TREND, TRADITION, AND TURMOIL

WHAT HAPPENED TO THE SOUTHEASTERN ARCHAIC?

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AND
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The Late Archaic of the American Southeast is typically described as a time of population growth, innovative developments in subsistence strategies, and increased social complexity. Although it is difficult to generalize, many Early Woodland communities are characterized as relatively small scale, fairly mobile foragers organized into unranked or minimally ranked lineages and clans. Early Woodland groups also seem to be more socially isolated than their Late Archaic predecessors, with a decline in regional exchange networks.

The papers in this volume were presented at a conference entitled "What Happened in the Late Archaic?" which was co-sponsored by the American Museum of Natural History and the St. Catherines Island Foundation and held on St. Catherines Island (Georgia), May 9–11, 2008. The Third Caldwell Conference invited the participants to engage the appropriate archaeological data from the American Southeast, specifically addressing the nature of change during the Late Archaic–Early Woodland transition. This volume consists of a dozen substantive papers, followed by three discussant contributions.

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ST. CATHERINES ISLAND, GEORGIA, MAY 9–11, 2008

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PREFACE

David Hurst Thomas and Matthew C. Sanger

The Late Archaic of the American Southeast is typically described as a time of population growth, innovative developments in subsistence strategies, and increased social complexity. Although it is difficult to generalize, many Early Woodland communities are characterized as relatively small scale, fairly mobile foragers organized into unranked or minimally ranked lineages and clans. Early Woodland groups also seem to be more socially isolated than their Late Archaic predecessors, with a decline in regional exchange networks.

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Participants in the Third Caldwell Conference listen to Matt Sanger (back to camera) discuss the recent block excavation at the McQueen Shell Ring, St. Catherines Island (Georgia). Left to right: Mike Russo, [unidentified person, mostly obscured], Jon Gibson, Chester DePratter, Matt Napolitano, Becky Saunders, Rochelle Marrinan, Victor Thompson, David Anderson, Ken Sassaman, Elliot Blair, Margo Schwadron, Sarah Bergh, Dave Thomas, Ginessa Mahar, and Joe Saunders.

by three discussant contributions.

Part I pairs two papers addressing the "Climate Hypothesis" in the lower Mississippi Valley. In chapter 1, Tristram R. Kidder revisits his (2006) Climate Hypothesis that addressed the effects of climate change on Late Archaic populations and the hiatus in occupation in the lower Mississippi Valley between ca. 3000 and 2500 cal B.P. Specifically, Kidder had previously argued that the Late Archaic to Early Woodland transition occurred during (or perhaps even because) of significant climatic changes that altered temperature, precipitation, and hydrology. The present review reveals that the data for understanding climate change, chronology, and human response are not especially well developed at this point. According to Kidder, the most pressing challenge is to account for human agency as people responded to changes in climate conditions. Climate-induced flooding in the area around Poverty Point in northeast Louisiana may have destabilized the site's population—leading to the abandonment of the site and the removal of populations into the uplands to the east. Collapse of Poverty Point may have precipitated or encouraged economic, technological, and social transformations by people living upriver for reasons that are unclear but perhaps because they depended on Poverty Point for ritual, symbolic, and mythological legitimization and continuity. Although climate change alone did not cause the end of the Archaic, in the interior riverine Southeast it appears to be a factor that must be considered in any account of the Archaic–Woodland transition. Kidder suggests that archaeologists working in the East should closely examine models of gradual cultural evolution before assuming that such models explain this or any historical transition.

Jon Gibson (chap. 2) also explores Kidder's Climate Hypothesis in some detail. While agreeing that "a centuries-long dark age settled over the land during the high waters of 3000 to 2500 cal B.P.," Gibson admits some "lingering doubts that climate-induced megaflooding was causally entangled with the demise of Poverty Point." He points out that the Poverty Point site was constructed on high ground, along the eastern escarpment of the Macon Ridge and suggests that the ages of the megafloods themselves do not correspond closely to either the beginning or the end of Poverty Point occupation—"they seem to be off, too late, by a couple of centuries." He notes the absence of archaeological components dating to the 3000–2500 cal B.P. interval in both the uplands and the lowlands of the lower Mississippi Valley. "It was as if a giant hand swept away humanity for half a millennium." Gibson suggests that if flooding was a massive regional disaster, then the outlying areas should be "teeming with new sites housing refugees other than the Tamaroha, and they are not."

Gibson argues that Poverty Point culture was "coextensive" with the physical town of Poverty Point—the social and ritual heart of a community spread across 1800 square km. "Whatever befell the town, also befell the culture, but natural disaster was not the culprit." He also believes that the Early Woodland people were "direct descendants" of those living at Poverty Point and its neighbors—reflecting a fundamental continuity within homegrown lower Mississippi traditions.

Part II presents a series of four case studies drawn from across the American Southeast. In chapter 3, Matthew C. Sanger and David Hurst Thomas discuss their research on two significant Late Archaic occupations on St. Catherines Island (Georgia): the McQueen Shell Ring (9Li1648) and St. Catherines Shell Ring (9Li231). The American Museum of Natural History has conducted detailed mapping and remote sensing operations on both sites, followed up by large block excavations. Both rings were constructed in similar ecological settings, situated adjacent to apparently stable freshwater creeks, with ready access to marsh and terrestrial resources during the early part of the Late Archaic (3000–2000 cal B.C.).

A total of 50 ^{14}C dates are available from both sites and these radiocarbon records overlap considerably. Large quantities of shell were deposited at each ring about 2250–2000 cal B.C. and deep pits were excavated into the centers of both rings about this time. Construction appears to have ceased at St. Catherines Shell Ring around 2000 cal B.C., but may have continued for another 50 years at McQueen Shell Ring. The ^{14}C evidence shows that shell construction ceased at both sites by 1800 cal B.C. Clearly, then, the chronologies of both shell rings on St. Catherines Island overlap significantly and the site structure is nearly identical. But the apparently contemporary assemblages differ considerably from one another, particularly with respect to ceramic decoration, nature and utilization of toolstone, the presence of baked clay items, and distribution of decorative artifacts.

In chapter 4, Rochelle Marrinan discusses her field investigations and recent reanalysis of two Late Archaic period shell rings (4200 to 3200 cal B.P.) on St. Simons Island (Georgia): the Cannon's Point Shell Ring (9GN57) and the West Ring (9GN76). Although similar shell rings had been known since the 19th century, few had received more than cursory examination before Marrinan's work on St. Simons Island. These two shell rings were excavated between 1973 and 1975 as part of a multisite project directed by Charles H. Fairbanks and Jerald T. Milanich of the University of Florida and formed the basis of Marrinan's doctoral dissertation (Marrinan, 1975; see also 1976). The four radiocarbon dates available from these two shell rings cluster between about 2800 and 2100 cal B.C.

Marrinan has recently reanalyzed the St. Simons shell ring materials and the results are published here for the first time. Because she hand-troweled two control units and water-screened the deposit through 1/8 in. screens, Marrinan recovered an excellent sample of vertebrate and invertebrate remains, as well as numerous archaeobotanical specimens. On the basis of fish size, clam data, migratory waterfowl, and floral availability, she believes it reasonable to conclude that the St. Simons Island shell rings were occupied year round.

In chapter 5, Rebecca Saunders discusses recent archaeological investigations on the Middle to Late Archaic above Choctawhatchee Bay, in panhandle Florida. Archaeological and paleoenvironmental evidence suggests that this area, occupied sporadically after 7200 cal B.P., was abandoned about 3500 cal B.P. Independently derived data on mid-Holocene megaflooding and catastrophic storm events indicate that major climatic changes at 3500 cal B.P. were likely responsible for the abandonment.

In chapter 6, Margo Schwadron presents new archaeological evidence, published in detail for the first time, from the interior freshwater tree islands within Everglades National Park's Shark River Slough (see also Schwadron, 2006a). She has identified a total of 42 archaeological sites, prehistoric black earth middens located on raised tree islands. Five Late Archaic sites were identified during this survey, challenging the generally accepted notion that the interior Everglades were uninhabited at this time. In this chapter, she discusses systematic archaeological testing at a dozen Ten Thousand Islands shell ring and shell work sites, with an associated array of 123 radiocarbon dates.

She also reports the discovery of a hardened, mineralized carbonate soil layer buried within most of the tree islands tested. Using a concrete saw to break through this level, she found well-preserved organic soil, sediment, faunal remains, and archaeological deposits buried below. A large suite of radiocarbon dates brackets the formation of the layer from about 4400 to 2700 cal B.P. Schwadron thinks that the south Florida environment was sufficiently stable to have supported intensive occupation of interior freshwater tree islands during the Late Archaic period, suggesting much greater populations than were previously thought to exist. In the Ten Thousand Islands, she presents new evidence demonstrating a long tradition of shell ring and shell architecture spanning the Late Archaic through Woodland Transition within both the interior wetlands and southwest Florida coast. This reflects an emergence of social complexity much earlier than was previously thought.

Part III consists of seven chapters specifically addressing the transition between Late Archaic and Woodland periods throughout the American Southeast. In chapter 7, Michael Russo examines the evidence of coastal Florida occupations dating 5000 to 2000 years ago, the time that constitutes the Late Archaic and Early Woodland periods. He employs the record of shell mounds, shell rings, and large shell middens for evidence of ancient coastal exploitation strategies. Russo concludes that the Florida archaeological record fails to support the hypothesis that coastal resources disappeared during certain sea level stands and oscillating conditions. He argues instead that various cultures coped with sea levels in different ways. In south Florida, shell rings and shell mounds continued to be utilized throughout the period in question, apparently reflecting coastal lifestyles that remained remarkably similar during the proposed low stand, and surviving "fairly intact" in terms of subsistence strategies, settlement locations, and social organization. The archaeological record of north and east Florida fails to demonstrate large shell features during this period. There are "moderately substantial" Late Archaic coastal occupations in parts of northwest Florida (prior to sea level drop) and Deptford period occupations after the proposed low stand. By contrast, large Late Archaic shell mound and ring features are known along the northeast coast, but the early Woodland period cultures constructed only moderately sized mounds and no shell rings. In these two areas, Early Woodland cultures do not seem to have carried on the same traditions as the Late Archaic coastal occupants.

In chapter 8, Thomas discusses the unique resource structure of St. Catherines and the other composite barrier islands of the Georgia Bight. Due to the extraordinary confluence of sea levels past and present, Georgia's Sea Islands are one of the few places on the globe where two enormously productive ecosystems—the estuarine salt marshes and the mature maritime forest—can be found in immediate proximity, coexisting side by side as accident of maritime geomorphology.

Despite the relative stability in Late Holocene sea levels and associated landforms, some significant (if less pronounced) fluctuations were yet to come and these changes had serious implications for foragers living on the "fake" barrier islands of the Georgia Bight. Thomas relies heavily on localized reconstructions of sea level change, suggesting that Late Archaic shell rings were abandoned in a time of significant lowering of sea levels, leaving a significant hiatus in the cultural history of St. Catherines Island. Both the St. Catherines and McQueen shell rings (discussed above) were initially occupied about 2900–2500 cal B.C. during a time of rising sea level. Then as now, both shell rings were perched along scarp margins of St. Catherines Island, where the immediate juxtaposition of the high-ranking resources of the Pleistocene core (especially the mast crop and newly isolated white-tailed deer herds) and the even higher-ranking saltwater marsh provided human foragers with an extraordinarily diverse and closely spaced set of marine and terrestrial patches. The Late Holocene transgression apparently peaked about 2300 cal B.C. Over the next seven centuries, sea level dropped about 2 m, and the saltwater marshland along the estuarine side of the island must have been significantly reduced (if not eliminated altogether). The St. Catherines and McQueen shell rings were soon abandoned (ca. 2180–1890 cal B.C.) and apparently never reoccupied.

In chapter 9, Sanger examines the occupational histories of shell rings sites throughout the American Southeast. More than 50 shell rings sites have been documented, and 32 of these have published radiocarbon dates. Sanger attempts to "reinvest shell rings with their own histories" by detailing the abandonment sequence of the shell rings, specifically in regards to the overall decline in sites along the coast during the Late Archaic–Early Woodland transition (with the possible exception of the Florida coast). After filtering the sample and applying relevant reservoir corrections, Sanger utilizes abandonment dates from 20 shell rings found in South Carolina, Georgia, and Florida.

The abandonment sequence is not a uniform event, spanning 800–1000 years. Sanger identifies three "waves of abandonment" for these Late Archaic shell rings. The earliest, about 2280 cal B.C., correlates with an inferred high stand of sea level. Many of these rings are sites at relatively low elevations, in places susceptible to flooding by high sea levels. Sanger argues that the combination of relatively low elevational profile, a sea level high stand, and the abandonment of the rings strongly suggests a causal correlation in which rising sea levels flooded many of these rings and forced their residents to abandon the sites. The second wave of abandonment takes place at rings located at a relatively high elevation at about 2020 cal B.C., a time of lowered sea level. Environmental models suggest that sea levels began to drop around 2300 cal B.C. and by 1900 cal B.C., sea level was nearly 3 m below current levels, likely decimating the available marsh and marine resources so heavily exploited by Late Archaic foragers. The final wave of abandonment took place at cal 1720 cal B.C. Current sea level models do not correlate with this series of abandonments, nor do they explain how these various ring sites survived during times of significantly lowered sea level. The cause of this last wave of abandonment is unknown and Sanger suggests that nonenvironmental factors might be responsible. Even within the periods of abandonment that appear to be related to changing sea levels, Sanger attempts to highlight examples where the unique decision-making of the site occupants creates a new historical trajectory that is counter to one entirely defined by environmental determinism.

