season was an effort to build on what we learned from the first season and to attempt some remote sensing techniques that were used successfully across the creek at the Mission site. We knew where small shell middens were located around the site with a quick visual survey, but we had no way of knowing the locations of structures and features. A proton magnetometer was employed for much of the first 2 weeks of the second field season in order to identify likely areas to place additional excavation squares. As soon as we determined a few promising areas, we laid out 2-m squares to ground truth to the magnetic anomalies. After all, a magnetometer survey had been successfully used the year before to locate a mission well and one wall of the church. We found that many of our anomalies at Fallen Tree were modern debris associated with recent farming events.

Block A was the first area that we started testing, and it was here that we quickly learned that some of our anomalies did not date to the mission period. However, we were fortunate that we were able to recover plenty of pottery fragments, and there were some areas that looked to be places to identify and sample features. We also recovered some interesting smoking pipe fragments. We were able to identify several loci, but did not identify any large features such as trash pits or postmolds. We stopped work in this block when it was clear that the excavation of more squares was not going to produce the results we needed.

We split the crew into two workgroups and began excavations in Blocks B and C because of their location near shell middens or the freshwater creek, respectively. Block B was immediately more productive, with features and stains identified beneath a possible plow zone. Most intact features were identified from 20 to 30 cm below the surface, and the top 20 cm contained a variety of artifacts dating from the present back to before the Spanish arrival. The majority of features were shell concentrations associated with what appeared to be single events: clam and oyster meals collected from the marsh and consumed immediately. These meals were supplemented with deer, corn, and other shellfish based on identified feature constituents. Unlike Block A, Block B contained a number of features but no obvious evidence of postmolds. Both a corncob-filled pit (B-1) and a trash pit (B-7) containing fine ash are candidates for the indirect presence of activity areas associated with a household structure. A circular feature (B-4) may have been a daub-processing area before being used as a trash pit, but no wall trench features were identified in the immediate vicinity. Altogether, Block B was a productive block with botanical samples indicative of local subsistence.

Blocks C and D both contained a small number of features with no obvious pattern of association with activity areas. Block C had two shell concentration features that contained mammal bone, charred wood, and oyster and clam shells, but no charred corncobs. The most plentiful artifact category was pottery, and it was found throughout the squares and levels. As in the other excavated blocks, most of the pottery was recovered in the first four levels. In addition, however, pottery was found as deep as Level 6 in Block D, 2S34E and Block C, 52N62E.

The majority of the pottery recovered from all of the excavated blocks was less than 2 cm in diameter, rendering the specimens too small to readily identify surface treatment or decoration but useful to indicate which levels had the greatest activity. Level 3 in Block B had one of the highest average counts per level of any block exca-

TABLE 26.6
**Aboriginal Ceramics Recovered in the 1983–1985 Excavations at Fallen Tree (9Li8)[a]**

| Ceramic type | Frequency |
|---|---|
| Altamaha Line Block Stamped | 14,283 |
| Altamaha circle in square | 9 |
| Altamaha Red Filmed | 9 |
| Irene Burnished Plain | 8 |
| Irene Complicated Stamped | 4 |
| Irene, miscellaneous | 1 |
| Grit-tempered, stamped | 1390 |
| Grit-tempered, plain | 47 |
| Grit-tempered, decorated | 180 |
| Grit-tempered, miscellaneous | 568 |
| Grit-tempered, burnished plain | 12 |
| Grit-tempered, check stamped | 121 |
| Grit-tempered, complicated stamped | 168 |
| Grit-tempered, incised | 212 |
| Grit/sand, incised | 19 |
| Grit/sand, punctated | 4 |
| Grit/sand, decorated | 74 |
| Grit/sand, plain | 15 |
| Grit/sand, miscellaneous | 104 |
| Savannah, cord marked | 9 |
| Savannah, incised | 4 |
| Savannah, stamped | 11 |
| Savannah, plain | 40 |
| Savannah, miscellaneous | 1 |
| Sand, complicated stamped | 6 |
| Sand, incised | 2 |
| Sand-tempered | 12 |
| Sand-tempered, plain | 1 |
| St. Catherines Cord Marked | 4 |
| St. Catherines Net Marked | 2 |
| St. Catherines, miscellaneous | 12 |
| Clay-tempered, plain | 1 |
| Clay/grit-tempered, plain | 3 |
| Clay/grit-tempered, miscellaneous | 17 |
| Clay/grit-tempered, decorated | 25 |
| Clay/sand with grit, plain | 9 |
| Clay/sand with grit, decorated | 18 |
| Clay/sand, miscellaneous | 10 |
| Wilmington Cord Marked | 8 |
| Wilmington Plain | 10 |
| Wilmington, miscellaneous | 8 |
| Walthour Complicated Stamped | 5 |
| Walthour Cord Marked | 2 |
| Deptford Check Stamped | 43 |
| Deptford, miscellaneous | 64 |
| Deptford Complicated Stamped | 21 |
| Deptford Cord Marked | 6 |
| Refuge Plain | 22 |
| Refuge, miscellaneous | 44 |
| Refuge Simple Stamped | 78 |
| St. Simons Plain | 4 |
| Fiber/grit-tempered, plain | 8 |
| Fiber/sand, decorated | 1 |
| Total | 17,739 |

[a] The typological categories are those specified in chapter 11; see also Brewer (1985) for a somewhat different classification of the same assemblage.

vated, and it is noteworthy that this level also contained the most features.

Block A had the fewest features or loci, but had the most fragments of aboriginal smoking pipes. The absence of features coupled with the presence of ritual or public artifacts may be evidence of public space used in community ritual and/or political activity. The presence of shell middens almost surrounding Block A suggests a central commons or plaza, similar to those present in much larger Mississippian period sites.

## ARTIFACTS OF ABORIGINAL MANUFACTURE

### Aboriginal Ceramics

The aboriginal ceramics recovered in the 1983–1985 excavations, discussed here, are summarized in table 26.6 and the ceramics recovered in Larson's 1959 excavations are summarized separately in table 26.7; see Brewer (1985) for a rather different classification of this same ceramic assemblage. The ceramic frequencies from the University of Georgia and American Museum transect survey excavations at Fallen Tree have already been listed in table 20.3. We emphasize that all of the aboriginal ceramics recovered from the various excavations at Fallen Tree were classified according to the criteria established in chapter 14.

Clearly, each assemblage from Fallen Tree is dominated by ceramics from the mission-period Altahama period. A smattering of earlier types are also present, documenting the relatively sparse precontact aboriginal occupation of Wamassee Head (see also the discussion of the evidence col-

TABLE 26.7
**Aboriginal Ceramics Recovered in Lewis Larson's 1959 Excavations at Fallen Tree (9Li8)[a]**

| Ceramic type | Frequency |
|---|---|
| Altamaha Line Block Stamped | 920 |
| Altamaha, circle in square | 125 |
| Altamaha Incised | 1 |
| Altamaha Check Stamped | 2 |
| Altamaha Red Filmed | 15 |
| Altamaha, decorated | 29 |
| Grit-tempered, plain | 109 |
| Grit-tempered, decorated | 9 |
| Grit-tempered, miscellaneous | 3 |
| Clay-tempered, plain | 4 |
| Clay/grit-tempered, plain | 5 |
| Clay/grit-tempered, miscellaneous | 2 |
| Clay/grit-tempered, decorated | 27 |
| Clay/sand with grit, plain | 12 |
| Clay/sand with grit, decorated | 9 |
| Deptford Check stamped | 19 |
| Deptford Linear check stamped | 3 |
| Deptford, miscellaneous | 1 |
| Sand/grit-tempered, plain | 9 |
| Sand/grit-tempered, decorated | 15 |
| Fiber-tempered | 2 |
| Fiber/grit-tempered, plain | 5 |
| Fiber/grit-tempered, decorated | 9 |
| Fiber/grit/sand-tempered, decorated | 6 |

[a] The typological categories are those specified in chapter 11; see also Brewer (1985) for a somewhat different classification of the same assemblage.

lected from this area in Transect I-6 of the Island-wide survey in chap. 20).

## Smoking Pipes
### by Lorann S. A. Pendleton

Several pipe fragments were recovered during the 1983–1985 excavations at Fallen Tree (table 26.8). Some fragments contained residues, but these had not been examined at the time of this writing. Evidence of the presence of these pipes as well as later examples of historic ceramic smoking pipes (two fragments) was recovered from almost all excavation squares.

Of the 71 pipe fragments, 50 are bowls, 25 with rims. The remainders are small stem fragments and pieces that could have come from any part of the pipe. The pipes are made from extremely fine-grained clay, often with small quartz temper. One example (28.3/8885) may have a fine mica temper in a tan and orange clay. This artifact consists of half of the original bowl, with an excurvate shape. The rim is lipped. The original pipe bowl would have had an exterior circumference of 34.13 mm, making it the largest bowl in the collection.

Pipe bowl 28.0/7013 is made from fine-grained gray clay, with a straight-sided bowl. The rim consists of segmented circles with a hole in their middle. The pipe is encrusted with a burned residue on the inside of the bowl. Artifact 28.0/7014 appears to have been an Irene effigy pipe. Part of the effigy is broken, but it may have represented a bird on the rim. Fine curving incised lines extend around the bowl from the rim.

Several of the pipe bowls are incised with a simple narrow line, while several others are punctated. The most complete pipe (28.3/8689) is made from tan clay. It is undecorated and only the stem is missing. The circumference of this pipe is 19.78 mm, making it the smallest pipe bowl in the collection. Artifact 28.3/8688's circumference is the same size.

The most complete stem (28.3/8688) has an exterior circumference of 15.97 mm, and 6.34 mm on its interior.

Aboriginal pipe fragments recovered are similar to portions of bowls described by Moore (1897). Larson (1957) describes similar pipes from the Irene site and Norman Mound, McIntosh County, Georgia, associated with Pine Harbor complex ceramics: Irene Plain, Irene Filfot Stamped, Irene Incised, and McIntosh Incised.

## Lithic Artifacts
### by Matthew Sanger

The analysis of lithic materials from Fallen Tree was divided into two groups—flaked stone and ground stone. The groups are defined by the most recent method used to form the artifact. Along with these two groups, there is a small collection of geological samples. The geological samples are stones that were not purposefully shaped but can be used to develop theories regarding lithic availability and procurement patterns. Of the 147 lithic artifacts re-

TABLE 26.8
**Distribution of Aboriginal Smoking Pipe Fragments Recovered in the 1983–1985 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Frequency | Description | Comment |
|---|---|---|---|---|---|
| Block A | | | | | |
| 5N36E | 2 | 28.3/8733.001 | 1 | Aboriginal bowl fragment | Dark orange paste, sooted interior, incised lines |
| 5N36E | 2 | 28.3/8733.002 | 2 | Aboriginal bowl fragments | Dark brown clay paste, sooted interior, burnished exterior |
| 5N36E | 3 | 28.3/8739.001 | 1 | Aboriginal bowl fragment | Bowl with incised lines |
| 5N36E | 3 | 28.3/8739.002 | 1 | Aboriginal pipe fragment | Possible rim with beveled edges |
| 5N36E | 3 | 28.3/8739.003 | 2 | Aboriginal stem fragments | Small stem fragments |
| 5N36E | 3 | 28.3/8739.004 | 3 | Aboriginal rim fragments | Everted rims, no evidence of sooting |
| 5N36E | 3 | 28.3/8739.005 | 3 | Aboriginal bowl rim fragments | Sooted interior |
| 5N36E | 3 | 28.3/8739.006 | 1 | Aboriginal bowl rim fragment | No evidence of sooting |
| 5N36E | 3 | 28.3/8739.007 | 2 | Aboriginal bowl fragments | Sooted interior |
| 5N36E | 3 | 28.3/8739.008 | 2 | Aboriginal bowl fragments | No evidence of sooting |
| 5N36E | 3 | 28.3/8739.009 | 7 | Aboriginal pipe fragments | Miscellaneous unidentifiable |
| 5N38E | 2 | 28.3/8744.001 | 1 | Aboriginal stem fragment | Thick stem fragment with sooted interior |
| 5N38E | 2 | 28.3/8744.002 | 2 | Aboriginal bowl rim fragments | Bowl fragments with everted rim |
| 5N38E | 2 | 28.3/8744.003 | 1 | Aboriginal bowl rim fragment | Rim fragment with burnished exterior |
| 5N38E | 2 | 28.3/8744.004 | 1 | Aboriginal pipe fragment | Possible rim fragment, beveled |
| 5N38E | 3 | 28.3/8743.001 | 1 | Aboriginal bowl fragment | Orange paste, sooted interior with two nodes |
| 5N38E | 3 | 28.3/8743.002 | 1 | Aboriginal stem fragment | Dark tan micaceous clay with small diameter |
| 5N38E | 3 | 28.3/8743.003 | 1 | Aboriginal bowl fragment | Dark orange clay paste, thin wall |
| 5N38E | 3 | 28.3/8743.004 | 1 | Aboriginal pipe fragment | Sooted interior |
| 6N37E | 2 | 28.3/8766.001 | 1 | Aboriginal stem fragment | Cross mend 28.3/8791.001, step notched |
| 6N37E | 2 | 28.3/8766.002 | 1 | Aboriginal bowl rim fragment | Rim with burnished exterior, everted rim |
| 6N37E | 2 | 28.3/8766.003 | 1 | Aboriginal stem fragment | Sooted interior, dark orange paste |
| 6N37E | 3 | 28.3/8765.001 | 1 | Aboriginal pipe fragment | Burnished exterior, sooted interior |
| 6N37E | 3 | 28.3/8765.002 | 2 | Aboriginal bowl fragments | Sooted interior |
| 6N37E | 3 | 28.3/8765.003 | 1 | Aboriginal pipe fragment | Miscellaneous fragments, sooted interior |
| 6N37E | 3 | 28.3/8765.004 | 1 | Aboriginal bowl rim fragment | Sooted interior |
| 6N37E | 3 | 28.3/8765.005 | 2 | Aboriginal pipe fragments | Miscellaneous unidentifiable, no evidence of sooting |
| 7N36E | 4 | 28.3/8785 | 2 | Aboriginal bowl fragments | Micaceous clay paste, sooted interior |
| 7N36E | 2 | 28.3/8781.001 | 1 | Aboriginal stem fragment | One stem fragment with sooted interior |
| 7N36E | 2 | 28.3/8781.002 | 1 | Aboriginal pipe fragment | Miscellaneous unidentifiable, no evidence of sooting |
| 7N36E | 3 | 28.3/8874.001 | 1 | Aboriginal bowl rim fragment | Bowl rim with incised lines with sooted interior, everted rim |
| 7N36E | 3 | 28.3/8874.002 | 1 | Aboriginal bowl rim fragment | Burnt |
| 7N36E | 3 | 28.3/8874.003 | 2 | Aboriginal stem fragments | Sooted interior |
| 7N36E | 3 | 28.3/8874.004 | 2 | Aboriginal pipe fragments | Sooted interior |
| 7N36E | 3 | 28.3/8874.005 | 1 | Aboriginal pipe fragments | No evidence of sooting |

TABLE 26.8
(*Continued*)

| Unit | Level | Catalog no. | Frequency | Description | Comment |
|---|---|---|---|---|---|
| 7N36E | 3 | 28.3/8874.006 | 2 | Aboriginal stem fragments | Small diameter, no evidence of sooting |
| 7N38E | 2 | 28.3/8791.001 | 1 | Aboriginal stem fragment | Cross mend 28.3/8766.001 (above), step notched |
| 7N38E | 2 | 28.3/8791.002 | 1 | Aboriginal bowl fragment | Bowl with ridge or "keel" on exterior |
| 7N38E | 2 | 28.3/8791.003 | 1 | Aboriginal bowl fragment | Notched rim bowl fragment |
| 7N38E | 2 | 28.3/8791.004 | 2 | Aboriginal pipe fragments | Miscellaneous unidentifiable, sooted interior |
| 7N38E | 2 | 28.3/8791.005 | 1 | Aboriginal pipe fragment | Miscellaneous unidentifiable, no evidence of sooting |
| 7N38E | 3 | 28.0/7140 | 1 | Aboriginal rim fragment | — |
| 7N38E | 4 | 28.3/8787 | 1 | Aboriginal bowl fragment | Dark gray micaceous paste, sooted interior |
| Block B | | | | | |
| 5N23E | 3 | 28.3/8820 | 1 | Aboriginal bowl fragment | Buff color paste, sooted interior |
| Block D | | | | | |
| 0N34E | 3 | 28.3/8710 | 1 | Aboriginal bowl fragment | Sooted interior, exterior tan clay paste |
| 0N36E | 1 | 28.3/8898.001 | 1 | Aboriginal rim fragment | Tan/orange clay paste, possible stem rim fragment |
| 0N36E | 1 | 28.3/8898.002 | 1 | Aboriginal rim fragment | Sooted interior, exterior dark orange |
| 0N36E | 3 | 28.3/8717.001 | 5 | Aboriginal pipe fragments | Miscellaneous unidentifiable |
| 0N36E | 3 | 28.3/8717.002 | 1 | Aboriginal pipe fragment | Sooted interior with incised lines |
| 0N36E | 3 | 28.3/8717.003 | 1 | Aboriginal rim fragment | No evidence of sooting |
| 0N38E | 2 | 28.3/8718.001 | 2 | Aboriginal pipe fragments | Miscellaneous unidentifiable, no evidence of sooting |
| 0N38E | 2 | 28.3/8718.002 | 2 | Aboriginal bowl rim fragments | Buff/light orange paste with everted rim |
| 2S34E | 2 | 28.3/8688 | 1 | Aboriginal stem fragment | Possible tubular pipe, dark brown paste |
| 2S36E | 1 | 28.3/8691 | 1 | Aboriginal bowl rim fragment | Everted rim with beveled edge |
| 2S36E | 3 | 28.3/8690 | 1 | Aboriginal pipe fragment | Thin wall, sooted interior, burnished exterior |
| 2S36E | 4 | 28.3/8689.001 | 1 | Aboriginal stem fragment | Orange paste, incised lines on exterior |
| 2S36E | 4 | 28.3/8689.002 | 1 | Aboriginal bowl fragment | Intact bowl: exterior diameter 19.5 mm, interior diameter 12.1 mm |
| 4S36E | 1 | 28.3/8695 | 1 | Aboriginal bowl fragment | Dark gray, fine-grain paste, possible pentagonal panels and punctated within panels |
| 4S36E | 2 | 28.3/8702 | 1 | Aboriginal pipe fragment | Dark gray micaceous clay with possible orange paste exterior |
| 4S36E | 3 | 28.3/8697.001 | 2 | Aboriginal rim fragments | Dark orange clay paste |
| 4S36E | 3 | 28.3/8697.002 | 1 | Aboriginal bowl fragment | Hand molded and irregular shape |
| 4S36E | 4 | 28.3/8694.001 | 1 | Aboriginal bowl fragment | Orange paste, sooted interior elbow part of bowl with possible punctated exterior |
| 4S36E | 4 | 28.3/8694.002 | 1 | Aboriginal rim fragment | Bright orange paste |

TABLE 26.8
(*Continued*)

| Unit | Level | Catalog no. | Frequency | Description | Comment |
|---|---|---|---|---|---|
| Block 1 × 1 | | | | | |
| IE3 | 3 | 28.0/7014 | 1 | Aboriginal bowl fragment | Bird effigy fine-grain micaceous paste |
| IE3 | 3 | — | 1 | Aboriginal bowl fragment | Decorated, micaceous clay paste |
| IE3 | 4 | 28.0/7013 | 1 | Aboriginal bowl fragment | Possible loop element design and charred residue on interior |
| IE4 | profile | 28.0/8885 | 1 | Aboriginal bowl rim fragment | Flared thickened rim, micaceous clay paste |
| IE4 | 3 | 28.0/7005 | 1 | Aboriginal bowl rim fragment | Everted rim, dark gray paste, sooted interior |
| IE4 | 3 | 28.0/7008 | 1 | Aboriginal pipe fragment | Sooted interior |
| Core Sample | | | | | |
| 10N16E | — | 28.3/8821 | 1 | Aboriginal pipe fragment | Orange brown fragment with incised lines |
| Total | — | — | 71 | — | — |

covered from Fallen Tree, 116 have been classified as flaked, 15 as ground, and 16 as geologic samples.

Raw Materials: Studies on lithic raw material usage have been used to comment on mobility (Parry and Kelly, 1987), trade (Odell, 2001), and stone tool technology (Andrefsky, 1994). Because of the lack of lithic resources on St. Catherines Island, every stone found at Fallen Tree had to be procured from the mainland. It is currently unclear whether this procurement was direct (through travel to lithic outcrops) or indirect (through trade).

The vast majority of flaked tool artifacts from Fallen Tree were made from four raw material types—quartz, quartzite, chert, and metavolcanics. When compared to an existing type collection, each of these materials is easily identifiable based on its color, hardness, and morphological structure.[3]

Quartz is one of the most abundant minerals on the planet and was a common raw material for lithic tools. Quartz is particularly abundant, even ubiquitous, in the Piedmont, Fall Line, and Coastal Plain regions of Georgia. It occurs as small fragments in the soil, in veins along ridge tops and escarpments, and as stream cobbles (Anderson et al., 1979; Sassaman et al., 1988: 82, 1990: 39). During a large-scale survey of the South Carolina Piedmont, outcrops of quartz occurred on average of every 1.5 km, and over half appeared to have been quarried, presumably during precontact periods (Goodyear et al., 1979). Quartz occurs in a variety of forms including "vein quartz", "crystal quartz", "banded quartz", and "milky quartz". While the use of these subtypes can be suggestive of the processes involved in the formation of the quartz, the application of this typology is very subjective and will not be used in this analysis.

While quartz is abundant throughout the southeast, it rarely dominates the archaeological record. This is likely due to the difficulty in flaking quartz. Of the 116 flaked lithic artifacts found at Fallen Tree only 10 were made of quartz. Half of these artifacts were shatter while the rest were primary, secondary, or biface thinning flakes.

Quartzite is also very common in the southeastern United States, often occurring as cobbles and bedded formations. Quartzite can be distinguished from quartz by the obvious signs of metamorphosis that have melded the quartz grains and silica cement together. While quartz is relatively fine-grained and is crystalline, quartzite is medium-grained and has a granoblastic texture. Quartzite is usually gray or white, but can come in darker colors if there is a large amount of impurities such as iron oxide or magnetite.

There were only four quartzite flaked artifacts recovered from Fallen Tree. Like quartz, quartzite is difficult to flake and rarely develops a very sharp edge. Of the four quartzite artifacts, one was a secondary flake, two were shatter, and the last was a large unifacial tool.

Chert is a sedimentary rock with fine-grained cryptocrystalline structure. Chert comes in a wide variety of colors, from light gray to dark red. Within the Georgia coast, Coastal Plain chert is the most common and most identifiable subtype of chert. Coastal Plain chert is available throughout the Coastal Plain zone, especially in areas that have been undercut by rivers. The largest formation available in the southeast is the Flint River formation in Allendale County in South Carolina and Burke County in Georgia. The chert from this locale is referred to as Flint River or Allendale Chert. Primary outcrops that show evidence of prehistoric quarrying include Rice Quarry (also called Allendale quarry) (38AL14), Stony Bluff (9BK5), and Theriault (9BK2; Anderson et al., 1979). Coastal Plain chert is fine-grained and relatively free of impurities except for fossils (Tippitt and Marquardt, 1984: 36). Microfossils are relatively common and can be used to securely identify this chert type. Generally, Coastal Plain chert is pale yellow to pale tan in color, but also appears as a mottled pink. Once heat treated, Coastal Plain chert often appears deep reddish in color.

Coastal Plain chert is one of the most common raw materials used to fashion the flaked stone artifacts from Fallen Tree. Chert can be flaked into a sharper edge than quartz or quartzite, although it must be resharpened more frequently. The fact that over half (55%) of the flaked stones were made from Coastal Plain chert is a testament to the popularity of this material type. The majority (88%) of the Coastal Plain chert artifacts from Fallen Tree were debitage (flakes and shatter). While there are large amounts of shatter and primary/secondary flakes, the number of biface thinning flakes is much higher than in other material types. Of the 10 biface thinning flakes found at Fallen Tree, 9 were made of Coastal Plain chert.

Not surprisingly, the majority of stone tools at Fallen Tree were made of Coastal Plain chert, including a drill and six projectile points. The only cores found at Fallen Tree were also fashioned from Coastal Plain chert.

There were 15 flaked stone artifacts from Fallen Tree that were made out of unknown chert types. The appearance of these unknown cherts varied widely and it is impossible to determine where they were originally procured. Thirteen of these artifacts were either secondary flakes or shatter. The remaining two objects are microblades.

Metavolcanics are a catch-all category that include schists, basalt, and rhyolite. As a group, metavolcanics are characterized as being relatively large-grained and dark in color. There are several metavolcanic types that are relatively fine-grained, such as Uwharrie rhyolite, but these types are not found on St. Catherines Island. Instead, the metavolcanics on St. Catherines Island are usually a light gray to a near black and are medium- to large-grained. Within this analysis there is only a single flaked artifact made out of metavolcanic stone—a massive bifacially flaked stone tool.

Flaked Stone Artifacts: The assemblage of flaked tools from Fallen Tree falls into six different morphological categories (table 26.9). These categories are core, flake, shatter, uniface, biface, and blade (see Tippitt and Marquardt, 1984; Tippitt, 1998).

Cores: These are the bases from which all flaked tools are formed. A core can be

TABLE 26.9
**Distribution of Lithics Recovered during the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Material | Description |
|---|---|---|---|---|---|---|---|---|
| Block A | | | | | | | | |
| 5N36E | 2 | 28.3/4560.001 | 13.41 | 8.99 | 3.24 | 0.4 | Gray chert | Shatter |
| 5N36E | 2 | 28.3/4560.002 | 13.86 | 6.15 | 5.51 | 0.3 | Gray chert | Shatter |
| 5N36E | 3 | 28.3/4527.001 | 18.03 | 12.94 | 8.00 | 2.1 | Pink white coastal plain chert | Biface–projectile point |
| 5N36E | 3 | 28.3/4527.002 | 8.73 | 5.83 | 2.52 | 0.1 | Pale yellow coastal plain chert | Shatter |
| 5N36E | 3 | 28.3/4527.003 | 6.60 | 4.57 | 2.60 | 0.1 | — | Geological sample |
| 5N36E | 3 | 28.3/4527.004 | 12.35 | 8.86 | 6.91 | 0.8 | — | Geological sample |
| 5N38E | 1 | 28.3/4557.001 | 7.76 | 4.45 | 2.97 | 0.2 | Quartz | Shatter |
| 5N38E | 1 | 28.3/4557.002 | 9.72 | 5.05 | 2.87 | 0.2 | Pale yellow coastal plain chert | Secondary |
| 5N38E | 2 | 28.3/4505.001 | 6.44 | 4.54 | 2.11 | 0.1 | Gray chert | Shatter |
| 5N38E | 2 | 28.3/4505.002 | 9.26 | 7.29 | 2.81 | 0.2 | Gray red coastal plain chert | Shatter |
| 5N38E | 3 | 28.3/4540.001 | 5.30 | 5.15 | 1.36 | 0.0 | Pink coastal plain chert | Shatter |
| 5N38E | 3 | 28.3/4540.002 | 4.29 | 4.03 | 1.33 | 0.0 | Pale yellow coastal plain chert | Shatter |
| 5N38E | 3 | 28.3/4540.003 | 18.56 | 13.99 | 4.38 | 0.8 | Gray coastal plain chert | Primary |
| 6N36E | 1 | 28.3/4511.002 | 13.68 | 7.47 | 3.01 | 0.3 | Clear quartz | Secondary |
| 7N36E | 1 | 28.3/4511.001 | 14.89 | 9.90 | 6.70 | 1.0 | Gray white chert | Secondary |
| 7N36E | 3 | 28.3/4520.001 | 20.25 | 7.17 | 5.34 | 0.7 | Gray white coastal plain chert | Shatter |
| 7N36E | 3 | 28.3/4520.002 | 11.81 | 11.30 | 4.87 | 0.7 | Gray red coastal plain chert | Secondary |
| 7N36E | 3 | 28.3/4520.003 | 12.72 | 9.61 | 5.77 | 0.6 | Gray red chert | Secondary |
| 7N36E | 3 | 28.3/4520.004 | 15.67 | 7.41 | 3.25 | 0.4 | Pale yellow coastal plain chert | Secondary |
| 7N36E | 3 | 28.3/4520.005 | 13.19 | 7.21 | 3.93 | 0.6 | — | Geological sample |
| 7N36E | 3 | 28.3/4520.006 | 11.51 | 6.94 | 5.67 | 0.5 | White gray quartzite | Shatter |
| 7N36E | 3 | 28.3/4520.007 | 7.48 | 4.8 | 3.45 | 0.2 | — | Geological sample |
| 7N36E | 3 | 28.3/4520.008 | 5.88 | 4.03 | 2.82 | 0.1 | — | Geological sample |
| 7N36E | 3 | 28.3/4520.009 | 22.38 | 12.41 | 5.06 | 1.1 | Pale yellow coastal plain chert | Secondary |
| 7N36E | 3 | 28.3/4556 | 36.62 | 15.85 | 4.18 | 1.7 | White gray coastal plain chert | Biface– projectile point |
| 7N36E | 4 | 28.3/4530.001 | 5.38 | 4.41 | 0.67 | 0.0 | Pale yellow coastal plain chert | Shatter |
| 7N36E | 4 | 28.3/4530.002 | 4.97 | 4.34 | 2.13 | 0.0 | — | Geological sample |
| 7N36E | 4 | 28.3/4544 | 14.81 | 9.96 | 3.29 | 0.5 | Pink white coastal plain chert | Secondary |
| 7N36E | 5 | 28.3/4534 | 13.39 | 8.15 | 2.73 | 0.2 | Pink coastal plain chert | Secondary |
| 7N38E | 1 | 28.3/4581 | 16.70 | 4.32 | 4.13 | 0.4 | Pale yellow coastal plain chert | Shatter |
| 7N38E | 2 | 28.3/4504 | 7.30 | 5.69 | 3.18 | 0.1 | White quartz | Shatter |
| 7N38E | 2 | 28.3/8799 | 99.13 | 88.94 | 61.79 | 559.6 | Granite | Ground stone fragment |
| 7N38E | 3 | 28.3/4591.002 | 18.22 | 10.66 | 7.10 | 1.1 | — | Ground stone fragment |
| 7N38E | 5 | 28.3/4541 | 8.30 | 6.62 | 6.37 | 0.3 | Quartzite | Shatter |