In chapter 10, Victor Thompson employs a macroregional view to examine the "rhythms, in both time and space" of three archaeological regions during the Archaic period: the lower Mississippi River Valley, the Green River area of Kentucky, and the shell rings of the Atlantic coast Georgia Bight. He seeks to illuminate three points: (1) whereas these traditions are often lumped together under a rubric of Archaic complexity, they actually represent very different timing or "rhythms of creation"; (2) the primary occupational sites of these traditions differ considerably, reflecting site functions and meaning not uniformly patterned in time and space; and (3) despite the variability in these traditions, they cease at the end of the Late Archaic, without analogous trends emerging during the Early Woodland period.

On a broader scale, Thompson hypothesizes that climatic shifts likely caused the disruption of these Late Archaic socioecological systems, as reflected in the mounds of the Mississippi basin, the Atlantic shell rings, and the shell-bearing sites of the Green River. But he argues that viewing such Archaic landscape in terms of "persistent places" facilitates a deeper understanding of how environmental change interacts with broad-scale culture dynamics. That is, these Archaic groups experienced the collapse of their persistent places and associated interaction networks—a response, in part, to climatic disruptions that impacted aquatic resources and regional exchange. Some Early Woodland groups (ca. 3000–2500 cal B.P.) adopted more mobile lifestyles to facilitate the expansion of information flow and social networks. Thompson sees this perspective as a "departure point" to better define the complex interactions among cultural traditions and their environment, emphasizing temporal rhythms across local, regional, and macroregional scale.

In chapter 11, Kenneth Sassaman reviews the terminal Archaic archaeology in the "middle" segment of three major river valleys, each "hotbeds of Late Archaic activity": (1) the middle Savannah of Georgia and South Carolina; (2) the middle St. Johns of northeast Florida; and (3) the middle Tennessee of northern Alabama. Although Sassaman recognizes that the respective histories of each area are quite different, he argues that the overall patterns of change have "relational parallels and some underlying pan-regional causes." In both the middle Savannah and middle St. Johns regions, emergent corporate structures emerged between two or more previously distinct people; Sassaman suggests that this pluralistic community quality (reflected in settlement dispersal and apparent anonymity of artistic expression) might have predisposed them toward fissioning. The Late Archaic–Early Woodland transition in the middle Tennessee River valley reminds Sassaman of the effects of political economies at the macroscale. Specifically, he argues, the acquisition of soapstone vessels across the lower South influenced local economic and social structures that were capable of forging alliances at a distance.

Sassaman defines two periods of "historical inflection" across all three river valleys. The first, at 3800 cal B.P., is reflected in major cultural realignments in the middle Savannah and middle St. Johns, and the onset of pottery use in middle Tennessee (and a regional surge in soapstone vessel production). Then, at 3300 cal B.P., there is an overall dispersal of settlement into upland units across much of the lower Southeast, and the eventual spread of pottery technologies with relatively simple surface treatments. Sassaman concludes that—whether or not the major shifts in the Late Archaic were triggered by environmental change—these

> social collectives of enormous scale and diversity arose in flashes of ethnogenesis . . . these were "disciplined" societies whose ritual proscriptions held sway, at least for several generations, over the choices people made. . . . The Late Archaic was "neolithicized" repeatedly in the American Southeast; what the ensuing Early Woodland shows is that this process was often (predictably) reversible.

In chapter 12, Joe Saunders notes that the Late Archaic–Early Woodland transition in northeast Louisiana is defined by the demise of the Poverty Point culture, coinciding with major flooding about 1000–600 cal B.C. during which the riparian ecosystem and trade networks were disrupted, ultimately leading to the abandonment of the Poverty Point culture area. But he notes that recent research in northeast Louisiana has identified another abrupt transformation between the preceding Middle Archaic (ca. 4000–2700 cal B.C.) and Late Archaic periods (2700–1000 cal B.C.).

Although Middle Archaic mounds were once viewed as antecedents of the mounds at Poverty Point, J. Saunders fails to see any degree of continuity in mound building between the two periods. He argues that the earthworks at Poverty Point were merely a "reincarnation" of a Middle Archaic ethos, an effort to maintain "a semblance of cultural continuity with the past." He suggests a similar hiatus separating the Late Archaic to Woodland transition. Following Kidder (2006), Saunders suggests that if environmental change actually triggering the collapse of the Poverty Point culture, then perhaps a similar cause could be invoked for the demise of the Middle Archaic mounds.

In Part IV of this volume—entitled "Concluding Ruminations[1]"—Chester DePratter (chap. 13), William Marquardt (chap. 14),[2] and David Anderson (chap. 15) discuss the previous dozen papers in some detail. Four major conversations emerge from this final section.

Most contributors seem to agree about the importance of the new data that are emerging from Late Archaic studies in the American Southeast, including Schwadron's remarkable discoveries in the Everglades, the systematic and large-scale surveys that are being conducted across the coastal plains of the Carolinas and Georgia, the increasing use of radiocarbon to derive fine-grained chronologies and depositional sequences, and so forth. But several contributors also stress the shortcomings in the present understanding of archaeology throughout the Southeastern Archaic. DePratter, for instance, notes that despite the large-scale regional sampling, earlier Paleoindian and Archaic sites probably exist on St. Catherines, but they have been undetected by current survey methods. He suggests looking in places where fresh water might have been available at a time when sea levels were depressed, within the island's Central Depression, or perhaps where former stream or river channels once flowed.

DePratter also expresses some skepticism about Thomas's use of optimal foraging models in the Late Archaic context, stressing the importance of watercraft and tidal creek access to the marshland. He argues for better control of evidence for seasonality of harvest for various marsh taxa before constructing models of Late Archaic mobility patterns. DePratter also emphasizes the importance of fine-grained paleobotanical studies on remains found in the shell rings and raises the possibility of early plant domestication—especially marshelder (*Iva annua*), chenopods (*Chenopodium berlandieri*), squash (*Cucurbita pepo*), and sunflower (*Helianthus annuas*)—in the Sea Island context. Anderson criticizes this notion, suggesting instead that early domestication of such "seed crops" was unlikely in the coastal marshland setting.

Another issue involves the increasing use of large ^{14}C databases. Anderson urges caution for archaeologists using "dates as data," as direct proxies for population density, correctly emphasizing the degree to which the terrestrial radiocarbon calibration curve is seriously skewed and nonlinear. Marquardt also discusses the importance of developing increasingly localized understandings of reservoir corrections for marine radiocarbon dates.

Another significant conversation developed regarding the degree to which monumentality and feasting behavior can be identified in coastal settings. Anderson, Marrinan, Russo, and Schwadron believe that the patterned accumulation of shell midden debris functions as an act of display, an enduring statement on the landscape about the abilities of some to provision others.

DePratter and Marquardt take exception to this view. DePratter (chap. 13) concludes his discussion by considering the function of Late Archaic shell rings and associated occupational sites. Stressing the lack of evidence regarding both ring and nonring sites, he expresses considerable skepticism regarding the "just-so story" regarding feasting activities and construction of monumental deposits.

Marquardt (chap. 14) criticizes several authors—Russo, Sanger, Sassaman, Schwadron, and Thomas—for interpreting shell rings, curvilinear shell mounds, and "shell works" as reflecting complexity, monumentality, ritual feasting, or some combination of these. While admitting that shell rings can be constructed for ritual purposes, he believes they were more typically domiciliary middens associated with relatively low sea level. "I get the distinct feeling that many authors in this volume are *assuming* complexity, feasting ritual, and monumentality rather than demonstrating them. Until we have hard evidence for these inferences, they are simply hypotheses."

Anderson (chap. 15), in turn, disagrees with Marquardt's interpretations of shell middens and monumentality. Like several others in this volume, he stresses the importance of demonstrating the intentionality and complexity, rather than simply assuming it. Anderson likewise agrees with Russo and Thompson, that many Late Archaic sites can serve as both domestic and purposeful constructions—perhaps simultaneously, but also changing through time. Amidst this controversy, everyone seems to agree about the necessity for generating additional finer-grained, stratigraphically controlled and systematic evidence from the shell-heavy sites themselves.

A third conversation revolves around past sea levels—how to measure them and what they mean. Marquardt (chap. 14) emphasizes the rapidity of change possible in sea level and he points to the paradox of archaeologists being forced to constrain fine-grained datasets into the gross sea level curves generated by geologists. He laments the fact that some authors in this volume continue to rely on "broad-scale, gradualistic models," thereby hampering their ability to understand the dynamic interplay between cultural and natural environments.

Marquardt specifically champions William Tanner's (1991, 1993, 2000) "nuanced" record of sea level change over the last 7500 years, generated from beach ridges studies in northern Denmark. Brushing aside potential objections from archaeologists concerned about more "fine-grained" sea level curves generalized to a global scale, Marquardt argues that multiple sea level records, including those from the North Atlantic and Gulf of Mexico are in "remarkable accord" with Tanner's reconstruction. Although not suggesting that Tanner record as the "only source"—"in fact, we should all endeavor to keep pace with the fast-emerging paleoclimate literature"—he argues that Tanner's Jerup record "has numerous advantages, in that it provides relatively fine-grained data on sea level fluctuations (therefore, implicit climate fluctuations) through much of the Holocene."

Using Tanner's reconstruction as a backdrop, Marquardt turns to the substantive studies in Part II, beginning with the Sanger and Thomas preliminary report from two shell ring sites on St. Catherines Island. Marquardt registers several objections to this project. He criticizes the use of the localized sea level chronology of Gayes et al. (1992: 159; fig. 3.6), which he dismisses as "a hockey stick-like affair that provides none of the nuances archaeologists need to interpret their much finer-grained data." Using the Danish curve, he offers "the alternative hypothesis that these two ring sites are not purposeful constructions, but instead domestic middens that owe their temporal placement to distinct episodes of sea level regressions within the Middle Holocene period, namely the "anomalous." Arguing that shell rings tend to be universally constructed in times of depressed sea level, Marquardt suggests that "the interior of the rings may have been excavated to enhance access to fresh water from below and/or to collect rainwater." Marquardt further faults Russo for relying on "broad-scale sea level records that are not of sufficient resolution to account for the kinds of questions archaeologists ask" and rejects Russo's interpretation of "modeled sea curves."

Throughout chapter 14, Marquardt derives quite different sea level and climatic reconstructions for data presented by J. Saunders, Sanger, and Thomas. As Anderson points out, the fact that such variabilities in reconstructions exist—different by matters of several meters for the same time period—underscores the fact that "we have a serious gap in our knowledge in need of resolution." As with the need for additional, and locally derived reservoir corrections, clearly, additional paleoenvironmental research is required to understand fine-grained changes in sea level, and to define how general trends are played out locally.

Finally, we have conversations relating Kidder's so-called Climate Hypothesis to the nature of cultural change during the Terminal Archaic. Clearly, the interval associated with the end of the Southeastern Archaic and the onset of the Woodland period was one of appreciable climate change and instability. As Anderson emphasizes in chapter 15, one of the "lessons of this volume is the necessity of bringing the paleoclimatological and archaeological records into congruence." As both Anderson and Marquardt note, archaeologists are developing increasingly fine-grained ways of measuring time at the subcentury scale, but relating these records to paleoenvironmental inputs is fraught with problems.

Marquardt discusses Kidder's updates to the Climate Hypothesis and revisits his (2006) discussion, still arguing that climate change during the period 3000–2500 cal B.P. (or so) was a major factor in the demise of the Terminal Archaic. But Marquardt criticizes Kidder's "retreat" from climate changes as causal factors (and chides Gibson because he "oversimplifies" Kidder's current presentation). Marquardt promotes climate change as a "major player" and advises the contributing authors to explore a more "dialectical approach" to human landscapes and group decision-making and to read the most recent paleoclimate literature (especially those sources addressing sudden climate change, monitored at the century scale, or even less).

Anderson concludes the volume with an apt tribute to Joseph Caldwell, for whom this conference series has been named. Broad-scale "trend and tradition" studies are still necessary, but they must be increasingly augmented by fine-grained documentation of specific events in specific places. We believe the papers in this volume embody a wide range of such "multiscalar" approaches.

A WORD ABOUT RADIOCARBON DATING

Throughout this volume, we report and discuss radiocarbon evidence according to the standards established by the journal *Radiocarbon* in their "Instructions for Authors" (promulgated 22 August, 2005, and updated 28 August, 2006). The standard reference on the calculations and terminology follows Stuiver and Polach (1977). Whenever possible, calibrated dates are reported using the latest available international calibration curve (currently INTCAL04); if a computer program was used to calibrated dates, authors have included the name and version number of the program in reporting calibrated ages.

Uncalibrated Ages: b.p.

In this volume, "b.p." is understood to signify "conventional radiocarbon years before a.d. 1950." Ordinarily, then, uncalibrated radiocarbon dates are reported in this form:

Beta-21408: 3470 ± 80 b.p.

where *Beta-21408* is the laboratory number for the sample and *3470 ± 80 b.p.* is the uncalibrated age of the sample (where 3470 is the age in radiocarbon years before 1950, and 80 is the laboratory's estimate of error at the 1σ [one standard deviation level]). Because b.p. is conventionally understood to mean "years before 1950," the form "yr b.p." is usually redundant. But in some cases, we employ the expression "^{14}C yr b.p." to distinguish conventional ages from those corrected to calendar estimates.

Calibrated Ages: cal b.c., cal a.d., cal b.p.

The symbol "cal" is used to express calibrated radiocarbon ages (with "cal" understood as "calibrated," not "calendar"). Such "calendar ages" are absolute dates, whether known or inferred, but a "calibrated date" is an estimate grounded in statistical probability, and is therefore properly expressed as one or more ranges of calendar years, accompanied by an appropriate confidence interval.

In this volume, authors are free to use either "cal b.p." or "cal b.c./cal a.d." (or both). Similarly, the use of 1σ and/or 2σ confidence intervals is left to the author's discretion.

Reservoir Corrections

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. Using known-age samples of *Crassostrea virginica,* Thomas (2008: chap. 13) derived a reservoir correction specific to St. Catherines Island and surrounding waters. For all marine samples from the central Georgia Bight, we employ 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 $\Delta R = -134 \pm 26$. Authors are invited to apply other relevant reservoir corrections as appropriate (but in each case, the precise method employed should be stipulated).

Rounding Conventions

We also employ the rounding conventions advocated by Stuiver and Polach (1977: 362). That is, for all radiocarbon determinations, we supply one more digit than can be accurately accounted for; in reporting estimated ages and statistical uncertainties, figures like 8234 ± 256 and 42,786 ± 2322 are 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 five below 50 years.

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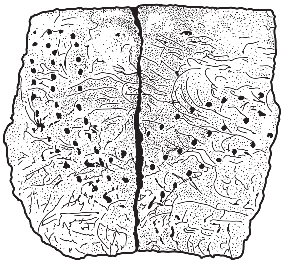
NOTES

1. The title of Part IV is respectfully borrowed from the Danger Cave report, written by Jesse D. Jennings (1957), a pioneer in the archaeology of both the American Southeast and the American West.

2. William Marquardt did not attend the Third Caldwell Conference, but the editors have included his paper in this volume because he raises several important issues relevant to the questions at hand. Marquardt presented a paper at the Southeastern Archaeological Conference (in November, 2008), raising numerous questions about shell mound interpretation. He urged rigorous interpretation of the archaeological sediments involved and suggested that closer attention be paid to independent climatic evidence. Thomas and Sanger subsequently approached Marquardt about contributing a discussion of the Third Caldwell papers, and chapter 14 is the result. We point this out because Marquardt's discussion was not presented at the St. Catherines Island venue and since we have provided all discussants the "final word" in this volume, the contributing authors in this volume have not have the opportunity to respond to his comments and criticisms (either in person or in print). Some authors have expressed a frustration with this process, and we look forward to continued discussion of the points raised in Part IV of this volume.

PART I
A PALEOENVIRONMENTAL BASELINE



CHAPTER 1
TREND, TRADITION, AND TRANSITION AT THE END OF THE ARCHAIC
Tristram R. Kidder

Recently, I published a paper (Kidder, 2006) outlining what I henceforth call the Climate Hypothesis, which suggested the demise of Poverty Point and also much of the Late Archaic of the riverine interior southeastern United States was causally entangled with global changes in climate that altered temperatures, precipitation, and hydrology. The focus of my argument was to explain the hiatus between the Late Archaic and Early Woodland throughout the floodplain regions of the Mississippi River drainage basin. This basin, which encompasses 3.2 million km^2 is so vast, I argued, that to explain the relatively contemporary gap in occupation between ca. 3000 and 2500 cal B.P. required a causal mechanism that transcended local or regional cultural factors. I further noted that while there was a gap in occupation in much of the interior riverine Southeast, a similar pattern had been noted for parts of the northeastern United States, and I demonstrated there were contemporary cultural changes in other parts of the world that could be or had been linked to global climate change at this time.

Scholars working in eastern North America have labored with poorly resolved chronologies and, as a result, archaeologically derived histories of native peoples emphasize gradualism, long-term continuity, and in situ transformations. In the past 20 years, continued research throughout the region has enabled archaeologists to develop better chronological control and more tightly resolved historical sequences. Nowhere has this emphasis on better dating had greater influence than in research on the Archaic period. The Archaic has been the epitome of the effects of fuzzy dating and resulting poorly constrained histories. Spanning nearly 8000 years, the Archaic has almost exclusively been seen as a period of long-term, gradual adaptation to changing Holocene environments. Going back to the seminal ideas of Caldwell and his contemporaries, cultural histories have proceeded from the implicit notion that change was slow and resulted from the accumulation of technological and economic changes over millennia. In many parts of the eastern United States, the perception of measured Archaic transformation is being rethought and reinterpreted.

In the lower Mississippi Valley (the Mississippi River alluvial floodplain south of the confluence of the Mississippi and Ohio rivers) work at Archaic sites, most notably sites with monumental architecture, has forced a reevaluation of native histories of the region. Chronological and culture historical resolution is now sufficiently developed to provide a more nuanced, and chronologically better controlled history of the Archaic. Evidence indicates that instead of a long, slow, gradual history, the story of native development is more complex, involving local processes and long-distance interactions, periods of rapid change, times of stasis, and episodes of significant transformation. While at a continental scale the history of the region is measured by very long-term continuity, at local scales it is discontinuous, episodic, and punctuated. There is no single reason for this varied history but in the lower Mississippi Valley, climate change and its influence on the fluvial and alluvial dynamics of the Mississippi River play a significant role.

In this paper I follow up on the Climate Hypothesis by expanding my existing arguments. It should come as no surprise that I still find the Climate Hypothesis to be a useful way of thinking about some aspects of the Late Archaic to Early Woodland transition. I'm not throwing out my baby with this bathwater. The major failings of the Climate Hypothesis seem to me to lie not in the basic proposition of climate change or even its direct effects on the environment. Nor is the major problem the poor assessment of chronology of both climate change and archaeological contexts, though this is one area greatly in need of further investigation. Instead, the major challenge to the Climate Hypothesis is to model human response to the presumed external, climate related, causal processes. This issue of how to model human response to climate change is not unique to the Climate Hypothesis; in fact, I'd argue it is endemic to almost all climate response models for human societies in the past (Rosen, 2007).

This paper presumes there is a Late Archaic to Early Woodland transition (which I place in the interval ca. 3000–2500 cal B.P., but which in its broadest scope can be dated ca. 3200–2200 cal B.P.). In allowing this assumption, I readily admit my perspective has a bias of looking from the lower Mississippi Valley where the demise of Poverty Point at ca. 3100–3000 cal B.P. appears momentous. It is a shame so little attention is paid to this transformation because in the Mississippi Valley and tributaries it is as meaningful as any of the major changes in pre-Hispanic eastern North American history. The Late Archaic to Early Woodland transition in this area is marked by considerable disjunction in regional, local, and site occupations and notable transformations in settlement structure, economy, and society. Throughout much of the Mississippi Valley, Late Archaic landscapes supported relatively high population densities, extensive settlement diversity, widespread long-distance trade and exchange, seemingly complex behavioral patterns manifest in mound architecture, burial patterns, and grave inclusions, and considerable artifact diversity. In contrast, Early Woodland societies generally look less complex, with apparently lower population densities, more restricted range of settlements and settlement types, less long-distance trade, and far fewer measures of complexity in architecture, burials, or artifacts. By setting up the cultural stage typology and marking these characteristics as the break between Archaic economies and those that followed, researchers long ago acknowledged this was perhaps *the* important transition in the history of the East (Ford and Willey, 1941; Caldwell, 1958; Willey and Philips, 1958; Willey, 1966; Phillips, 1970).

Even though this transition is, in at least some areas, quite notable, it is not a subject that has received much attention. There are many reasons for this seeming archaeological indifference. One reason is that for many, if not most of the archaeological community, this "transition" is literally a nonevent (Griffin, 1978; 1986). The most popular explanation for the end of the Archaic and the rise of Woodland "cultures" lies in the gradual transformation of one to the other, with Early Woodland representing an Archaic lifeway supplemented by three important (but not fully formed and thus not too important at the time) phenomena: pottery, horticulture/domestication, and mound building and associated ritual (Funk, 1978: 334). Attendant changes in Early Woodland societies, such as the decline in long-distance trade and exchange of raw materials and finished products, reorganization of settlements and settlement patterns, and alterations in patterns of symbolic and ritual expressions, are either ignored, not seen as important, or perceived to be the result of a gradual evolution through time. I would argue that this transition, whether conceived as a gradual process or as a more momentous set of events, is understudied and undertheorized.

Another reason for the lack of interest is that archaeologists apparently find the Early Woodland boring. It is the epitome of a "good gray culture" (Williams, 1963). At least in the interior Southeast and across much of the Northeast, Early Woodland is ignored, treated in a few sentences, or discussed only in relation to the "important" processes of interest (e.g., ceramics, horticulture, or incipient ritual practices along with mound building and burial in earthworks). The best evidence for this sweeping statement comes from the publications in Farnsworth and Emerson's (1986) magisterial edited tome on Early Woodland archaeology. In this volume there is surprisingly little concern for why there is an Early Woodland or how it came to be, short of the incremental addition of certain material culture traits (notably pottery). This disinterest in research is not discussed in the literature and perhaps I do my colleagues a disservice, but on the regional scale, with the eastern United States being the region, there are few archaeologists I know who are specifically targeting the Early Woodland as an area of research. Work is done on the time frame and period, to be sure, but if one looks at the extant literature it is evident this attention developed secondarily either from geographically determined work (usually cultural resource management related) or accidentally because researchers found Early Woodland material on top of or beneath the material of specific interest.

In my original formulation of the Climate Hypothesis, I suggested there were four "models" employed to cover the transition, even though none was specifically articulated as a formal explanation for the end of the Archaic or origin of Early Woodland. My synthesis of explanations lumped together too many different sorts of explanations, most of which had never been conceived of as having the capacity to support an account of such a momentous process. I've noted above that the primary model is to ignore the transition as a phenomenon. We could also cite this as the evolutionary or gradual model. This explanation-by-indifference is, I think, a valid way of (not) thinking about the Late Archaic–Early Woodland transition. The advantage of this explanation is that it has a universal explanatory quality. It is "global" in its breadth and scope and by explaining nothing it accounts for everything. In fairness, the same might be said for the Climate Hypothesis, which picks up on Fiedel's (2001) suggestion that climate was a cause of the apparent population declines in the Northeast at ca. 3000 cal B.P.

I also discussed, probably unfairly, two other hypotheses, Emerson and McElrath's (2001) account of the Late Archaic–Early Woodland transition in the American Bottom, and Jon Gibson's (2000) model for the demise of Poverty Point. In retrospect, it was unfair to try to globalize these as explanations both because this was certainly never the claim of the original authors, but also because in doing so I was trying to make explanations with specific historical grounding into a universal scheme. It is a reflection of my desire to identify explanations for the Late Archaic–Early Woodland transition that I latched on to these and that they got tarred with the same critical brush I used for the evolutionary model of change.

On the plus side, right or wrong, promulgation of the Climate Hypothesis places the notion of culture continuity and discontinuity at the forefront of discussions about long-term histories in eastern North America. For too long, we have accepted the received wisdom of cultural continuity and stasis (Fortier, 2001; Pauketat, 2001). This is not to say there aren't periods of long-term stability in regional histories, but rather that we should not take such an assumption as the null hypothesis without testing (see J. Saunders, chap. 12, this volume). In most regions, we accept the notion that the cultural historical charts that have been drawn are largely correct except for their fine details. Population histories may be far more complex than is commonly acknowledged and I hope this work helps to push us to challenge the assumption of continuity and to test it against the null hypothesis.

THE CLIMATE HYPOTHESIS

The Climate Hypothesis evolved more by accident than design. I was one of those researchers who encountered Early Woodland remains even though I was not looking for them—and then had to contend with their interpretation. At the Raffman site (Kidder, 2004; Roe, 2006) and in the region around Raffman, we found that Early Woodland (Tchula period, Tchefuncte culture, in the lower Mississippi Valley cultural-historical scheme) remains were quite abundant and collectively these deposits represented what could reasonably be attested as a contemporary community consisting of "hamlets" (small sites with remains suggesting but not clearly proving multihouse occupations), and at least one conical mound erected over the remains of some midden-producing activity (we found no burials and identified no evidence the mound was used as a burial tumulus). When we encountered these remains in stratigraphic settings, these Early Woodland relics were consistently the basal cultural occupation. There are no sites in the upper Tensas basin that I know of where there is direct stratigraphic continuity between Late Archaic Poverty Point–related materials and Tchefuncte culture Early Woodland remains. As part of our research we obtained a small but consistent suite of radiocarbon dates indicating the Early Woodland occupation lasted from ca. 2400–2100 cal B.P. (Kidder et al., in press).

At the same time that I was wrestling with interpreting these Early Woodland remains I was trying to understand the chronology of the Late Archaic Poverty Point "culture." As we grappled with the complexities of dating Poverty Point, it became apparent there was a hiatus between the youngest contextually secure Poverty Point dates and the oldest Early Woodland ones. An explanation suggested itself as we did further work in northeast Louisiana. Extensive geological and geoarchaeological investigation in the region showed there was a very significant flood event or events that must have affected the topography, hydrology, and culture history of a large area of the Tensas Basin. Analysis of the geological and archaeological contexts indicated the age of these floods could be constrained in the range between 3100 and 2500 cal B.P.[1] Seizing the flooding as an explanation for the hiatus between Late Archaic and Early Woodland seemed natural and led to an increasing globalization of the analysis (Adelsberger and Kidder, 2007; Kidder et al., 2008).

The Climate Hypothesis posited that global climate change led to regional alterations in temperature and especially precipitation in the Mississippi River watershed. Changes in these parameters, coupled with other changes in global climate systems, led to massive "megaflooding" in the Mississippi River and its tributaries (Brown et al., 1999). These floods were epic in proportion to historically documented ones, and may have lasted for prolonged periods or have repeated over many years (or, most likely, both). Locally the effect, I argued, was catastrophic, with the floodplain of the Mississippi River being inundated for extended periods, local hydrology altered, and landforms considerably reworked. Local fauna was certainly disturbed, and the floodplain as a habitat that gave sustenance to the Late Archaic people in the region was rendered uninhabitable and probably unusable for prolonged stretches. Locally and regionally, then, Late Archaic populations would have had their subsistence system significantly challenged if not entirely demolished. Further, because these floods were documented throughout the Mississippi basin, I noted that the Late Archaic trade system that sustained Poverty Point and related settlements was undercut or so completely disrupted that it ceased to function. I thus labeled climate change as a "causal agent" in the Late Archaic to Early Woodland transition without trying to specify the nature of the agency.