TABLE 26.9
(*Continued*)

| Unit | Level | Catalog no. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Material | Description |
|---|---|---|---|---|---|---|---|---|
| Block B | | | | | | | | |
| 11N23E | 1 | 28.3/4506 | 10.38 | 6.65 | 4.42 | 0.3 | Pale yellow, purple, orange coastal plain chert | Shatter |
| 11N25E | 2 | 28.3/4526 | 13.88 | 8.03 | 6.18 | 0.3 | Pink white coastal plain chert | Secondary |
| 11N25E | 3 | 28.3/4589 | 69.30 | 48.13 | 37.28 | 147.2 | Quartzite | Pecking stone |
| 13N25E | 1 | 28.3/4538 | 17.63 | 11.70 | 2.02 | 0.3 | Pink coastal plain chert | Biface thinning |
| 13N25E | 2 | 28.3/4552 | 16.99 | 12.04 | 9.48 | 1.6 | Red orange white coastal plain chert | Secondary |
| 13N25E | 3 | 28.3/4566 | 23.06 | 20.63 | 12.16 | 8.3 | Granite | Ground stone fragment |
| 5N23E | 2 | 28.3/4536.001 | 32.67 | 24.93 | 11.01 | 9.2 | Gray coastal plain chert | Primary |
| 5N23E | 2 | 28.3/4536.002 | 52.67 | 16.64 | 15.82 | 15.3 | Quartzite | Ground stone fragment |
| 5N23E | 2 | 28.3/4553 | 15.64 | 9.14 | 4.23 | 0.5 | Quartz | Secondary |
| 5N23E | 4 | 28.3/4519.001 | 9.82 | 6.51 | 2.41 | 0.1 | Pale yellow coastal plain chert | Secondary |
| 5N23E | 4 | 28.3/4519.002 | 14.12 | 9.55 | 3.81 | 0.4 | Pink white coastal plain chert | Secondary |
| 5N25E | 1 | 28.3/4548.001 | 9.53 | 6.75 | 3.52 | 0.2 | White pink coastal plain chert | Biface thinning |
| 5N25E | 1 | 28.3/4548.002 | 14.94 | 13.24 | 5.91 | 1.2 | Quartz | Shatter |
| 5N25E | 2 | 28.3/4529.001 | 7.30 | 4.43 | 2.03 | 0.0 | Quartz | Biface thinning |
| 5N25E | 2 | 28.3/4529.002 | 7.01 | 5.36 | 2.60 | 0.1 | — | Geological sample |
| 5N25E | 2 | 28.3/4529.003 | 8.93 | 4.66 | 2.22 | 0.0 | Gray white coastal plain chert | Biface thinning |
| 5N25E | 2 | 28.3/4529.004 | 7.11 | 3.76 | 2.73 | 0.0 | — | Geological sample |
| 5N25E | 2 | 28.3/4529.005 | 7.16 | 5.35 | 1.60 | 0.0 | Gray chert | Shatter |
| 5N25E | 2 | 28.3/4529.006 | 4.86 | 3.64 | 2.65 | 0.0 | Quartz | Shatter |
| 5N25E | 2 | 28.3/4529.007 | 4.16 | 3.53 | 2.14 | 0.0 | — | Geological sample |
| 5N25E | 2 | 28.3/4529.008 | 4.78 | 3.39 | 2.52 | 0.0 | — | Geological sample |
| 5N25E | 2 | 28.3/4529.009 | 13.90 | 7.66 | 3.46 | 0.3 | Gray chert | Shatter |
| 5N25E | 3 | 28.3/4509 | 27.44 | 14.86 | 9.32 | 3.5 | White quartz | Primary |
| 5N25E | 3 | 28.3/4563 | 71.93 | 31.48 | 26.39 | 85.0 | Quartzite | Polished stone |
| 6N27E | 2 | 28.3/4521.001 | 16.35 | 14.53 | 3.41 | 0.4 | Pale yellow coastal plain chert | Biface–projectile point |
| 6N27E | 2 | 28.3/4521.002 | 20.13 | 10.08 | 5.80 | 1.0 | Pink white coastal plain chert | Primary |
| 6N27E | 3 | 28.3/4587 | 87.95 | 59.26 | 38.51 | 193.9 | Limestone | Incised ground stone fragment |
| 6N27E | 4 | 28.3/4543 | 9.00 | 8.54 | 3.20 | 0.3 | White quartz | Shatter |
| 6N27E | 4 | 28.3/4567 | 12.98 | 6.45 | 2.60 | 0.1 | Gray coastal plain chert | Shatter |
| 6N27E | 5 | 28.3/4525 | 20.20 | 11.18 | 4.35 | 1.0 | Gray white chert | Secondary |
| 7N23E | 2 | 28.3/4551 | 10.83 | 7.06 | 2.50 | 0.3 | Gray white coastal plain chert | Shatter |
| 7N23E | 3 | 28.3/4523 | 23.46 | 11.67 | 6.98 | 1.7 | Red coastal plain chert | Biface–drill |
| 9N23E | 1 | 28.3/4585 | 13.46 | 6.62 | 5.48 | 0.4 | Pink white coastal plain chert | Shatter |

TABLE 26.9
(*Continued*)

| Unit | Level | Catalog no. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Material | Description |
|---|---|---|---|---|---|---|---|---|
| 9N23E | 2 | 28.3/4586 | 44.73 | 21.47 | 11.33 | 8.7 | Slate | Primary |
| 9N25E | 2 | 28.3/4545 | 22.23 | 15.70 | 10.48 | 3.7 | Pale yellow coastal plain chert | Primary |
| Block C | | | | | | | | |
| 50N62E | 2 | 28.3/4542.001 | 4.79 | 3.72 | 3.59 | 0.0 | — | Geological sample |
| 50N62E | 2 | 28.3/4542.002 | 9.62 | 8.31 | 0.80 | 0.1 | Yellow red coastal plain chert | Biface thinning |
| 50N62E | 3 | 28.3/4546.001 | 4.69 | 4.06 | 1.19 | 0.0 | Pale yellow coastal plain chert | Biface thinning |
| 50N62E | 3 | 28.3/4546.002 | 5.56 | 4.08 | 1.59 | 0.0 | — | Geological sample |
| 50N64E | 1 | 28.3/4517.001 | 21.52 | 14.80 | 2.71 | 1.0 | Pink white coastal plain chert | Secondary |
| 50N64E | 1 | 28.3/4517.002 | 24.51 | 19.90 | 6.52 | 3.1 | Pink, gray, white coastal plain chert | Secondary |
| 52N62E | 2 | 28.3/4559 | 7.20 | 5.89 | 0.74 | 0.0 | White coastal plain chert | Secondary |
| 52N62E | 2 | 28.3/4580.001 | 12.92 | 11.14 | 2.41 | 0.2 | Pale yellow coastal plain chert | Secondary |
| 52N62E | 2 | 28.3/4580.002 | 13.88 | 11.43 | 1.60 | 0.2 | Pale yellow coastal plain chert | Secondary |
| 52N62E | 2 | 28.3/4590 | 52.74 | 43.02 | 32.45 | 92.3 | Quartzite | Ground stone fragment |
| 52N62E | 4 | 28.3/4569 | 10.54 | 5.96 | 1.79 | 0.1 | White, pale yellow coastal plain chert | Secondary |
| 52N64E | 1 | 28.3/4562 | 90.85 | 81.14 | 54.56 | 467.3 | Granite | Ground stone fragment |
| 52N64E | 2 | 28.3/4579 | 7.73 | 3.70 | 2.24 | 0.1 | — | Geological sample |
| 52N64E | 4 | 28.3/4533 | 83.37 | 39.94 | 12.58 | 32.4 | Pink white coastal plain chert | Biface–projectile point |
| 52N64E | 5 | 28.3/4528 | 8.71 | 8.96 | 1.55 | 0.1 | Pale yellow, orange coastal plain chert | Secondary |
| 54N60E | – | 28.3/4568 | 4.29 | 3.95 | 0.65 | 0.0 | Red coastal plain chert | Secondary |
| 54N60E | 2 | 28.3/4501 | 22.56 | 19.02 | 11.17 | 2.9 | Banded gray red white coastal plain chert | Primary |
| 54N60E | 3 | 28.3/4554 | 5.84 | 3.35 | 2.90 | 0.0 | Pale yellow coastal plain chert | Shatter |
| 54N62E | 2 | 28.3/4503 | 9.71 | 6.24 | 2.28 | 0.1 | Red costal plain Chert | Shatter |
| 54N62E | 2 | 28.3/4508.001 | 8.75 | 4.88 | 1.33 | 0.0 | White coastal plain chert | Shatter |
| 54N62E | 2 | 28.3/4508.002 | 6.64 | 5.58 | 0.91 | 0.0 | Gray Chert | Secondary |
| 54N62E | 2 | 28.3/4508.003 | 11.85 | 11.46 | 2.10 | 0.2 | White coastal plain chert | Secondary |
| 54N62E | 2 | 28.3/4513 | 8.63 | 8.1 | 4.28 | 0.3 | — | Geological sample |
| 54N62E | 2 | 28.3/4515 | 23.90 | 22.98 | 4.78 | 2.1 | Pink white coastal plain chert | Primary |
| 54N62E | 3 | 28.3/4583 | 44.91 | 34.27 | 20.85 | 20.9 | Granite | Shatter |
| 54N62E | 4 | 28.3/4507 | 7.33 | 3.88 | 2.13 | 0.1 | Pale yellow coastal plain chert | Shatter |
| 54N62E | 4 | 28.3/8866 | 86.73 | 51.73 | 46.82 | 247.7 | Granite | Ground stone fragment |
| Block D | | | | | | | | |
| 0N34E | 1 | 28.3/4588 | 14.49 | 7.36 | 2.67 | 0.2 | Pink white coastal plain chert | Secondary |
| 0N34E | 4 | 28.3/4524 | 12.75 | 5.25 | 3.20 | 0.1 | Pale yellow coastal plain chert | Shatter |
| 0N34E | 6 | 28.3/4518 | 15.77 | 12.94 | 6.37 | 0.8 | Red coastal plain chert | Secondary |
| 0N36E | — | 28.3/4582 | 12.16 | 9.82 | 1.88 | 0.2 | Gray chert | Secondary |

TABLE 26.9
(*Continued*)

| Unit | Level | Catalog no. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Material | Description |
|---|---|---|---|---|---|---|---|---|
| 0N36E | 2 | 28.3/4531.001 | 10.47 | 9.61 | 1.80 | 0.2 | Pink white coastal plain chert | Biface thinning |
| 0N36E | 2 | 28.3/4531.002 | 8.05 | 5.94 | 1.22 | 0.0 | White coastal plain chert | Secondary |
| 0N36E | 2 | 28.3/4531.003 | 32.48 | 26.70 | 10.08 | 8.6 | Gray coastal plain chert | Primary |
| 0N36E | 3 | 28.3/4510.001 | 11.19 | 3.65 | 3.61 | 0.1 | Pale yellow coastal plain chert | Secondary |
| 0N36E | 3 | 28.3/4510.002 | 14.69 | 10.87 | 6.17 | 0.7 | Tan quartzite | Secondary |
| 0N36E | 4 | 28.3/4561.001 | 19.38 | 17.05 | 4.20 | 1.1 | Pale yellow, red coastal plain chert | Secondary |
| 0N36E | 4 | 28.3/4561.002 | 17.59 | 8.16 | 2.50 | 0.3 | White chert | Microblade |
| 0N36E | 4 | 28.3/4561.003 | 13.93 | 8.48 | 2.70 | 0.2 | Gray chert | Secondary |
| 0N36E | 4 | 28.3/4561.004 | 24.85 | 8.12 | 2.35 | 0.5 | White chert | Microblade |
| 2S34E | 1 | 28.3/4558 | 27.78 | 21.14 | 4.62 | 3.3 | Tan coastal plain chert | Biface–projectile point |
| 2S34E | 3 | 28.3/4535.001 | 12.37 | 9.22 | 1.97 | 0.1 | Pale yellow coastal plain chert | Secondary |
| 2S34E | 3 | 28.3/4535.002 | 7.66 | 7.04 | 1.45 | 0.0 | Pale yellow coastal plain chert | Biface thinning |
| 2S34E | 3 | 28.3/4535.003 | 8.32 | 6.00 | 2.45 | 0.2 | — | Geological sample |
| 2S34E | 3 | 28.3/4535.004 | 7.57 | 5.67 | 1.32 | 0.0 | Quartz | Secondary |
| 2S34E | 3 | 28.3/4535.005 | 5.81 | 4.88 | 1.13 | 0.0 | White pink coastal plain chert | Secondary |
| 2S34E | 3 | 28.3/4535.006 | 5.96 | 4.58 | 2.31 | 0.0 | — | Geological sample |
| 2S34E | 3 | 28.3/4535.007 | 5.45 | 4.29 | 0.98 | 0.0 | Pale yellow coastal plain chert | Secondary |
| 2S34E | 3 | 28.3/4535.008 | 15.52 | 8.35 | 4.80 | 0.6 | Pink coastal plain chert | Secondary |
| 2S34E | 4 | 28.3/4522.001 | 6.23 | 5.32 | 1.72 | 0.0 | Pale yellow coastal plain chert | Secondary |
| 2S34E | 4 | 28.3/4522.002 | 6.56 | 4.89 | 1.06 | 0.0 | Gray Chert | Secondary |
| 2S34E | 4 | 28.3/4522.003 | 4.96 | 4.79 | 0.66 | 0.0 | Pale yellow coastal plain chert | Secondary |
| 2S34E | 4 | 28.3/4522.004 | 10.88 | 5.02 | 4.64 | 0.1 | Gray coastal plain chert | Shatter |
| 2S34E | 4 | 28.3/4571 | 115.94 | 45.81 | 44.36 | 168.1 | Metavolcanic ground stone fragment | Biface tool |
| 2S34E | 5 | 28.3/4539 | 9.21 | 5.79 | 1.78 | 0.1 | Gray coastal plain chert | Shatter |
| 2S36E | 2 | 28.3/4555 | 26.22 | 10.96 | 4.69 | 1.3 | Light brown coastal plain chert | Biface–projectile point |
| 2S36E | 4 | 28.3/4565 | 6.67 | 4.38 | 0.97 | 0.0 | Pale yellow coastal plain chert | Secondary |
| 2S36E | 4 | 28.3/4570 | 47.82 | 37.24 | 26.80 | 60.5 | Quartzite | Pecking stone |
| 4S36E | 3 | 28.3/4502 | 13.60 | 8.99 | 4.33 | 0.3 | Pale yellow coastal plain chert | Secondary |
| 4S36E | 4 | 28.3/4514.001 | 10.24 | 8.34 | 2.34 | 0.1 | Pale yellow coastal plain chert | Biface thinning |
| 4S36E | 4 | 28.3/4514.002 | 6.34 | 5.42 | 0.26 | 0.0 | White chert | Shatter |
| 4S36E | 4 | 28.3/4514.003 | 15.97 | 11.51 | 3.11 | 0.5 | Pink white coastal plain chert | Secondary |
| 6S36E | 2 | 28.3/4512 | 15.24 | 11.35 | 3.94 | 0.5 | Pink white coastal plain chert | Secondary |
| 6S36E | 3 | 28.3/4537 | 13.25 | 11.03 | 2.34 | 0.3 | Pale yellow coastal plain chert | Secondary |
| 6S36E | 4 | 28.3/4532 | 9.95 | 5.54 | 1.59 | 0.1 | Red coastal plain chert | Shatter |
| 6S36E | 4 | 28.3/4584 | 61.44 | 47.79 | 20.30 | 54.3 | Pale yellow coastal plain chert | Core fragment |
| 6S36E | 6 | 28.3/4516 | 11.82 | 7.46 | 0.83 | 0.0 | Pale yellow coastal plain chert | Biface thinning |

TABLE 26.9
(*Continued*)

| Unit | Level | Catalog no. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Material | Description |
|---|---|---|---|---|---|---|---|---|
| Block 1 × 1 | | | | | | | | |
| IE3 | 6 | 28.3/4547 | 9.68 | 5.54 | 2.03 | 0.1 | White pink coastal plain chert | Shatter |
| IE4 | 2 | 28.0/7007.001 | 5.89 | 5.15 | 0.68 | 0.0 | Orange chert | Secondary |
| IE4 | 2 | 28.0/7007.002 | 10.47 | 4.16 | 3.07 | 0.1 | Yellow coastal plain chert | Shatter |
| IE4 | 3 | 28.0/7018 | 8.02 | 6.01 | 1.81 | 0.0 | Pink white coastal plain chert | Shatter |
| TP 1 | 1 | 28.0/2059 | 103.24 | 63.08 | 32.23 | 185.3 | Quartzite | Unifacial tool |
| TP 1 | 1 | 28.0/2060 | 172.46 | 36.37 | 15.35 | 48.0 | Quartzite | Pecking stone |
| TP 4 | 2 | 28.0/2064 | 40.12 | 28.54 | 21.45 | 24.3 | Granite | Ground stone fragment |
| SQ A | 1 | 28.0/2803 | 53.17 | 41.41 | 28.48 | 55.6 | Granite | Ground stone fragment |
| SQ C | — | 28.0/2815 | 21.34 | 15.73 | 4.93 | 1.6 | Gray coastal plain chert | Primary |
| Surface | Surface | 28.3/4592 | 46.49 | 33.54 | 22.88 | 38.9 | Quartzite | Ground stone fragment |
| Trench | 2 | 28.0/2809 | 36.58 | 21.37 | 13.96 | 11.7 | Gray coastal plain chert | Core fragment |

a river cobble, a large piece quarried from an outcrop, or any other large stone that has had flakes removed from it. While there are numerous types of cores—unidirectional, bidirectional (bipolar), multidirectional (random), or pyramidal (prismatic)—only unidirectional and a multidirectional cores were found at Fallen Tree.

**28.0/2809**—A unidirectional core fragment made from a tan Coastal Plain chert with streaks of gray. There is a small amount of cortex on one face of the core fragment.

**28.3/4584**—A multidirectional core fragment made from a stippled pale yellow, gray and pink Coastal Plain chert.

FLAKES: These are defined as a stone fragments that have morphological evidence of being detached from a core. This morphological evidence can include a platform, bulb of pressure, eraillure scars, or compression rings. Flakes can be further subdivided into primary, secondary, and biface thinning. Primary flakes are dislodged from the core early in the reduction sequence and therefore exhibit a large amount of cortex (generally more than 30% of the dorsal face), especially near their platform. Secondary flakes exhibit much less cortex than primary flakes because they are removed from the core later in the reduction sequence. A biface thinning flake is a specialized term for flakes that were removed in order to thin a bifacially flaked tool. This flake type can be recognized by the appearance of a ridge near the center of the flake and a bifacial platform. Numerous scars from previous flake removal are often visible starting at, and running perpendicular to, the ridge (for a full description of lithic reduction sequences, see Crabtree, 1972). A total of 116 flaked stone artifacts were recovered at Fallen Tree, 66 are flakes; of these, there are 10 primary flakes, 47 secondary flakes, and 9 biface thinning flakes.

SHATTER: This is any small angular piece of stone that has obviously been removed from a larger core or flake but does not show any of the characteristics used to define a flake (e.g., bulb of percussion, platform, etc.). Shatter is generally formed as a byproduct of dislodging flakes. There were 36 pieces of shatter found at Fallen Tree.

UNIFACIAL: These tools are defined as purposefully shaped by being flaked along only a single edge face. This type can be further delineated by the base form of the tool—either a flake or a core. Unifacial flake tools are often called scrapers while unifacial core tools can be referred to as choppers. These common names are applied sporadically in the literature and will not be used here.

**28.0/2059**—The single unifacial tool found at Fallen Tree is made from a light gray quartzite. This large tool was made from a massive primary flake. Several flakes have been detached from the ventral surface of the tool to create a cutting edge. The dorsal face is covered in a smooth, possibly water worn, cortex.

BIFACIAL: These tools are differentiated from unifaces by the application of flaking on both faces of a single edge. As with unifaces, bifaces can be separated into flake and core tools. Bifacial flake tools, often called knives, also contain the projectile point subtype.

**28.3/4571**—This is a massive bifacial core tool manufactured from a relatively low-quality metavolcanic stone. Numerous flakes have been removed from the ventral face in order to shape the artifact. The majority of the dorsal face is still covered in cortex. A few flakes have been removed from the dorsal face and they are only along the same edge as the ventral flaking.

**28.3/4523**—Repeated flaking along a single edge of this bifacial tool has shaped this flake into a drill. While the distal end of this tool has been heavily modified, the proximal end still shows a small amount of cortex. Unlike the other Coastal Plain chert tools in the Fallen Tree collection, this artifact shows signs of being heat-treated. These signs include a change in color and structural morphology. While most Coastal Plain chert is a pale yellow to light tan, this artifact is a deep red/brown. The exterior of the drill has also become more glassy, or reflective, which indicates a change in structural morphology associated with heat treatment (Tippitt and Marquardt, 1984: 37).

**28.3/4521.001**—This artifact is the base of a projectile point that was manufactured out of a pale yellow/tan Coastal Plain chert (table 26.10 and fig. 26.5). The base is slightly incurvate and was thinned on both faces. Overall, the blade appears to have parallel sides and a trapezoidal bisection. Likely, this artifact is the basal half of an unstemmed Woodland point. According to the scar pattern at the break line, the distal half appears to have snapped off during a longitudinally (parallel to length) oriented high impact event.

Based on morphological similarity as well as its being found in the same level (albeit at separate units) as artifact 28.3/4555, a complete projectile point, this item may have been the base of a Greeneville point. The temporal and spatial occurrence of Greeneville points are discussed below with the analysis of 28.3/4555.

**28.3/4527.001**—This artifact is a fragment of the basal end of a projectile point made out of a mottled pink/gray Coastal Plain chert. Only the base, half of the stem, and a fragment of the shoulder remain. With so little of the artifact remaining, it is difficult to type this point beyond the general type of stemmed. Stemmed points can be found in the Late Archaic to the Middle Woodland period in the southeast.

**28.3/4533**—This stemmed projectile point is entirely intact and shows no sign of being resharpened or repaired. The base of the contracting stem is flat and has had several flakes removed in an effort to thin the base. The shoulders are flared and slightly barbed as the tip of the shoulders diverges toward the proximal end of the point. The blade is slightly constricted half way along the edge, but has a straight profile overall. The raw material for this point is a fine-grained Coastal Plain chert that fades from a light tan at the proximal end to a pink and then a green at the distal tip. The point shows no sign of use or damage.

Based on the morphology of the point, this artifact has been typed as part of the Late Archaic cluster of point types that includes Savannah River Stemmed and Mar-

TABLE 26.10
**Distribution of Projectile Points Recovered during the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Artifact No. | Length (mm) | Width (mm) | Thickness (mm) | Weight (g) | Shoulder width (mm) | Stem width (mm) | Basal width (mm) | Stem length (mm) | DSA | PSA | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Block A | | | | | | | | | | | | | | |
| 5N36E | 3 | 28.3/4527 | 1 | 18.03[a] | 12.94[a] | 8 | 2.1 | — | — | — | — | — | — | Unknown stemmed |
| 7N36E | 3 | 28.3/4556 | | 36.62 | 15.85 | 4.18 | 1.7 | — | — | 15.85 | — | — | — | Mississippian triangular |
| Block B | | | | | | | | | | | | | | |
| 6N27E | 2 | 28.3/4521 | 1 | 16.35[a] | 14.53 | 3.41 | 0.4 | — | — | — | — | — | — | Greeneville |
| Block C | | | | | | | | | | | | | | |
| 52N64E | 4 | 28.3/4533 | — | 83.37 | 39.94 | 12.58 | 32.4 | 39.94 | 17.76 | 9.71 | 11.89 | 185 | 75 | Savannah River stemmed |
| Block D | | | | | | | | | | | | | | |
| 2S34E | 1 | 28.3/4558 | — | 27.78[a] | 21.14 | 4.62 | 3.3 | 21.14 | 11.57 | 6.98 | 5.93 | 195 | 80 | Late Archaic stemmed |
| 2S36E | 2 | 28.3/4555 | — | 26.22 | 10.96 | 4.69 | 1.3 | — | — | 9.5 | — | — | — | Greeneville |

[a] Artifact measurement is approximate because of breakage.

ion types. This would place the point at 3000–1000 B.C.

**28.3/4555**—This artifact is very similar to the projectile point base described above (see 28.3/4521.001). This point also has a thinned base and parallel sides near the base. While the blade is parallel near the proximal end, by the middle of the point the blade becomes slightly excurvate then comes to an acute distal end. This point is entirely intact and shows no signs of resharpening. The point was manufactured out of a light brown/orange Coastal Plain chert.

Based on morphology, this point has been typed as a Greeneville (Kneberg, 1957). The Greeneville point type appears to be a regional variant of the Copena cluster (Justice, 1995: 208; Whatley, 2002: 46) and would therefore date to the Early/Middle Woodland (1000–0 B.C.).

**28.3/4556**—This unstemmed projectile point retains some of the original flake morphology from early in its reduction sequence. Because it has undergone relatively little modification, the ventral face of this point is still incurvate. The base of this point is flat and shows signs of being thinned. The blade shape is straight and the blade edge is serrated. Serration has been described as being the result of resharpening (Justice, 1995: 60), which would suggest that this artifact had been used to a point that it required rejuvenation.

Because of the blade shape and relatively small basal width (15.85 mm), this point has been typed as a Mississippian Triangular.[4] Mississippian Triangulars occur in a wide variety of sizes, can have incurvate, flat, or excurvate bases, and can have waisted or expanded blade shapes. Based on this analysis, this point would date to the Mississippian (800–1500 A.D.)

**28.3/4558**—This stemmed projectile point has been manufactured out of a tan Coastal Plain chert. While it is missing its tip and a small section of the body of the blade, the rest of the point is in pristine condition. The base is flat and the stem is slightly contracting. The shoulders are sloping and the blade is straight. The blade edges have been finely flaked and exhibit a small amount of serration. As noted above, the presence of serration suggests resharpening.

Without additional temporal markers it is difficult to accurately type this point. It very clearly falls within the Late Archaic to Early Woodland (3000–350 B.C.) stemmed cluster of point types (including Otarre, Wade, and Swannanoa). All of these points are medium to small with triangular blades and relatively small stems (see Cambron and Hulse, 1975: 46; Keel, 1976: 194).

MICROBLADES: These are extraordinarily rare artifacts throughout native North America and especially in the southeastern United States. Blades are defined as being flakes that are twice as long as they are wide (Crabtree, 1972: 42). Microblades are a subtype of the blade type and are defined as being smaller than 50 mm in length (Arnold, 1987: 63). Beyond these metric attributes, the term microblade is used here to also mean the blade shows signs of being detached from a prismatic core. Blade characteristics include broad angle on the prepared platform, parallel edges, dorsal scars that parallel the blade edges and originate from the same platform, and no cortex (Aigner, 1970: 61; Johnson, 1983: 50; Dietler, 2003: 25). While it is possible to make microblades using the same flaking methods as for bifacial and unifacial tools, it is more effective and more typical to use a method involving prismatic cores. The creation and utilization of prismatic cores and blades is a significant shift in methodology over unifacial and bifacial tools. Currently there are no theories regarding how this technology came to be used on St. Catherines Island. Microblade technology in North America occurred in Alaska, Western Canada, and among the Chumash in California. The closest occurrence of microblades are several caches found at Cahokia and Poverty Point. More research is needed to understand the origin of these blades.

Both of the microblades (28.3/4561) were found in a single unit and level (N0 E36 Level 4). Both blades were constructed out of the same unknown chert type. While this chert resembles Coastal Plain chert in color, it differs in its structural morphology. Coastal Plain chert is usually medium/fine-grained with fossilferious inclusions. The chert used to manufacture these blades was extremely fine-grained with no inclusions. It is possible that the blades were made out of a very high-quality Coastal Plain chert, but without further evidence, the raw material type has been designated as an unknown chert type. While both blades are obviously made from the same material, they do not refit with each other.

**28.3/4561.002**—The first microblade is the distal end of a prismatic blade. There is a medial ridge that runs almost the entire length of the blade. This ridge does not meet at a point in the center; rather it reaches a plateau between the dual flake scars that run parallel to the blade. Both of these flake scars represent single flake removals, likely resulting in other prismatic blades. The parallel flake removal scars in conjunction with the plateau between them gives the blade a trapezoidal bisection (see Dietler, 2003: 69, for a description and illustrations of bisection types). The blade has a slight lateral curve to the right (with the distal end being "up" and the dorsal face toward the viewer). The edges show signs of use, but no secondary retouch has taken place.

**28.3/4561.004**—This artifact is the midsection of a much longer blade. Like the blade described above, there is a medial ridge running down the center of this blade. On both the distal and proximal ends of the blade this medial ridge has a plateau section. However, as the medial ridge moves into the center of the blade this plateau section disappears and a single medial ridge takes its place. As in the other blade, this ridge was constructed by the removal of two parallel flakes. This blade is remarkably straight and shows no signs of twisting or curving. There is evidence of use on both edges but no retouching.

It has been suggested that microblades were used for shell bead manufacture by the Chumash (Preziosi, 2001; Dietler, 2003) and at Cahokia (Yerkes, 1983). Based on the relatively large number of shell bead blanks found at Fallen Tree it is possible that the site was being used as a production zone for shell beads and the microblades were associated with this activity (see Blair and May, below).

Ground Stone Artifacts: As noted earlier, there were 15 ground stone artifacts recovered from Fallen Tree. While there is a widely accepted and fully developed terminology for ground stone artifacts, the paucity of ground stones found at Fallen Tree precludes the need for a discussion of the existing typology. Instead, all of the ground stone artifacts from Fallen Tree fall into just four categories—pecking stones, polished stones, incised stone, and ground stone fragments.

The term pecking stones is used here to mean any stone that shows signs of purposeful battering on one or more edges. The term hammer stone could also be used to describe this artifact type. There are three pecking stones found at Fallen Tree, all of which were made from quartzite. Two of the pecking stones (28.3/4570 and 28.3/4589) have extensive use wear including large flakes detached during hammering. The third pecking stone, 28.0/2060, has much less use wear and is entirely intact.

The term polished stone is poorly defined and its functionality is not understood. Within this analysis, polished stones are any ground stone that appears to have been purposefully smoothed. Differentiating between naturally polished and purposefully smoothed stones is difficult and far from definitive. Nonetheless, there is a single polished stone found at Fallen Tree. This artifact, 28.3/4563, is a quartzite stone that has been ground and polished into an oblong shape. There is no observable use wear on the stone.

Incised stones are any stone that shows signs of deliberate carving. The single incised stone found at Fallen Tree (28.3/4587) is a piece of limestone that has two perpendicular lines that make a "T" shape.

The nine remaining ground stone artifacts have been classified as ground stone fragments, meaning that there is no direct evidence of how they were shaped or used because so much of their original morphology has been lost. It should be remembered that there is no naturally occurring stone on St. Catherines. So, while these fragments display little evidence of purposeful modification, they are nevertheless significant.

Spatial Overview: When looking at the spatial distribution of lithic artifacts at Fallen Tree, very few patterns emerge. There are several units that contained far more lithic artifacts than other units. For example, the densest accumulation of stone artifacts occurred in S2 E34, where an average of 6.5 stone items/m$^3$ were recovered. However, the unit immediately adjacent to this high concentration, S2 E36 had only 1.5 stone items/m$^3$. This suggests that there may be several very localized lithic reduction areas at Fallen Tree. Those areas would include N0 E36, N5 E25, N7 E36, and S2 E34.

**N0 E36**—An average of 5 stone items/m$^3$ were found in this unit. These artifacts were found throughout the second, third, and fourth levels. In addition to the two microblades found in this unit, six secondary and one biface thinning flake were also recovered.

**N5 E25**—While this unit had an average of 4.5 stone items/m$^3$, the vast majority of lithic artifacts came from a single level, Level 2, which when measured by itself, has a density of 12.5 stone items/m$^3$. Along with several pieces of shatter, two biface thinning flakes were recovered from this level.