CRITIQUE: CLIMATE, CHRONOLOGY, AND HUMAN RESPONSE

While a more dispassionate critic might find many problems with the Climate Hypothesis, I focus on three areas where there is the most to be gained by further study. Some of the background geological and geomorphic problems with the Climate Hypothesis have been addressed in several recent publications and I refer readers interested in such details to these (Adelsberger and Kidder, 2007; Kidder et al., 2008). The issue of climate change is salient because it is the primary causal link and needs to be considered in any critique of the Climate Hypothesis. Chronology is the weakest link in my argument and has to be carefully considered if the Climate Hypothesis is to be a viable explanation. As I indicated above, modeling human response is perhaps the most important aspect of any critique that advocates a way to move forward. If we can substantiate the sequence of climatic events and if we can constrain the temporal pattern appropriately, this latter concern is the only one that counts. Even if climates changed at the right time, there is no reason to assume a priori that these processes were the agents that caused humans to change their behavior or history as they did.

CLIMATE CHANGE

In the realm of climate change at the global scale, recently published data (postdating the publication of my 2006 paper) continue to support the basic thesis that there was an episode of global climate change at ca. 3000–2500 cal B.P. (Turney et al., 2005; Dark, 2006; Drysdale et al., 2006; Johnstone et al., 2006; Li et al., 2006; Maher and Hu, 2006; Moros et al., 2006; Plunkett, 2006; Riehl and Pustovoytov, 2006; Thompson et al., 2006; Thorndycraft and Benito, 2006; Turney et al., 2006; van Geel et al., 2006; Voigt, 2006; Mason and Kuzila, 2007; Miao et al., 2007; Li et al., 2007). These climatic events are found throughout the global climate record and are temporally coherent at all latitudes (Mayewski et al., 2004). It is not evident from my original publication that even though most parts of the globe recorded some signature of climate change at this time, there is no singular pattern of change. Some parts of the world are cooler and wetter and some warmer and dryer. Some parts of the world have indications of climate change without any obvious responses, and it is likely some parts of the world recorded no appreciable change at all. In sum, this interval or episode was complex and highly variable. Much of our knowledge of the patterns at that time is dictated by the spatial distribution of proxy records and their temporal and data resolution. Today, as when I first published, one of the major problems lies in the lack of useful high-resolution climate proxies from areas near the study location. High-resolution well-dated climate sequences for the lower Mississippi Valley don't exist and many of the extant sources from nearby regions were studied at a time when fine-grained chronologies were difficult, if not impossible, to obtain.

While the evidence for climatic change continues to accumulate for the interval 3000–2500 cal B.P., it is clear we must be very cautious about how we interpret the data. Evidence from high-resolution climate proxies in northwestern Europe indicates a great deal of variability in time and space (Dark, 2006; Turney et al., 2006; Voigt, 2006). Similarly, there is considerable debate about the timing and effect of climate change in the southern steppe region of Eurasia (van Geel et al., 2003, 2004, 2006; Riehl and Pustovoytov, 2006). These data challenge us to recognize that determining human response to climate change isn't going to be easy and the notion that climate change is a meaningful concept as a driver of local cultural processes will have to be carefully considered. For example, spatial variability in climate responses suggests that the lower Atlantic slope and peninsular Florida were relatively insulated from the effects of climate change during the period in question, indicating contemporaneous spatial variability in climate responses. The effects of these climate processes on sea level are not known at present, and the data for specific sea level histories from the Gulf of Mexico are contradictory (Tanner, 1991, 1993; Blum et al., 2001; Blum et al., 2003; Blum and Törnqvist, 2000; Törnqvist et al., 2004).

One issue with the Climate Hypothesis is that the data from extant Mississippi River climate-related chronologies are ambiguous and can be read in several possible ways. Examination of the Brown et al. (1999) data on flooding from the Orca Basin in the Gulf of Mexico, for example, demonstrates there likely were multiple megaflood events during the Late Archaic, including one at ca. 3500 cal B.P., that left a very decisive signal in the Gulf of Mexico sedimentary record. As Rebecca Saunders has noted (chap. 5, this volume; personal commun., 2008), the ca. 3500 cal B.P. date for this megaflood coincides with the terminus post quem (TPQ) date for the onset of crevasse splay formation in the Upper Tensas basin. Thus, she asks, could this flood not have been an important event in the history of the lower Mississippi Valley and, if so, what was its role in the history of Poverty Point?

Flooding in the lower Mississippi Valley is a common occurrence and must have been part of the generational experience of anyone living in the region. Floods of larger than normal extent (e.g., ones that filled the valley from valley wall to valley wall) are not common but in historic times have been documented on multiple occasions (Humphreys and Abbot, 1861; Kidder, 2006). Thus I am in complete agreement that flooding was and is a factor in human settlement history and settlement organization. However, the data from the Mississippi River watershed as well as local geological data do not support the idea that the ca. 3500 cal B.P. flood or floods recorded in the Gulf of Mexico were as important to the people living in the lower Mississippi Valley as suggested by Saunders. Upstream data from the headwaters of the Mississippi show no unusual departures in precipitation or flood frequency or flood magnitude at that time. Similarly, sedimentary and archaeological data from the lower Mississippi Valley proper record no specific evidence that flooding ca. 3500 cal B.P. had a notable effect. Specifically, within the Upper Tensas Basin of northeast Louisiana, home of the Poverty Point culture, we can detect nothing indicating that flooding caused or was related to particular cultural change. While indeed ca. 3500 cal B.P. is the TPQ for the onset of crevasse building, there is no actual signal of flooding or sedimentary deposition at this time. The core from which we extracted these dates showed an unconformity between the clays from which we extracted the dateable materials and the coarse-grained crevasse sediments we associate with the onset of flooding ca. 3000 cal B.P. While a TPQ indicates the earliest date at which an event may have occurred it should not be construed to date an event without further evidence. Although ^{14}C dates from Poverty Point-age sites other than Poverty Point are rare, the data at hand indicate occupation at sites such as Jaketown, Teoc Creek, Copes, and Claiborne, as well as Poverty Point, in the period ca. 3600–3400 cal B.P. Thus, I don't see evidence of significant disruptions of settlement in the lower Mississippi Valley at that time. I am not suggesting there were no climatic events at that time or that climatic events did not have an effect on the people living at and around Poverty Point. What this (these) event(s) did not do is profoundly or obviously disrupt life for the Late Archaic peoples of the Mississippi Valley.

Personal communications (2008) from both Becky Saunders (see also chap. 5, this volume and Jon Gibson (see chap. 2, this volume) suggest the possibility that the florescence of Poverty Point might have been in some way partially stimulated by the flood events documented by Brown et al. (1999) at ca. 3500 cal B.P. The implication here is that flooding and associated disruptions may have led to risk-reduction strategies that led to people at and around Poverty Point extending their trade and exchange processes farther afield and induced these people to enter into interpersonal interactions that would have dampened risk by spreading reciprocal economic and social relations over a vast area of the East. If I have characterized their argument correctly, it is possible that Poverty Point gets its start as a result of stimulus from some climatic event or process. Early dates from Poverty Point and contemporary sites support the notion that the Late Archaic occupation at Poverty Point begins in the era ca. 3600–3400 cal B.P. I would be more comfortable, however, if there were physical data indicating climatic change-related processes both locally and throughout the region at this time, especially upstream in the Mississippi Valley watershed.

Chronology

In this instance I focus on climate and cultural chronology separately, but they of course overlap and have important ramifications for each other. I didn't note in my 2006 paper the importance of radiocarbon decline and plateau that defines the period ca. 3000–2400 cal B.P. (van Geel et al., 2000; van Geel et al. in Peiser et al., 1998; van Geel and Renssen, 1998; van Geel et al., 1998; van Geel et al., 2003). This drop and plateau has significant ramifications for how we date climatic and cultural factors. The changes in radiocarbon production in the atmosphere suggest archaeologists must do a better job dating materials and interpreting their results. Thomas's (2008a) recent work on St. Catherines Island is one example of a new, tightly defined and carefully reasoned approach to dating in this interval. Bas van Geel (personal commun., 2006) suggests high-resolution wiggle match dating may be the only way to robustly resolve discrepancies in the ^{14}C record at this time.

One of the challenges with the climatic chronology is the best high-resolution sequences indicate the date(s) of the climate event or events cluster at ~2850 cal B.P., which creates a problem for the Climate Hypothesis. Evaluation of the range of archaeological and climatic dating indicates there is a considerable age span for climate change and 3200–2400 cal B.P. is still an acceptable (though conservative) chronological bracket; however, this is an issue that needs further investigation. Not surprisingly, this chronological concern raises the issue of how to understand climate processes and how we define them and how they may have been felt by those living during or through them. If the data show this climate process is a specific time-constrained event (e.g., a geomagnetic excursion, solar flare, etc.), a date range outside the timing of archaeological change is a clear refutation of the Climate Hypothesis. To the degree that the chronological data represent a central tendency of an interrelated series of events and processes, they pose less of an immediate problem. At one time, such a distinction might not have been relevant but with the acknowledgment that massive climate processes can occur over very short time frames of decades to centuries (e.g., Younger Dryas, 8200 ^{14}C yr B.P.), it is incumbent to consider, if not directly address, these chronological concerns as we move forward.

The archaeological chronology of eastern North America is, on a relative basis and in comparison to many climate sequences, poorly defined and I don't think we are any further today than we were when the article was published—with one exception—the St. Catherines Island record (Thomas, 2008a). In my 2006 paper on the Climate Hypothesis, I examined the existing ^{14}C record from the Mississippi Valley and posited hiatuses at ca. 3000–2500 in the lower Mississippi Valley, the central Mississippi Valley, and the upper Tennessee Valley. I made a similar argument for the American Bottom region near the confluence of the Mississippi and Missouri rivers, but I relied on Emerson's analysis. I see no reason to reject these conclusions and we have effectively no new data to resolve this issue. However, if we consider the idea that the Late Archaic to Early Woodland transition is marked by dramatic changes in material culture and associated behavior, there are two trends that may pose a problem, for the Climate Hypothesis. First, dates for this transition from the interior riverine Southeast (specifically here I mean the Mississippi River and its tributaries) seem to be early (≥3000 cal B.P.) relative to the climate dates, and second, those to the east and south (Atlantic Slope etc.), to the extent there is even an identifiable transition, tend to be either much earlier (≥3800) or later (≤3000 B.P.). The lack of congruence across large-scale regions suggests we are either not recording a real climate event or that the Late Archaic–Early Woodland transition isn't an event but a gradual process. Alternatively, we could suggest a time transgressive trend. Such a hypothesis fits well with the general sense that one of the critical markers of Early Woodland, namely pottery, diffused or was carried out of the lower Southeast and moved in a westerly and northerly direction along the coast and into and along the major river valleys (Jenkins et al., 1986). However, recent recognition that pottery (both local and imported) was a part of the Poverty Point material culture (Gibson, 1995; Gibson and Melancon, 2004; Hays and Weinstein, 2004; Ortmann and Kidder, 2004; Stoltman, 2004) nullifies the notion that ceramics traveled westward only during the Early Woodland.

From a Mississippi Valley perspective (and emphasizing again, this is particular to the floodplain of the Mississippi and its tributaries), however, the chronological data appear to falsify the null hypothesis of unbroken continuity. One aspect that I didn't discuss in any detail was evidence from the eastern side of the valley and some east-side tributaries that suggests an increase in Early Woodland settlement in upland regions along edges of the floodplains. For example, there are increases in the number of sites dating to the Early Woodland in western Tennessee (Mainfort, 1986; Mainfort and Chapman, 1994), parts of central Mississippi (Jackson et al., 2002; Rafferty, 2002), and the Green River/Mammoth Cave area (Crothers, 1999, 2004; Marquardt and Watson, 2005a, 2005b). In this latter region, Early Woodland site densities in the in uplands around Mammoth Cave area increase considerably in contrast to the floodplain areas (Railey, 1991, 1996). Curiously, site densities west of the Mississippi River or in the uplands adjacent to western tributaries (e.g., the Ouachita) do not appear to increase at all during the Early Woodland. In fact, in many of these regions Early Woodland components are nearly nonexistent. Work on Macon Ridge and near or adjacent to Poverty Point does not show evidence of an increase in settlement density after the decline of the Poverty Point site ca. 3000 cal B.P. While it is certain that the amount of research in some of these areas is far less than in parts of the eastern hills of western Tennessee and Mississippi, where surveys have been done, there is no indication of upward tick in site densities in late Poverty Point through Tchula times (Gibson, 1977, 1985a, 1985b, 1992; Weinstein and Kelley, 1984; Kidder, 1986).[2]

HUMAN RESPONSE

Perhaps the greatest failing of the Climate Hypothesis is its poor accounting of the human response to the climatic changes documented in the period ca. 3000–2500 cal B.P. My 2006 paper has a decidedly deterministic approach; agency is absent and populations throughout the east are portrayed as incapable of or unwilling to respond to the challenges of a changing climate. The Climate Hypothesis could be read to indicate that people simply gave up, deciding it was too wet or too cold to bother with long-distance trade or exchange, and finding that the building of great earthworks and the like was to bothersome. In my defense, it is certain that in parts of the lower Mississippi Valley the floodplain was inhospitable for prolonged periods during this interval. I suggested in the paper there may have been significant effects on subsistence pursuits, with fish, once one of the primary targets of subsistence, being dispersed from what had been predictable and highly productive pools and bayous. Flooding, to the extent that we have documented, also shifted mammalian populations out of the floodplain and onto the uplands. For hunter-gatherers, this shift may have forced a change in subsistence pursuits as populations residing in logistically organized (semi-?) sedentary communities were forced by the changing ecological structure to shift to a more residentially mobile collector strategy. Also, hydraulic changes meant many Poverty Point–age sites were now no longer adjacent to flowing sources of water. Thus, for the populations living in these areas, the effects of climate change may have been direct and substantial.