**N7 E36**—Like Level 2 in N5 E25, Level 3 in this unit contained numerous pieces of lithic debitage. The unit has a lithic density of 6 stone items/m$^3$, while Level 3 has 17.5 stone items/m$^3$, including a projectile point (28.3/4556).

**S2 E34**—While a projectile point (28.3/4558) was found in the first level of this unit, the third and forth levels contained the vast majority of lithic artifacts. Together, the two levels contained eight secondary flakes and a biface thinning flake.

The vertical distribution of lithic artifacts from Fallen Tree is notable. It appears that the material culture of an earlier occupation is visible in the forth level of excavation. Both the Late Archaic point (28.3/4533) and the microblades (28.3/4561) were recovered from Level 4. While neither of these objects are definite cultural markers (see McNeil in chap. 21), both suggest an earlier occupation under the Woodland refuse.

CONCLUSIONS: The lithic assemblage from Fallen Tree is typical of a stone-poor environment with a minimal amount of stone working. The morphological makeup of the lithic artifacts from Fallen Tree suggests that the lithic resources that were being imported from the mainland were likely being brought to St. Catherines Island in a finished or nearly finished form. The minimal number of cores and the relatively low amount of debitage (when compared to the number of finished tools) suggests that the shaping and modification of stone tools were usually happening outside of Fallen Tree, and likely off of St. Catherines Island. Nevertheless, there are a relatively large number of biface thinning flakes at Fallen Tree. The removal of a biface thinning flake is generally one of the last steps before the completion of a biface. This would suggest that while the majority of flaking may have been taking place outside of Fallen Tree, a small number of bifaces were being completed on site. Several of the possible locations where this small scale lithic reduction was taking place are visible in the archaeological record by the marked increase in debitage. There are several questions that require further research, including the origin of the microblades and the possible existence of a Late Archaic occupation.

## BONE AND SHELL
### BY LORANN S. A. PENDLETON

During the course of the Fallen Tree excavations, only a small number of artifacts of bone and shell were recovered. These items were significant due to their scarcity as well as their find locations. The quantity of worked bone and shell is higher per excavation square than that of the mission. The following tables and discussions quantify and elaborate on the distribution of these artifacts.

WORKED BONE: Worked bone artifacts, in the forms of awls or pins, were found across the excavations at Fallen Tree (table 26.11). The bone artifacts are generally made from deer. The two bone pins (28.0/7000 and 28.3/5758) were highly polished on all surfaces. The awls had use polish on the distal worked ends only. One of the bone pins (28.3/5758) was missing its distal end, but the proximal end had been cut and polished into a thin square. A single awl recovered from the Block A excavations also is a direct measure of the absence of features and general low density of recovered artifacts. A broken awl tip (28.3/8753) from Level 1 in square 6N27E, Block B, is an indication of the relatively disturbed first layer across the site. The majority of worked bone pieces were recovered from Level 3 through Level 5.

Almost half of the recovered worked bone artifacts came from the 1 × 1 m squares excavated during the first season. These squares were dug in the obvious shell concentrations visible from the surface. None of these tools were complete and were probably discarded. None of these artifacts were associated with any obvious stratigraphy within the shell concentrations. Additionally, only one artifact was recovered from the surface of the shell concentrations or the first 10-cm level.

WORKED SHELL: For all of the shell observed within excavation units or features, very few exhibited evidence of modification as either hammers or hoes. Large whelk columella were used as hammers in the absence of lithic hammerstones. The larger whelk were usually punched at the top and used as hoes.

Two delicate shell pins were found (28.3/8741 and 28.3/8802). While not as carefully made as the bone pins, they are quite small (36.64 mm length, 6.32 mm diameter; 56.51 mm length, 10.24 mm width, 6.08 mm thick) and finely shaped with tapered ends.

Shell hammers were absent in Block A, rare in Block C, and more frequent in Blocks B and D (table 26.12). A single shell hoe (28.3/8834) was recovered in Block C as well as one (28.3/8708) in Block D.

## SHELL BEADS
### BY ELLIOT BLAIR AND PETER FRANCIS

Seventeen shell beads were recovered during the 1983–1985 excavations at Fallen Tree. The beads were analyzed by the late Peter Francis, at the Center for Bead Re-

TABLE 26.11
**Distribution of Worked Bone Recovered in the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Frequency | Description |
|---|---|---|---|---|
| Block A | | | | |
| 5N36E | 3 | — | 1 | Awl |
| Block B | | | | |
| 6N27E | 1 | 28.3/8753 | 1 | Broken awl tip, top half |
| 6N27E | 5 | 28.3/5758 | 1 | Pin |
| Block C | | | | |
| 52N64E | 2 | 28.3/8859 | 1 | Awl with medial break, deer; possible flaker |
| 52N64E | 2 | 28.3/8853 | 1 | Incised and polished bone tool |
| Block D | | | | |
| 2S36E | 2 | 28.3/8902 | 1 | Punched |
| 2S36E | 3 | 28.3/8686 | 1 | Awl fragment, tip |
| 4S36E | 3 | 28.3/8904 | 1 | Awl |
| 6S36E | 1 | 28.3/8703 | 1 | Perforated bone tube |
| 6S36E | 3 | 28.3/8706 | 1 | Awl tip |
| Block 1 × 1 | | | | |
| IE3 | 4 | 28.0/7015 | 1 | Highly polished bone pin; top 1/3 square |
| IE3 | 5 | 28.3/8881 | 1 | Awl fragment, top half |
| IE4 | 2 | 28.3/8903 | 1 | Broken awl tip |
| IE4 | 2 | 28.0/7001 | 1 | Deer awl |
| IE4 | 3 | 28.3/8888 | 1 | Deer awl |
| IE4 | 4 | 28.0/7000 | 1 | Polished pin |
| IE4 | 5 | 28.3/8890 | 1 | Deer awl, broken in half |
| IIA3 | 2 | 28.3/8879 | 1 | Deer awl |
| Total | | — | 18 | — |

search in Lake Placid, New York. The bead distribution and morphological characteristics are summarized in table 26.13.

In his morphological analysis Francis identified bead size, shell type, bead shape or form, and perforation and finishing characteristics. Bead size measurements, in millimeters, were recorded for length (the measurement of the bead parallel to the perforation), diameter (the measurement of the bead perpendicular to the perforation), and aperture diameter (only recorded when greater than 0.6 mm). Shell type was determined, when possible, to the level of univalve or bivalve, though unless the bead is made from the columella of a univalve, this is generally extremely difficult. No beads made from whelk columella were identified at Fallen Tree. Univalve and bivalve determinations were made based upon the layers of shell composing the bead.

Francis described bead shape and form based on standard bead terminology (see Beck, 1928). Perforation descriptions include shape, location of the aperture (center or off-center), and characteristics such as "wobbly" or concentric. These descriptions indicate two things: if the bead was drilled from one or both ends and type of drill used (hand drill or mechanical). Beads drilled from both ends with a tapered drill exhibit an hourglass, or biconical, perforation shape. Beads drilled from only one end will have a more irregular perforation because the distal end of the perforation will shatter or "break out". "Wobbly" perforations indicate hand drilling, while concentric perforations indicate the use of a mechanical drill, such as a bow drill (see Gwinnett and Gorelick, 1981: 22).

Of the perforation apertures measured by Francis, those greater than 0.6 mm indicate the use of a tapered drill—though this will only be observed as long as the bead is of sufficient length for the taper to be seen. Only one bead from Fallen Tree (28.0/

TABLE 26.12
**Distribution of Worked Shell Recovered in the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Frequency | Description |
|---|---|---|---|---|
| Block A | | | | |
| 5N38E | 2 | 28.3/8741 | 1 | Whole pin |
| 7N38E | 4 | 28.3/4572 | 1 | Whelk columellae pin |
| Block B | | | | |
| 5N25E | 2 | 28.3/8727 | 1 | Whelk columellae |
| 7N23E | — | 28.3/8768 | 1 | Whelk columellae pick |
| 7N23E | 3 | 28.3/8769 | 2 | Whelk columellae |
| 9N23E | 3 | 28.3/8802 | 2 | Whelk shell columellae |
| 9N25E | 1 | 28.3/8809 | 1 | Whelk shell columellae fragment |
| 9N25E | 2 | 28.3/8812 | 1 | Whelk shell columellae |
| 9N25E | 2 | 28.3/8814 | 1 | Large fragment of worn whelk columellae |
| 9N25E | 3 | — | 1 | Whelk shell columellae |
| 11N23E | 2 | 28.3/8828 | 1 | Shell hoe, handle hole, wear on columellae |
| 11N23E | 2 | 28.3/8829 | 1 | Shell hoe, handle hole, wear on columellae |
| 11N25E | 2 | 28.3/8832 | 1 | Whelk hammer hoe |
| Block C | | | | |
| 50N62E | 2 | 28.3/8834 | 1 | Shell hoe, handle hole, wear on columellae |
| Block D | | | | |
| 2S34E | 2 | 28.3/8687 | 1 | Small whelk with possible columellae wear |
| 2S34E | 2 | 28.3/8687 | 1 | Whelk shell columellae fragment |
| 4S36E | 1 | 28.3/8693 | 1 | Whelk expended columellae and whorl |
| 4S36E | 2 | 28.3/8696 | 1 | Hammer pick |
| 6S36E | 3 | 28.3/8707 | 2 | Shell hoe, handle hole, wear on columellae |
| 6S36E | 3 | 28.3/8708 | 1 | Shell hoe, handle hole, wear on columellae |
| Block 1 × 1 | | | | |
| IIA3 | 2 | 28.3/8875 | 1 | Whelk canal, 1 culatum hoe |
| Total | | — | 24 | — |

7009) has a perforation diameter greater than 0.6 mm. Its comparatively greater length (8.9 mm) indicates the use of a tapered drill.

Francis also noted finishing characteristics of the beads—describing whether or not the bead had been ground—and if it had, whether facets are present. Beads that have not been ground are considered unfinished blanks. Grinding is indicative of a finished bead. Faceted grinding and off-center perforations indicate that a bead was individually finished. Conversely, centered perforations and smooth grinding is indicative of beads that have been finished as a group, in the *heishi*[5] style (see Francis, in press).

Though the shell bead sample from Fallen Tree is small (17), several observations about the general characteristics of the site's beads can be made. Short barrel, short cylinder, and disc beads dominate the shapes, comprising 94 percent of the sample. Larger shell beads made from the columellae of a whelk, more characteristic of the earlier burial mounds on St. Catherines (Pendleton, 1986: 20; Thomas and McNeil, 2002: 38; Francis, in press), are noticeably absent. Additionally, univalves are the preferred shell type at Fallen Tree, with 53 percent of the sample identified as such. Only one bead, 28.0/7020, is identified as coming from a bivalve. This is consistent with the standard notion that most shell beads, including shell disc beads, are predominantly made from univalves (Mitchem, 1997: personal commun. to Goddard, Powell, and White).

TABLE 26.13
**Distribution of Shell Beads Recovered during the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Diameter (mm) | Length (mm) | Shell type | Form | Perforation | Finishing characteristics |
|---|---|---|---|---|---|---|---|---|
| Block B | | | | | | | | |
| 7N25E | FS (B) #3 | 28.3/2302 | 7.2 | 2.4 | univalve | short cylinder | hourglass, wobbly, off center | ground, facets |
| 7N25E | 1 | 28.3/2318 | 8.2 | 3.5 | univalve | short cylinder blank | hourglass, wobbly | not ground |
| Block C | | | | | | | | |
| 52N62E | 4 | 28.3/2305 | 7.6 | 6.1 | — | short barrel wedge profile | hourglass, wobbly, off center | ground, facets |
| Block D | | | | | | | | |
| 0N34E | 1 | 28.3/2303 | 12.3 | 2.7 | univalve | short cylinder blank, from square piece | hourglass, wobbly | not ground |
| 2S36E | 4 | 28.3/4574 | 7.08 | 2.85 | univalve | short cylinder | hourglass, wobbly | broken |
| 4S36E | 6 | 28.3/2304 | 8.2 | 3.5 | univalve | short cylinder blank | hourglass, wobbly | not ground , broken |
| Block 1 × 1 | | | | | | | | |
| IE3 | 4 | 28.0/7016 | 3.9 | 2.0 | — | short cylinder | hourglass, off center | ground |
| IE3 | 5 | 28.0/7003 | 8.9 | 2.6 | univalve | short cylinder blank | hourglass, wobbly | not ground |
| IE4 | 1 | 28.0/7020 | 11.7 | 0.6 | bivalve | disc blank | hourglass, wobbly | not ground |
| IE4 | 2 | 28.0/7011.001 | 12.5 | 2.9 | univalve | disc blank | hourglass, wobbly | not ground |
| IE4 | 2 | 28.0/7011.002 | 6.5 | 1.1 | univalve | disc blank | conical from interior | not ground |
| IE4 | 2 | 28.0/7011.003 | 4.0 | 2.3 | — | short cylinder | hourglass, off center | ground |
| IE4 | 2 | 28.0/7011.004 | 4.4 | 2.9 | — | short barrel, wedge profile | hourglass | ground |
| IE4 | 3 | 28.0/7009 | 9.3 | 8.9 | — | ellipsoidal barrel | hourglass, off center 3.0 × 2.8 | ground, facets |
| IIA1 | 4 | 28.0/7021 | 7.6 | 2.4 | — | short cylinder | hourglass, wobbly, off center | ground |
| IIA2 | 4 | 28.3/2307 | 9.8 | 1.8 | univalve | disc blank | hourglass, wobbly | not ground |
| IIA2 | 5 | 28.0/7019 | 4.9 | 2.9 | — | short cylinder blank | hourglass, wobbly | partly ground |

Nine of the beads, 53 percent of the sample, are unfinished blanks, 75 percent of those beads that are not blanks are faceted and/or have an off-center perforation, 71 percent of the sample has visibly "wobbly" or eccentric perforations, and 94 percent of the sample exhibit hourglass perforations. These numbers suggest that bead making may have occurred at the site. They were manufactured by a labor-intensive process involving the individual perforation and grinding of beads. The beads were drilled individually, from both sides, with a hand drill. The finish grinding was completed without the utilization of the mass production *heishi* technique.

The sample of shell beads obtained from Fallen Tree is so small and scattered, both horizontally and vertically, that few conclusions can be drawn about the distribution of beads. With the exception of square IE4, no unit contained more than two beads. Even in square IE4, with six beads distributed throughout the top three levels, the density of beads is so low that no conclusions can be drawn.

## ARTIFACTS OF EURO-AMERICAN MANUFACTURE

The overwhelming majority of recovered artifacts reflect aboriginal manufacture. Significantly, artifacts of Euro-American manufacture were recovered and are discussed in the following sections.

### Majolica and Other Colonial Pottery by David Hurst Thomas and J. Alan May

We have already described the European ceramics recovered during the University of Georgia excavations and the Island-wide transect survey (table 20.4). A number of sherds recovered in the 1983–1984 excavations at Fallen Tree can likewise be identified as Spanish and New World majolicas, olive jar sherds, plus a few pieces of English earthenwares.[6] In this brief overview, we will describe the identifiable sherds and examine the temporal occurrence of each type (table 26.14)

Isabella Polychrome (28.3/8851): One triangular fragment of Isabella Polychrome was recovered. The interior is a grayish-white tin enamel glaze, and the paste is a soft chalky buff with no visible inclusions. The outside is painted a bright cobalt blue and yellow design, but the sherd is too small to determine the exact depiction. Earliest New World use of this pottery type is documented at La Isabella (1493; see Deagan and Cruxent, 2002a: 152–153). This type also constitutes part of the European pottery found at sites such as St. Augustine and Santa Elena. Deagan (1987: 58–59, table 2) suggests an age range of 1493–1580.

Yayal Blue on White (28.3/8862): Two Yayal Blue on White rim sherds were recovered at Fallen Tree. On one, the outer lip has been chipped off and tool marks are evident the underside of the lip. The white slip covers a salmon-colored paste, with clearly visible sandlike inclusions. The other side is tin glazed with a blue design on white. The design contains a double band painted concentrically along the rim touching blue chevron. The second sherd (28.0 7074) of Yayal Blue on White is also a broken rim, with two clear concentric bands; the thickness of this sherd suggests that it may have been part of a chamber pot. Deagan (1987: table 2) assigns a temporal span of 1490–1650; this type is known from both St. Augustine and St. Elena.

Ichtucknee Blue on Blue (28/38723): A rim sherd of Ichtucknee Blue on Blue was found, and a portion of the glaze has been worn off in the lip area. The blue on blue glaze appears on both sides of this sherd, and the paste is a soft chalky white without visible inclusions. Approximately 6 mm from the edge is a painted rim band, adjacent to several arabesque designs, painted in a darker blue. The cream-colored paste suggests that this sherd is probably Italian Ligurian, dating to the second half of the 16th century (Lister and Lister, 1982: 75). Deagan (1987: table 2) assigns an age range of 1600–1650 (see also Goggin, 1968).

San Luis Blue on White (28.3/8726; 28.3/8749 [n = 2]; 28.3/8900): The surface on four

TABLE 26.14
**Distribution of Historic Ceramics Recovered in the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Size | Frequency | Comment |
|---|---|---|---|---|---|
| Block A | | | | | |
| 5N36E | 2 | 28.3/8731 | <2 cm | 2 | Lead-glazed English earthenware |
| 5N38E | 2 | 28.3/8749 | <2 cm | 2 | San Luis Blue on White–red paste |
| 5N38E | 2 | 28.3/8749 | <4 cm | 1 | Lead-glazed English earthenware |
| 5N38E | 2 | 28.3/8749 | <2 cm | 2 | Lead-glazed English earthenware |
| 7N38E | 2 | 28.0/7088 | <4 cm | 1 | Lead-glazed English earthenware |
| 7N38E | 3 | 28.3/8792 | <2 cm | 1 | Cologne stoneware |
| Block B | | | | | |
| 5N25E | 2 | 28.3/8723 | <4 cm | 1 | Ichtucknee Blue on Blue |
| 5N25E | 3 | 28.3/8726 | <4 cm | 1 | San Luis Blue on White–white paste |
| 6N27E | 1 | 28.3/8900 | <4 cm | 1 | San Luis Blue on White–red paste |
| 9N23E | 3 | 28.3/8803 | <2 cm | 1 | Cologne stoneware |
| 9N25E | — | 28.3/8808 | <4 cm | 1 | Glazed red/brown ironstone ware |
| Block C | | | | | |
| Surface | — | — | <4 cm | 1 | Glazed gray/white rim–red paste. 5.6 mm |
| 50N64E | 2 | 28.0/7074 | <6 cm | 1 | Yayal Blue on White |
| 50N64E | 2 | — | <2 cm | 2 | Puebla Blue on White |
| 52N62E | 2 | 28.3/8846 | <2 cm | 1 | Puebla Blue on White |
| 52N64E | 1 | 28.3/8851 | <2 cm | 1 | Isabella Polychrome |
| 52N64E | 2 | 28.3/8857 | <2 cm | 2 | Glazed white/cream ware |
| 54N60E | 2 | 28.3/8864 | <6 cm | 1 | Red/brown thin glass/ceramics, striations |
| 54N60E | 2 | 28.3/8862 | <6 cm | 1 | Yayal Blue on White |
| N of 54N62E | — | 28.3/8873 | <8 cm | 1 | Possible Fig Springs/San Juan Polychrome or San Luis Blue on White |
| Block D | | | | | |
| 0N36E | 3 | 28.3/8716 | <4 cm | 1 | Cologne stoneware, 4.4 mm |
| 2S36E | 1 | 28.0/7077 | <4 cm | 1 | Cologne stoneware, 6.3 mm thickness |
| No provenience | — | 28.3/8892 | <2 cm | 1 | San Luis Blue on White–red paste |
| Total | — | — | — | 28 | — |

of the San Luis Blue on White sherds is a crazed grayish-white enamel with blue markings. These sherds all have a distinctively soft brick-red chalky paste, without visible inclusions. One sherd (N6 E 27 Level 1; 28.3/8900) shows striped blue markings and has a curvature and thickness indicative of the opening rim of a basin (or, more typical for this type, a deep brimmed plato). San Luis Blue on White is made in Mexico and commonly found throughout the Spanish settlements in the New World—it is frequently found with (and contemporaneous to) Fig Springs, San Juan Polychrome.

The remaining San Luis Blue on White (28.3/8726) is a rim sherd, is not crazed, and has a very soft white paste. The blue design on the rim shows lobed floral arabesque-type curves touching on concentric blue bands. The inner band is 8.5 mm from the lip and the outer band is 4.1 mm below the rim. The brighter blue of the white-clayed San Luis Blue on White sherd as well as its soft clayey paste suggest a lower firing temperature, as the cobalt used to produce the blue design is more stable at lower firing temperatures (Rice, 1987: 337–338). Deagan (1987: table 2) assigned a temporal range of 1580–1650.

The white-pasted San Luis Blue on White, which dates to the latter half of the 16th century and early 17th century, is later than the red pasted variety that dates to the middle of the 17th century—suggesting the expansion of production centers from Mexico City.

FIG SPRING/SAN JUAN POLYCHROME (28.3/8873): One rim sherd has a grayish white background enamel, with a painted light blue dot near the edge. The paste is red with inclusions. Laminar fractures suggest the temper was probably shell (Rice, 1987: 407). The crazing is perhaps due to a secondary lead glaze. This sherd is 5 mm thick and very slightly inclines, suggesting that it may have been part of a brimmed plato, ''deep, saucerlike plates'' (Deagan, 2002: 54, see fig. 7.4) that are a common shape for the Fig Springs/San Juan type. Earliest appearance of this type in St. Augustine (and more generally, outside of Mexico) dates to the 1580s, and the latest occurrences date to the 1650s (Deagan, 1987: 74, table 2).

PUEBLA BLUE ON WHITE (28.3/8846): Three sherds of this type were recovered and, although the design is indeterminable, the color combination and the pale peach paste suggest that the sherds belong to Puebla Blue and White. We cannot determine the nature of the vessels involved. The sherds have a grayish-white background cream enamel with faded blue areas; the shiny appearance suggests that a separate lead clear glaze may have been added in a subsequent firing, leading to the crazing evident on the surface. Deagan (1987: table 2) assigns a temporal duration of about 1700–1850.

BROWN COLOGNE STONEWARE (28.0/7077; 28.3/8716; 28.3/8792; 28.3/8803): Four sherds with a mottled salt-glaze of brownish red were recovered at Fallen Tree. The paste is very hard, ranging from dark to lighter gray. These sherds are probably German stoneware (Hunter, 2002: 176).

LEAD-GLAZED ENGLISH EARTHENWARE (28.0/7088; 28.3/8731; 28.3/8749): We found three sherds of lead-glazed earthenware, one piece with part of the bottom ring, with glaze only on the inside. The other sherds have glaze on both sides. The paste is buff and hard. Lead-glazed earthenwares were the cheapest and the most widely available of the American pottery of the 17th century (Noël Hume, 1969).

To identify the sherds as lead-glazed English earthenware, we sent digital photos to Kathleen Deagan for analysis. We had initially thought that they were some type of majolica sherd, but she concluded that they looked like lead-glazed slipped earthenware, which could either place these sherds as coming from a later post-Oglethorpe occupation or deriving from trade. Deagan further suggested that one of the sherds, part of the base ring for the vessel, looked like part of a ''milk pan'' form—quite common at places like Ft. Frederica during the 18th century (Deagan, personal commun.).

OLIVE JARS: About three dozen olive jar sherds were recovered in the 1983–1984 excavations at Fallen Tree (see table 26.15), mostly from Level 2 or 3, a depth greater than 10 cm but less than 20 cm below the ground surface. This small number of sherds recovered from almost 110 $m^2$ of excavations suggests that few of these vessels made their way into the material culture of the Guale and that this form was not readily copied into aboriginal form. The greatest concentration of sherds is from Block B with a density of 0.6 sherds/$m^2$. The lowest density is from Block D, with just 0.1 sherd/$m^2$.

Olive jar fragments were recovered from all of the excavation blocks, though the greatest concentration was from Block B. Block C had a low density in comparison, which is interesting because of its proximity to Larson's 1959 excavations and Mission Santa Catalina de Guale. The generally low density of recovered artifacts from Block C is interpreted to mean that few if any aboriginal structures were located in this area.

The collection contains olive jar rims (28.3/8800). Following Goggin's typology, the rim sherds belong to middle phase olive jars, which date from 1585 until the early 18th century (Goggin 1964: 263–265, 278). One of the rim sherds shows traces of bitumen, commonly used a sealant.

Most of the olive jar sherds from Fallen Tree are unglazed (28.3/8705; 28.3/8776; 28.3/8806; 28.3/8843; 28.3/8893), but five show a distinctive greenish lead glaze on

TABLE 26.15
**Distribution of Olive Jar Sherds Recovered in the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Size (length) | Thickness (mm) | Frequency | Comment |
|---|---|---|---|---|---|---|
| Block A | | | | | | |
| 6N37E | 2 | 28.0/7086 | <6 cm | 10 | 1 | Unglazed buff/gray |
| 7N36E | 1 | 28.3/8786 | <4 cm | 9.3 | 1 | Unglazed buff/gray |
| 7N36E | 3 | 28.0/7068 | <4 cm | 4.6 | 1 | Unglazed buff/gray, eroded |
| 7N38E | 3 | 28.3/8788 | <6 cm | 8.0 | 1 | Unglazed buff/gray |
| 7N38E | 3 | 28.3/8788 | <4 cm | 7.8 | 1 | Unglazed buff/gray |
| 7N38E | 3 | 28.3/8788 | <2 cm | 6.5 | 1 | Glazed green interior |
| 7N38E | 4 | 28.3/8796 | <4 cm | 10.3 | 1 | Unglazed buff/gray |
| Block B | | | | | | |
| 6N27E | 2 | 28.3/8760 | <6 cm | 5.7 | 1 | Unglazed buff/gray |
| 6N27E | 3 | 28.3/8757 | <4 cm | 5.7 | 1 | Unglazed buff/gray |
| 7N25E | 2 | 28.0/7090 | <4 cm | 5.8 | 1 | Unglazed buff/gray; two pieces able to be refitted |
| 9N23E | 1 | — | <2 cm | 6.5 | 1 | Unglazed buff/gray |
| 9N23E | 1 | 28.3/8807 | <4 cm | 6.6 | 1 | Unglazed buff/gray |
| 9N23E | 2 | 28.3/8806 | <4 cm | 7.7 | 1 | Glazed green interior and exterior |
| 9N23E | 2 | 28.3/8800 | <8 cm | 13.5 | 1 | Glazed interior, rim, 79.7 mm diameter |
| 9N25E | 2 | 28.3/8813 | <4 cm | 6.5 | 1 | Unglazed buff/gray |
| 9N25E | 2 | 28.3/8813 | <6 cm | 6.5 | 1 | Unglazed buff/gray |
| 9N25E | 2 | 28.3/8813 | <8 cm | 5.8 | 1 | Unglazed buff/gray |
| 9N25E | 2 | 28.3/8813 | <8 cm | 11.7 | 1 | Unglazed buff/gray |
| 11N23E | 2 | 28.3/8823 | <6 cm | 9.3 | 1 | Unglazed buff/gray |
| 11N23E | 2 | 28.3/8822 | <4 cm | 9.7 | 2 | Unglazed red/tan, reduced dark interior |
| 11N23E | 2 | 28.3/8822 | <12 cm | 10.5 | 1 | Unglazed red/tan, reduced interior |
| 11N23E | 3 | 28.3/8827 | <4 cm | 8.0 | 1 | Glazed interior, buff/gray |
| 11N23E | 3 | 28.3/8827 | <4 cm | 9.3 | 1 | Unglazed buff/gray |
| 11N23E | 3 | 28.3/8827 | <4 cm | 8.3 | 1 | Unglazed buff/gray |
| 11N23E | 3 | 28.3/8827 | <6 cm | 7.2 | 2 | Unglazed buff/gray |
| 13N25E | 2 | 28.3/8843 | <6 cm | 8.7 | 1 | Glazed light green interior and exterior |
| 13N25E | 1 | 28.0/7200 | <6 cm | 7.7 | 1 | Unglazed buff/gray |
| Block C | | | | | | |
| 50N62E | 2 | 28.3/8835 | <4 cm | 12.2 | 1 | Unglazed buff/gray |
| 50N64E | 1 | 28.3/8841 | <4 cm | 6.8 | 1 | Unglazed light green/gray |
| 54N60E | 2 | 28.3/8865 | <8 cm | 13 | 1 | Unglazed buff/gray |
| 54N60E | 2 | — | <4 cm | — | 1 | Unglazed green exterior–red paste |
| Block D | | | | | | |
| 4S36E | 1 | 28.3/8692 | <6 cm | 12.4 | 1 | Unglazed buff/gray |
| 6S36E | 2 | 28.3/8705 | <6 cm | 7.6 | 1 | Unglazed buff/tan exterior, glazed green/yellow interior |
| Block 1 × 1 | | | | | | |
| IIA2 | 2 | 28.3/8776 | <12 cm | 10.6 | 1 | Unglazed tan/red exterior, glazed green interior |
| Surface | — | 28.3/8893 | <6 cm | 8.7 | 1 | Unglazed tan/red exterior, glazed green interior |
| Total | | — | — | — | 36 | — |

the interior and two have glaze on both sides. On several of the sherds (including 28.3/8776 and 28.3/8893), a striped pattern has been painted on the outside, perhaps in ochre. One sherd has tool-incised striations covering the entire outer surface.

DISCUSSION: Most of the Euro-American pottery from Fallen Tree is Spanish style utilitarian tableware, majolica, and olive jar. Of the historic pottery, the Cologne Stoneware dates to the post-Mission period.

Aside from their use as tableware and storage vessels (Lanning, 1935: 21), the pottery had extensive uses, often recycled after breakage for use as roofing material, patios, and walls (Deagan, 1987: 32). Many of the olive jars and other sherds may have had several use lives. They may have first been used by the friars and Guale alike for tableware and storage and later recycled by the pueblo dwellers for construction purposes.

### EURO-AMERICAN SMOKING PIPES BY LORANN S. A. PENDLETON

Two fragments of Euro-American smoking pipes were recovered at Fallen Tree. One of these (28.3/8901) is a kaolin bowl fragment, with a leaf motif and mold seam, presumably of British or Dutch origin. We also recovered a kaolin pipe stem (28.3/8839), with a bore diameter of 5/64 in. (suggesting a date manufacture dating of 1730–1780).

### GLASS ARTIFACTS BY LORANN S. A. PENDLETON

The glass artifacts from Fallen Tree consist of small fragments, relatively few in number (table 26.16). Bottle glass, flat glass, and glass beads appear to be from similar sites of the late 16th through the 18th centuries (Linda Carnes-McNaughton, personal commun.). Some of the more commonly found "seed" or trade beads may have been made during the 17th century; however, none of the highly diagnostic 16th century Spanish beads were recovered. This contrasts with the middle period olive jar fragments recovered from the same excavations. Such evidence is interpreted to mean a more or less continuous occupation during the Spanish Entrada, but with little sharing of Spanish vernacular material culture.

The presence of glass fragments in aboriginal sites is interpreted as an indication of some form of exchange between Native Americans and European traders, colonists, or missionaries. The presence of glass with aboriginal materials in closed context dates these artifacts to post-A.D. 1550. The presence of beverage container glass fragments in spatially discrete loci across the site may, with additional data, be evidence of food processing areas or group social activity areas, that is, places where information or goods were exchanged between traders and Guale people.

The mixing of material from upper levels by cultivation may produce errors of interpretation from contamination. Glass bottle fragments may not co-occur with aboriginal artifacts, and therefore "cap" the terminal occupation of Fallen Tree. The presence of window glass indicates a sophistication of construction or the presence of economic wealth not previously recorded for this part of the Atlantic coast. A small glass sliver was recovered from a concentration of corn cobs in Block B, but may be the result of contamination from above.

No flat or beverage glass was recovered from the 1 × 1 m units. The majority of fragments were recovered from Block B. The "black" beverage glass fragments may be from 18th or early 19th century activities at this site. The depth of the black glass beverage bottle puntels from the area of Middle Settlement, St. Catherines Island, are the basis for this conclusion. None of the beverage glass fragments were recovered from feature context; therefore dating them to a particular era is problematic. Clear glass fragments, both beverage and flat glass, probably date from the late 19th through the first half of the 20th centuries.

A finely made polished, cobalt blue glass ring was found in Block B (28.3/4696). About half the artifact was present. It measures 14.14 mm in diameter and 1.35 mm thick. The ring has been finished by grinding the top and bottom surfaces. It may have been reworked from a larger object, such as a bottle.

TABLE 26.16
**Distribution of Beverage Containers and Other Glass Fragments Recovered during the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Weight (g) | Frequency | Glass type | Diaphaneity |
|---|---|---|---|---|---|---|
| Block A | | | | | | |
| 5N36E | 1 | 28.3/4694 | 41.0 | 21 | Recent glass | Various |
| 5N38E | 1 | 28.3/4698 | 0.4 | 1 | Recent glass | Various |
| 5N38E | 7 | — | — | 2 | — | — |
| Block B | | | | | | |
| 5N23E | 1 | 28.3/4685 | 38.3 | 19 | Recent glass | Various |
| 5N23E | 2 | 28.3/4689 | 19.5 | 3 | Recent glass | Various |
| 5N25E | 1 | 28.3/4687 | 12.7 | 10 | Recent glass | Various |
| 5N25E | 1 | 28.3/4687 | 2.3 | 1 | Dark olive green | Translucent |
| 5N25E | 2 | 28.3/4699 | 1.7 | 5 | Clear glass | Transparent |
| 5N25E | 4 [FS(B) #1] | 28.3/4686 | <0.1 | 1 | Clear glass | Transparent |
| 6N27E | 2 | 28.3/4688 | 0.4 | 1 | Recent glass | Various |
| 7N23E | 1 | 28.3/4693 | 1.8 | 1 | Recent glass | Various |
| 7N25E | 1 | 28.3/4690 | 0.1 | 1 | Clear glass | Transparent |
| 9N25E | 1 | 28.3/4691 | 0.6 | 1 | Clear glass | Transparent |
| 9N25E | 2 | 28.3/4696 | 0.2 | 1 | Cobalt blue | Transparent |
| 11N23E | 1 | 28.3/8907 | 1.4 | 1 | Green glass with enamel-like weathering | Opaque |
| 11N23E | 1 | 28.3/8908 | 0.2 | 1 | Dark yellow-green | Transparent |
| 13N25E | 2 | 28.3/4697 | 20.7 | 2 | Dark olive green | Translucent |
| Block C | | | | | | |
| 52N62E | 1 | 28.3/8896 | <0.1 | 1 | Clear glass | Transparent |
| Block D | | | | | | |
| 2S36E | 5 | — | <4 cm | 1 | — | — |
| Total | | — | — | 77 | — | — |

## Glass Beads
by Elliot Blair and J. Alan May

Twenty-nine glass beads of various colors, shapes, and sizes were recovered from the four excavation blocks at Fallen Tree. None were recovered from the five 1 × 1 m squares excavated during the first field season. These early squares were all located in obvious shell concentrations, which contained other categories of artifact. The distributions and descriptions of the glass beads can be found in table 26.17.

All of the recovered beads are of European manufacture and are constructed from drawn glass. European drawn glass beads were developed in Venice around 1490. In this process a gather of glass is drawn into a long hollow cane. Once the cane was cooled, it was chopped into shorter segments. These shorter segments were either sold as short tubes, "bugle" type beads, or were further rounded through the application of heat. All beads recovered from Fallen Tree have been heat rounded. Prior to 1817 the methods of heat rounding were limited to the *a speo* (by the spit) and the *a ferrazzo* (on an iron pan) methods. The *a speo* method, developed by the *Paternostri* guild in Venice and later exported to France and the Netherlands, consisted of unfinished beads threaded onto iron rods, the spit, and rotated in a furnace (for more detailed descriptions of the *a speo* method and methods of identifying beads finished in the *a speo* method, see Gasparetto, 1958: 186; Karklins, 1993: 27–36; Francis, in press). Beads finished by the *a ferrazzo* method were the domain of the *Margareteri* guild of Venice. This method was first practiced in Venice, followed by Amsterdam, and only later did it spread to France and Bo-

TABLE 26.17

**Distribution of Glass Beads Recovered during the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog no. | Kidd No. | Size: Diameter (mm) | Size: Length (mm) | Frequency | Description |
|---|---|---|---|---|---|---|---|
| Surface | — | 28.3/2316 | IIa | 4.76–7.99 | >5.35 | 1 | Simple transparent blue bubble glass with multicolored patina |
| Block A | | | | | | | |
| 5N36E | 2 | 28.3/2311 | IIa40 | 4.76–7.99 | 2.51–4.50 | 1 | Simple translucent blue bubble glass |
| 7N38E | 1 | 28.3/2315 | IIa40 | 4.76–7.99 | 2.51–4.50 | 1 | Simple translucent blue bubble glass |
| 7N38E | 1 | 28.3/2314 | IIa6 | 4.76–7.99 | 2.51–4.50 | 1 | Simple opaque black bubble glass |
| 7N38E | 3 | 28.3/2310 | IIa40 | 4.76–7.99 | 2.51–4.50 | 1 | Simple translucent blue bubble glass |
| Block B | | | | | | | |
| 5N25E | 2 | 28.3/2312 | IIa11 | 2.60–3.50 | <2.51 | 1 | Compound opaque white with clear core rocaille |
| 5N25E | 2 | 28.3/2313 | IIa | 3.51–4.75 | <2.51 | 1 | Simple transparent cobalt blue rocaille |
| 5N25E | 3 | 28.3/2309.001 | IIa6 | 4.76–7.99 | <2.51 | 1 | Simple opaque manganese black bubble glass |
| 5N25E | 3 | 28.3/2309.002 | IIa6 | 3.51–4.75 | <2.51 | 1 | Simple opaque black bubble glass; seed bead |
| 6N27E | 2 | 28.3/2331 | IIa6 | 2.60–3.50 | <2.51 | 1 | Simple opaque black bubble glass; seed bead |
| 6N27E | 2 | 28.3/2332.001 | IIa | 3.51–4.75 | <2.51 | 1 | Simple opaque gray-blue *rocaille* |
| 6N27E | 2 | 28.3/2332.002 | IIa | 3.51–4.75 | <2.51 | 1 | Simple opaque gray-blue *rocaille* |
| 7N25E | 2 | 28.3/2324 | IIa | 3.51–4.75 | <2.51 | 1 | Simple opaque gray-blue *rocaille* |
| 9N25E | 1 | 28.3/2319 | IIa40 | 8.00–14.99 | >5.35 | 1 | Simple opaque blue bubble glass; fragment |
| 9N25E | 2 | 28.3/2326 | IIa | 2.60–3.50 | <2.51 | 1 | Simple opaque gray-blue *rocaille* |
| 9N25E | 2 | 28.3/2325 | IIa | 3.51–4.75 | 4.51–5.35 | 1 | Simple transparent blue bubble glass; oval, highly patinated |
| Block C | | | | | | | |
| 50N62E | 2 | 28.3/2317 | IIa40 | 2.60–3.50 | <2.51 | 1 | Simple translucent blue *rocaille* |
| 52N62E | 1 | 28.3/2327 | IIa40 | 4.76–7.99 | >5.35 | 1 | Simple translucent blue bubble glass |
| 52N62E | 1 | 28.3/2328 | IIa6 | 4.76–7.99 | 2.51–4.50 | 1 | Simple opaque black bubble glass |
| 52N62E | 2 | 28.3/2323 | IIa40 | 4.76–7.99 | >5.35 | 1 | Simple translucent blue bubble glass |
| 52N62E | 5 | 28.3/2308 | IIb70 | 4.76–7.99 | 4.51–5.35 | 1 | Complex translucent cobalt blue with white stripe *rocaille* |
| 52N64E | 2 | 28.3/2321 | IIa6 | 4.76–7.99 | 4.51–5.35 | 1 | Simple translucent black bubble glass |
| 54N60E | 2 | 28.3/2320 | IIa6 | 3.51–4.75 | <2.51 | 1 | Simple opaque black bubble glass |
| 54N60E | 2 | 28.3/2306.001 | IIa | 3.51–4.75 | <2.51 | 1 | Simple transparent cobalt blue *rocaille* |
| 54N60E | 2 | 28.3/2306.002 | IIa | 3.51–4.75 | <2.51 | 1 | Simple transparent cobalt blue *rocaille* |
| 54N60E | 2 | 28.3/2306.003 | IIa | 3.51–4.75 | <2.51 | 1 | Simple transparent cobalt blue *rocaille* |
| 54N36E | 3 | 28.3/2322 | IIa40 | 4.76–7.99 | >5.35 | 1 | Simple opaque bi-lobed blue bubble glass |
| Block D | | | | | | | |
| 0N34E | 3 | 28.3/2330 | IIa40 | 4.76–7.99 | >5.35 | 1 | Simple translucent blue bubble glass |
| 0N34E | 3 | 28.3/2329 | Iia40 | 4.76–7.99 | >5.35 | 1 | Simple opaque bilobed blue bubble glass |
| Total | — | — | — | — | — | 29 | — |

hemia (Francis, 1988: 49; 2000: 7–8; in press). In this method beads were packed in charcoal, ash, and sand and stirred in a pan over the fire. Due to the inefficiency of this process when used for larger beads, the *Margareteri* almost exclusively produced smaller beads—those commonly referred to as "seed beads" (Karklins and Adams, 1990: 72–73; Karklins and Jordan, 1990: 6; Karklins, 1993: 27; Francis, in press). Here we will refer to them as *rocailles*,[7] following Francis (in press). After 1817, a technique was developed where beads were rounded by a tumbling method. Beads were packed into a metal drum with lime, charcoal, and sand; the drum was rotated in a furnace until the beads became round. Only beads rounded by this method should be referred to as having been finished by "tumbling".

The beads recovered from Fallen Tree can be divided into two general types: the aforementioned *rocailles* (38% of the sample), and *a speo* finished bubble glass beads (62% of the sample). The *rocailles* include nine simple beads (beads composed of one layer of glass without added decoration), one compound bead (beads composed of two or more layers of glass), and one complex bead (beads composed of one layer of glass with added decoration).[8] The simple *rocailles* include four transparent cobalt blue beads, four opaque gray-blue beads, and one translucent blue bead (likely colored with copper). The single compound specimen (28.3/2312) is composed of two layers of glass: opaque white over a clear core. The single complex bead (28.3/2308) is cobalt blue with 10 longitudinal white stripes. All *rocailles* would have been made in Venice or Amsterdam, and finished *a ferrazza*, if they are contemporary with the Spanish presence on St. Catherines. Any of these beads attributable to a subsequent deposition (see below) could have originated in France or Bohemia.

The remaining 18 *a speo* finished beads from Fallen Tree are "bubble glass" beads. This refers to the miniature air bubbles that occur within the glass. These bubbles are the result of impurities in the glass formula,[9] and create beads that tend toward an opaque to translucent diaphaneity. All bubble glass beads are finished by the *a speo* method. Beads finished *a speo* and not composed of bubble glass likely originate in either Venice or Amsterdam. Based on the poor quality glass (bubble glass) with which these beads are composed, historical evidence of the establishment of the *Paternostri* guild in France, and Spanish cargo lists from the 16th and 17th centuries, Francis (in press) argues for a French origin for bubble glass beads finished by the *a speo* method (see also Turgeon, 2001). Eleven of the bubble glass beads are simple blue specimens (colored with copper). Two of these specimens are bilobed, caused by the fusion of two beads during the *a speo* process (Karklins, 1993: 30–31). The remaining seven bubble glass beads are black specimens (colored with manganese and appearing violet when exposed to light). Two of the black bubble glass beads fall into the same size range as the *rocailles*. They are differentiated from these, however, by the bubbles in the glass and because they were finished by the *a speo* process. In table 26.17 "seed bead" is used to describe these specimens.

All beads recovered from Block A excavations (16 $m^2$) were found within the first three layers. The soil matrix in this block was dry and loose for the first three levels, with 5–7 cm of leaf litter covering the first level. The general profile of Block A squares appear to have shell and charcoal generally throughout the top two levels with little present in all of the lower levels. The few beads found below Level 2 may be the result of bioturbation. There are too few beads to suggest a pattern of distribution, but most were found near the roots of the large pine situated in the center of the block.

Eleven small beads were recovered from Block B (40 $m^2$), also within the first three levels. These beads were also recovered from the general matrix of the level and not associated with any feature. There are too few beads to identify any pattern of bead distribution in Block B.

Eleven beads were recovered from Block C (24 $m^2$), all but two within the first two levels. Beads found in this block were rela-

TABLE 26.18
**Distribution of Worked Metal Recovered in the 1983–1984 Excavations at Fallen Tree**

| Unit | Level | Catalog No. | Iron | Lead | Copper | Other | Description |
|---|---|---|---|---|---|---|---|
| Block A | | | | | | | |
| 5N36E | 3 | 28.3/8729 | — | — | 1 | — | Aglet 54 mm long × 4.55 mm diameter |
| 5N36E | 3 | 28.3/8734 | 1 | — | — | — | 7.0 mm diameter |
| 5N36E | 3 | 28.3/8738 | — | — | — | 1 | Flat fragment |
| 5N36E | 3 | 28.3/8740 | 1 | — | — | 1 | 1 corroded iron fragment, 1 flat fragment |
| 5N36E | 3 | 28.3/8736 | — | 1 | — | — | Linear with rounded end |
| 5N38E | 2 | 28.3/8745 | — | — | — | 1 | Round |
| 5N38E | 3 | 28.3/8750 | — | 2 | — | — | 2 melted fragments |
| 6N37E | 3 | 28.3/8764 | 2 | — | — | — | Flat fragments <2 mm thick |
| 7N36E | 3 | 28.3/8779 | 4 | — | — | — | Small extrusions and nail |
| 7N36E | 3 | 28.3/8783 | — | 2 | — | — | Lead fragments |
| 7N36E | 4 | 28.3/8780 | — | 1 | — | — | U-shaped fragment |
| 7N38E | 1 | 28.3/8790 | 2 | — | — | — | Eroded fragment <1 cm diameter |
| 7N38E | 2 | 28.3/8795 | 1 | — | — | — | Modern "finish" nail |
| 7N38E | 3 | 28.3/8798 | 1 | — | — | — | Pipe fragment 29.2 mm × 9.5 cm |
| 7N38E | 3 | 28.3/8819 | — | — | — | 2 | Miscellaneous unidentifiable |
| 7N38E | 4 | 28.3/8794 | 1 | — | — | — | 2 cm diameter hammered flat |
| Block B | | | | | | | |
| 5N23E | 2 | 28.3/8720 | 1 | — | — | — | 3 cm diameter flat < 2 mm thick |
| 5N25E | 1 | 28.3/8725 | — | — | — | 1 | Recent aluminum band |
| 5N25E | 2–4 | 28.3/8728 | 3 | — | — | — | 2 eroded fragments, bar stock 16.1 × 2.5 cm |
| 6N27E | 2 | 28.3/8762 | 2 | — | — | — | Flat |
| 6N27E | 3 | 28.3/8763 | 1 | — | — | — | Wedge with many eroded layers |
| 6N27E | 3 | 28.3/8761 | 7 | — | — | — | 4 flat fragments, 1 eroded, 2 possibly slag |
| 6N27E | 4 | 28.3/8751 | 1 | — | — | — | Flat |
| 6N27E | 4 | 28.3/8756 | 1 | — | — | — | FS (B) no. 2 iron nail 7.5 cm length |
| 6N27E | 5 | 28.3/8752 | 1 | — | — | — | FS (B) no. 2, flat |
| 6N27E | 6 | 28.3/8759 | 3 | — | — | — | FS (B) no. 2, flat |
| 7N23E | 1 | 28.3/8772 | — | 1 | — | — | Lead shot 8.1 mm diameter |
| 7N23E | 1 | 28.3/8771 | 1 | — | — | — | Iron fragment <1 cm flat |
| 7N23E | 2 | 28.3/8773 | 2 | — | — | — | Key 97.4 mm length, fragment |
| 7N23E | 2 | 28.3/8767 | 4 | — | — | — | Flat wrought iron |
| 7N25E | 2 | 28.3/8777 | 3 | — | — | — | Flat fragments < 2 cm |
| 7N25E | 2 | 28.3/8778 | 2 | — | — | — | Flat fragments |
| 7N25E | 3 | 28.3/8775 | 1 | — | — | — | Nail fragment |
| 7N25E | 3–4 | 28.3/8774 | 1 | — | — | — | FS no. 3; nail fragments |
| 9N23E | 3 | 28.3/8805 | 1 | — | — | — | Pointed; many small fragments |
| 9N23E | 3 | 28.3/8804 | 1 | — | — | — | Small flat fragment < 2 cm length |
| 9N25E | 1 | 28.3/8815 | 1 | — | — | — | Modern implement |
| 9N25E | 3 | 28.3/8909 | 1 | — | — | — | Iron flat uncorroded |
| 11N25E | 2 | 28.3/8830 | — | — | 1 | — | Copper ring 10 mm diameter and 9 mm wide |
| 13N25E | 1 | 28.3/8842 | 1 | — | — | — | Small fragment < 1 cm diameter |
| Block C | | | | | | | |
| 50N62E | 2 | 28.3/8836 | 1 | — | — | — | Small eroded fragment |
| 50N62E | 3 | 28.3/8837 | 1 | — | — | — | Possible handle 18.3 cm long × 4.5 cm wide |
| 52N62E | 1 | 28.3/8845 | 1 | — | — | — | Flat fragment 2 cm × 1.5 cm < 2 mm thick |
| 52N64E | 1 | 28.3/8852 | 2 | — | — | — | Nail fragments |
| 52N64E | 2 | 28.3/8854 | 2 | — | — | — | 5 fragments from same piece |
| 52N54E | 2 | 28.3/8858 | 10 | — | — | — | 1 nail fragment broken into multiple pieces |
| 54N60E | 2 | 28.3/8860 | 1 | — | — | — | Flat < 3 mm thick, approximately 1.5 cm |
| 54N62E | 2 | 28.3/8871 | 3 | — | — | — | About 2 cm diameter fragments < 2 mm thick |

TABLE 26.18
(*Continued*)

| Unit | Level | Catalog No. | Iron | Lead | Copper | Other | Description |
|---|---|---|---|---|---|---|---|
| 54N62E | 2 | 28.3/8872 | 1 | — | — | — | 1 flat fragment |
| 54N62E | 2 | 28.3/8861 | — | — | 1 | — | Buckshot ? |
| 54N62E | 3 | 28.3/8867 | 1 | — | 2 | — | < 1 cm diameter, fine wire looped together |
| 54N62E | — | 28.3/8868 | 1 | — | — | — | Small < 1 cm diameter |
| Block D | | | | | | | |
| 0N34E | 1 | 28.3/8709 | 2 | — | — | 1 | Aluminum tab, 2 small flat fragments |
| 0N34E | 2 | 28.3/8712 | 1 | 1 | — | — | Eroded iron, lead rod 7.2 mm × 4.55 mm diameter |
| 0N34E | 3 | 28.3/8711 | 1 | — | — | — | Small flat fragment |
| 0N36E | 2 | 28.3/8714 | 4 | — | — | — | 3 small flat fragments, 1 eroded |
| 0N36E | 3 | 28.3/8713 | — | — | — | 2 | Small slag fragments |
| 2S34E | 2 | 28.3/8685 | — | 1 | — | — | Shot, 9.1 mm diameter |
| 2S36E | 3 | 28.3/8684 | 1 | 1 | — | — | Small fragments |
| 4S36E | 2 | 28.3/8701 | 1 | — | — | — | < 2 cm diameter flat fragment |
| 4S36E | 2 | 28.3/8700 | 1 | — | — | — | 2 cm diameter curved fragment |
| 6S36E | 2 | 28.3/8704 | — | 1 | — | — | Shot 14.1 mm diameter |
| Block 1 × 1 | | | | | | | |
| IIA2 | 3 | 28.0/7004 | 1 | — | — | — | Nail |
| IE3 | 4 | 28.0/7017 | — | 1 | — | — | Rod fragment 3.5 mm long × 0.4 mm diameter |
| Total | | — | 84 | 12 | 5 | 9 | — |

tively higher in density than Block B, possibly indicating higher "traffic" and thus greater opportunity for loss. The only complex bead at Fallen Tree (28.3/2308), cobalt blue with white stripes, was found in Level 5 of square 52N62E. It was the deepest bead found at the site; however, the depth may be the result of displacement by bioturbation, specifically a tree root or rodent burrow.

Only two beads were recovered from Block D (24 $m^2$), all from Level 3 in the general matrix. One of the beads (28.3/2329) was an example of two beads fused together during the *a speo* rounding process. None of these beads were recovered within a feature.

The limited number of beads recovered, the extent of vertical and horizontal distribution, and the lack of any clear temporally diagnostic beads allow for very few theories about the distribution of the glass beads. These beads are, most likely, contemporary with the Spanish presence on St. Catherines, or they could represent a later interaction with the English. Additionally, no conclusions can be drawn about the use of the beads; there is no evidence of necklaces or embroidery.

## Metal Artifacts
### by Lorann S. A. Pendleton

Prior to the 1983–1984 excavations at Fallen Tree, field crews systematically walked the surface surrounding the obvious shell concentrations near a small tidal creek to the west of the site. Because the area had previously been cultivated and later made into pasture, ground visibility was near zero with some very dense saw palmetto covering portions of the site. To locate promising areas for excavation required a remote sensing strategy of systematic transects using a proton magnetometer similar to that employed at Santa Catalina de Guale (Thomas, 1987). A number of areas were identified for excavation on the basis of "hits" from the magnetometer survey. Recovery of a large number of metal objects associated with the mission period occupation at Fallen Tree was expected. Unfortunately, much of the metal recovered from the surface and Level 1 was modern iron associated with agricultural practices during the mid-20th century. Nonetheless, a number of metal fragments were recovered in the less disturbed levels (table 26.18).

A total of 84 metal artifacts are made of iron. Many of these are very small fragments of indeterminate use. Several pieces of bar iron were recovered, but they were also heavily eroded, and determining function was not possible. At least one fragment in Block C, 50N62E Level 3 (28.3/8837), may have been a tool or weapon handle. A square or cut nail from square IIA2 Level 3 (28.0/7004) was found within one of the shell concentrations. A second cut nail was recovered from Block B, 6N27E Level 4, Feature B-2 (28.3/8756). This rather large nail may have been curated from another area in this part of the island

Perhaps the most interesting iron object is a key (28.3/8773). The key is nearly complete and appears to be made of cast iron. Cast iron keys are thought to date to the latter half of the 18th century (Nöel Hume, 1976: 246). The key consists of the broken handle, the shaft, and the ward. It is too corroded to see the pattern on the ward.

Of particular importance was the recovery of a copper aglet in Level 3, 5N36E, (28.3/8729) normally associated with 16th century Spanish clothing.

In addition to the aglet, a finely crafted copper alloy ring (28.3/8830) was found. This ring has an appearance identical to several rings found at the mission. It consists of a copper alloy band, finished on all surfaces, folded over to form a ring shape. The ring measures 10.0 mm in length, 9.0 mm wide, with a thickness of 0.81 mm.

Several lead fragments or sprue, usually associated with shot manufacture, were also recovered from Fallen Tree, as was a piece of shot. Again, the quantities are small and not systematically associated with an area or feature. Lead shot was recovered from Blocks B and D. A lead ball with a diameter of 8.1 mm was recovered from 7N23E Level 1, Block B (28.3/8772). Its proximity to the surface may indicate recent manufacture; it was not distorted in a way to suggest that it was probably lost rather than fired. Another lead shot with a diameter of 14.1 mm was recovered from Block D, square 6S36E, Level 2 (28.3/8704). This specimen, too, exhibited no evidence that it was fired.

## Discussion

A total area of 104 $m^2$ was excavated at the Fallen Tree site, although not a great deal of historic material was recovered. A number of fragments of beverage glass were recovered from the Block A excavations, Level 1, and are most certainly modern (mid-20th century). A few beverage container fragments were recovered from deep, Level 7, within Block A, but are at that depth because of bioturbation. Few other artifacts were recovered from squares excavated to that depth. No flat or window glass was recovered at Fallen Tree.

Only a limited number of glass beads were recovered; they are probably coeval with the Spanish occupation of St. Catherines Island, although we cannot rule out trade with the British as another possible source.

The presence of olive jar fragments throughout the Fallen Tree excavation blocks may be a function of the site's proximity to Mission Santa Catalina de Guale rather than the result of trade directly with site inhabitants. Only a few body and rim sherds were recovered, compared with a greater quantity recovered from the Mission site proper. Many of the fragments recovered from Fallen Tree may have been transported there individually rather than transporting whole vessels to the site. These vessels were used to transport trade goods between Spaniards rather than between Spaniards and Native Americans.

Eighty-five fragments or whole artifacts of metal were recovered from the four excavation blocks and two 1 × 1 m squares. The majority of these (66) were iron in an advanced state of disintegration. A single hand-wrought nail was recovered from a 1 × 1 m square (IIA2) within a shell concentration, where it may have been discarded.

Four copper artifacts were recovered, including an aglet and two strands of fine copper wire looped together. The aglet is associated with Spanish clothing and is similar to a lacing tip on a shoestring. The copper wire is more problematic in function and may have been part of the decorated edge of a cloak or other item of clothing.

Fourteen fragments of lead and shot were recovered, the majority of which came from Block A followed by Block D. A single lead artifact, shot, was recovered from Block B, though no lead was recovered from Block C.

## ETHNOBOTANY

Recognizing the importance of ethnobotanical information, we took soil samples for flotation from all excavation units by level; by the end of the 1984 field season, we had processed 68 such soil samples. Preservation of plant remains ranged from poor to fair. In contexts where plants would have to be carbonized in order to be preserved, plant remains were sparse (see tables below). A small sample (9%) of flotation fractions was examined for plant remains, consisting of 12 (both light and heavy) flotation fractions recovered from both general level and feature contexts. These 12 samples represent a total of 96 liters of fill and altogether contained 393.63 g of carbonized plant material. The most important results obtained from this study are the presence of the following: maize (*Zea mays*), peach (*Prunus persica*), hickory nut shell (*Carya* sp.), acorn (*Quercus* sp.), and pitted goosefoot (*Chenopodium berlandieri* Moq.; see table 26.19).

The plant assemblage from Fallen Tree site suggests an emphasis on cultivated plant food and indigenous crops, especially maize, which served as a staple food. The only Old World plant identified thus far is peach. Melons, watermelon, and wheat have yet to be identified in the Fallen Tree light and heavy fractions. Tobacco (*Nicotiana* sp.) has not been identified from the described samples, but may be present in unexamined light and heavy fractions from the site. Nutshell comprises a relatively small percentage of the sample, and this either reflects the poor state of preservation or a sampling bias. Generally, charred wood and corncobs constitute the largest quantity of carbonized plant remains. Noncarbonized plant remains were found in almost all levels and were usually identified as roots or rootlets. Noncarbonized grape (*Vitis* sp.) seeds were common in the upper levels of all squares and probably represent the current environment rather than that of the occupation period.

TABLE 26.19
**Distribution of Selected Archaeobotanical Remains Recovered at Fallen Tree**

| Block | Taxon | Common name |
|---|---|---|
| B | *Zea mays* | Corn |
| B | *Carya* sp. | Hickory |
| B | *Quercus* sp. | Oak |
| B | *Quercus virginiana* | Live oak |
| B | *Prunus persica* | Peach |
| B | *Phytolacca americana* | Poke |
| B | *Poaceae* sp. | Grass family |
| B | *Gallium* sp. | Bedstraw |
| B | *Polygonaceae* | Knotweed |
| C | *Zea mays* | Corn |
| C | *Phytolacca americana* | Poke |
| 1 × 1 | *Zea mays* | Corn |
| 1 × 1 | *Quercus* sp. | Acorn |
| 1 × 1 | *Chenopodium berlandieri* | Chenopod |
| 1 × 1 | *Carya* sp. | Hickory |
| 1 × 1 | *Pinus* sp. | Pine |
| 1 × 1 | *Prunus persica* | Peach |

Light fractions were captured in fine-woven cloth bags and heavy fractions were recovered in window screen with approximately 1.6-mm mesh. Heavy fractions were sorted in the field to remove shell, lithics, ceramics, and geological rock, and visible chunks of wood charcoal and charred corncobs were removed also. Charred wood and cobs are described in tables below with light and heavy fraction samples following.

Each fraction was dried thoroughly and sifted through a series of 10 nested U.S. Standard geologic sieves with mesh sizes ranging from 6.35 mm (sieve #0) to 0.21 mm (sieve #6). Carbonized plant remains that did not pass through the 2.00-mm screen (sieve #3b) were completely sorted and weighed. Other materials (nonbotanical) particularly in the heavy fraction included noncarbonized plant material, marine shell, lithics, animal bone, and ceramic. These were weighed as an aggregate for each sample and reported as "residue < 2 mm" (table 26.20). Material passing through the 2.00-mm screen was searched

TABLE 26.20
**Screened Flotation Sample Heavy Fraction from Feature B-2 at Fallen Tree**

| Unit | Level | Screen size | Fraction Weight (g) | Residue <2 mm (g) | Wood (g) | Hickory nut fragment (g) | Uncarbonized plant (g) | Comment |
|---|---|---|---|---|---|---|---|---|
| 6N27E | 5 | — | 90.14 | — | — | — | — | — |
| 6N27E | 5 | 0 | 62.81 | — | — | — | — | Marine shell |
| 6N27E | 5 | 1 | 8.29 | — | 0.59 | — | 0.09 | Marine shell |
| 6N27E | 5 | 2 | 6.12 | — | 1.15 | 0.07 | 0.31 | Marine shell |
| 6N27E | 5 | 3a | 1.99 | — | 0.51 | — | 0.12 | Marine shell |
| 6N27E | 5 | 3b | 2.90 | — | 0.68 | — | 0.18 | Marine shell |
| 6N27E | 5 | 4a | — | 5.30 | — | — | — | 1 glass fragment |
| 6N27E | 5 | 4b | — | 2.42 | — | — | — | 1 glass fragment |
| 6N27E | 5 | 5a | — | 0.07 | — | — | — | 1 glass fragment |
| 6N27E | 5 | 5b | — | 0.02 | — | — | — | 1 glass fragment |
| 6N27E | 5 | 6 | — | 0.06 | — | — | — | 1 glass fragment |
| 6N27E | 5 | 7 | — | 0.16 | — | — | — | 1 glass fragment |

for seeds, cultigen remains, and items not previously identified in the larger size classes. Seeds were sorted into types and weighed together for each fraction. Most of the weight in table 26.20 is from nonbotanical materials that include marine shell, roots, geologic rock (sand), and animal bone.