Nominally, however, Poverty Point itself should have been immune from the direct effects of flooding. There is no evidence the site experienced any flooding from Mississippi River–related sediments since it is situated on the elevated terrace of Macon Ridge. So what happened at Poverty Point? One reasonable but untested possibility is that the site's population was being subsidized overwhelmingly by people living on the floodplain or exploiting plant and animal resources found in the floodplain. While the data from Poverty Point are not sufficient at present to address this issue, there are hints from the Copes site that some of the high meat-bearing skeletal elements from deer taken nearby were being exported out from this small settlement (Jackson, 1986, 1989a, 1989b). Thus, if people at Poverty Point were getting some or much of their subsistence from sites situated to the east, interruption of the floodplain economy could well have had a significantly negative effect on the site's inhabitants.

Furthermore, as Gibson (1994a, 1994b, 1994c, 1998a, 2000) has argued, Poverty Point was heavily dependent on the long-distance movement of lithic material for basic tool production. All stone at the site had to be imported and even the so-called local chert came from distances that would have required a two-day round-trip journey (roughly 65 km east or west from Poverty Point). Because the local chert is obtained from gravel bars and deposits in river and creek bottoms or in eroded exposures, high water in the Mississippi system would have limited access to this source during times of flooding. Upstream flooding in tool-stone source areas (e.g., the upper Mississippi, middle Ohio Valley, the upper Tennessee Valley, and the upper Ouachita system) may have disrupted populations living in these areas and made access to these valuable raw materials difficult, if not impossible, over prolonged periods of time. Thus, part of the economic rationale of Poverty Point may have been interrupted or cut off, leading to both specific economic difficulties—e.g., lack of stone for making tools required for day-to-day subsistence—as well as creating social and/or political stresses on folks living at Poverty Point and adjacent sites.

But there is a problem with the Climate Hypothesis that goes deeper: Poverty Point looks as if it was in decline or perhaps even abandoned when the floods were filling the alluvial valley to the east. There are very few dated Poverty Point mound sites outside Poverty Point. The two which are dated, Hays, in northeast Louisiana (Joe Saunders, personal commun., 2007), and Lake Enterprise (Jackson and Jeter, 1994) in southeast Arkansas, both have a single radiocarbon date indicating that they were constructed late or even at the end of the Late Archaic sequence in the Lower Mississippi valley. Marvin Jeter (personal commun., 2006) argues these small, single-mound sites with late dates reflect a pattern of dissolution of the Poverty Point center. While both Hays and Lake Enterprise have dates that overlap the latest occupation at Poverty Point, the presence of these single-mound sites might reflect a gradual process whereby Poverty Point as a center and as a community was losing its centripetal political, social, ritual, and economic authority or control. Thus, Poverty Point may have already been in decline before the flooding I have alleged caused its demise.

This proposition introduces back into the equation Gibson's (1974, 2000) models of Poverty Point's collapse being related to the inability of the community to maintain its organization in the face of populations that had grown too large and sociopolitical complexity that had become too unwieldy in the light of existing social mechanisms for integration and regulation. If we extend this social process model to the larger sphere of Poverty Point interactions, one of the most intriguing aspects of Late/Terminal Archaic trade is that it was so remarkably one way. Poverty Point and its related sites were importing vast quantities of goods over very long distances, but the sum total of reciprocal goods is a handful of jasper owl beads, few of which show up in localities that were central to the resources being exploited. What was Poverty Point exchanging as a currency for the goods it acquired?

What could Poverty people export? The resources abundant at or near Poverty Point are available essentially everywhere else in the Southeast (e.g., nuts, plant foods, tubers, deer, fish, and wood). There are no obvious mineral deposits (e.g. salt, lithics) in the region that would serve as an export commodity. One possible export would be bird feathers; another possibility is that Poverty Point served as the economic intermediary for trade in Marine Shell (Schambach, 2005). The problem with this latter hypothesis is there is no significant marine shell found in upstream localities after ca. 3500 cal B.P. If we assume for a moment that the people living at Poverty Point depended on Late Archaic populations living in the interior riverine valleys for some or even much of their basic economic existence, then cutting off trade because of flooding and prolonged hydrologic disruptions in the Mississippi Valley may have had a significant impact at the type site and surrounding communities. This logic doesn't extend, however, to the upstream communities, where there is no evidence of a purely economic dependency with Poverty Point. As far as we know, these upstream communities got nothing of economic value from the south.

I suggest it is possible for these upriver communities to have received from Poverty Point social, ritualized, and or mythic legitimization. Such speculation (to label it a hypothesis would be unwise at this point) is based on a notion that Poverty Point may have been the charter community that crystallized disparate mythic strands of community origin and creation. Gibson (2000, 2004, 2006, 2007), Sassaman (2005), and I (Kidder, in press a, in press b; Kidder et al., 2008; Kidder et al., 2009) have been arguing similar ideas recently, suggesting Poverty Point is far more than "just" a community; rather, it represents a sui generis settlement that reflected in its construction, layout, economy, and society a set of cosmological precepts that focus on origins, legitimization, and the construction of local and larger-scale regional social and political identities. A historical example of such a place and process, of course, is Mecca. A parallel argument citing the archaeological record has been made for Chaco Canyon (Renfrew, 2001a; Mills, 2002).

Peoples living in the interior riverine Southeast and Midwest have endured countless floods over millennia without witnessing large-scale social, political, and economic transitions. Some of these floods have been of the "mega" variety too, so we can conclude that flooding alone is not likely the sole cause either of the demise of Poverty Point or of the apparently contemporary or nearly contemporary "transition" throughout the region to an Early Woodland pattern that looks to be considerably different. However, the climatic processes identified in the era 3000–2500 cal B.P. were at a scale significantly different from anything documented before or after. Perhaps more importantly, they appear to have lasted for a considerable period of time and their local and regional effect may well have been historically unprecedented. While the chronology is far from impeccable, these floods altered the hydrology of a vast area of the lower Mississippi Valley and can be documented in many of the tributary valleys.

The climatic events of this era occurred at a time in local and regional history such that the cause and effect relationships were nonlinear and appear to have had ramifications far beyond those caused by similar processes at earlier times. Local transformation of the environment at Poverty Point triggered cascading responses upriver. One of the responses was specific to Poverty Point and its importance as a central place in the social, ritual, and mythic realms of the region. The collapse of Poverty Point would have caused some level of economic disruption upriver, if the relationship to Poverty Point was truly based on material interactions. On the other hand, if the material relationship to Poverty Point was mediated through social, ritual, and symbolic processes (e.g., pilgrimages), collapse of the center may have disrupted the social fabric of numerous small-scale societies throughout the Mississippi basin. Coupled with their response to local and regional climate change that demonstrably was affecting the entire watershed of the Mississippi, local populations may have responded to the demise of Poverty Point by shedding their cosmopolitan connections that no longer served their purposes and turning both materially and ritually inward. At the same time, there were important economic transformations emerging throughout the region as new food sources were being exploited and as new technologies (e.g., ceramics) were making their presence felt across large areas, thus challenging local communities to reorient their economic and ritual activities. The post–Poverty Point emergence of multiple, presumably independent, ritual communities practicing mound construction in the midcontinent (e.g., Tchefuncte, Adena) may reflect the local appropriation of rites, symbols, and ceremonial processes selected from a historical continuum reaching into the Late Archaic. There are, of course, local dynamics that I cannot even begin to touch on, the histories of which will become critical for understanding these events and processes.

CONCLUSION

The end of the Archaic from a western, Mississippi River Valley perspective, looks to be sudden and marked. There are, however, possibly two or maybe even more than two transitions in the east. What happens in the west isn't matched, at least to any similar extent, by the processes south and east along the Atlantic coast. Here the transition looks more evolutionary than revolutionary, and it appears to have a much longer duration. In yet other parts of the East (e.g., the northern and northwestern peripheries of the Midwest, the trans-Mississippi south, parts of the mid-Atlantic), there may be a separate pattern of evolution and gradual transformation. In the American Bottom, the pattern looks like there was a population replacement, suggesting yet another pattern for this "transition."

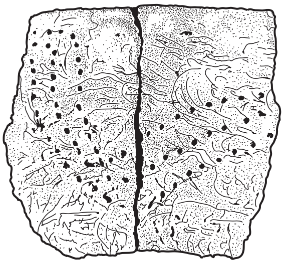
In my 2006 paper I was imprecise with my terminology. The "Late Archaic–Early Woodland transition" is a phrasing that begs the question of how we define the Late Archaic, how we define Early Woodland, and what we mean by transition. Much of how we view what I've characterized as the Late Archaic–Early Woodland transition depends on the categorization of Archaic cultures prior to the ca. 3000–2500 cal B.P. interval. While the Late Archaic is generally thought to be a time of relative complexity in the east, it is clearly not a uniform cultural pattern across space or through time (Kidder and Sassaman, 2009). Some of the hallmarks of Archaic complexity are only minimally manifest in parts of the east and thus the emergence of Early Woodland economies and societies can be defined partly as an in situ gradual affair defined by the accumulation of a limited number of key technologies. Further, the dating and definition of what is taken to be Early Woodland is crucial. We labor under the gradual evolutionary model and this has important ramifications for how we define and understand the events in this era. For example, historically Adena is recognized as the Early Woodland culture in parts of the Ohio Valley and is assumed to have developed seamlessly out of the Late Archaic (Griffin, 1978; Otto and Redmond, 2008). The radiocarbon data for this part of eastern North America are at best ambiguous and we have no more evidence for continuity than we do for the alternative hypothesis of temporal and cultural discontinuity. Moreover, this development is almost surely not a singular event but a process with some temporal dimension. The scale of our analysis is crucial and there is no a priori reason why we should assume patterns of history and behavior over very large areas should be linked synchronously by the same cause and effect relationships.

The historical, social, political, and economic events of the period ca. 3000–2500 cal B.P. in eastern North America are almost certainly far more complex than I put forth in the Climate Hypothesis. This hypothesis has many problems, including but not limited to the nature of climate change, the chronology of these events and processes, and how humans responded. We should not be distracted, however, from the central issue that gives rise to this volume: there is a momentous change in the east at this time. These changes are geographically widespread, have effects across many different environments, economies, and societies, and have a relatively limited (but perhaps elastic) temporal duration. Climate change is probably better thought of as a description of a process instead of an explanation, but it is a reasonable starting point for thinking about what occurred, and how it happened, at this time. If the only consequence of the Climate Hypothesis is to challenge the continuity model of eastern North American Indian history between 3000 and 2500 cal B.P., it will be worth the ink and paper expended.

NOTES

1. To be specific, we argue the chronology of this event is *younger than* 3880–3590 cal B.P. (2σ; 3470 ± 60 radiocarbon years B.P.) but not any older than the youngest Poverty Point–age site on Joes Bayou, or ca. 3100 cal B.P. (Adelsberger and Kidder, 2007: 89; Kidder, 2006: 218; Kidder et al., 2008: 1265). Radiocarbon dates from the upper surface of the crevasse splay at Raffman and St. Mary indicate the splay formed before 2743–2370 cal B.P. (2σ; 2510 ± 40 radiocarbon years B.P.; Kidder et al., 2010: tables 5, 6). We conclude the fluvial event or events that formed the splays must be constrained in the interval ca. 3100–2500 cal B.P. We have never argued the flood or floods happened *at* ca. 3500 cal B.P., but that this event or these events happened after this time.

2. Gibson's observation in chapter 2 about the density of Early Woodland settlements in some parts of the Mississippi Valley and its tributaries is well taken. However, while Early Woodland site densities in some areas may be greater than I indicate, there is still no evidence that Macon Ridge itself saw any increase in occupation immediately after the hypothesized flooding. The absence of sites in high, presumably dry ground adjacent to the alluvial valley is still perplexing, no matter what happened roughly 500 years later.



CHAPTER 2

“NOTHING BUT THE RIVER’S FLOOD”:[1] LATE ARCHAIC DIASPORA OR DISENGAGEMENT IN THE LOWER MISSISSIPPI VALLEY AND SOUTHEASTERN NORTH AMERICA

Jon L. Gibson

Between 3000 and 2500 cal B.P. (Kidder, 2006; chap. 1, this volume), Late Archaic peoples across the Southeast seem to have plunged into demographic and cultural bleakness. What happened to them is the deep question probed at this, the Third Caldwell Conference.[2] David Hurst Thomas and Matthew Sanger, the conference organizers, asked David Anderson, Chester DePratter, and me to offer some final thoughts on the matter. I completely agree with the muted voices I overheard one afternoon aboard *The Lounge*, as Royce Hayes drove us through the pines, lauding the choice of a certain discussant for his master synthesizing abilities, but I deny the rumor that the other two discussants were selected because they witnessed the Archaic transformation firsthand. For the conference, we discussants were charged with reviewing the papers that fell within our regional purview, but for this follow-up synopsis, Thomas and Sanger cut us loose to free-fall wherever the sage words of our colleagues carried us, although, hopefully, never landing too far from the consuming question—what happened to the Late Archaic?

Among the ideas discussed was T.R. Kidder’s Climate Hypothesis, which proposes that global cooling increased rainfall, which, in turn, triggered massive flooding in the Mississippi Valley, stopping the Late Archaic dead in its tracks and keeping Early Woodland submerged for some 500 years (Kidder 2006; chap. 1, this volume). By Kidder’s reckoning, Poverty Point got lost in the watery misery too.[3]

As a longtime fan of Poverty Point, hearing it mentioned piqued my interest. So, after kicking this around with the symposium organizers, I agreed to transform my “discussant” role into the present chapter, a chance to look at the Climate Hypothesis more closely. I am not interested in compiling additional climate data or commenting on the veracity or relevance of those presented, pro or con, but instead opt to point out other concerns that will better situate his exogenous argument in human terms.