The fraction weight, 90.14 g, is the gross weight of the sample before screening. Rounding errors and the removal of artifacts and other nonbotanical elements result in less than 100 percent of the fraction weight (table 26.20). The charred wood fragment weight is not reflected in the total weight for wood and hickory nut shell found in table 26.21. Noncarbonized plant remains in the form of roots, twigs, and seeds were common in most of the screened fractions analyzed.

### Distribution of Wood Charcoal and Nut Shell

Wood charcoal concentrations were absent from the squares of Block A, and features were absent also (table 26.20). Charcoal flecks were noted in the first levels of almost all of the dug squares, and this was attributed to deliberate and accidental burning during the recent historic past. Where wood charcoal is identified within a general level context, samples are mostly associated with shell features or charred corncob concentrations (i.e., Feature B-1). This association, either directly within or adjacent to features, is interpreted as the presence of fuel wood and not necessarily the remains of wood implements. The resulting fragments were broken up, making it difficult to identify a family, genus, or species except in rare cases as noted in table 26.21.

Wood charcoal was identified in all four of the excavated 1 × 1 m units. These squares were placed in or adjacent to shell concentrations visible from the ground surface and interpreted as trash dumps near residential structures. Here, also, wood charcoal fragments were small and unidentifiable to genus except where noted (table 26.21). A single feature was identified in square IE3 that contained a small amount of wood charcoal and charred corncob (table 26.22).

Hickory nut fragments were identified in both general level and feature context (table 26.21). Feature B-2, a possible trash pit, contained marine shell, charred cob, and hickory nutshell as well as pottery fragments. Feature B-7 may also be characterized as a trash pit that contained charred wood, corncobs, and marine shell. Hickory nutshell was also found in the lower level of square IIA2. The hickory shells within features undoubtedly are food processing by-

TABLE 26.21
**Distribution of Wood Charcoal (g) Vertically and Horizontally at Fallen Tree**

| Unit | Level | Provenience | Contents | Weight (g) |
|---|---|---|---|---|
| Block B | | | | |
| 5N23E | 1–3 | North Balk | Wood | 0.90 |
| 5N23E | 2 | General level | Wood | 1.40 |
| 5N23E | 3 | Locus 1 | Wood | 19.70 |
| 5N23E | 4 | General level | Wood | 3.40 |
| 5N25E | 1–5 | Balk | Wood | 4.40 |
| 5N25E | 2 | General level | Wood and hickory nut shell | 2.10 |
| 5N25E | 3 | Feature B-1 | Wood | 96.50 |
| 5N25E | 3 | General level | Wood | 5.50 |
| 5N25E | 4 | General level | Wood | 5.80 |
| 5N25E | 6 | General level | Wood | 0.10 |
| 6N27E | 5 | Feature B-2 | Wood and hickory nut shell | 0.63 |
| 7N23E | 1 | General level | Wood | 0.10 |
| 7N23E | 2 | General level | Hickory nut shell and peach | 0.70 |
| 7N23E | 3 | General level | Wood | 2.80 |
| 7N25E | 2 | General level | Wood and hickory nut shell | 0.70 |
| 7N25E | 3 | General level | Wood | 0.50 |
| 9N23E | 2 | General level | Wood | 0.80 |
| 9N23E | 3 | Locus 1 | Wood | 7.00 |
| 9N25E | 3 | Feature B-6 | Wood | 0.50 |
| 11N23E | 2 | General level | Wood (pine) | 1.10 |
| 11N23E | 3 | Feature B-7 | Wood (pine) | 11.10 |
| 11N25E | 3 | Feature B-7 | Wood and hickory nut shell | 5.40 |
| 13N25E | 2 | General level | Wood | 1.10 |
| 13N25E | 3 | General level | Wood | 2.50 |
| Block C | | | | |
| 52N62E | 1 | Feature C-2 | Wood | 0.30 |
| Block D | | | | |
| 0N36E | 4 | General level | Wood | 0.30 |
| 4S36E | 2 | Locus 1 | Wood | 3.40 |
| Block 1 × 1 | | | | |
| IE3 | 4 | Feature 1 | Wood | 0.30 |
| IE4 | 1 | General level | Wood | 0.10 |
| IE4 | 2 | General level | Wood | 1.90 |
| IE4 | 3 | General level | Wood | 12.60 |
| IE4 | 5 | General level | Wood | 2.50 |
| IIA2 | 1 | General level | Wood | 6.50 |
| IIA2 | 3 | General level | Wood (pine) | 0.40 |
| IIA2 | 5 | General level | Wood and hickory nut shell | 1.20 |
| IIA3 | 3 | General level | Wood | 4.00 |

products. Once the nutmeat or oil was extracted, the shells were a convenient source of fuel.

## Distribution of 8–10 Row Eastern Dent Maize

Though all domesticated maize is a single species, there are numerous maize cultivars (Scarry, 1988). These cultivars vary in morphological attributes of the ear, which are retained even when cobs are burned. It is possible to determine what type of maize was raised and whether more than one cultivar was grown. This has implications for the presence or absence of high-row corn from Mexico that was introduced by the Spanish at nearby Santa Catalina de Guale.

TABLE 26.22
**Distribution of Charred Corncobs Vertically and Horizontally at Fallen Tree**

| Unit | Level | Provenience | Contents | Weight (g) |
|---|---|---|---|---|
| Block B | | | | |
| 5N23E | 2 | General level | Charred cob | 1.40 |
| 5N23E | 3 | Locus 1 | Charred cob | 19.70 |
| 5N23E | 4 | General level | Charred cob | 11.00 |
| 5N25E | 2 | General level | Charred cob | 2.10 |
| 5N25E | 3 | Feature B-1 | Charred cob | 71.80 |
| 5N25E | 3 | General level | Charred cob | 0.80 |
| 5N25E | 4 | General level | Charred cob | 5.80 |
| 5N25E | 5 | Feature B-5 | Charred cob | 4.70 |
| 6N27E | 5 | Feature B-2 | Charred cob | 0.11 |
| 7N25E | 2 | General level | Charred cob | 0.70 |
| 7N25E | 3 | General level | Charred cob | 0.50 |
| 9N25E | 3 | Feature B-6 | Charred cob | 0.50 |
| 11N23E | 3 | Feature B-7 | Charred cob | 0.90 |
| 13N25E | 1 | General level | Charred cob | 1.00 |
| Block C | | | | |
| 54N60E | 2 | Feature C-1 | Charred cob | 0.90 |
| Block 1 × 1 | | | | |
| IE3 | 3 | General level | Charred cob | 0.50 |
| IE3 | 4 | Feature 1 | Charred cob | 3.60 |
| IE3 | 5 | General level | Charred cob | 9.70 |
| IE3 | 6 | General level | Charred cob | 11.60 |
| IE4 | 1 | General level | Charred cob | 0.10 |

Very few fragments of corn kernels were identified during the present analysis. Because of this, no metric attributes to search for multimodal distributions that might indicate the presence of more than one maize cultivar were applied (Scarry, 1988). The abundance of charred cobs was inspected with a hand lens and a low power binocular microscope to determine row number and cob shape. A single cluster of 8–10 row cobs were identified; however, cupule height and width were not recorded during the present analysis. Cob shape, round or rectangular, shows no evidence of patterned distribution where present in the excavated blocks.

The small quantity of maize kernels recovered from features (table 26.22) suggests these materials are incidental inclusions rather than deliberately burned refuse. Most were probably remains from food prepared in the adjacent (conjectured) dwellings. They might have fallen into the fire as a cooking spill or have been present among debris swept out when floors were cleaned.

The charred cobs recovered from Feature B-1 (described in table 26.22) are typical of examples recovered from other contexts as noted above. In general these cobs are small, averaging 5–7 mm in diameter (after burning) and consist of 8–10 rows. Almost rectangular in cross section, these cobs contain two rows per side with four rows and are identified as eastern Dent cultivar (cf. Scarry, 1988). The preponderance of this cultivar at Fallen Tree may be because it is storable for longer periods and is less subject to fungi infestation than the softer flour maize cultivars (Scarry, 1988).

### Flotation Analysis of Selected Squares and Features

During the course of excavating squares across the site, particular attention was directed to recording features and mapping individual artifacts that are time sensitive or represent an artifact class that indicates contact with European material culture. Some features containing diagnostic artifacts and charred corncobs were selected for further analysis, including flotation. Additionally, we hypothesized that several of these squares served as multiple use areas: Food processing and lithic resharpening or manufacture were accounted for in flotation analysis. We were looking for activity areas and were also looking to discover where botanical remains were not being recovered. In the absence of features, no samples from Block A were analyzed in the present study. In addition to the lack of features identified there, no concentrations of ceramics or diagnostic European artifacts were recovered from this block. Recall that the magnetic anomalies that led to the identification of this area for excavation were modern metal fragments associated with modern cultivation practices.

IIA1 Level 7, Heavy fraction: This 1 × 1 m square was excavated in an obvious shell midden near the edge of the western edge of the site. Near the bottom of the marine-shell-filled matrix, a single peach pit (*Prunus persica*) as well as an acorn (*Quercus* sp.) fragment were recovered from the flotation sample in Level 7. An unidentified fish scale in addition to a small fragment of charred corncob and 2.75 g of charred wood were all recovered from this level.

IIA2 Level 3–5, Feature 1 Heavy fraction: This feature, contained within a 1 × 1 m square, consisted mainly of marine shell, charred wood (5.77 g), charred corncob fragments (2.48 g), and noncarbonized plant roots. Most of the weight of this fraction (158 g) was contributed by marine shell. A small hickory nut fragment (0.05 g) was recovered from the 2.00-mm mesh sieve. A chenopod, pitseed goosefoot (*Chenopodium berlandieri*) seed was recovered from the 1.41-mm mesh sieve. A single peach (*Prunus persica*) fragment was also recovered from this fraction. A small quantity of fragmented charred plant remains (0.36 g) was unidentifiable because of their small size and lack of distinguishing characteristics.

6N27E Level 5, Feature B-2 Light and Heavy fractions: The archaeo-botanical materials from this feature included charred wood (3.41 g), noncarbonized plant material (2.29 g), and a pokeberry seed (*Phytolacca americana*). The pokeberry seed was recovered from the 3b (2.00-mm mesh) sieve of the light fraction. In addition, a small fragment of glass was recovered from the 4a sieve (1.41-mm mesh) of the heavy fraction. Noncarbonized grass seed was identified in the 4b sieve of the light fraction.

5N25E Level 5, Feature B-5 Light and Heavy fractions: This feature contained marine shell, charred wood and a number of corncobs, and hickory nutshell. Two *Galium* seeds (*Galium* sp.) were identified and may have been a nonfood addition. *Galium* (bedstraw) has a number of internal and external uses among Native American groups. For example, it has been used as an antidiarrheal and as an antirheumatic. Other uses include serving as a cleaning agent to get rid of tree pitch and, when dried, helping to light fires (Moerman, 1998: 242).

An acorn fragment was also recovered from the light fraction. One knotweed (Polygonaceae sp.) seed was recovered, but may not have been a food item and simply accidentally included in the feature fill. The presence of a fish scale is interpreted as somehow migrating from a food processing area or former hearth site into a storage pit.

54N60E Level 2, Feature C-1 Light and Heavy fractions: This feature, which contained marine shell, charred wood, and a small number of corncobs also contained an iron artifact and hickory nutshell. A single pokeberry seed (*Phytolacca americana*) was identified and may have been a nonfood addition, as the root of this plant is associated with medicine and dying. Animal bone was also recovered from this feature, which is interpreted as a hearth.

The heavy fraction from this feature contained mostly marine shell (334.6 g out of a total weight of 354.2 g). A small quantity of charred corncob (0.05 g) was also recovered. A small segment of an unidentified plant stem, pedicel, was recovered from the 3b screen (2.00-mm mesh). Some noncarbonized plant remains, including roots and grape (*Vitis* sp.) seeds, were identified and noted in this fraction.

52N62E Level 3, Feature C-2 Heavy fraction: This feature contained marine shell (602.32 g), charred wood (1.48 g), and a small amount of noncarbonized plant remains (0.32 g), pottery fragments, and unidentified animal bone fragments. The feature was a dark stain, with marine shell constituting the majority of the heavy fraction (641.48 g). No charred corncob or hickory nutshell was identified in this fraction.

IE4 Level 3: The largest quantity by weight (12.6 g) of wood charcoal from the excavated 1-m squares was recovered from the general level of this square. At least one piece was large enough to identify as *Pinus* sp. No corn or other identifiable plant remains were recovered in this level. As with other levels in the 1-m squares, noncarbonized plant remains in the form or small roots were common.

5N25E Level 3, Feature (B)-1: In addition to the presence of charred corn cobs (table 26.22) in this feature, almost 100 g (96.5 g) of wood charcoal were recovered. No other identifiable plant remains were recovered from this feature. The upper level of this feature has been lost due to disturbance, either land clearing or past agricultural activity.

7N23E Level 3: From the general level we recovered 2.8 g of wood charcoal, and none of the fragments were large enough to identify to genus. A small fragment of hickory nut shell was sorted and identified from this level. As with other flotation samples processed, a quantity of noncarbonized root fragments and modern seeds (*Vitis* sp.) were recovered.

5N23E Level 4: From the general level was recovered 11.0 g of charred cob fragments. Additionally 3.4 g of wood charcoal came from this level, but were too small to identify to genus. In conjunction with the poorly defined Locus 1 in this square and Level 3, a small amount of botanical material was sorted and weighted. No other botanical materials from this locus were large enough to identify. A quantity of noncarbonized root fragments and grape (*Vitis* sp.) was also recovered.

## Discussion

During each of the field seasons at Fallen Tree, soil samples from the southeast quadrant of each excavated level as well as each identified feature were taken for flotation analysis. The initial concern was that there would be little in the way of preserved plant remains outside of intact features or shell-filled trash dumps. This hypothesis was confirmed on the basis of the absence of identifiable plant remains in Block A, where no features or artifact concentrations were noted. Furthermore, no maize remains, either cobs or kernels, were recovered from Blocks A or D. Only Feature D-1 contained a very small amount of wood charcoal (0.60 g) within a marine shell deposit that was interpreted as a dumping episode from a single meal or a small number of meals.

Wood charcoal came primarily from Block B and 1 × 1 m squares, and many of the recovered plant remains also came from these areas. For example, acorn fragments, peach pits, seeds, and wood were preserved in shell middens, where chenopods were recovered as well. Maize and hickory nut fragments were recovered in the squares of Block B and are described in tables 26.21 and 26.22.

A very small percentage of the recovered plant remains came from the early woodland domesticates chenopod and knotweed. Both examples are normally found in disturbed ground context and may have been indication of the immediately surrounding plant community rather than a deliberately collected food source. Additionally, no examples of maypop (*Passiflora incarnata*), common bean (*Phaseolus vulgaris*), or squash (*Cucurbita* sp.) were recovered from the analyzed fractions. The absence of beans and squash and the presence of maize is somewhat surprising; however, examples of beans and squash may be recovered when additional fractions are analyzed. The absence of other southeastern plant remains usually associated with coastal sites is also somewhat surprising, but may be explained by the poor state of preservation within the site.

## NOTES

1. The initial test pits excavated at the Fallen Tree site (9Li8) have already been discussed in conjunction with the Island-wide transect survey (see chap. 20), and the artifacts were described in chapter 21. The present discussion presents the results of the 1983–1984 block excavations conducted at this site. The vertebrate faunal remains from all excavations at Fallen Tree are discussed elsewhere (in chaps. 22 and 27).
2. All of the Fallen Tree materials described here (resulting from the research of Larson, Caldwell, and the American Museum of Natural History) are presently curated at the Fernbank Museum of Natural History (Atlanta).
3. See Tippitt and Marquardt (1984) for further descriptions of raw material types.
4. See Sassaman et al. (1990: 168) for the split between Mississippian and Late Woodland Triangular points based on basal width.
5. "The term *heishi* is derived from the language of Pueblo Santo Domingo of New Mexico, meaning originally shell disc beads, but now including similar beads of other materials as well. The term should not be used

to describe any beads other than those made in the Pueblo, but "heishi technique" or "heishi method" are acceptable labels for a beadmaking technique that involves stringing drilled blanks and smoothing them together against a flat or grooved rock. This technique is very old, first recorded in India from the Upper Paleolithic (Francis, 1983: 145). It is widely spread around the globe, from South Africa to Taiwan and Thailand to Early Historic India. It is not yet known when it was first used in North America, but the procedure may well have been reinvented several times" (Francis, in press).

6. We gratefully acknowledge the assistance of Kathleen Deagan, Andrea Kent Cakars, and Lindsay Moira Weiss, who assisted in the analysis of these materials.

7. *Rocailles* refers to seed beads, finished *a ferrazza* or tumbled, and made of high quality, hard, nonlead glass. The term is used by Italian, French, Czech, Japanese, and Indian bead makers. Its origin dates to 1360 in France (Francis, in press).

8. The terms *simple*, *compound*, and *complex* (along with the term *composite*) are standard bead terminology, devised by Duffield and Jelks (1961: 40–41) and revised by Stone (1974: 88–89).

9. For further information on the chemical composition of "bubble glass" type beads, see Hancock et al., (1994); Kenyon et al., (1995); and Hancock et al., (1996).

# CHAPTER 27. CHANGE AND STABILITY IN VERTEBRATE USE BETWEEN THE IRENE PERIOD AND THE MISSION PERIOD: NONHUMAN VERTEBRATE REMAINS FROM MEETING HOUSE FIELD AND FALLEN TREE

Elizabeth J. Reitz and Joel Dukes

This chapter discusses zooarchaeological assemblages recovered from Meeting House Field and Fallen Tree, two sites intensively investigated by the American Museum of Natural History and the University of Georgia (see chaps. 25 and 26 for an overview of each site). Meeting House Field (9Li15) is an Irene period (late precontact) site and Fallen Tree (9Li8) is part of the Guale village (or pueblo) associated with 17th-century Mission Santa Catalina de Guale.

The Irene period vertebrate faunal material from Meeting House Field and other Irene sites on St. Catherines Island provides evidence for vertebrate use before the First Spanish Period (1565–1600) began. In addition, the material forms a baseline against which change and stability during the 17th century mission effort can be measured.

The Guale are associated with the First Spanish Period, which began in 1565 when a permanent Spanish presence was established by Pedro Menéndez de Avilés at St. Augustine and Santa Elena. Both Jesuit and Franciscan priests established a chain of missions between the two European towns as part of the Spanish colonization effort. Spanish authorities hoped to settle native populations at missions in order to indoctrinate them into Christianity and otherwise alter their political, economic, and social structures. As part of this effort, Mission Santa Catalina de Guale was established on St. Catherines Island, probably in the 1580s. The mission was abandoned briefly in the 1590s, but was rebuilt in the early 1600s. The mission became increasingly important as Spanish outposts to the north were closed, and in 1680 Mission Santa Catalina de Guale was relocated farther south.

Although it is likely that the Irene people and the ethnohistorical Guale people comprise essentially the same population, in this chapter we use the term "Guale" to refer to Native Americans of the First Spanish Period in order to distinguish between people living on the island prior to Spanish colonization (Irene) and those living under Spanish governance (Guale). Therefore, Meeting House Field represents an Irene occupation just prior to and possibly during the very early First Spanish Period, while Fallen Tree is a 17th century Native American pueblo associated with Mission Santa Catalina de Guale.

The comparative vertebrate faunal remains from Meeting House Field, Fallen Tree, and other St. Catherines archaeological sites enable us to explore the consequences of interaction between Spaniards and Native Americans on the meat-based portion of their diet.

## MATERIALS AND METHODS

The data reported here are primarily abstracted from a University of Georgia Masters thesis by Joel A. Dukes (1993), supplemented by data on South End Mound I prepared by Daniel C. Weinand (1997). Following the stratigraphic plan used by Reitz elsewhere in this volume (chap. 22), all three sites are in the West sample stratum. Dukes (1993) reports data from two excavation seasons at Meeting House Field: Thomas' 1975 excavation at Middens D and E and Saunders' 1988 excavation at Middens H and M. Dukes also reported data from two excavation seasons at Fallen Tree: Thomas' 1980 excavation and May's 1983 excavation. The Fallen Tree data from the 1980 Thomas excavation reported here are distinct from those recovered during the transect survey and reported elsewhere in this volume (see chap. 26, site 9Li8). Reference is also made to data from South End Mound I (9Li3), an Irene mortuary site reported by Larsen et al. (2001; see also chap. 24, this volume). Mound fill from South End Mound I was disturbed, but ceramics from the site indicate it was constructed during the Irene period.

Dukes and Weinand studied vertebrate remains from these sites at the Zooarchaeology Laboratory, Georgia Museum of Natural History, University of Georgia, using methods described elsewhere in this volume (see chap. 22). A conservative approach is followed to estimate the minimum number of individuals (MNI) for each site. For Meeting House Field, MNI is estimated for the two separate field seasons (Thomas and Saunders). Thus, data from Middens D and E are combined and data from Middens H and M are combined to estimate MNI. For the Fallen Tree assemblage, MNI is estimated separately for the Thomas excavation and the May excavation. All data from South End Mound I are combined into a single analytical unit to estimate MNI. In all cases, data from units and levels within each midden or excavation season are combined. In the summary tables, only biomass data for those taxa for which MNI is estimated are included in order to ensure that MNI percentages and biomass percentages can be compared. For example, biomass estimates for UID Mammal are not included in the summary tables because no MNI estimates were made for this taxon. Likewise, estimates of diversity and equitability are only derived using biomass for those taxa for which MNI is estimated.

We will also examine selectivity in transportation and access to parts of the white-tailed deer skeleton in terms of the food utility value of portions of the deer carcass using a modified food utility index (FUI). Following Purdue et al. (1989), deer skeletal elements are assigned to categories by potential meat, marrow, and bone grease yield (Reitz and Wing, 2008: 228–230). The food utility categories are low (<1000 FUI), medium (1000–3000 FUI), and high (>3000 FUI). The number of deer specimens included in this application is smaller than the deer number of identified specimens (NISP) in each collection or present in the standard deer skeleton because some of the specimens do not have a food utility value or are otherwise problematic for this application.

## MEETING HOUSE FIELD (9LI21)

Meeting House Field is located on the west coast of St. Catherines Island (see chap. 25). Numerous Irene period sites were tested during the Island-wide survey, and these data are summarized elsewhere in this volume (see chap. 22). None of the Irene sites from the transect survey yielded a large collection of vertebrate remains.

The Meeting House Field data reported here derive from American Museum of Natural History excavations, directed by David Hurst Thomas and Rebecca Saunders. During the 1975 tests at Meeting House Field, archaeological deposits at Middens D and E were sieved through 1/4-in. mesh screen. Middens H and M were examined in 1988, the crew using stacked 1/4-in., 1/8-in., and 1/16-in. mesh screens.

Radiocarbon dating and ceramic analysis at Meeting House Field are discussed in chapters 13 and 25. This is a single component, Irene period site, with one-sigma limits ranging between cal A.D. 1300 and cal A.D. 1520 and two-sigma limits of cal A.D. 1190–1670. The confidence limits of the probability correspond almost precisely with the limits of the Irene period as defined in the St. Catherines Island ceramic chronology. No Spanish materials or transitional ceramic types were recovered.

As documented in chapter 25, we believe that most of the middens at Meeting House Field were deposited year-round, with oysters collected largely during the summer and fall and *Mercenaria* collected from summer to winter. A seasonal occupation of Meeting House Field would provide an unsatisfactory comparison with the assumed-to-be-sedentary Guale at the Fallen Tree site because any observed changes in resource use might simply be due to sedentism instead of some other aspect of missionization. We believe the evidence for year-

TABLE 27.1
**Meeting House Field, NISP for Each Midden**

| Taxa | | Midden D (Thomas) | Midden E (Thomas) | Midden H (Saunders) | Midden M (Saunders) |
|---|---|---|---|---|---|
| UID mammal | | 27 | 242 | 25 | 35 |
| Soricidae | Shrew family | — | — | — | 8 |
| *Scalopus aquaticus* | Eastern mole | 1 | — | 2 | — |
| *Sylvilagus* sp. | Rabbit | — | 5 | 1 | — |
| *Procyon lotor* | Raccoon | — | 18 | — | — |
| *Mustela vision* | Mink | — | 1 | — | — |
| *Odocoileus virginianus* | White-tailed deer | 8 | 65 | 1 | 1 |
| UID bird | | — | 2 | — | — |
| *Grus canadensis* | Sandhill crane | — | 1 | — | — |
| *Rallus longirostris* | Clapper rail | — | 1 | — | — |
| *Corvus brachyrhynchos* | Crow | — | 1 | — | — |
| UID turtle | | 551 | 2546 | 147 | 2 |
| *Chelydra serpentina* | Snapping turtle | — | 4 | — | — |
| Kinosternidae | Musk/mud turtle family | 1 | 29 | 2 | 1 |
| *Kinosternon subrubrum* | Eastern mud turtle | — | 4 | — | — |
| *Malaclemys terrapin* | Diamondback terrapin | 83 | 1144 | 19 | — |
| UID lizard | | — | — | 8 | 47 |
| *Anolis carolinensis* | Green anole | — | — | 1 | 5 |
| UID snake | | 90 | — | — | — |
| Caudata | Salamanders | — | — | 29 | 36 |
| Anura | Frog or toad | — | 1 | 2 | 3 |
| UID fish | | — | 11 | 663 | 122 |
| *Lepisosteus* sp. | Gar | — | — | 4 | — |
| Ariidae | Sea catfish family | 1 | 12 | 3 | 1 |
| *Ariopsis felis* | Hardhead catfish | 4 | 46 | 1 | 1 |
| *Bagre marinus* | Gafftopsail catfish | — | 7 | — | — |
| *Fundulus heteroclitus* | Mummichog | — | — | 62 | 5 |
| *Cynoscion nebulosus* | Spotted seatrout | — | 3 | — | — |
| *Stellifer lanceolatus* | Star drum | — | — | — | 1 |
| *Mugil* sp. | Mullet | — | — | 39 | 7 |
| Total | | 766 | 4143 | 1009 | 275 |

round occupation of Meeting House Field is compelling.

Faunal material from both the 1975 and 1988 excavations are reported here. Substantial differences are found among the four middens, particularly between the 1975 excavations (Middens D and E) and 1988 explorations (Middens H and M; table 27.1–27.13). It is likely that these differences reflect screen sizes used during recovery, though they could also reflect unrecognized temporal, social, or functional differences. For this reason, the two sets of middens are reported separately. Subsequently, the data are combined to establish an Irene, pre-mission pattern of vertebrate use on St. Catherines Island that can be compared to patterns from other Irene sites as well as to those from Fallen Tree.

## Results: The 1975 Excavation

The collection from the 1975 excavation from Middens E and D at Meeting House Field contains 4909 specimens, weighing 4391.86 g and representing the remains of an estimated 68 vertebrate individuals (tables 27.1 and 27.2). MNI is estimated for 16 taxa, and preservation of the vertebrate materials is generally good. Although the combined assemblage is relatively large in terms of the NISP, estimated MNI is low. The vast majority of the materials are from Midden E (table 27.1).

TABLE 27.2
**Meeting House Field, Thomas Excavation: Species List**

| Taxa | | NISP | MNI | % | Weight (g) | Biomass (kg) |
|---|---|---|---|---|---|---|
| UID mammal | | 269 | — | — | 290.04 | 4.33 |
| *Scalopus aquaticus* | Eastern mole | 1 | 1 | 1.5 | 0.04 | 0.001 |
| *Sylvilagus* sp. | Rabbit | 5 | 1 | 1.5 | 2.41 | 0.06 |
| *Procyon lotor* | Raccoon | 18 | 3 | 4.4 | 41.88 | 0.76 |
| *Mustela vision* | Mink | 1 | 1 | 1.5 | 0.17 | 0.005 |
| *Odocoileus virginianus* | White-tailed deer | 73 | 3 | 4.4 | 445.00 | 6.36 |
| UID bird | | 2 | — | — | 0.55 | 0.01 |
| *Grus canadensis* | Sandhill crane | 1 | 1 | 1.5 | 1.01 | 0.02 |
| *Rallus longirostris* | Clapper rail | 1 | 1 | 1.5 | 0.07 | 0.002 |
| *Corvus brachyrhynchos* | Crow | 1 | 1 | 1.5 | 0.13 | 0.003 |
| UID turtle | | 3097 | — | — | 1908.28 | 5.0 |
| *Chelydra serpentina* | Snapping turtle | 4 | 1 | 1.5 | 1.6 | 0.04 |
| Kinosternidae | Musk/mud turtle family | 30 | 2 | 2.9 | 10.63 | 0.15 |
| *Kinosternon subrubrum* | Eastern mud turtle | 4 | — | — | 1.88 | 0.05 |
| *Malaclemys terrapin* | Diamondback terrapin | 1227 | 41 | 60.3 | 1623.20 | 4.5 |
| UID snake | | 90 | 1 | 1.5 | 10.33 | 0.15 |
| Anura | Frog or toad | 1 | 1 | 1.5 | 0.07 | — |
| UID fish | | 11 | — | — | 1.36 | 0.04 |
| Ariidae | Sea catfish family | 13 | — | — | 2.18 | 0.04 |
| *Ariopsis felis* | Hardhead catfish | 50 | 8 | 11.8 | 11.58 | 0.2 |
| *Bagre marinus* | Gafftopsail catfish | 7 | 1 | 1.5 | 2.02 | 0.04 |
| *Cynoscion nebulosus* | Spotted seatrout | 3 | 1 | 1.5 | 0.38 | 0.019 |
| UID vertebrate | | — | — | — | 37.05 | — |
| Total | | 4909 | 68 | — | 4391.86 | 21.780 |

White-tailed deer (*Odocoileus virginianus*), other wild mammals, and wild birds contribute only 16 percent of the individuals but 59 percent of the biomass (table 27.3). Raccoon (*Procyon lotor*) contribute 4 percent of the individuals. One of the raccoons was a male evidenced by the presence of a baculum. Deer also contribute 4 percent of the individuals but venison contributes about half of the meat. The three deer individuals include one that was a juvenile at death, one adult, and one individual of indeterminate age at death (table 27.4). Elements from all parts of the complete deer skeleton are present (fig. 27.1; table 27.5). Only specimens from the foot are substantially underrepresented compared to the "standard" deer (fig. 27.2). The most common modification on mammal specimens is burning (table 27.6); however, one UID Mammal specimen from Unit 1 is worked into a pointed tool as is one UID Vertebrate specimen (probably a mammal) in Unit 2. Both worked specimens are from Midden E. Wild birds are uncommon in the 1975 collection, despite the presence of an unusual record of a sandhill crane (*Grus canadensis*).

One shed antler base and an antler base still attached to the frontal indicate that two of the deer individuals were males. The antler cycle on Sea Islands is prolonged and confounded by individual as well as annual variations. Antler development begins in

TABLE 27.3
**Meeting House Field, Thomas Excavation: Summary**

| Taxa | MNI | % | Biomass (kg) | % |
|---|---|---|---|---|
| Deer | 3 | 4.4 | 6.360 | 51.7 |
| Other wild mammal | 5 | 7.4 | 0.825 | 6.7 |
| Wild bird | 3 | 4.4 | 0.025 | 0.2 |
| Turtle | 44 | 64.7 | 4.690 | 38.1 |
| Sharks and fish | 10 | 14.7 | 0.259 | 2.1 |
| Commensal taxa | 3 | 4.4 | 0.151 | 1.2 |
| Total | 68 | 100% | 12.310 | 100% |

TABLE 27.4
**Meeting House Field, Thomas Excavation: Epiphyseal Fusion for Deer**

| Skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | 1 | 2 | 3 |
| Scapula, distal | — | — | — |
| Radius, proximal | — | 3 | 3 |
| Acetabulum | — | 2 | 2 |
| Metapodials, proximal | — | 4 | 4 |
| 1st/2nd Phalanx, proximal | 1 | 2 | 3 |
| Middle fusing | | | |
| Tibia, distal | 1 | — | 1 |
| Calcaneus, proximal | 1 | — | 1 |
| Metapodials, distal | 1 | — | 1 |
| Late fusing | | | |
| Humerus, proximal | — | — | — |
| Radius, distal | — | — | — |
| Ulna, proximal | — | 1 | 1 |
| Ulna, distal | — | — | — |
| Femur, proximal | 2 | — | 2 |
| Femur, distal | 1 | 1 | 2 |
| Tibia, proximal | 1 | — | 1 |
| Total | 9 | 15 | 24 |

approximately mid-April and antlers may be shed as late as January (Goss, 1983; Jacobson and Griffin, 1983:19; Halls, 1984: 94; Gwynn, 1986; Miller, 1989: 26; Warren et al., 1990: 53). It is likely, however, that these two antlers represent distinct hunting events, one in the middle of the antler cycle and the other at the end of the cycle. Both antlers are in the same sample, from Unit 1, 50–60-cm level. They may have been raw material intended for eventual use in tools rather than the product of specific hunting events. The shed antler in particular may have been collected from the ground rather than from a kill.

Estuarine animals contribute 79 percent of the individuals and 40 percent of the biomass (Table 27.3); most of these are turtle remains. The most abundant species is the diamondback terrapin (*Malaclemys terrapin*), which contributed 60 percent of the individuals and 37 percent of the biomass (tables 27.2 and 27.3). This is the most common species in the entire collection and second only to deer in terms of meat contribution. Fish contribute an estimated 15 percent of the individuals and a small percentage of the biomass. Hardhead catfish (*Ariopsis felis*) is the most abundant fish present. Burning is the most common modification to turtle specimens, appearing on 3 percent of the turtle specimens (NISP = 123; table 27.6). None of the fish specimens are modified.

Three commensal individuals contribute 4 percent of the individuals and 1 percent of the biomass (table 27.3). These include an eastern mole (*Scalopus aquaticus*), UID Snake, and frog or toad (Anura). The mole and all of the snake specimens are from the 40–70-cm level of Midden D. The frog/toad specimen is from the 30–40-cm level of Midden E.

## Results: The 1988 Excavation

The collection from the 1988 excavation at Middens H and M at Meeting House Field contains 1284 specimens weighing 157.67 g and representing the remains of an estimated 37 individuals (table 27.7). The collection from Midden H is much larger than the one from Midden M (table 27.1). MNI is estimated for 14 taxa, and, although NISP and MNI are very low, preservation in Middens H and M was good.

White-tailed deer (*Odocoileus virginianus*) and other wild mammals contribute only 5 percent of the individuals but 47 percent of the biomass (table 27.8). Very few mammal and no bird remains are present in the Saunders collection. Rabbit (*Sylvilagus* sp.) and deer each contribute equal, but small, percentages of the individuals (table 27.7). Venison, though, contributes 39 percent of the biomass (table 27.8). Only two deer specimens are present in the collection (table 27.5), and age at death cannot be estimated. Both specimens are from the lower leg. None of the mammal specimens are modified (table 27.9).

Estuarine animals contribute 68 percent of the individuals and 52 percent of the biomass (table 27.8). Turtles contributed 8 percent of the individuals and 40 percent of the biomass, suggesting that turtle meat was as common in the diet as venison. Although musk/mud turtle (Kinosternidae) individu-

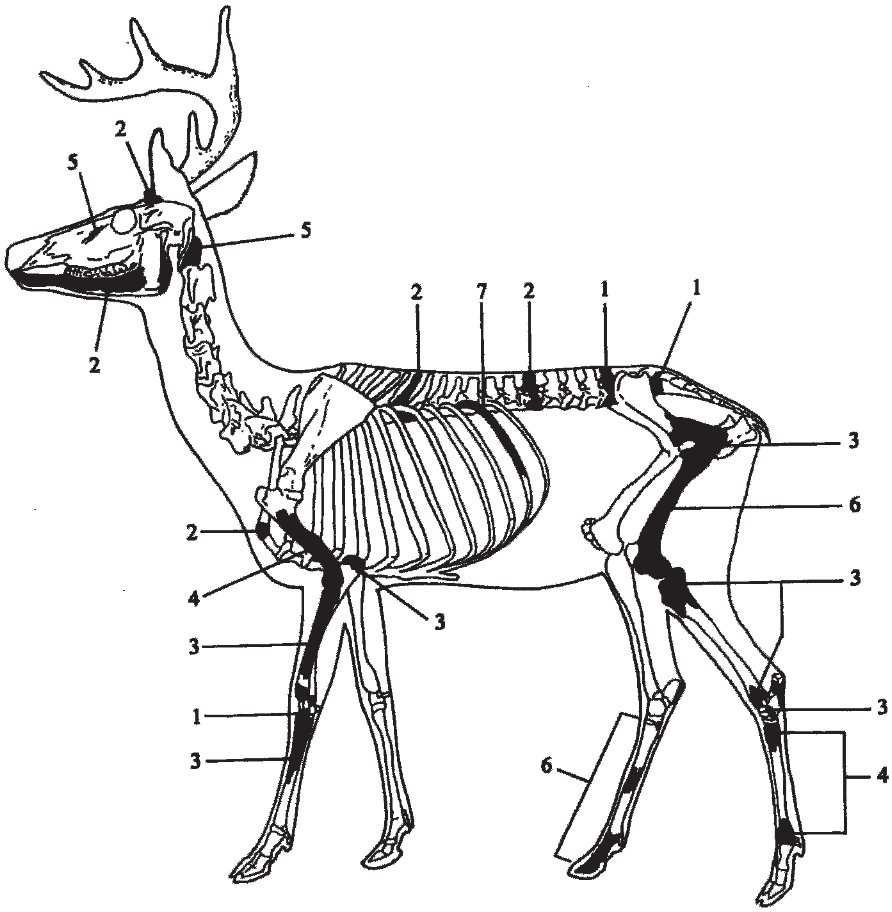


Fig. 27.1. Deer elements identified at Meeting House Field. Data from Thomas excavations (NISP = 73) and Saunders excavations (NISP = 2) are combined. Not illustrated are seven loose teeth.

als are more common than diamondback terrapin (*Malaclemys terrapin*) individuals, the larger terrapins contribute 33 percent of the biomass. Fishes are the most abundant group in the collection, contributing 60 percent of the individuals. Three small fish taxa are particularly common. These are mummichog (*Fundulus heteroclitus*), star drum

TABLE 27.5
**Meeting House Field and South End Mound I: Deer Elements Represented**

| Skeletal element | Meeting House Field (Thomas) | Meeting House Field (Saunders) | South End Mound I |
|---|---|---|---|
| Skull | 9 | — | 38 |
| Tooth | 7 | — | 78 |
| Vertebra/rib | 19 | — | 4 |
| Forequarter | 10 | — | 21 |
| Forefoot | 4 | — | 7 |
| Foot | 5 | 1 | 36 |
| Hindfoot | 6 | 1 | 30 |
| Hindquarter | 13 | — | 14 |
| Total | 73 | 2 | 228 |

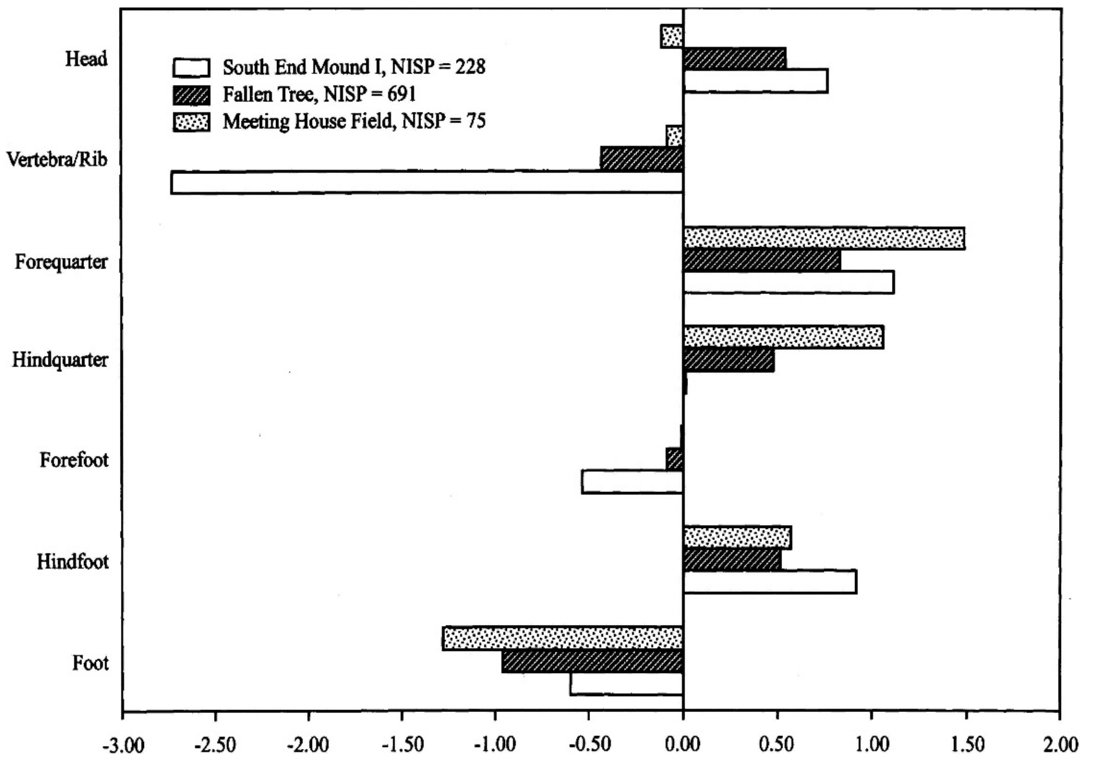


Fig. 27.2. Ratio diagram comparing deer elements represented at the Meeting House Field, Fallen Tree, and South End Mound I sites to a complete deer skeleton. The Standard deer is represented by the vertical line. Categories with positive values are more abundant than in the Standard and negative values indicate categories that are less abundant than the Standard.

(*Stellifer lanceolatus*), and fingerling mullet (*Mugil* sp.). Mummichog alone constitutes 35 percent of the individuals, testifying to the excellent recovery methods used during excavation. Fish contribute 12 percent of the biomass. Modifications are uncommon in Middens H and M; the only modification is burning on a few turtle and fish specimens (table 27.9).

Commensal taxa contribute 27 percent of the individuals but 2 percent of the biomass (table 27.8). Most of the commensal individuals are green anoles (*Anolis carolinensis*). Other commensal taxa include shrew

TABLE 27.6
**Meeting House Field, Thomas Excavation: Modifications**

| Taxa | Burned | Cut | Worked | Gnawed | |
|---|---|---|---|---|---|
| | | | | Rodent | Carnivore |
| UID mammal | 13 | 1 | 1 | — | — |
| Raccoon | — | 1 | — | 1 | — |
| Mink | 1 | — | — | — | — |
| Deer | — | 3 | — | — | 6 |
| UID turtle | 118 | — | — | — | — |
| Diamondback terrapin | 5 | — | — | — | 1 |
| UID vertebrate | 7 | — | 1 | — | — |
| Total | 144 | 5 | 2 | 1 | 7 |

TABLE 27.7
**Meeting House Field, Saunders Excavation: Species List**

| Taxa | | NISP | MNI | % | Weight (g) | Biomass (kg) |
|---|---|---|---|---|---|---|
| UID mammal | | 60 | — | — | 44.45 | 0.8 |
| Soricidae | Shrew family | 8 | 1 | 2.7 | 0.04 | 0.002 |
| *Scalopus aquaticus* | Eastern mole | 2 | 1 | 2.7 | 0.24 | 0.007 |
| *Sylvilagus* sp. | Rabbit | 1 | 1 | 2.7 | 1.59 | 0.04 |
| *Odocoileus virginianus* | White-tailed deer | 2 | 1 | 2.7 | 10.54 | 0.219 |
| UID turtle | | 149 | — | — | 75.03 | 0.571 |
| Kinosternidae | Musk/mud turtle family | 3 | 2 | 5.4 | 1.33 | 0.038 |
| *Malaclemys terrapin* | Diamondback terrapin | 19 | 1 | 2.7 | 13.9 | 0.184 |
| UID lizard | | 55 | — | — | 0.15 | — |
| *Anolis carolinensis* | Green anole | 6 | 6 | 16.2 | 0.04 | — |
| Caudata | Salamanders | 65 | 1 | 2.7 | 0.14 | — |
| Anura | Frog or toad | 5 | 1 | 2.7 | 0.05 | — |
| UID fish | | 785 | — | — | 3.60 | 0.083 |
| *Lepisosteus* sp. | Gar | 4 | 1 | 2.7 | 0.51 | 0.018 |
| Ariidae | Sea catfish family | 4 | — | — | 0.63 | 0.013 |
| *Ariopsis felis* | Hardhead catfish | 2 | 1 | 2.7 | 0.65 | 0.013 |
| *Fundulus heteroclitus* | Mummichog | 67 | 13 | 35.1 | 0.41 | 0.015 |
| *Stellifer lanceolatus* | Star drum | 1 | 1 | 2.7 | 0.04 | 0.004 |
| *Mugil* sp. | Mullet | 46 | 6 | 16.2 | 0.53 | 0.016 |
| UID vertebrate | | — | — | — | 3.80 | — |
| Total | | 1284 | 37 | — | 157.67 | 2.023 |

(Soricidae), eastern mole (*Scalopus aquaticus*), salamander (Caudata), and frog or toad (Anura). All of the commensal taxa are from the 30–60-cm levels. This high percentage of commensal animals suggests a period of inactivity at these two middens. Alternatively, anoles, salamanders, and small frogs or toads may have been consumed during this part of the occupation.

## Meeting House Field: Summary

Most of the differences between the 1975 and 1988 collections are probably due to the combination of sample size, screen size, and intramidden differences. The abundance of mummichog and fingerling mullet in Midden H can be attributed to the use of 1/16-in. mesh screen for recovery of materials from that midden; however, the abundance does not explain why these animals are rare in Midden M. The richer species list from Midden E may be due to the larger sample size from that midden.

Intramidden differences may reflect cultural factors that are not yet understood. Most of the UID turtle (NISP = 2539) and diamondback terrapin (NISP = 1141) specimens, as well as all of the deer specimens (NISP = 65) in Midden E are from

TABLE 27.8
**Meeting House Field, Saunders Excavation: Summary**

| Taxa | MNI | % | Biomass (kg) | % |
|---|---|---|---|---|
| Deer | 1 | 2.7 | 0.219 | 39.4 |
| Other wild mammal | 1 | 2.7 | 0.04 | 7.2 |
| Turtle | 3 | 8.1 | 0.222 | 39.9 |
| Sharks and fish | 22 | 59.5 | 0.066 | 11.9 |
| Commensal taxa | 10 | 27.0 | 0.009 | 1.6 |
| Total | 37 | 100% | 0.556 | 100% |

TABLE 27.9
**Meeting House Field, Saunders Excavation: Modifications**

| Taxa | Burned |
|---|---|
| Musk/mud turtle family | 1 |
| UID fish | 1 |
| UID vetebrate | 1 |
| Total | 3 |

40-cm to 110-cm levels. This concentration of deer and turtle specimens in the lower levels of Midden E does not correlate with a stratigraphic ceramic change within the midden. In her analysis of ceramics, Saunders (1992: 67) found very little evidence of regular change within these middens. This is especially true for Middens E and H. Saunders and Russo (1988: 45) report some unexplained differences in the Midden E ceramic assemblage. In her intermidden analysis of rim and surface treatment, Saunders identified two clusters (Saunders, 1992: 76). All four of the middens reported here fell within the second cluster. Saunders thought that middens in this second cluster were deposited later than the other middens she studied (and for which no faunal study was done); the radiocarbon dates for Midden E are earlier than the ceramic attributes suggest. Perhaps the differences in material culture and animal remains in Midden E indicate that the midden was deposited by a household with a different social status than the other middens; the structure associated with Midden E may have also had a different function than the structures associated with Middens D, H, and M.

Some characteristics are consistent among the middens and may represent a general Irene subsistence pattern that can be compared to the Fallen Tree data for evidence of change and stability in vertebrate use at the mission pueblo. A wide range of taxa are used (combined assemblage richness is 22). Most of these taxa (*n* = 13) are from the nearby estuarine setting, as are most of the individuals (at least 75% of the MNI) and a substantial portion of the biomass (at least 41%). Most of the other taxa also probably fed in the marsh at least part of the time and could be considered marsh if not actually estuarine resources. Three taxa are ubiquitous: deer, musk/mud turtles, and hardhead catfishes. Raccoons and diamondback terrapin are also common, although not ubiquitous among the four middens. The small fishes in Midden H indicate a fishing strategy that made use of fine-meshed nets in the weedy edge of the nearby marsh. Half of the meat is from deer and the other half from the wide range of other animals (table 27.10). Over a third of the meat is from estuarine turtles. The percentage of deer individuals and biomass is much lower than would be predicted from the Irene collections reported from the transect survey (see chap. 22). Juveniles constitute 25 percent of the deer individuals (no subadults are present). The combination of sea catfishes, juvenile and adult deer individuals, and at least one male deer in antler suggests multiseasonal, and perhaps yearround, use of the site. The other Irene sites reported in the transect survey also suggest multiseasonal use rather than use during a specific season.

TABLE 27.10
**Meeting House Field, Thomas and Saunders Excavation: Combined Summary**

| Taxa | MNI | % | Biomass (kg) | % |
|---|---|---|---|---|
| Deer | 4 | 3.8 | 6.579 | 51.1 |
| Other wild mammal | 6 | 5.7 | 0.865 | 6.7 |
| Wild bird | 3 | 2.9 | 0.025 | 0.2 |
| Turtle | 47 | 44.8 | 4.912 | 38.2 |
| Sharks and fish | 32 | 30.5 | 0.325 | 2.5 |
| Commensal taxa | 13 | 12.4 | 0.160 | 1.2 |
| Total | 105 | 100% | 12.866 | 100% |

It does not appear that deer were processed at a special activity hunt site for transport to the Meeting House Field middens. Many times, the entire deer carcass was brought to Midden E (fig. 27.1; table 27.5), although the elements represented indicate a distinct preference for parts of the skeleton associated with the forequarter and hindquarter (fig. 27.2). This supports the observation that medium and high food utility specimens are overrepresented compared to the Standard deer (fig. 27.3; table 27.11). In addition, this aspect suggests some selective transport of the carcass, with low utility head and feet specimens sometimes, but not always, discarded elsewhere.

An interesting contrast is found between the Meeting House Field data and the large Irene collection from the South End Mound I mortuary site (Larsen, 2001; table 27.12). Although the South End Mound I collection derives from disturbed mound fill, a 1/8-in. mesh screen was used to recover the materials. Although this screen size

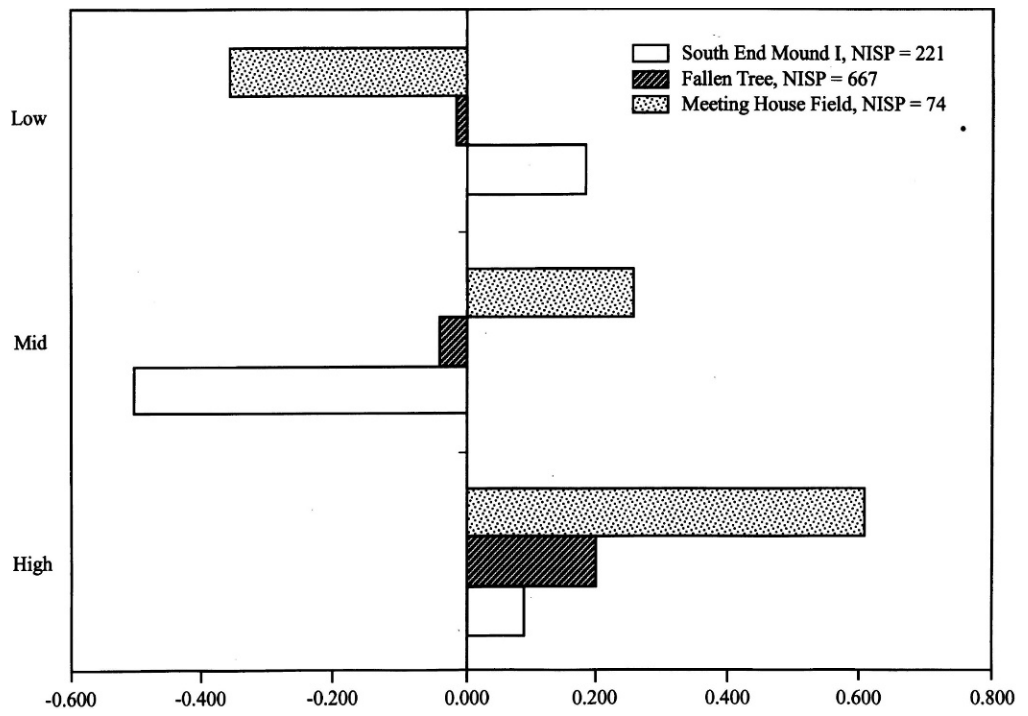


Fig. 27.3. Ratio diagram comparing food utility categories (FUI) for deer at the Meeting House Field, Fallen Tree, and South End Mound I sites to a complete deer skeleton. The Standard deer is represented by the vertical line. Categories with positive values are more abundant than in the Standard and negative values indicate categories that are less abundant than the Standard.

should enhance recovery of small fishes, such finds were rare. The general prominence of raccoon, deer, diamondback terrapin, and hardhead catfishes found at Meeting House Field is also characteristic of the South End Mound collection; deer is just one of 19 taxa in the collection. Venison, however, dominates the meat estimate in the mound fill. Furthermore, although specimens from throughout the deer carcass are present in the mound fill, low utility specimens are more common than are specimens from medium and high utility parts of the carcass (figs. 27.2 and 27.3; table 27.11). Teeth are particularly overrepresented in the mound fill. This suggests that the mound fill was gathered from a nearby general rubbish heap or that site formation processes favoring the survival of teeth and the loss of other parts of the skeleton were at work. However, among the postcranial parts of the carcass, high-utility specimens are more abundant compared to the Standard deer than are medium-utility specimens, which are decidedly underrepresented. However, the nitrogen-stable isotope signature in the human skeletal remains suggests a strong marine orientation (Larsen, 2001). The faunal remains at South End Mound I probably do not represent routine dietary practices practiced at residential sites elsewhere on the island, though they do share many of characteristics of the Irene diet found at domestic sites.

Another difference is found between the St. Catherines Island Irene collections and those from elsewhere on the Georgia coast. For example, residents of the Irene site on the mainland in McIntosh County, known as Harris Neck (9Mc141; Braley et al., 1986) also had a subsistence strategy that focused on a wide range of estuarine resources for animal protein. In the Harris Neck collection, fish and turtles provided 73 percent of the individuals and 28 percent of the biomass. In the Meeting House Field

TABLE 27.11

**Number of Deer Specimens (NISP) in Each Food Utility Category (FUI) in the Meeting House Field, South End Mound I, and Fallen Tree Collections Compared to the Numbers in a Complete Deer Skeleton[a]**

| Skeletal elements | Meeting House Field | South End Mound I | Fallen Tree | Standard deer |
|---|---|---|---|---|
| Low utility (< 1000 FUI) | | | | |
| Antler | 2 | 5 | 11 | 2 |
| Mandible | 2 | 14 | 20 | 2 |
| Tooth | 7 | 78 | 192 | 32 |
| Other skull | 5 | 19 | 58 | 27 |
| Atlas/axis | 5 | 2 | 10 | 2 |
| Metacarpus/carpus | 4 | 7 | 35 | 16 |
| Phalanx/sesamoid | 5 | 29 | 56 | 48 |
| Subtotal | 30 | 154 | 381 | 129 |
| Medium utility (1000–3000 FUI) | | | | |
| Vertebra | 5 | 2 | 43 | 24 |
| Pelvis/sacrum | 4 | 5 | 14 | 10 |
| Rib | 7 | — | 69 | 26 |
| Scapula | — | 7 | 11 | 2 |
| Humerus | 4 | 6 | 16 | 2 |
| Radius/ulna | 6 | 8 | 22 | 4 |
| Metatarsus | 4 | 14 | 28 | 2 |
| Subtotal | 30 | 42 | 203 | 70 |
| High utility (> 3000 FUI) | | | | |
| Sternum | 2 | — | 1 | 7 |
| Femur | 6 | 2 | 23 | 2 |
| Tibia/tarsal | 6 | 23 | 59 | 14 |
| Subtotal | 14 | 25 | 83 | 23 |
| Total | 74 | 221 | 667 | 222 |

[a] Food utility categories follow Purdue et al. (1989). Some deer specimens could not be used in this procedure.

assemblage, fish and turtle provided 75 percent of the individuals and 41 percent of the biomass (table 27.10). Wild mammals, particularly rabbits, played a larger role as a meat source at Harris Neck. More interesting is the role of deer, a source of 46 percent of the Harris Neck biomass compared to 51 percent of the Meeting House Field biomass. Deer are consistently more common in collections from St. Catherines Island than they are at other coastal sites. In this regard, Meeting House Field may be more similar to sites off the island than to other Irene sites on the island itself.

The diversity and equitability values suggest that although few species were used, their use was relatively equitable (table 27.13). The diversity and equitability estimates for Middens D and E suggest that a limited number of species were used with a single dominant species. The dominant species is diamondback terrapin. The estimate is similar for biomass, where the low diversity and equitability values reflect the dominance of venison and terrapin. The diversity and equitability estimates for Middens H and M suggest a slightly more diverse strategy in which three resources dominate the MNI (anoles, mummichog, and mullet), but in which most resources were used more equitability. Although the South End Mound I collection is somewhat more diverse and more equitable in terms of MNI than the other two assemblages, the very low biomass diversity reflects the dominance of venison within an overall strategy similar to that practiced at Meeting House Field. The Meeting House Field diversity and equitability estimates are more similar to those for Harris Neck. Although the inhabitants of Harris Neck relied on a similar range of estuarine resources, they used

TABLE 27.12
**South End Mound I: Species List**

| Taxa | | NISP | MNI | % | Weight (g) | Biomass (kg) |
|---|---|---|---|---|---|---|
| UID mammal | | 966 | — | — | 1025.69 | 13.487 |
| *Scalopus aquaticus* | Eastern mole | 1 | 1 | 3.3 | 0.07 | 0.002 |
| *Sylvilagus* sp. | Rabbit | 3 | 1 | 3.3 | 2.83 | 0.067 |
| *Sciurus* spp. | Squirrel | 2 | 1 | 3.3 | 0.64 | 0.018 |
| Cricetinae | New World mice | 2 | 1 | 3.3 | 0.06 | 0.002 |
| *Procyon lotor* | Raccoon | 22 | 4 | 13.3 | 28.88 | 0.543 |
| *Odocoileus virginianus* | White-tailed deer | 229 | 5 | 16.7 | 1125.35 | 14.661 |
| UID bird | | 2 | 1 | 3.3 | 0.54 | 0.012 |
| *Alligator mississippiensis* | Alligator | 3 | 1 | 3.3 | 7.26 | — |
| UID turtle | | 194 | — | — | 84.02 | 0.616 |
| *Chelydra serpentina* | Snapping turtle | 1 | 1 | 3.3 | 3.78 | 0.077 |
| Emydidae | Pond turtle family | 44 | — | — | 52.19 | 0.447 |
| *Malaclemys terrapin* | Diamondback terrapin | 36 | 3 | 10.0 | 50.24 | 0.436 |
| UID snake | | 53 | — | — | 2.70 | 0.01 |
| Colubridae | Colubrid snake family | 7 | 1 | 3.3 | 0.78 | 0.002 |
| Viperidae | Pit viper family | 19 | 1 | 3.3 | 5.97 | 0.026 |
| Anura | Frog or toad | 11 | — | — | 0.40 | — |
| Bufonidae | Toad family | 2 | 1 | 3.3 | 0.25 | — |
| *Scaphiopus holbrookii* | Spadefoot toad | 19 | 2 | 6.7 | 0.54 | — |
| UID fish | | 60 | — | — | 11.70 | 0.216 |
| Siluriformes | Catfishes | 9 | — | — | 1.99 | 0.038 |
| Ictaluridae | Freshwater catfish family | 2 | — | — | 0.52 | 0.011 |
| Ariidae | Sea catfish family | 1 | — | — | 1.48 | 0.029 |
| *Ariopsis felis* | Hardhead catfish | 7 | 2 | 6.7 | 2.69 | 0.051 |
| *Bagre marinus* | Gafftopsail catfish | 9 | 1 | 3.3 | 9.48 | 0.169 |
| Sciaenidae | Drum family | 5 | — | — | 0.70 | 0.03 |
| *Bairdiella chrysoura* | Silver perch | 1 | 1 | 3.3 | 0.03 | 0.003 |
| *Cynoscion* sp. | Seatrout | 1 | 1 | 3.3 | 0.14 | 0.009 |
| *Mugil* sp. | Mullet | 10 | 1 | 3.3 | 0.34 | 0.004 |
| UID vertebrate | | — | — | — | 356.40 | — |
| Total | | 1721 | 30 | 100% | 2777.66 | 30.966 |

more species than did the inhabitants of Meeting House Field while emphasizing venison and rabbit as sources of meat.

The variation among the middens at Meeting House Field and between Meeting House Field and other Irene materials underscores the importance of intrasite variation in faunal analysis and subsequent interpretation of human behavior. Placement of excavation units is as important as screen size when planning excavation techniques, although the consequence of deciding where to excavate is more difficult to assess than the consequences of deciding how to dig. Although some uncertainty exists in the interpretation of certain aspects of the Meeting House Field data, it appears that this assemblage does, in a general way, represent Irene vertebrate use. Therefore, it can be used cautiously as the pre-Hispanic base line for a study of change and stability in vertebrate use between the Irene period and the Mission period on St. Catherines Island.