THE CLIMATE HYPOTHESIS

The Climate Hypothesis has its empirical basis in a couple of radiocarbon-dated cores extracted from crevasse fans, the flood-created kind, along Joes Bayou, which is a relict Mississippi River distributary near Poverty Point in northeastern Louisiana (Kidder 2006; chap. 1, this volume). It builds upon the discovery that the dates correlate with an episode of massive flooding in the lower Mississippi Valley, during and after 3500 cal B.P. and again between 3000 and 2500 cal B.P. (Brown et al., 1999) And the real head-turner is that Kidder suggests that this is also the time when the Poverty Point community and contemporary communities disappear, leaving a five-to-seven century gap in history or in the archaeological record. If the disappearance is historical, it represents an undetected change of unknown origin or a catastrophe of biblical proportions; if investigative, it is sampling bias without compare.

Kidder finds evidence for massive flooding all around the world about this time, and he recommends abrupt global climate change as the likely harbinger (Kidder, 2006). I agree with Kidder that a centuries-long dark age settled over the land during the high waters of 3000 to 2500 cal B.P. Yet, I have lingering doubts that climate-induced megaflooding was causally entangled with the demise of Poverty Point.

Counting the doubts:

1. The crevasses, or levee breaches, on Joes Bayou, which Kidder attributes to massive flooding, formed around 3580 and 3469 cal B.P. (Adelsberger and Kidder, 2007: 89), and floodwaters periodically continued to escape through these gaps for as long as Mississippi overflow came down the Tensas River and Joes Bayou, possibly for a thousand years or more (Adelsberger and Kidder, 2007: 88–89). Thus, levee failure happened *when Poverty Point was flourishing* (Connolly, 2006; Kidder, 2006). Poverty Point continued another two to three centuries without suffering harmful consequences from high water. Could megaflooding have impacted folks living on one side of the bayou more than those on the other?

2. The answer is a resounding yes. Poverty Point sat up high and dry on the eastern escarpment of the Macon Ridge, while the levees were failing along Joes Bayou out in the swamp, less than 16 km away. The Macon Ridge at Poverty Point stands about 4 m higher than the failed sections of Joes Bayou levees. No flood ever topped the Macon Ridge. Its top stratum is Peoria loess, not Holocene alluvium.

Carroll Butts, who lived at Poverty Point during the Great Depression, told me about the time the megaflood of 1927 reached Macon Ridge.

> When that ’27 flood came you could hear that water comin’ cross there [sweeping his hand over the swamp]. You could hear it roarin’ all over the country. ’N’ before it got here [Poverty Point], it ran the deer outta the swamp. It ran my grandfather ’n’ ’em out. They were gettin’ cows outta the woods over near Boeuf River—they lived over on Boeuf River—’n’ they were out in the woods on horses gettin’ cows ’n’ they heard it comin’. He said it sounded like people comin’ through the woods beatin’ on everything. ‘N’ he said you just saw a river of leaves and twigs ’n’ heard rumblin’. The Mississippi River broke at what they call Millikin Bend. I know. I was here, ’n’ I never will forget as long as I live that ol’ boy tryin’ to hold that deer up there . . . Yeah, had horns ’bout like that [measuring with his hands], a young one. It tore that man up. Used its feet kickin’ him. That boy was mad, Hillabee—I’ll never forget that. It was right out in there [pointing], right out in front of there in a pasture. (Carroll Butts, personal commun. to Jon Gibson, June 1988, Poverty Point; recorded in Gibson, 1990: 9)

Grandpa Butts pointed out the highest level reached by the 1927 flood. It was about 5 or 6 m below the top of Macon Ridge—an impressive sight from a safe vantage.

3. Folks living at Poverty Point were always safe and secure from flooding, no matter how high the water got and how long it stayed up, but the same cannot be said for the lowland villagers who lived at J.W. Copes, Terral Lewis, and Stockland Landing (Webb, 1982: 24–29; Jackson, 1986; Gregory, 1991; Gibson, 1998a: 315–319). These villages were vulnerable to flooding. People lived at Copes sometime around 3380 to 3258 cal B.P. (Jackson, 1986; McGimsey and van der Koogh, 2001), presumably after megaflooding broke the levees on the Joes Bayou distributary around 3500 cal B.P. Terral Lewis and Stockland Plantation have not been radiocarbon dated, and the single thermoluminescence age of 3040 B.P. for Terral Lewis is too late (Weber and Webb, 1970: 102).

If the 3500 cal B.P. flooding happened before these villages were founded, it obviously did not devastate the swamp or render it uninhabitable. If flooding occurred during their tenure or later, it might have caused some inconvenience but again does not seem to have ruined the swamp. Flood deposits, if present, are barely more than a veneer. However, villages and surrounding field camps sit back away from the modern bank of Joes Bayou on the highest parts of the natural levee or else on the high banks of oxbow lakes, where we should not expect them to be buried deeply.

4. To people living in the swamp, flooding is simply a fact of life. Even big floods do not worry folks accustomed to having water in their homes. This is why I do not automatically assume that finding a correlation between moments of flooding and changing culture bears any necessary causality (see Sassaman, chap. 11, this volume, for a similar conclusion). It was too easy to grab the kids, throw the gear in the canoe, and take refuge on the nearby Macon Ridge for a few weeks or even months. Lower Mississippi natives were used to that. I contend that high

water brought little impetus for change among fishing and canoe peoples.

I know. I grew up on a hill overlooking Castor Creek, which flooded every spring. This didn't change our routine one whit, except maybe for having to drive free-ranging hogs—pineywood rooters we called them—out of our garden. Actually, it did entail a lot of garden fence-mending, frequent hog-butcherings, and lots of trade-off suppers with aunts and uncles. We ate a lot of pork. And fish!

Despite contrary opinion (Kidder, chap. 1, this volume), high water actually benefits fishing, under certain circumstances. Sunfish beds are easy to spot in backwater shallows, and trails of frothy bubbles give away the location of "blabbers," or foraging freshwater drum. Air-gulping garfish still gulp air, which would have rendered them vulnerable to spear fishermen. Shifting currents among flooded trees would have shown net fishermen where to string gill nets and which direction to face slat traps.

My point here is simple: The megaflooding at 3500 cal B.P. did not spoil the swamp or keep people out of it. If megaflooding happened only once or even several times, then no matter how severe, there was always time for the swamp and the swampers to recover, after the high water went down. We must always keep in mind, too, that truly high ground—the safe haven of the Macon Ridge—was only a few km away, minutes by canoe.

5. People lived at Poverty Point, on and off, since Paleoindian times (Gibson, 2000: 44–65). Sometime around 5730 cal B.P. (Saunders et al., 2001: 75), Middle Archaic people built the Lower Jackson mound, 2.2 km south of future site of the giant ringed earthwork. They also camped around the mound and on a couple of spots up on the grounds of the future ringed complex (Webb, 1970: 30–31, 1982: 69; Saunders et al., 2001: 75), but they did not litter the bluff front where the northeastern rings would be built later, as revisionists claim (Connolly, 2002: 62–64, 2006: 7–8; Kidder and Sassaman, 2009: 673–674). How do I know? Simple! Middle Archaic people did not make Poverty Point–style cooking objects, and Poverty Point–style objects (cylindrical grooved, cross grooved, and biconical extruded) are imbedded in the deeply buried midden (Stratum 4A), overlain by approximately 6 m of artificial fill, where one of the supposed Middle Archaic–age dates derived (Greene, 1985:tab. 3). However, the other two assays from Stratum 4A date to the Poverty Point period. Three other dates with intercepts that suggest Middle Archaic origin come from building layers that *stratigraphically overlie* Stratum 4A (Greene, 1985: 28–29, fig. 4). Claims of stratigraphic reversals in built earth carry no credibility either, given the total absence of Middle Archaic artifacts in the fill. Cherry-picking radiocarbon dates without considering their contexts and associations is perfunctory and, in this case, misleading. Middle Archaic people lived on Poverty Point's grounds, but not here.

Shortly before 3700 cal B.P., another group took up residence on the deserted grounds, established a ring village, and almost immediately started building a mighty earthwork. These are the first residents that we call Poverty Point people, or Tamoroha[3] (Gibson, 2007: 523; Clark et al., in press), and they lived in and around Poverty Point in press around 3300 cal B.P. (Gibson, 1998a: 319; 2000: 96), or maybe a century or so later (Kidder, 2006: 203). Then, they abandoned their town and hinterland and stepped into oblivion.

The crux of Poverty Point history is this: The Tamoroha appeared instantaneously, as archaeological reckoning goes, shortly before 3700 cal B.P. They seem to have materialized out of local loess and bayou water, stirred with the hyperbole of their mastery of heavenly cycles and celebration of their own venerable birth (Gibson, 2007, 2009; cf. Kidder and Sassaman, 2009; Sassaman, 2005). But what does all this have to do with the Climate Hypothesis? I suggest that the Tamaroha came into being already well along in the process of gearing up for and chasing after the particular tasks and ideas that made them who they were (Gibson, 2007; see also Ingold, 2000: 195; Renfrew, 2001b).[4] And the natural world they were engaging was *a watery one*.

It is their watery world that has momentous bearing on the Climate Hypothesis. Off the escarpment where Poverty Point reposes is an extensive lowland. Trapped between the escarpment on the west, Joes Bayou meander-belt ridge on the east, Van Ranslaer Slough ridge on the south, and the slightly higher ground (higher than 26 m above mean sea level) on the north, the lowland figures to have been the bed of an ancient shallow lake, covering about 150 square km (Gibson, 1984: 102–109). I bring up the possibility of Poverty Point being a lakeside settlement, because "Lake Macon," as I refer to it, apparently originated as a consequence of Joes Bayou crevassing, which dammed the basin and prevented outflow of runoff and overflow water. Several small Tamaroha (and later) field camps line the crevasse ridge (Van Ranslaer Slough) and occur on small hummocks, or islands, out in what would have been the lake, revealing that Poverty Point was already flourishing at the time (findings of a comprehensive survey by a team from Indiana State University led by Robert Pace in the winter of 1983–1984; Pace, 1984).

Thus, we know that Lake Macon formed before or during Poverty Point's three- to four-century occupation, but we don't know exactly when. No archaeological sites, of any age, are known from its presumed bed, which is low and poorly drained to this day. Its bed is covered with Mississippi River clay (Allen et al., 1987), but infilling could have happened on several occasions (Kidder, 2006). Examination of color infrared aerial images, furnished by Thomas Sever, when he was at NSTL Station in Bay St. Louis, Mississippi, does not pinpoint the moment of formation but narrows the window relatively. Actually, if the ancient lake had been seasonal, like Catahoula Lake to the south (Dunbar, 1804: 19), then there very well could have been multiple filling episodes.

Whatever the case, at the point where the Van Ranslaer crevasse ridge stacked up against the Pleistocene terrace (Macon Ridge) near—the southernmost ring in Poverty Point's central earthwork enclosure—signs of a massive blowout appear. The blowout is not the same event that formed Van Ranslaer ridge, but a later one. The collapsed section of the ridge may be as much as half a km long. Lake Macon spilled out through the gap, creating a sandy alluvial cone, extending all the way to Bream Brier and Ray's brakes about 14 km to the south and averaging 4 km wide. The alluvial plug choked the interlevee lowland between Joes Bayou and the Macon Ridge escarpment, an area of some 50 to 60 square km. Axes of still-visible outflow channel scars record the violence of the discharge. Torrential waters poured out of the gap, surged southeastward until encountering the higher land along Joes Bayou meander-belt ridge, and were deflected southwestward toward Macon Ridge, where subsequent alluviation along the modern Bayou Macon (which follows the foot of the Macon Ridge escarpment) obscures the cone farther south.

The Van Ranslaer blowout might have been one event or several, but I am confident of one thing: The energy required to blow the gap was generated by a major flood(s)—a megaflood, perhaps a later deluge in the 3500 cal B.P. cycle or possibly one of the floods between 3000 to 2500 cal B.P. The oldest known sites founded on the plug are Woodland, probably no more than 1600–1900 years old (J. Saunders, personal commun., 2009; data from state site files).

Interesting geomorphology, but what does it have to do with Poverty Point? An existing lake helps account for much of Poverty Point's technology, economic logistics, and personhood. Simply living along rivers and bayous helped shape the worlds of earlier mound-building peoples, including their periodic but temporary gatherings for ritualizing and mound building, but cultural outcomes differed (Gibson, 2006: 320–321; Saunders and Allen, 1997).

TECHNOLOGY

From the outset, Tamaroha technology was geared toward exploiting a slack-water environment including interlevee and oxbow lakes, sluggish underfit bayous, and even seasonal backwaters. Preceding Middle Archaic mound builders got their food from lowland and upland larders (Saunders et al., 2005). The Tamaroha were consummate fishermen (Jackson, 1986, 1991b), catching catfish, gar, bowfin, bass, sunfish, drum, buffalo, and others that got entangled in their nets (Jackson, 1991b: table 3). To keep their nets properly deployed and prevent them from rolling up in a current, the Tamaroha added heavy iron ore plummets (weights) to the mudlines of their gill nets, in effect, creating an all-weather netting suitable for all water conditions. They fashioned plummets out of magnetite and hematite acquired from the Ouachita Mountains around Hot Springs (Lasley, 1983)—so, the Tamaroha came into being engaging long-distance exchange (or direct acquisition) and realizing political-economic importance from net-making and fishing. They ate nuts, acorns, and other plant foods in season (Thomas and Campbell, 1978; Byrd and Neuman, 1978: table 3; Jackson, 1991b; Ward, 1998), but they favored aquatic roots, which they dug also in season. Starch analysis shows that seven out of 13 cooking objects from Poverty Point, indiscriminately picked for testing, showed lotus or cattail residues (Cummings, 2006). Such a tiny sample with such an extraordinarily high percentage of root starch leads me to suspect that aquatic roots (and fish) formed the basis of subsistence economy. Lake Macon and nearby water bodies had an inexhaustible supply of these staples. And lest I forget: Roots were dug with large, hand-sized bifacial hoes, chipped from durable Dover and Fort Payne flint *acquired from sources on the Tennessee River in western Tennessee* (Gibson, 2009), adding another ply of political-economic machinations.