## FALLEN TREE (9LI8)

The area designated as ''Fallen Tree'' represents only a limited portion of the Indian pueblo associated with Mission Santa Catalina de Guale. Before the settlement pattern of the pueblo was understood, a distinction was made between Fallen Tree and the rest of the Guale pueblo because of what later proved to be two portions of the same village that were separated by a drainage ditch (see chap. 26). The entire Indian pueb-

TABLE 27.13
**Diversity and Equitability**

| Variable | Sample total | Number of taxa | Diversity | Equitability |
|---|---|---|---|---|
| Meeting House Field, Thomas Excavation (Middens D and E, Irene) | | | | |
| MNI | 68 | 16 | 1.6185 | 0.584 |
| Biomass | 12.310 g | 15 | 1.1455 | 0.4230 |
| Meeting House Field, Saunders Excavation (Middens H and M, Irene) | | | | |
| MNI | 37 | 14 | 2.0911 | 0.792 |
| Biomass | 0.556 g | 11 | 1.6149 | 0.673 |
| South End Mound I (Irene) | | | | |
| MNI | 30 | 19 | 2.7357 | 0.9291 |
| Biomass | 16.082 g | 16 | 0.4450 | 0.1605 |
| Harris Neck (Irene) | | | | |
| MNI | 128 | 28 | 2.1330 | 0.6401 |
| Biomass | 3.1173 g | 26 | 1.9990 | 0.6136 |
| Fallen Tree (Guale) | | | | |
| MNI | 80 | 36 | 3.1832 | 0.888 |
| Biomass | 38.6535 g | 34 | 0.7377 | 0.209 |

lo, including Fallen Tree, was renamed Pueblo Santa Catalina de Guale. For convenience, the name Fallen Tree is used here to describe these materials because of the name's association in the literature with these samples. A more complete study of life in the pueblo will be developed in the future using data gathered during excavations in and around the mission compound. Until analysis of these additional pueblo data is completed, information about social or functional distinctions within the pueblo is unknown.

As noted in chapter 16, this site was first tested by Caldwell in the late 1960s. In 1977, the Island-wide transect survey crossed Fallen Tree. The faunal materials recovered both by Caldwell and from the American Museum's transect survey were analyzed in the Zooarchaeology Laboratory at the University of Georgia, and are reported elsewhere in this volume (see chap. 22). Results of the transect survey suggested a change in the animal-based part of the subsistence strategy practiced by Guale living around the mission compared to preceding Irene patterns (see chap. 22). The accuracy of this conclusion, however, was limited by small sample size (MNI = 63) and Caldwell's use of 11/32-in. mesh screen to recover faunal materials during his fieldwork. The University of Georgia and American Museum data from Fallen Tree both indicate changes in the pre-Hispanic patterns of vertebrate use, but the suggested changes are diametrically opposite (see chap. 22). It is assumed that the American Museum's data more accurately reflect vertebrate use in the pueblo because of the 1/4-in. screen used to recover them, but the small number of specimens in the AMNH collection (NISP = 13) suggests that caution be exercised in accepting interpretation derived from such a small sample.

The Fallen Tree vertebrate faunal materials reported derive from two additional studies of Fallen Tree: one in 1980 (directed by Thomas) and another in 1983 (directed by May); the results of both excavations are discussed in chapter 22. The 1980 research was focused on the search for the Mission Santa Catalina de Guale in and around Fallen Tree (Thomas, 1987). At that time, Fallen Tree was divided into ten 1-ha quads and an excavation strategy using random 1 × 1 m test units was initiated in Quad One, which included Fallen Tree. Thirty-two units were excavated to an average depth of 50 cm and the soil was sieved although 1/4-in. mesh screen. After the preliminary random shovel test strategy in Quad One was concluded, the field protocol was changed to use power augers that consumed less time. Faunal material from the auger survey has not been examined and is therefore not included in the data reported here.

The 1983 operations at Fallen Tree were focused on four concentrations located during a magnetometer survey. May and his crew screened soil from twenty-eight 2 × 2 m units through 1/4-in. and 1/8-in. mesh screen. The 32 units excavated in 1980 and the 28 excavated in 1983 are used to examine vertebrate animal use at Fallen Tree.

## Results: Fallen Tree

Despite the use of different excavation methods, the species lists from the 1980 and 1983 work are remarkably similar (table 27.14) and both species lists are combined here. These results are presented separately elsewhere (Dukes, 1993: 94–96, 102–104). The 1980 faunal collection contained 2655 vertebrate specimens weighing 2238.76 g and representing the remains of an estimated 40 individuals. The 1983 faunal assemblage contained 5712 specimens weighing 3476.37 g and represented the remains of an estimated 40 individuals. The combined assemblage contains 8367 specimens weighing 5715.13 g and contains the remains of an estimated 80 individuals (table 27.15). MNI is estimated for 36 taxa. Overall, the faunal preservation is good.

The only direct evidence of Spanish influence is found in the domestic animals. Domestic animals contributed 4 percent of the identified individuals and 3 percent of the biomass (table 27.16). This category contains two pigs (*Sus scrofa*) represented by 10 cranial and 4 postcranial specimens (table 27.17). One of the pigs was a subadult at death and the other was an adult. The only domestic bird is a single chicken (*Gallus gallus*).

White-tailed deer (*Odocoileus virginianus*) and other wild mammals contribute 34 percent of the individuals and 89 percent of the biomass (table 27.16). Elements from the entire deer skeleton are present (fig. 27.4; table 27.17). Only specimens from the foot are substantially underrepresented compared to the "standard deer" (fig. 27.2). This suggests that less meaty portions from the foot were occasionally discarded elsewhere. In terms of food utility, little difference is observed between the low, medium, and high value parts of the carcass compared to the "standard" deer, but high-value portions are more abundant in the assemblage than they are in the standard (fig. 27.3). Half of the 12 deer individuals died before reaching adulthood, indicating that hunting did not focus on older animals. Two of the deer were juveniles when they died, four were subadult, four were adults, and two individuals were of indeterminate age when they died (table 27.18).

One third (NISP = 10) of the antler fragments are from various parts of the antler body; 21 specimens are from antlers still attached to the frontal. These antler fragments confirm the presence of at least three male deer. Nineteen of these fragments are probably from the same individual, representing multiple fragments from the posterior portion of a skull with two attached antlers in a single sample from Level 3 in Unit 52N64E. The two other attached antler fragments are from different deer individuals; one from Unit IE4 and the other from Unit 2S36E. In both of these cases, the specimen indicates that a left antler was still attached to the frontal bone when these two male individuals died; however, in one case (Unit 2S36E) the actual specimen is a frontal bone with hack marks where the antler was removed with a metal tool.

Raccoon (*Procyon lotor*) is the other prominent wild mammal and the second most common species in the assemblage. At least one of these individuals was an adult at death. Specimens from the lower leg are notably absent; the assemblage is dominated by mandibles, maxilla, teeth, and ulna (table 27.17).

Burning is the most common modification process observed, present on 12 percent of the mammal specimens (table 27.19). In addition to the three hacked deer specimens (one frontal, one lumbar vertebra, and one innominate specimen),

TABLE 27.14
**Fallen Tree: NISP for Thomas and May Excavations**

| Taxa | | Thomas | May |
|---|---|---|---|
| UID mammal | | 1435 | 4452 |
| *Didelphis virginianus* | Opossum | 1 | — |
| *Scalopus aquaticus* | Eastern mole | — | 2 |
| *Sylvilagus* sp. | Rabbit | 1 | 6 |
| *Sciurus* sp | Squirrel | 1 | 3 |
| Cricetinae | New World mice | 1 | — |
| Carnivore | Carnivores | 2 | 2 |
| Canidae | Dog family | 1 | — |
| *Canis familiaris* | Dog | 2 | — |
| *Procyon lotor* | Raccoon | 32 | 57 |
| *Mustela vision* | Mink | 1 | — |
| *Sus scrofa* | Pig | 6 | 8 |
| *Odocoileus virginianus* | White-tailed deer | 279 | 441 |
| UID bird | | 9 | 7 |
| Ardeidae | Heron family | — | 1 |
| *Mycteria americana* | Wood stork | 11 | — |
| Anatidae | Duck family | — | 2 |
| *Anas* sp. | Duck | 1 | — |
| *Branta canadensis* | Canada goose | 1 | — |
| Accipitridae | Hawk | 1 | — |
| *Gallus gallus* | Chicken | — | 2 |
| *Meleagris gallopavo* | Turkey | — | 1 |
| *Rallus longirostris* | Clapper rail | 1 | — |
| Passeriformes | Song birds | 2 | — |
| UID turtle | | 462 | 524 |
| Kinosternidae | Musk/mud turtle family | — | 3 |
| Emydidae | Pond turtle family | 22 | 2 |
| *Deirochelys reticularia* | Chicken turtle | 3 | 2 |
| *Malaclemys terrapin* | Diamondback terrapin | 72 | 51 |
| *Terrapene carolina* | Box turtle | — | 1 |
| UID snake | | 8 | 1 |
| Anura | Frog or toad | — | 30 |
| *Scaphiopus holbrookii* | Spadefoot toad | 1 | 25 |
| Chondrichthyes | Sharks | — | 1 |
| UID fish | | 195 | 78 |
| *Lepisosteus* sp. | Gar | 20 | 7 |
| Ariidae | Sea catfish family | 5 | 6 |
| *Ariopsis felis* | Hardhead catfish | 25 | 19 |
| *Bagre marinus* | Gafftopsail catfish | 1 | — |
| Sciaenidae | Drum family | — | 2 |
| *Cynoscion nebulosus* | Spotted seatrout | 3 | — |
| *Micropogonias undulatus* | Atlantic croaker | 1 | — |
| *Pogonias cromis* | Black drum | 4 | 1 |
| *Mugil* sp. | Mullet | 45 | 4 |
| Total | | 2655 | 5712 |

one deer metacarpus is grooved and snapped, one deer metatarsus is incised, and three deer metatarsal specimens are worn to a smooth edge similar to what might be associated with a beamer.

Nine different bird taxa are present in the Fallen Tree assemblage (table 27.15). Most of these are aquatic or marsh edge birds such as wood stork (*Mycteria americana*), ducks (Anatidae, *Anas* sp., *Branta canaden-*

TABLE 27.15
**Fallen Tree: Species List**

| Taxa | | NISP | MNI | % | Weight (g) | Biomass (kg) |
|---|---|---|---|---|---|---|
| UID mammal | | 5887 | — | — | 2352.99 | 30.3603 |
| *Didelphis virginianaus* | Opossum | 1 | 1 | 1.3 | 0.3 | 0.0090 |
| *Scalopus aquaticus* | Eastern mole | 2 | 2 | 2.5 | 0.33 | 0.0097 |
| *Sylvilagus* sp. | Rabbit | 7 | 2 | 2.5 | 5.37 | 0.1269 |
| *Sciurus* sp. | Squirrel | 4 | 2 | 2.5 | 0.38 | 0.0114 |
| Cricetinae | New World mice | 1 | 1 | 1.3 | 0.05 | 0.0020 |
| Carnivora | Carnivores | 4 | — | — | 1.72 | 0.0451 |
| Canidae | Dog family | 1 | — | — | 0.4 | 0.0120 |
| *Canis familiaris* | Dog | 2 | 1 | 1.3 | 0.7 | 0.0190 |
| *Procyon lotor* | Raccoon | 89 | 9 | 11.3 | 100.66 | 1.7865 |
| *Mustela vision* | Mink | 1 | 1 | 1.3 | 0.1 | 0.0030 |
| *Sus scrofa* | Pig | 14 | 2 | 2.5 | 54.14 | 1.0235 |
| *Odocoileus virginianus* | White-tailed deer | 691 | 12 | 15.0 | 2533.80 | 32.5643 |
| UID bird | | 16 | — | — | 5.55 | 0.1019 |
| Ardeidae | Heron family | 1 | 1 | 1.3 | 0.10 | 0.0025 |
| *Mycteria americana* | Wood stork | 11 | 1 | 1.3 | 11.1 | 0.182 |
| Anatidae | Duck family | 2 | 1 | 1.3 | 1.87 | 0.0361 |
| *Anas* sp. | Duck | 1 | 1 | 1.3 | 1.71 | 0.033 |
| *Branta canadensis* | Canada goose | 1 | 1 | 1.3 | 3.58 | 0.065 |
| Accipitridae | Hawk | 1 | 1 | 1.3 | 0.5 | 0.011 |
| *Gallus gallus* | Chicken | 2 | 1 | 1.3 | 1.53 | 0.0301 |
| *Meleagris gallopavo* | Turkey | 1 | 1 | 1.3 | 0.6 | 0.0128 |
| *Rallus longirostris* | Clapper rail | 1 | 1 | 1.3 | 0.1 | 0.003 |
| Passeriformes | Song birds | 2 | 1 | 1.3 | 0.15 | 0.004 |
| UID turtle | | 986 | — | — | 320.03 | 1.8952 |
| Kinosternidae | Musk/mud turtle family | 3 | 1 | 1.3 | 1.53 | 0.0420 |
| Emydidae | Pond turtle family | 24 | — | — | 30.70 | 0.3602 |
| *Deirochelys reticularia* | Chicken turtle | 5 | 2 | 2.5 | 2.93 | 0.0695 |
| *Malaclemys terrapin* | Diamondback terrapin | 123 | 7 | 8.8 | 177.65 | 2.0370 |
| *Terrapene carolina* | Box turtle | 1 | 1 | 1.3 | 0.36 | 0.0525 |
| UID snake | | 9 | 2 | 2.5 | 1.46 | 0.0201 |
| Anura | Frog or toad | 30 | 3 | 3.8 | 2.07 | — |
| *Scaphiopus holbrookii* | Spadefoot toad | 26 | 3 | 3.8 | 3.84 | — |
| Chondrichthyes | Sharks | 1 | 1 | 1.3 | 0.02 | 0.0044 |
| UID fish | | 273 | — | — | 12.47 | 0.2598 |
| *Lepisosteus* sp. | Gar | 27 | 2 | 2.5 | 4.36 | 0.1073 |
| Ariidae | Sea catfish family | 11 | — | — | 4.10 | 0.0787 |
| *Ariopsis felis* | Hardhead catfish | 44 | 7 | 8.8 | 8.69 | 0.1611 |
| *Bagre marinus* | Gafftopsail catfish | 1 | 1 | 1.3 | 0.02 | 0.0005 |
| Sciaenidae | Drum family | 2 | 1 | 1.3 | 0.69 | 0.0296 |
| *Cynoscion nebulosus* | Spotted seatrout | 3 | 1 | 1.3 | 0.3 | 0.0160 |
| *Micropogonias undulates* | Atlantic croaker | 1 | 1 | 1.3 | 0.05 | 0.0040 |
| *Pogonias cromis* | Black drum | 5 | 2 | 2.5 | 4.4 | 0.1387 |
| *Mugil* sp. | Mullet | 49 | 2 | 2.5 | 1.22 | 0.0360 |
| UID vertebrate | | — | — | — | 60.51 | — |
| Total | | 8367 | 80 | 100% | 5715.13 | 71.7667 |

*sis*), and clapper rail (*Rallus longirostris*), although one turkey (*Meleagris gallopavo*) is also present. Wild birds contribute 10 percent of the Fallen Tree individuals, but less than 1 percent of the biomass (table 27.16). Modifications to UID Bird include one worked shaft fragment worn to a point (table 27.19).

TABLE 27.16
**Fallen Tree: Summary**

| Taxa | MNI | % | Biomass (kg) | % |
|---|---|---|---|---|
| Domestic mammal | 2 | 2.5 | 1.0235 | 2.6 |
| Domestic bird | 1 | 1.3 | 0.0301 | 0.1 |
| Deer | 12 | 15.0 | 32.5643 | 84.2 |
| Other wild mammal | 15 | 18.8 | 1.9368 | 5.0 |
| Wild bird | 8 | 10.0 | 0.3454 | 0.9 |
| Turtle | 11 | 13.8 | 2.201 | 5.7 |
| Sharks and fish | 18 | 22.5 | 0.4976 | 1.3 |
| Commensal taxa | 13 | 16.3 | 0.0548 | 0.1 |
| Total | 80 | 100% | 38.6535 | 100% |

TABLE 27.17
**Fallen Tree: Elements Represented**

| Skeletal element | Dog | Raccoon | Pig | Deer |
|---|---|---|---|---|
| Skull | — | 19 | 1 | 89 |
| Tooth | 2 | 37 | 9 | 191 |
| Vertebra/rib | — | 2 | — | 123 |
| Forequarter | — | 29 | — | 49 |
| Forefoot | — | — | — | 35 |
| Foot | — | — | — | 76 |
| Hindfoot | — | — | 1 | 61 |
| Hindquarter | — | 2 | 3 | 67 |
| Total | 2 | 89 | 14 | 691 |

Estuarine turtles and fishes constitute 36 percent of the individuals and 7 percent of the biomass (table 27.16). Most of the biomass is from turtles, which contribute 6 percent of the biomass. Diamondback terrapin (*Malaclemys terrapin*) is the most common turtle. The most common fishes are hardhead catfishes (*Ariopsis felis*), although members of the drum family (*Cynoscion nebulosus*, *Micropogonias undulatus*, *Pogonias cromis*) are also present. More than 2 percent of the turtle specimens are burned (table 27.19).

Commensal taxa contribute 16 percent of the individuals but less than 1 percent of the biomass (table 27.16). These include eastern mole (*Scalopus aquaticus*), New World mouse (Cricetinae), dog (*Canis familiaris*), song bird (Passeriformes), UID snake, and spadefoot toad (*Scaphiopus holbrookii*). The dog is too incomplete to be considered a burial (table 27.17).

Species richness, diversity, and equitability suggest a strategy in which a wide variety of different animals were used equitably, though only one resource (deer) contributed a substantial quantity of meat (table 27.13). Although the assemblage contains the remains of 36 different taxa, just four animals (raccoon, deer, diamondback terrapin, and hardhead catfish) comprise almost half of the individuals and only one animal (deer) contributes most of the meat. The low biomass diversity confirms that the strategy emphasized venison, which is further supported by the very low biomass equitability value.

### Fallen Tree: Summary

The Fallen Tree assemblage suggests that a variety of species were exploited but that deer provided most of the meat. Turtles and fishes contributed as many individuals as terrestrial deer and other wild mammals, suggesting a balance between use of these two distinctive resource areas and the demands of scheduling and technology required to utilize both locales (table 27.16). Domestic pigs and chickens are present but clearly were not prominent in the pueblo diet, confirming the minor role of domestic animals suggested by the University of Georgia and Island-wide transect survey data (see chap. 22). Hacking is present and appears to be an indication of a metal blade used for disarticulating. The MNI diversity is very high and species use is equitable; however, the biomass diversity is very low. A very wide range of species was included in the diet, but only one of these, deer, contributed substantially in terms of meat, with preference given to high-meat-yield portions of the carcass.

## CHANGE AND STABILITY IN VERTEBRATE USE BETWEEN THE IRENE PERIOD AND THE MISSION PERIOD

This study permits an assessment of the impact of missionization on the meat-based portion of the Guale subsistence strategy on St. Catherines Island. Consistent with the observation that stability is more common in subsistence strategies than is change, the

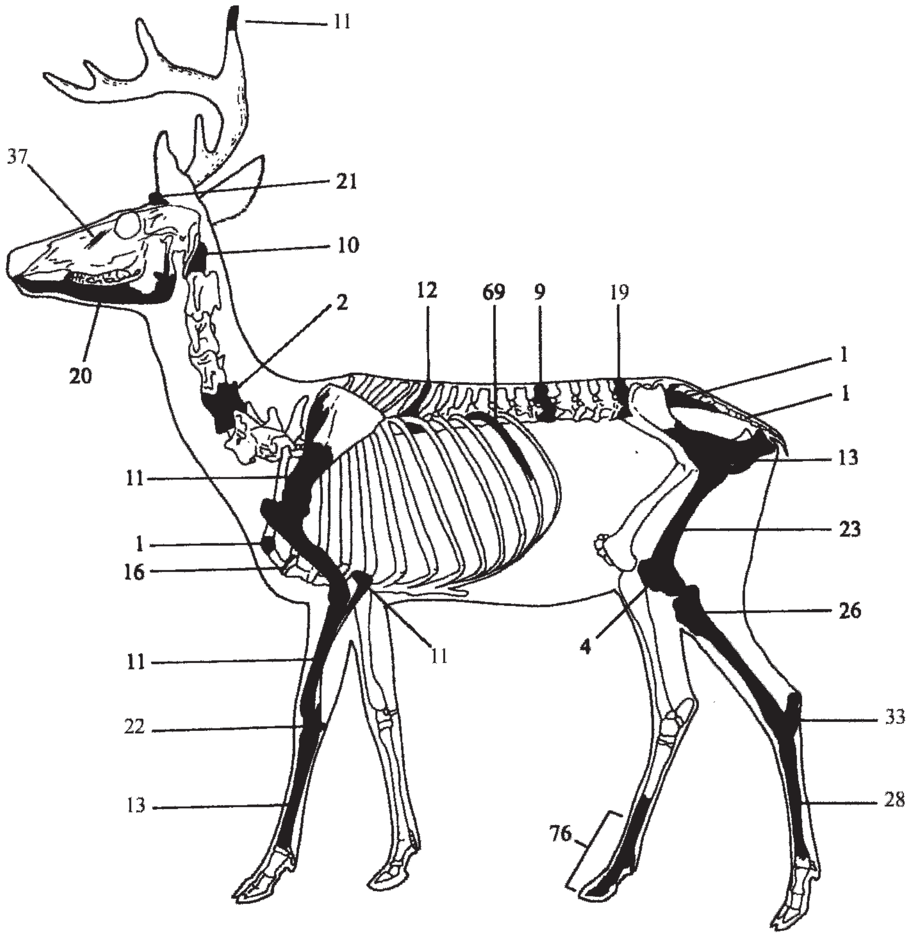


Fig. 27.4. Deer elements identified at Fallen Tree. Data from Thomas and May excavations are combined. Not illustrated are 191 loose teeth. NISP = 691.

Irene and Guale data reviewed here indicate that many of the resources and strategies used prior to the mission's presence continued to be used at the pueblo. Differences exist within each of these assemblages, and between these assemblages and those from other sites. Stable isotope studies also indicate that we should expect differences based on gender (e.g., Larsen et al., 2001). As further work is done at these and other locations, we anticipate such variations will reflect location, time period, site function, and social variables that are not yet understood.

Although it is true that people tend to use resources very close to their home base, the differences among these assemblages are probably not due simply to location, resource proximity, or routine access to preferred resources. All three sites are on the western, estuarine side of the island. The distance encompassed by Meeting House Field, Fallen Tree, and South End Mound I is approximately 6 km. All three sites occupied a similar environmental setting and inhabitants had access to and used similar resources from each of them. All animals in these assemblages could be procured within a few kilometers of each site, at least in theory (see discussion of deer carrying capacity on the island in chap. 8). Even so, variations among the assemblages suggest other factors were at work as secondary decision criteria within the strong preference to use nearby resources.

TABLE 27.18
**Fallen Tree: Epiphyseal Fusion for Deer**

| Skeletal element | Unfused | Fused | Total |
|---|---|---|---|
| Early fusing | | | |
| Humerus, distal | — | 4 | 4 |
| Scapula, distal | — | 5 | 5 |
| Radius, proximal | — | 5 | 5 |
| Acetabulum | 1 | 3 | 4 |
| Metapodials, proximal | — | 18 | 18 |
| 1st/2nd Phalanx, proximal | 3 | 15 | 18 |
| Middle fusing | | | |
| Tibia, distal | 3 | 10 | 13 |
| Calcaneus, proximal | 1 | 4 | 5 |
| Metapodials, distal | 11 | 6 | 17 |
| Late fusing | | | |
| Humerus, proximal | 3 | — | 3 |
| Radius, distal | 1 | 4 | 5 |
| Ulna, proximal | 1 | — | 1 |
| Ulna, distal | — | 2 | — |
| Femur, proximal | 2 | 6 | 8 |
| Femur, distal | 2 | 2 | 4 |
| Tibia, proximal | 1 | 2 | 3 |
| Total | 29 | 86 | 115 |

It appears that South End Mound I represents a special activity site, a function that is reflected in the use of deer at that site. The prestige of deer may best be indicated by the high percentage of deer at this mortuary site and the unusual pattern of elements represented in the assemblage compared to the "standard deer" and to the residential sites at Meeting House Field and Fallen Tree.

In general, inhabitants of the Meeting House Field site focused on estuarine resources and used techniques that offered high returns for low inputs of time and effort. In particular, procurement activity included small fish such as mummichog and mullet that were probably moving through the shallow tidal creeks. Capture of these species was likely done with a seine net or a basketry scoop along the shallow banks of the tidal creeks. The gar, sea catfish, and drum could be caught on either a trot line or in weirs and nets used to capture mummichog and mullet. Turtles also could be captured with similar devices or gathered from shallow waters. Wild birds are rare, perhaps indicating the difficulty of capturing these animals when most of the technology was designed for fishing in the estuary, trapping raccoons, and hunting deer.

The Meeting House Field data conform to the pattern found at other pre-Hispanic sites on the Georgia coast. The importance of estuarine resources for Native Americans on the Georgia coast can be seen in the continuity of this subsistence system over centuries (Reitz, 1988a; see also chap. 22). It seems unlikely that a subsistence system would be sustained for such a long period of time unless strong reasons to do so existed. The primacy of estuarine resources for coastal human populations can be attributed to a combination of characteristics: They

TABLE 27.19
**Fallen Tree: Modifications**

| Taxa | Burned | Cut | Hacked | Worked | Gnawed: Rodent | Gnawed: Carnivore |
|---|---|---|---|---|---|---|
| UID mammal | 760 | 5 | — | — | 1 | 13 |
| Rabbit | — | — | — | — | — | 1 |
| Raccoon | — | 3 | — | — | 1 | 1 |
| Pig | 1 | — | — | — | — | — |
| Deer | 15 | 10 | 3 | 5 | 2 | 24 |
| UID bird | — | — | — | 1 | — | — |
| UID turtle | 27 | — | — | — | — | 5 |
| Diamondback terrapin | — | — | — | — | — | 1 |
| UID fish | 1 | — | — | — | — | — |
| UID vertebrate | 17 | — | — | — | — | — |
| Total | 821 | 18 | 3 | 6 | 4 | 45 |

are more stationary, abundant, nonseasonal, and predictable than terrestrial resources in this area. Estuarine resources also are captured more readily in large numbers using techniques that are less costly in terms of time and effort. Both deer and birds are more risky and require more effort to obtain. That being said, however, the use of deer on St. Catherines Island was higher than was typical at coastal sites elsewhere. There is currently no available explanation for this observation.

The subsistence strategy at Fallen Tree continued to use the same animal resources found at Meeting House Field, probably capturing these resources using familiar techniques. However, the species recovered from Fallen Tree indicate a change in the emphasis within this suite of resources and technologies, perhaps due to the mission's influence. The Guale shifted their focus from a strategy that combined a moderately diverse array of turtles and fishes with venison to one that used an even more diverse array of animals but focused on venison. Indigenous terrestrial mammals contribute over one-third of the individuals and over 80 percent of the meat in the Fallen Tree assemblage, compared to less than one-tenth of the individuals and slightly more than half of the biomass in the Irene Meeting House Field assemblage. The increase in young deer from 25 percent of the deer individuals in the Meeting House Field assemblage to 50 percent of the deer individuals in the Fallen Tree assemblage may be part of a suite of changes in the use of deer associated with mission life. Wild birds are also more common. The amount of hunting suggested by the increase in venison, as well as the time and effort required to master the new skills of tending livestock and ensuring highly productive maize fields, indicates that life in the mission pueblo was quite different from that experienced at Meeting House Field.

A surprising change in the diet is the increased diversity of individuals used in conjunction with the decline in biomass diversity (table 27.13). The decline in the use of turtle is particularly interesting. Opossum, rabbits, squirrels, raccoons, and deer are well-known garden and field predators; the apparent increase in their use may be an outgrowth of increased farming and the resulting increased opportunity to hunt and trap around fields and decreased opportunity to hunt, trap, and fish in the traditional manner (e.g., Linares, 1976; Neusius, 1996). Although fishing effort may have declined somewhat, time and effort spent on collecting turtles declined considerably. In addition, small amounts of pork and chicken were added to the diet, which further increased dietary diversity.

Several questions may be raised about the high quantity of deer present in the Fallen Tree assemblage. The possibility that this is the result of recovery bias is eliminated by the inclusion of fine-screened material from the 1983 excavation. Even with improved recovery technique, venison dominates the estimated biomass.

Deer, as well as maize, were economically important resources in the Franciscan mission system. Indians brought deerskins to the missions to buy wax and to pay for burials (Loucks, 1979: 46). The increase in deer remains could be a response to demands for meat and/or hides from Mission Santa Catalina de Guale. Deer are represented by elements from the entire skeleton. However, forequarter and hindquarter portions are more abundant compared to the standard deer than are vertebra/rib or foot portions, which are underrepresented compared to the standard deer (fig. 27.2). Likewise, specimens from high utility cuts are more common in the Fallen Tree assemblage than in the standard deer (fig. 27.3). This is consistent with patterns of discard found at a consumption or residential site rather than at kill or butchering venues. The higher frequency of forequarter and hindquarter specimens compared to the standard deer suggests that deer were killed some distance from the pueblo, that low-utility foot portions and medium-utility vertebra/rib portions were sometimes (but not always) discarded at the kill site, and that high-utility specimens were preferentially transported back to Fallen Tree for consumption. We note in passing that not all high-utility cuts were tithed to the mission's priests; a substantial number of them were retained within the pueblo.

The deer element distribution at Fallen Tree unfortunately provides little evidence for the role of deer hides in hunting and transport decisions. It is generally assumed that the hide is removed from the carcass at the kill/butchering site when the primary, if not the only, goal of the hunt is to acquire hides for trade, tithes, or tribute. Among the few specimens that might return to the village would be phalanges, often bearing characteristic skinning marks. Unfortunately, the characteristic skinning cuts that often are found on phalanges from skinned animals are not present on the Fallen Tree deer specimens. This suggests that the procurement of hide was not the sole reason for each hunt; meat was also a factor.

Analysis of the vertebrate fauna is only one way to study change and stability in diet and other aspects of animal use during the 16th and 17th centuries. The full impact of missionization can be better understood when these results are combined with invertebrate, botanical, and human skeletal data. The Meeting House Field and Fallen Tree data support the results of Larsen and his colleagues (1990, 2001) in their isotopic analysis of pre-mission and mission human skeletal populations. Both analyses indicate increased reliance on terrestrial resources and decreased reliance on marine resources between the Irene and Mission periods. The nitrogen and carbon isotope ratios, in particular, indicate that people ate less maize and more marine foods before missionization and that consumption of maize increased along with a decrease in marine foods under the influence of the mission (Larsen et al., 2001; Reitz et al., 2002).

Comparison of the Meeting House Field and Fallen Tree data demonstrates that the missionized Guale did not maintain their traditional subsistence practices unchanged. On the other hand, the Guale did not completely adopt Spanish habits. The Guale combined their traditional subsistence practices with some aspects of Spanish animal use to create a new system that continued to rely on locally available estuarine resources but emphasized local terrestrial resources such as deer and raccoon. They also incorporated some quantity of pigs and chickens into their diet. Changes in Guale subsistence can be seen as attempts to satisfy new social obligations and to take advantage of new opportunities created by the mission system. The labor and schedule demands for supplying goods and services, as well as participating in religious training, diverted time and effort away from activities that were at one time essential to the economic livelihood of the community. The Spanish mission effort influenced the choice of resources with the most value to the mission system, which is reflected by the changes in vertebrate subsistence seen at Fallen Tree.

## CONCLUSIONS

The evidence leads to the conclusion that on St. Catherines Island, both the Spaniards (Reitz, 1990) and the Guale altered their subsistence patterns in response to one another. The Spaniards altered their subsistence by focusing on deer rather than on European domesticates. The Guale, probably in response to Spanish demands for labor, maize, deer, and other goods and services, changed from a strongly estuarine diet to one that relied heavily on deer and incorporated select European domesticates.