LOGISTICS

The rhythms of the swamp are predictable, except when disrupted by extraordinary flood or drought. Spring flooding followed by low waters are normal, but sometimes the waters do not abide by nature's cadence. Nonetheless, swampers like the Tamaroha adapted to normal and abnormal conditions by venturing out to food patches and returning home with food, a pattern of engagement that Binford (1982) calls logistical mobility. This avoided the risk of being flooded out, while preserving the security of the town of Poverty Point and lowland villages, located on higher ground (see Gibson, 1998a). Residential stability enabled villagers to pursue mound building, acquire exotic resources, and institute the arts of social living that bound the Tamaroha together as a community and established their identity for outlanders to see (Gibson, 2006), all without worrying about the threat of floods.

PERSONHOOD

Stable living, or organic sedentism (Gibson, 2006), contributed to a body of differentiated persons and persona in the community. Becoming Tamaroha required thinking and doing in Tamaroha—it was mental before it was corporeal and physical. For example, situating the town of Poverty Point depended on finding the right spot where preexisting ideas of layout, space, cosmology, and creation, among others, could all be accommodated (Gibson, 2008). Ford and Webb (1956) referred to this as a blueprint, and it was, but it was not only for architects and builders. It was of and for the people, the communal group. At the moment of Tamaroha conception, visionaries foresaw labor needs and the practical aspects of marshalling and maintaining such a force. Visionaries conceived of improvements in hardware, in design, material, and deployment, essential for enabling the movement. Visionaries knew where to obtain far-off materials that steeled hardware and increased efficiency. Visionaries won over the people by instilling in them the essence of communal living and corporate existence. Visionaries preserved tribal lore, promoted reverence for the ancestors, healed the sick, worked the magic, and explained the great mysteries. So, becoming Tamaroha started in the mind but, in the process of expression, created the doers and shakers and followers, who drove the corporate spirit along and gave it substance and meaning. The Tamaroha created themselves (Gibson, 2007: 515). No need to belabor the search for progenitors. The Tamaroha did not exist before their time. Poverty Point celebrates their moment of becoming.

So what does a lake have to do with helping to create Poverty Point and the Tamaroha? I proposed that the physical grounds of Poverty Point were selected because they offered the perfect vista—the Macon Ridge bluff towered above the lake waters, ostensibly giving sky-watching "priests" an unimpeded view of the processional march of the northernmost and southernmost rising positions of important heavenly orbs along the far eastern horizon (Gibson, 2008). Transferring those positions to the ground, relatively, established the configuration (and size) of the earthwork (Clark, 2004; Patten, 2007a, 2008; Sassaman and Heckenberger, 2004a). A clear vista also opened the prospect of having unimpeded connections (visual access to) with deep-seated mythological concepts (Gibson, 1998b).

Still, finding the best vista was ultimately contingent on the location of Lower Jackson mound, which, I maintain, furnished their "Navel of the Earth," the place where their ancestors were born (Gibson, 2004, 2006). They directly tied their own massive earthwork complex to Lower Jackson mound (Clark, 2004: 204; Gibson, 2004: 266), and this, to me, furnishes one of the better arguments for the existence of an open vista, which hypothetical Lake Macon would have provided. There is room for two Poverty Point ringed enclosures to have been built along the Macon Ridge bluff between Lower Jackson and the place where the enclosure was actually constructed, but the view along this intervening stretch would have been obscured by 48 m (160 ft) tall, virgin cypresses growing along the foot of the bluff (Gibson, 2008). Only after reaching the point where Van Ranslaer crevasse ridge abutted the bluff—the far southwestern corner of Lake Macon—would the view from the bluff have opened up. And, lo and behold, here sits

Poverty Point.

The search for the perfect vista, if that indeed transpired, implies that the Tamaroha already had the vision of Poverty Point in mind, its layout, its size, and its cosmic and magical representations, just another indication that the Tamaroha were conceived together in mind and deed. This essential dualism means there was no run-up to being Tamaroha. One day, they did not exist; the next, they did.

Climate Change and Poverty Point

If climate-induced megaflooding impacted the Tamaroha, it would seem to have more to do with their birth and the founding of their capitol than it did directly with their disappearance.

How so?

1. The ages of the megafloods themselves do not correspond very well with Poverty Point's beginning or end—they seem to be off by a couple of centuries, either too late or too early respectively (Saunders, chap. 5, this volume).

2. The Tamaroha were geared for the water. Their domestic economy and enabling technology centered on fishing and gathering aquatic roots. Water connected them to northern bedrock highlands where they acquired the hard rock for their fishery and root-harvests. The mighty Mississippi linked all the rock sources together, preventing travelers from having to make a single pullover or take a short hike. The Tamaroha were boat people. If their travels had been on foot, they assuredly would have been more provincial. Dugouts spared bended backs of the burden of carrying heavy rocks, a substantial relief considering that an estimated 71 metric tons of foreign rocks were transported to Poverty Point (Gibson, 2000: 174). The Tamaroha were born to and of a watery world. They were not vulnerable to being washed away by it, no matter how bad the flood or how long it lasted.

Dugouts rode on high waters, as well as low waters, providing protection against floodwaters. Weighted netting enabled fish to be caught during high waters, as well as low waters, and having something to eat is really the heart of what we are talking about. Yet, for sake of argument, let us suppose that the technology-enhanced fisheries were disrupted for an abnormally long time. Macon Ridge was not a wasteland. Its dry forests and meadows would have offered succor to refugees—its spring greens, summer seeds, and fall nuts and acorns, augmented by deer, bear, and smaller animals driven there by the water. No, refugees would not have gone hungry. At the worst, they might have had to give up their favorite dishes, fish stew and baked lotus root, for a while. Actually, tablefare would not have changed drastically. Even during normal times, the Tamaroha got a sizeable share of their foods from Macon Ridge. The main difference during flood time would have been the increased amount of time and work required to put food on the spit and in the earth oven.

3. Another counter point: There are no known components on Macon Ridge confidently dated, radiometrically or artifactually, to the time of Poverty Point's abandonment or immediately thereafter. The components that do sit up on the ridge can be ascribed stylistically to Poverty Point's occupation span, 3700 to 3300–3200 cal B.P. (Gibson, 1998a). If the flooding of 3000 to 2500 cal B.P. drove people out of the swamp permanently, we should be able to materially recognize new camps and villages on the ridge. Additionally, I expect there to be more terminal Poverty Point encampments than encampments dating to the height of occupation, not only on the Macon Ridge escarpment but on the distant walls of the Mississippi Valley. If flooding was a culturally unmitigated, valleywide human disaster, then the Mississippi Valley walls beyond Poverty Point territory ought to be teeming with new sites housing refugees other than the Tamaroha, and they are not.

The bottom line is this: We do not, perhaps cannot (typologically), recognize any component dating to the 3000 to 2500 cal B.P. interval, *anywhere in the uplands or the lowlands*. It was as if a giant hand swept away humanity for half a millennium. But floods destroy homes, not cultures. If we compare materials from 3300 cal B.P. with those from 2500 cal B.P. (Ford and Quimby, 1945), there are substantial differences, but they are what we expect to happen in local cultures experiencing internal change, not wholesale replacements brought by an influx of outlanders. Early Woodland people throughout the lower Mississippi Valley were direct descendants of the Tamaroha or their contemporary neighbors (contra Sassaman, 2005; Kidder and Sassaman, 2009).

SO, WHAT IS THE DEAL?

With one or two possible exceptions, Early Woodland Tchefuncte components date between

2600 and 2100 cal B.P. (see McGimsey and van der Koogh, 2001). Cross Bayou, a single component site, located 100 km downstream from Poverty Point, produced an early radiocarbon age of 2770 cal B.P. (Gibson, 1991) but also a later one of 2120 cal B.P., both from the same shallow midden. Bayou Jasemine near Lake Pontchartrain in southeastern Louisiana also has calibrated radiocarbon intercepts spanning seven centuries, from 3150 to 2060 cal B.P., but they are stratigraphically out of order (Hays and Weinstein, 1996: 57–65, table 1), leaving us still groping for an Early Woodland Tchefuncte component that confidently dates to the megaflooding interval.

I am not including Cormorant components from the east side of the lower Mississippi Valley in this discussion despite conventional wisdom, which places them in the Early Woodland Tchula period (Phillips et al., 1951; Phillips, 1970; Kidder, 2002b). The peoples who carried Cormorant culture were demographically, socially, and materially different from Tchefuncte peoples—after all, they were separated by a mighty river—and their identity did not coalesce until long after flooding began. Besides, they were hill people anyway.

Despite Kidder's (chap. 1; this volume) lamentation, Tchefuncte sites are common throughout the Mississippi lowlands and adjoining coastal marshes, just not in the swampland along the Tensas and Bouef rivers or along the high banks of the Ouachita Valley, *the heart of Kidder's research domain.*

An intensive bankline survey I conducted along the upper reaches of Big Creek, the major interior drainage of the Macon Ridge, west of the escarpment, some 20 to 70 km southwest of Poverty Point, resulted in the discovery of 133 sites, 34 of which (a little over a quarter) were or contained Tchefuncte components (Gibson, 1977). Further south, in the Catahoula-Larto swamp, field investigations by William Baker, Clarence Webb, and me, and later by Hiram Gregory and associates following extensive land clearing, recorded 70 sites along the sluggish bayous, lakes, and brakes, and 31 sites, or 44%, had Early Woodland Tchefuncte components (Gibson, 1975, 1991; Gregory et al. 1987). Nearer the coast, a systematic bankline survey of the upper Vermilion River in south-central Louisiana disclosed 35 sites, including 14 Tchefuncte components (40%; Gibson, 1976). Tchefuncte sites are also common throughout the coastal zone (Ford and Quimby, 1945; Shenkel and Gibson, 1974; Weinstein and Rivet, 1978; Neuman, 1984; Shenkel, 1980, 1982, 1984; Weinstein, 1986, 1995, 1996; Byrd, 1994).

Early Woodland components are unmistakable. Allowing for local free-hand expression, Tchefuncte pottery is a stylistic giveaway, although stone, bone, and shell utensils, as well as mound building, vary locally (Ford and Quimby, 1945; Gibson, 1998c).

> [Tchefuncte sites] are usually small, but some long-used shell middens on the coast . . . cover more than 1 ha. . . . Inland sites . . . tend to be larger, sometimes covering two–three ha. . . , and may have one to five associated earth mounds. Mounds are conical affairs . . . used for burial and primarily contain disarticulated individuals of both sexes and all ages that were interred without grave furniture. Socioculturally, Tchefuncte culture was made up of many diverse groups, whose common bond was pottery decoration and not genealogy or ethnicity. These groups were probably organized on a tribal level, some more rigidly than others. (Gibson, 1998c: 831–832)

What was going on culturally within the valley or along its high walls between 3000 and 2600 cal B.P.? The Tamaroha were already long-gone, and Tchefuncte folk evidently had yet to materialize. If giant floods had swept over the swamp, accompanied by strong hurricanes, as claimed (Kidder, 2006: 215), then I can imagine some enclaves responding like the marsh dwellers at Big and Little Oak islands near Lake Pontchartrain, east of New Orleans.

Big Oak Island was an open-sided shell ring (crescent), located in the wet marsh about 3 km south of the present shore of Lake Pontchartrain. It rose some 2–3 m above the marsh and was composed of interbedded lenses of Rangia shells, most clean, some dirty, with a few showing evidence of burning and traffic. The piled shell rested on a 15–20 cm thick layer of shell hash (pulverized shell). We assumed that the crushed shell layer was a beach, and, for most of our dig, we bottomed our test pits at the contact (Shenkel, 1974; Shenkel and Gibson, 1974). About two days before the initial field season was over, we decided to see what was beneath the "beach." To our amazement, it turned out to be the richest Tchefuncte midden I have ever seen, full of materials—sherds as green as grass when first uncovered but blackening right before our eyes when the salt air hit them. It was a black earth midden; there were no clamshells. Obviously, basal Big Oak Island had been a serious residence for a long time.

The raised mass of the ring was artifactually impoverished by comparison. There was a small amount of pottery—mainly from big plain pots—some *Busycon* gouges, bone points and other bone and shell tools, and tubular clay pipes (Shenkel, 1980).

The key point here: The shell hash was storm surge from a devastating hurricane. It wiped out a thriving village, and in the aftermath of the storm, the unlucky villagers did not rebuild. They founded a new village in the marsh about 3 km east of Big Oak Island and at least 2 km farther away from the shores of the lake that had wrought such destruction. People took their sweet time with the recovery effort. Basal Big Oak was destroyed around 2700 to 2490 cal B.P. Little Oak Island, their new home, did not spring up until ca. 2325 to 2130 cal B.P. (McGimsey and van der Koogh, 2001). It was not until then that fishermen returned to the site of their old destroyed village, and then they came only to fish and collect clams (or hold feasts). Big Oak Island became a field camp, a collecting station aimed at taking advantage of a very specific ecological niche, the predation of marsh clams by drum fish. Visiting parties preyed on both and carried clam meat and fish fillets back home to Little Oak, leaving smelly residue behind.