# CHAPTER 28. PALEOCLIMATES AND HUMAN RESPONSES ALONG THE CENTRAL GEORGIA COAST: A TREE-RING PERSPECTIVE

DENNIS B. BLANTON AND DAVID HURST THOMAS

Recent paleoclimatic research on baldcypress (*Taxodium distichum*) in the American Southeast offers a new way of assessing the role of short-term climatic variability on the aboriginal foragers of St. Catherines Island.

We discuss in this chapter the baldcypress tree-ring record for the outer coastal plain of Georgia and consider its relevance to St. Catherines Island archaeology. Our reconstruction of growing season precipitation for this area employs tree-ring data from the lower Altamaha River near the central Georgia coast. This tree-ring dataset was compiled by the Tree Ring Laboratory at the University of Arkansas in the 1980s (Stahle, 2006: http://hurricane.ncdc.noaa.gov/pls/paleo/ftpsearch.treering).

## METHODS AND PROCEDURES

Archaeologists are most familiar with the power of dendrochronology to provide precise dating sequences, but tree rings likewise provide a powerful proxy for charting climatic trends of the past, and recent research has extended this potential to the American Southeast (Stahle and Cleaveland, 1992; Anderson, 1994: 277–289; Anderson et al., 1995; Stahle et al., 1998; Blanton, 2000, 2004). Constructed from ancient and living baldcypress trees (ranging up to 1000 years old), the present tree-ring sequence proves an accurate measure of available moisture during the growing season because it integrates the effects of spring–summer precipitation and temperature anomalies on soil water conditions (Stahle et al., 1998: 564–565). By appropriately calibrating the tree-ring data, it is possible to estimate the moisture availability throughout the growing seasons of the past 1000 or more years. By providing reliable indicators of rainfall during periods of peak growth (about April through July), tree rings can be used to generate indices of drought or wetness, such as the Palmer Hydrological Drought Index (PHDI; after Stahle and Cleaveland, 1992). In turn, these drought reconstructions provide clues as to the sustainability of food supply, especially maize provisioning strategies, as well as water quality conditions and contexts of intercultural hostility.

Tree-ring chronologies are created from long series of raw ring width measurements that have been statistically standardized. The standardization process functions to remove the "noise" introduced by extraneous and biological effects on tree growth so that a common series signal can be identified (Cook and Holmes, 1999: 1). The version of the Altamaha chronology that we have used for our reconstruction is called ARSTAN since it is developed to register the strongest climatic signal possible by reincorporating the pooled model of autoregression into the RESID version of the chronology (Cook, 1985; Cook and Holmes, 1999: 11).

Reconstructing past climate conditions from tree-ring data, in this case patterns of precipitation, begins with examination of the correlation between tree-ring behavior and relevant modern meteorological data. The degree of fit between a tree-ring chronology and available quantitative measurements for local precipitation history establishes a confidence level for the trends observed across a full, centuries-long reconstruction. For our purpose the correlation between the Altamaha ARSTAN chronology and modern growing season (April–July) PHDI values from eastern Georgia since 1895 was measured. With an $r$-value of 0.588 (and an $r$-square value of 0.346), these independent datasets correlate at a fairly high level, at least as well as that for the Virginia–North Carolina sequence (Stahle et al., 1998). In effect, the correlation establishes that an appreciable amount of the variation in baldcypress tree-ring width on

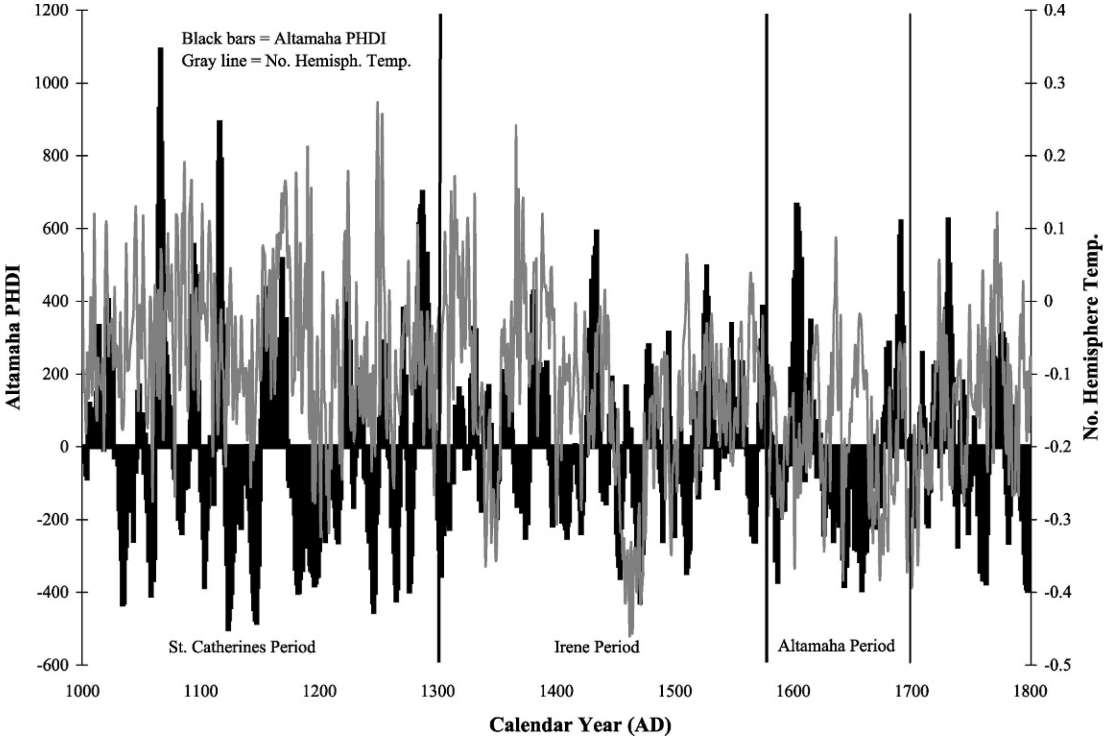


Fig. 28.1. Reconstructed Growing Season Palmer Hydrological Drought Index (PHDI) for lower Altamaha River shown as 5-year moving average of deviation from series mean, combined with Northern Hemisphere temperature reconstruction (Mann et al., 2000) shown as deviation from series mean, A.D. 1000–A.D. 1800.

the lower Altamaha can be accounted for by changes in growing season soil moisture conditions as measured by the Palmer Hydrological Drought Index.

The University of Arkansas data for the lower Altamaha River supplies a 1055-year-long series suitable for climate reconstruction. By statistically extending the modern PHDI correlation across the entire series, a reconstruction of growing season soil moisture availability was generated that, in turn, serves as a reasonable proxy for past wet-dry trends since A.D. 930 (fig. 28.1). To round out the climate picture, the relevant portion of the Briffa et al. (1998) Northern Hemisphere temperature reconstruction has been added to the PHDI graph. When graphed together, these independent lines of paleoclimatic information reveal a complex, oscillating history of wetter–drier and warmer–colder conditions with implications for human adaptation.

While the Altamaha River reconstruction reveals considerable periodicity in wet–dry conditions over the last millennium, two extended downturns are especially prominent (fig. 28.2). The earliest spans the period A.D. 1176–1220 and marks a particularly prolonged interval of drought. This interval also corresponds to a spell of relatively cool temperatures in the Northern Hemisphere. Together the dry, cool conditions would have potentially posed problems for emergent agricultural economies in the region.

The second prominent period of extended dryness occurred between A.D. 1627 and A.D. 1667. Although drought conditions during this span appear to have abated for brief periods, the prevailing pattern was clearly one of below-average growing season precipitation. In contrast to the cooler temperatures of the earlier extended dry period, temperatures for the hemisphere were

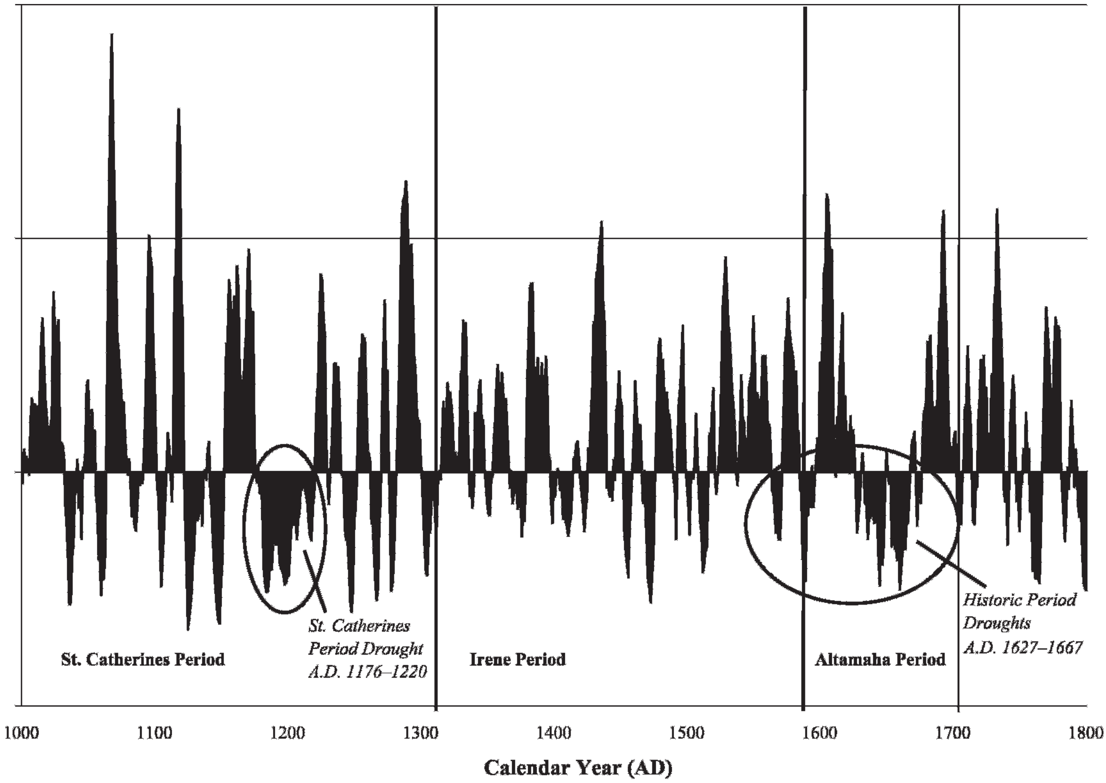


Fig. 28.2. Reconstructed Growing Season Palmer Hydrological Drought Index (PHDI) for lower Altamaha River shown as 5-year moving average of deviation from series mean, A.D. 1000–A.D. 1800.

relatively warm during the middle of the 17th century.

Two shorter periods of colonial-era drought also bear mention. Together these droughts exemplify the highly variable and often extreme climatic conditions that characterize the latter part of the 16th century, a time when "megadrought" afflicted much of North America (Stahle et al., 2000). The first falls between A.D. 1564 and A.D. 1571, with the most severely dry conditions occurring in 1567–1570. As described below, this dry spell complicated the earliest interval of sustained Spanish settlement in the region. The second relatively brief colonial drought is registered in the tree-ring data for A.D. 1585–1595. The 1587–1589 low point in this interval corresponds with the brief but severe spell known as the Lost Colony Drought observed in a Virginia–North Carolina reconstruction (Stahle et al., 1998). In sections to follow, we explore some of the potential linkages that explain patterns observed in both the tree-ring and archaeological records.

## THE ST. CATHERINES PERIOD DROUGHT (A.D. 1176–1220)

Drawing upon the Palmer Hydrological Drought Index, we call particular attention to the major drought episode circa A.D. 1176–A.D. 1220, denoting a cool and dry interval that would certainly have had some bearing on the early Mississippian occupation of the outer coastal plain.

Figure 28.4 superimposes the A.D. 1176–A.D. 1220 drought episode on the $^{14}C$ histogram of all available radiocarbon dates spanning the interval cal A.D. 1–A.D. 1500. Note the $^{14}C$ trough that dominates the late St. Catherines period; within one-sigma limits of cal A.D. 1160–A.D. 1290, there is a clear-cut drop-off in the number of available radiocarbon dates for this interval. We have previously discussed, in some detail, the sampling issues surrounding the late St. Catherines period gap in radiocarbon evidence; for the reasons spelled out in chapter 16, we are convinced that this gap in the available $^{14}C$ evidence indeed reflects a significant, behavioral event—the real decline in both midden accumulation and mortuary activities during the late St. Catherines period.

We should note further that the observed trough in radiocarbon evidence during the late St. Catherines period (with one-sigma limits of cal A.D. 1160–A.D. 1290), corresponds almost precisely with DePratter's (1979a, 1991) age estimates of cal A.D. 1280–1310/1390 for the Savannah period.[1] In chapter 16, we discussed in some detail the problems associated with defining a Savannah period presence on St. Catherines Island, despite the dramatic increase in construction of Savannah Period earthen platform mounds near the mouth of the Savannah River—most notable at the Irene site (Caldwell and McCann, 1941) and the Haven Home burial mound (also known as the "Indian King's Tomb," 9Ch15; Waring, 1968f). Because we lacked compelling evidence for a definitive, time-bounded Savannah period on St. Catherines Island, we did not employ the "Savannah period" as a distinct archaeological interval.

As discussed in Part III, stable isotope analysis of human bone suggests that maize might have been included, to some degree, in the diet during the St. Catherines period (Schoeninger et al., 1990; Larsen et al., 1992; Hutchinson et al., 1998; Larsen, 2001: 29, 72; see also chaps. 25 and 32, this volume). But the lack of dental and skeletal pathologies suggest that the bulk of the diet derived from nondomesticated sources (Larsen and Thomas, 1982: 327–329). Additional stable isotope analysis is on-going, but regardless of the outcome, it seems clear that a period of prolonged drought from A.D. 1176 through A.D. 1220 must have had a significantly negative impact on the aboriginal St. Catherines Islanders.

This scenario is not inconsistent with the timing of intensified Mississippian occupation in the lower Savannah River basin. We note that a separate tree-ring dataset from Ebenezer Creek, a tributary of the lower Savannah River, very closely follows the major trends discovered in the Altamaha record (fig. 28.3). With respect to the major drought periods of the 12th and 13th centuries, the two tree-ring sequences are in essential lock step. Also, recently improved dating of Mississippian mound centers on the lower Savannah indicate that pulses in their developmental history accord with expectations drawn from the observed pattern of wet–dry periodicity.

These findings refine the pioneering examination of tree-ring evidence introduced to the region's archaeologists by David Anderson just over a decade ago (Anderson, 1994). New work at two mound complexes on the lower Savannah (i.e., Hollywood, Lawton, Red Lake, and Spring Lake sites, upriver from the Irene site) by Adam King and Jared Wood establish that the most intensive occupation occurs between A.D. 1275 and A.D. 1375 (Adam King, personal commun.). Anderson (1994) notes that several major construction episodes also occurred at the Irene site farther downstream through the Savannah I/II, III, and Irene phases. This is not to say that Mississippian settlements do not occur on the lower reaches of the river before or after the period of intensive mound building, but only that the pattern then was a more dispersed one.

The newly dated phase of mound center development coincides squarely with a spell of relatively normal rainfall conditions depicted in the tree-ring records of the lower Savannah and Altamaha rivers, between a severe dry period that ended about A.D. 1210–A.D. 1220 and another one that began around A.D. 1360. Anderson (1994: 284–286) recognized the same correlation in his broader treatment of climatic and Mississippian settlement trends. Anderson concludes that the climatic conditions for maize agriculture were comparatively "benign" during the A.D. 1000–A.D. 1100 interval. But several times during the second quarter of the 12th century, successive years experienced below-average rainfall. Anderson

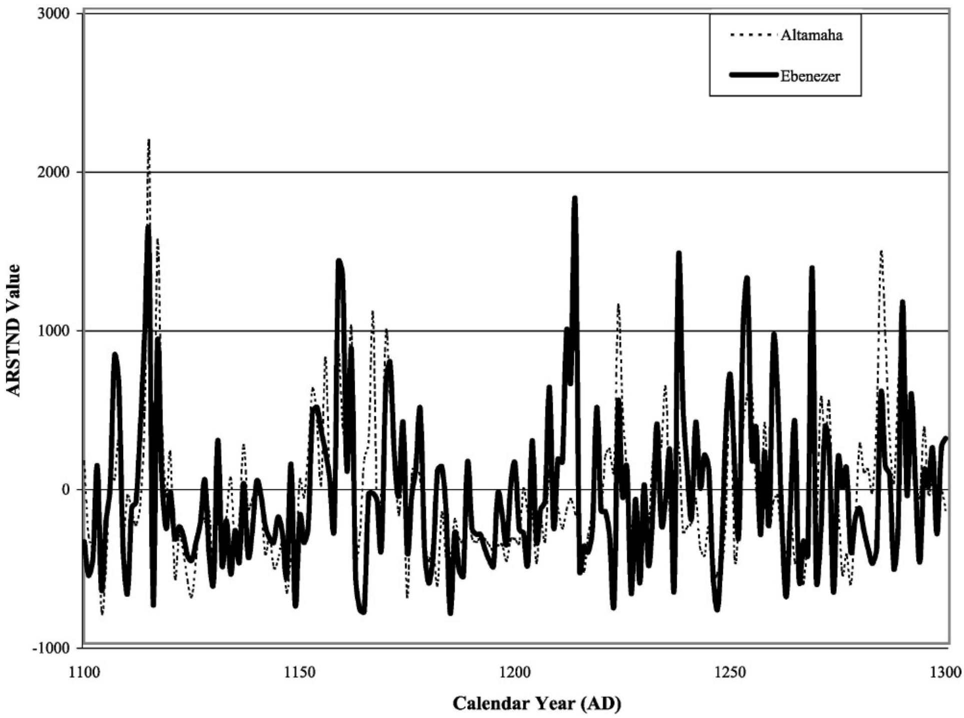


Fig. 28.3. Smoothed-line comparison of ARSTND tree-ring values for lower Altamaha River and Ebenezer Creek (lower Savannah River) during the late St. Catherines Period, A.D. 1100–A.D. 1300.

predicted food shortfalls for about half the years between A.D. 1124 and A.D. 1152. That is, tree-ring evidence indicates a time of generally favorable climatic conditions corresponding to a time when the earliest mound construction took place at the Irene Mounds, sometime around A.D. 1150–1200 (Caldwell and McCann, 1941: 78; see also Anderson, 1994: 174). But Anderson also suggests that the first half of the 13th century was apparently a time of "modest climatic deterioration" in the Savannah River basin, with food shortfalls projected for about one-third of the years between 1201 and 1250. Between circa A.D. 1359–A.D. 1377, the Savannah River Basin experienced another severe climatic downturn, with food shortages projected for 12 of 19 years.

## SPANISH COLONIAL PERIOD DROUGHTS

During the early European contact period, Stahle et al. (1998: 545) document "a prolonged drought from 1562 through 1571 that was most severe from 1565 to 1569" and this is exactly when the Jesuit missionary arrived in the Chesapeake and the Guale coast (fig. 28.5).

We now understand that Jesuit missionization of the Carolina/Georgia coastline took place during the driest period of the 16th century. Rebecca Saunders (2000b) and John Worth (1999) were the first two investigators, to our knowledge, to recognize the relevance of the baldcypress tree-ring record to the issues raised as the "Guale problem" (see also Anderson, 1994: 288 for comparable statements relating to the natives of Orista). Noting the prolonged drought from 1562 to 1571, Saunders (2000b: 37) noted, "these data apply directly to the Jesuit experience in Virginia and might be applicable south through Guale territory. If so, then the drought began just as the French arrived, and reached its peak during the Jesuit occupation. In that case, both sides of the subsistence/settlement argument may contain

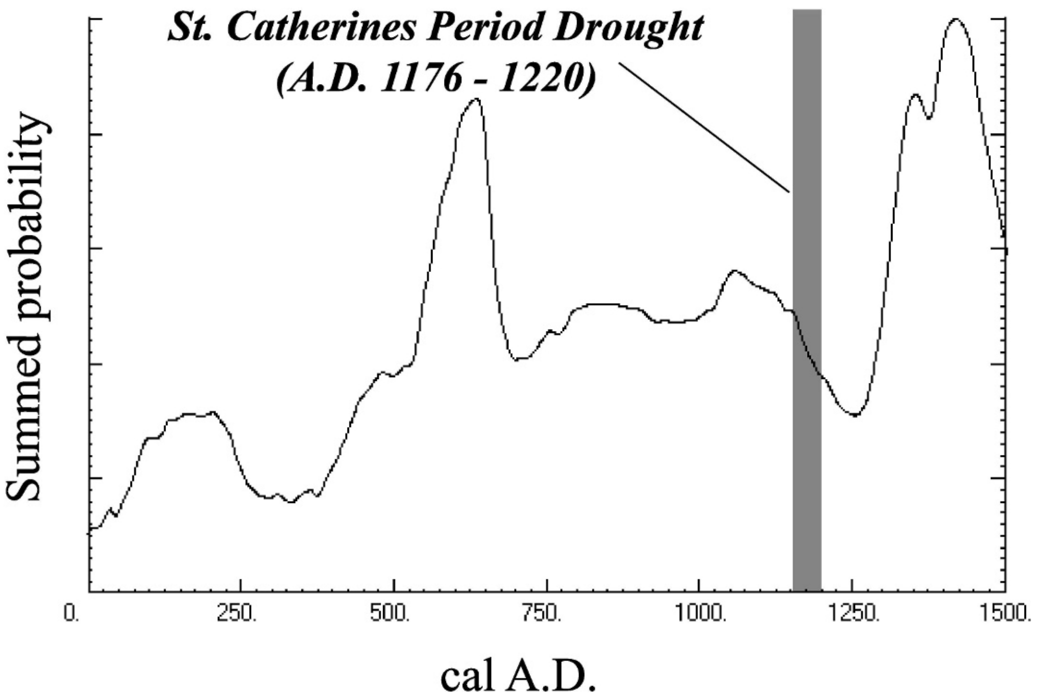


Fig. 28.4. The St. Catherines Period Drought (A.D. 1176–A.D. 1220) compared with the summed probability distribution of St. Catherines Island radiocarbon dates between cal A.D. 1 and cal A.D. 1000.

some truth." Jesuit priests lived for several months among the coastal Indians in 1569 and 1570 and John Worth (1999: 1) has observed that, "because of their early date and vivid narrative, these accounts have long dominated scholarly thinking on the Guale and others."

Looking more closely at the documentary evidence, we see that in April and May of 1566, Adelantado Pedro Menendez de Aviles left St. Augustine (a settlement he had founded) to sail northward up the Georgia Bight, locating the towns of Guale and Orista, then meeting with the *micos* and attempting to establish rudiments of Christianity (Barcia, 1951: 112–119; Jones, 1978: 181).[2] Gonzalo Solís de Merás, Menendez de Aviles' brother-in-law, joined the expedition and provided the primary account (Solís de Merás, 1964: 166–181; see also Quinn, 1979: 492–493).

The Guale people informed the Adelantado that a severe drought had created immediate food shortages and likely would precipitate warfare with the Orista chiefdom (at Port Royal, present-day South Carolina), where food was likewise short due to drought conditions. According to Solís de Merás (1964: 170–171), "It had not rained for 8 months in this country, and their corn fields and farming lands were dry, whereat they were all sad, on account of the little food they had. The Adelantado told them that God was angry with Guale, because he was at war with Orista … and this was the reason God would not give him water. …[T]he Adelantado found the land very good and fit for raising grain and grapes."

Menendez left for Santa Elena the next morning, eventually arriving at the village of Orista, where he feasted on maize, boiled and roasted fish, oysters, and acorns (Solís de Merás, 1964: 175). Despite the hospitality, the documentary evidence likewise confirms a severe drought at Orista in 1566, and when Menendez de Aviles stationed 20 men with the Orista, they complained that food was in such supply that "even if the Indians had been willing to give their

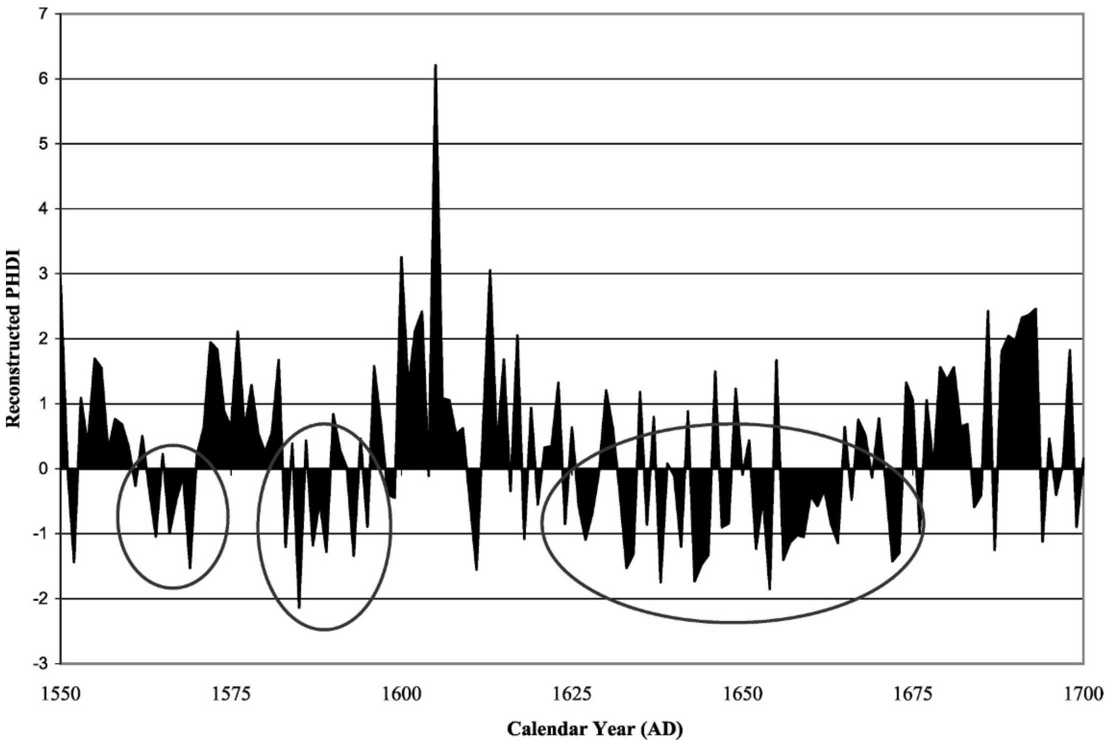


Fig. 28.5. Detail of reconstructed PHDI for Altamaha tree-ring series showing periods of 16th and 17th century dryness, notably A.D. 1564–A.D. 1571, A.D. 1585–A.D. 1595, and A.D. 1627–A.D. 1667.

food … they had none, for it had not rained for many months'' (Solís de Merás in Waddell, 1980: 147; see also Anderson et al., 1995: 267). The Adelantado eventually returned southward, still intent on brokering a peace between the two chiefdoms, arriving back at Guale on May 8, 1566, where the cacique at Guale informed Menendez that he since was now "a Christian, and had made peace with Orista in order not to anger God, [Menendez] should beseech Him to give me water for his maize fields and other cultivated lands, as it had not rained for 9 months'' (Solís de Merás, 1964: 178–181).[3]

Although leaving vivid accounts of extremely poor harvests, little stored foodstuffs, rampant hunger, native rebellions, and local unrest, Menendez de Aviles (and the Jesuit missionaries who followed him) had no way of knowing that they were witnessing the driest period of the 16th century. The record for 1587 (the summer of the disappearance of the English colonists at Roanoke) is the most extreme growing-season drought in the 800-year record. This drought persisted for 3 years, affected the entire southeastern United States, but it "was particularly severe in the Tidewater region near Roanoke'' (Stahle et al., 1998). Although the late 16th century megadroughts of A.D. 1567–A.D. 1570 and A.D. 1587–A.D. 1589 are well documented for the Chesapeake, the Jamestown drought of 1607 does not extend as far south as the Altamaha River. Researchers suggest that the Jamestown drought was a more localized event, restricted largely to the Chesapeake region (Stahle et al., 1998; Blanton, 2000).[4]

The warm and dry interval of A.D. 1627–A.D. 1667 was punctuated by torrid conditions from A.D. 1654 to A.D. 1664. Although this event has been little discussed in the recent literature, it signals an extraordinarily difficult time for forager–farmers along the Georgia coastline and highlights one of many challenges facing European and native American alike. Unlike previous drought episodes, the known ethnohistorical accounts are relatively silent with respect to this event. While documents merit further scrutiny for commentary about the effects of drought at this time, it is worth asking if the paucity of comments reflects a more seasoned view of the vagaries of climate on the Georgia coast among the Spanish colonials. We think it important to explore more thoroughly the ramifications of reduced crop yields and other effects at this time of extreme duress created by rebellion, epidemics, and foreign marauders. Relative to these other hardships, a spell of below-average precipitation might understandably pass with little remark.

But the question remains: To what extent were the climatic conditions a factor in the historically documented events? Certainly elsewhere, including the English colony at Jamestown, conflict and disease have been linked causally to environmental factors (Blanton, 2000).

## NOTES

1. As discussed in chapter 16, DePratter (1979a, 1991) actually estimated the Savannah period between A.D. 1200 and A.D. 1325, but these figures reflected uncalibrated $^{14}C$ years, which we have "calibrated" for the present discussion.

2. Although Swanton (1922: 50–51) believed that this meeting at Guale might have taken place on St. Catherines Island, Jones (1978: 181, 203) argues that in 1566, the principal Guale town was located on the inland side of Ossabaw Island (along the Bear River, as indicated by Spanish descriptions) or perhaps even on Skidaway Island (the French sources favor this location; cf. Lanning, 1935: 13). We must note that the archaeological record of Ossabaw Island suggests (1) an aboriginal abandonment prior to Spanish contact and (2) a virtual absence of Spanish period artifacts (Pearson, 1979a, 2001).

3. The account continues: "The Adelantado told him that God was very angry with him, because He had ordered him to do many things and he had not done them, and on this account He would not give the cacique water, although he besought Him to do so." After considerable back and forth, the cacique of Guale argued "sorrowfully that he had been a true Christian since the very first day; and he went directly to the cross which was near there, knelt before and kissed it, and turned to the Adelantado and said to him through the interpreter: 'Behold, how I am a true Christian'. … This occurred at about 2 o'clock in the afternoon: not half an hour had gone by when there came thunder and lightening, and it began to rain very hard, and a bolt struck and splintered into many pieces a tree near the village: all the Indian men and women ran to it to take the broken branches and bring them to their houses, to keep them: then they all went with the cacique to the Adelantado's house, some of them weeping, some throwing themselves at his feet, and others taking his hands, imploring him to leave Christians there." The Adelantado soon departed Guale, leaving his nephew, Alonso Menéndez [Marqués] on the Georgia coast, where, soon thereafter, "The rain which fell in Guale lasted 24 hours, and extended over the whole island, which may be 4 or 5 leagues in length" (Solís de Merás, 1964: 178–181).

4. By comparison, we note that the Anderson et al. (1995) reconstruction of the Savannah River/South Carolina records most of the other precipitation downturns evident in the Altamaha River sequence, suggesting some local consistency in this aspect of the coastal Georgia tree-ring sequence.

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