Hurricanes inflict immediate damage, and the one that hit Lake Pontchartrain 2700 years ago, a time when storms were bigger and more frequent (Liu, 2004), wiped out a village *but not a people or their way of life*. Big Oak islanders faced the fury of the storm, but when calm returned, Tchefuncte people were still around.

WASHING AWAY OUR SINS

It seems to me that we have been looking at Poverty Point all wrong, ever since we envisioned it as a widespread culture reaching throughout the lower Mississippi Valley and across the Gulf coastal plain (Webb, 1968, 1982, 1991), but Poverty Point is not some bloated synchronic or homogeneous way of life. Poverty Point was a town, North America's first (Clark et al., 2009), the social and ritual heart of a community encompassing 1800 square km. Neighbors living beyond community limits were not Tamaroha—they created their own social networks, forged their own identities, and seem not to have carried on much truck with the Tamaroha (Gibson, 2000: 232–265).

Distant contemporary villages, such as Jaketown (Ford et al., 1955), Claiborne (Gagliano and Webb, 1970, Webb 1982: 34–36; Bruseth, 1991), and Beau Rivage (Gibson, 1979), were considered to be of Poverty Point "culture" because they participated in exchange (or acquisition) of exotic materials, which emanated from or led to the town of Poverty Point and thusly left them with more Poverty Point–looking materials than components in between (Brasher, 1973; Webb, 1982: table 18).

What I am driving at is that Poverty Point culture is coextensive with the town of Poverty Point (and community). Whatever befell the town, also befell the culture, but natural disaster was not the culprit. People recover from natural disasters—witness Big Oak Island—without losing their traditions or their history. When the last Tamaroha left Poverty Point, they left their identity behind.

Kidder (2006: 221) suggests that massive flooding disrupted long-distance exchange, causing across-the-board failure in Poverty Point's domestic and political economies, but he does not explain why the megaflooding of 3000 (3300–3200) cal B.P. was so culturally devastating when the earlier round of megaflooding of 3500 cal B.P. was so benign (see also Saunders, chap. 5, this volume). Might floods giveth and taketh away? Actually, we are not told why and how floods destabilized river "commerce." Even if rock-securing missions had been put on hold until flood crests subsided, the most telling historical fact remains: Poverty Point exchange came through the earlier round of megaflooding unscathed.

Flooding as a blanket explanation is simply insufficient (see Sassaman, chap. 11, this volume). Explaining what happened to the Archaic must be sought in histories so precise that we can almost see the faces of those who lived them, and we must contextualize the local histories we create within the broader scope of a regional history retrofitted to accommodate them. For example, Sassaman wonders if Alexander peoples living on the Middle Tennessee River might not have intercepted soapstone shipments bound for Poverty Point, thus hastening the breakdown of Poverty Point exchange or, alternatively, if Alexander peoples just happened to be in the right place at the right time, enabling them to capitalize on the waning Poverty Point soapstone "exchange." While neither scenario is chronologically tenable, they portend the kind of people-thinking that needs to gird our quest for history.

TESTING THE WATERS AROUND THE SOUTHEAST

The bleakness between 3700 and 3600 (or after about 3300 cal B.P. in the lower Mississippi Valley) and 2500 cal B.P. also affects other localities in the Southeast but not all. Michael Russo (chap. 7, this volume) and Margo Schwadron (chap. 6, this volume) report an absence of shell rings and shell heaps on the Atlantic coast of Florida and in the Everglades, but they blame rising sea level for their absence, not some "tumultuous shift" in nature that eliminated populations and dissolved cultures. They reason that Late Archaic and Early Woodland assemblages look so much alike that life must have continued unabatedly through the Transitional period; only subsequently rising sea level destroyed or drowned the evidence. Similarly, R. Saunders (chap. 5, this volume) found that Late Archaic occupations along the Mitchell River in Choctawhatchee Bay, Florida, ended around 3720–3560 cal B.P., about the time Elliot's Point enclaves all around the bay were experiencing dissolution (Thomas and Campbell, 1991; Janice Campbell and James Morehead, personal commun., 2009). She suspects that estuary deterioration was responsible, due, perhaps, to a flurry of devastating hurricanes (or rising sea level; see Thomas and Campbell, 1991: 113–115)? Yet, there was food and high ground and sweet water beyond the strand and bay shores where people could have relocated. Rising water and loss of oyster beds may have been catalytic but were not dual scythes of the grim reaper. People can always leave or change their way of doing when they do not like the conditions they find themselves in. The efficient cause of social change is in peoples' actions, not in nature's fickleness.

The bleakness on both coasts of Florida seems to have started when Poverty Point was under construction in the lower Mississippi Valley (also note the coincident transformation of Stallings socialities in the middle Savannah Valley, Orange groupings along the St. Johns River, shell-ring builders/dwellers on the Georgia Sea Islands, and Elliot's Point enclaves around Choctawhatchee Bay (Janice Campbell and James Morehead, personal commun., 2009; Sanger, chap. 9, this volume; Sassaman, chap. 11, this volume; Thomas, chap. 8, this volume). We simply do not have the fine-scale chronological resolution needed to tell if these were simultaneous but differing responses to prevailing (or changing) but differing environmental conditions. Chester DePratter (chap. 14, this volume) and Sassaman (chap. 11, this volume) both suggest that social changes occurring at the time may have affected some institutions or some groups but not others. Whatever the case, both the contiguous coasts of Georgia and Florida and the lower Mississippi Valley were caught up in the dim time that persisted from at least 3000 until 2500 cal B.P.

The argument for Late Archaic–Early Woodland continuity during the Florida Transitional period prompted me to reexamine material traits in the lower Mississippi Valley in order to see if there was a similar bridging materiality. Russo and Schwadron suspect that Florida's early Early Woodland components were drowned, so I purposefully focused on alluvially buried components—Cross Bayou and Mount Bayou in the Catahoula-Larto swamp (Gibson, 1975, 1991), Baker Mounds on Bayou Portage of the Woods along the western margin of the Atchafalaya Basin (Russo, 1992), Bayou Perronet (or Bumblebee) on Bayou Amy just south of the Baker Mounds (Gibson, 1982: 459–472), and Ruth Canal on Vermilion Bayou, 40 km inland from the coastal marshes (Gibson, 1976: 45–49). My examination affirms the formal and stylistic distance between Late Archaic Poverty Point and Early Woodland Tchefuncte materials. Resemblances are general, primarily on a class level, but a few specific types suggest that in-house (regional and local) traditions survived the five-century-long bleakness (compare Webb, 1982 with Ford and Quimby, 1945); e.g., Pontchartrain, Gary, and Ellis point types; Tchefuncte pottery decorative techniques (Gibson, 1995: 70–73; Gibson and Melancon, 2004); biconically shaped baked-earth cooking objects, and a few other forms. However, there are noticeable differences in most styles and forms. This comparison suggests fundamental continuity within homegrown lower Mississippi traditions, rather than a spliced-together olio created by new immigrants or ritual visitors. Tchefuncte, like Poverty Point, manifests indigenous coalescence. The bottom line is this: These buried Tchefuncte components arguably date after the great floods. They are not the "transitional" sites we seek in the bleakness. The bleakness still looks bleak.

Admitting this still does not resolve the fundamental question. I am not sure that a sufficient answer is at hand or that we are even close to one—whether due to inadequate data, chronological imprecision, or immature paradigm. Until we find or recognize materials from the time of the bleakness, I am afraid we will continue to construct fairy tale cultures out of one part Late Archaic and one part Early Woodland and then have friendly debates about what happened to them.

Where does this leave the Tamaroha? In limbo, I'm afraid? It may be that Victor Thompson (chap. 10, this volume) is on the right track when he avers that changes, whether externally or internally induced, were mediated by Early Woodland groups returning to a mobile lifestyle to facilitate information flow and social networking. In other words, the Tamaroha left town for the backwoods and, in the doing, walked away from their recognizable lifestyle and distinctive materiality—disengagement and diaspora. The cause that matters resides in the change itself. That, I'm afraid, passed into oblivion with the Tamaroha, always beyond proving, even if we were to stumble upon that remote truth.

NOTES

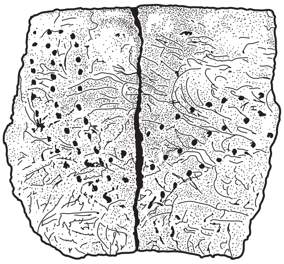
1. "[N]othing but the river's flood" is a line borrowed from Mark Twain's (1979: 492) story about life on the Mississippi, recounting his relief-boat excursion on the lower Mississippi during the wall-to-wall flood of 1882.

2. The Third Caldwell Conference is one of the most enjoyable archaeological gatherings I have ever attended. Part of the enjoyment was the charm and beauty of St. Catherine's Island, and the rest was the pleasant company. I discovered that I did not mind being treated like royalty, chauffeured around, or sated with an unending supply of ambrosia and nectar. I have David Hurst Thomas, Matthew Sanger, Lori Pendleton, Royce Hayes, and student interns to thank LL for my three-day reign as king and the AMNH for making it all possible. Long way from an adobe casa in Rancho de Taos, huh David? The long 28-hour ride to the island from the pineywood hills of North Louisiana and back was delightfully shortened by having Joe Saunders ride "shotgun." I think we resolved more archaeological dilemmas sitting in the front seat of a pickup truck than we ever have digging in the ground. Here's to our next road trip, Joe. Thurman Allen, Jan Campbell, Sherwood Gagliano, Joel Gunn, Dennis LaBatt, James Morehead, Evan Peacock, Mike Russo, Joe and Arville Touchet contributed data and ideas on matters discussed herein, some of which I actually incorporated, though not necessarily in the manner they were intended. To all the conferees: Thanks for allowing me to share in your deliberations. I rode the boat back to Half Moon dock on the mainland, wet and cold, but enriched by the words I just heard and confident that the future of Southeastern archaeology is in deft hands and nimble minds.

3. In the lower Mississippi Valley, manifestations taxonomically identified as Middle Archaic would be classified as Late Archaic elsewhere in the Southeast (see Saunders and Allen, 1997).

4. Clark and associates named the people who lived at the Poverty Point site and in the surrounding community, the Tamaroha (Clark et al., 2009), in order to clearly differentiate residents and their lifeways from Poverty Point culture, an artifact-based taxonomic unit (Webb, 1968). The name is Tunican, which was probably their native tongue (Gibson, 2000:7–8), and means "Mound Cave People" (Julian Granberry, personal communication to Jon Gibson, 2004). The name honors the widespread native creation story in which first people emerged from a sacred water-filled cave beneath a mound (or "Navel of the Earth").

PART II
NEW SUBSTANTIVE STUDIES



CHAPTER 3

THE TWO RINGS OF ST. CATHERINES ISLAND: SOME PRELIMINARY RESULTS FROM THE ST. CATHERINES AND MCQUEEN SHELL RINGS

Matthew C. Sanger and David Hurst Thomas

Over the last three decades, the American Museum of Natural History has conducted archaeological fieldwork on two Late Archaic shell rings located on St. Catherines Island (Georgia): the McQueen Shell Ring (9Li1648) and St. Catherines Shell Ring (9Li231). We have conducted detailed mapping and remote sensing operations on both sites, and have excavated both test units and large block excavations. Although this research is very much ongoing at this writing, we think it worthwhile to present some preliminary findings and conclusions. Elsewhere in this volume, each of us discusses selected aspects of the St. Catherines Island fieldwork relative to the overarching objectives of the Third Caldwell Conference.

LATE ARCHAIC SHELL RINGS OF THE AMERICAN SOUTHEAST

More than 40 Late Archaic shell rings are found along the coast of the American Southeast (Russo, 2006; see fig. 3.1). From South Carolina, through Georgia and Florida, and into Mississippi, shell rings are often the oldest sites found in the coastal regions of each of these states. Largely because of their prominence on the landscape, shell rings have been a focus of archaeological investigations for two centuries, commencing with the work of John Drayton (1802), William McKinley (1873), and Clarence B. Moore (1897).

Numerous investigators launched large-scale scientific excavations on shell rings during the 1940s, 1950s, and 1960s (including Sea Pines, Skull Creek Large and Small, early work on Fig Island, Sewee, and Sapelo). Whereas many of these excavations were extensive, they were vastly underreported (when published at all). Not until the 1970s was extensive, well-documented work performed on the shell rings of the American Southeast. Michael Trinkley's work at Lighthouse Point (Trinkley, 1975) and Rochelle Marrinan's research on Cannon's Point (Marrinan, 1975) marked a turning point in the excavation and publication of shell ring data (see also chap. 4, this volume).

The quality of shell ring excavations and the reports of those investigations have steadily increased. Recent work by Mike Russo, Rebecca Saunders, Gregory Heide, and Victor Thompson highlight the current quality of excavations and analysis undertaken at Late Archaic shell rings. This paper reports preliminary results and ongoing research objectives at two shell rings on St. Catherines Island, Georgia.

Late Archaic shell rings are an archaeological manifestation unique to the American Southeast. Late Archaic rings are similar to their Middle Archaic precursors—the large mounds found in Florida, Louisiana, and Tennessee—in that both represent a significant investment of time and energy. But Late Archaic shell rings are qualitatively different from their predecessors. Their form, for instance—often a hollow circle—would seem to imply a greater degree of planning and purpose than the generally conical, occasionally random, shape of the Middle Archaic mounds. The function of Late Archaic shell rings, still very much in debate, also differs markedly from the Middle Archaic sites (that often appear to have been used as mortuary locales).

Until recently, shell rings were largely

Fig. 3.1. The distribution of Late Archaic shell rings in the American Southeast.

thought to be temporally limited to the Late Archaic. Recent research however (Schwadron, chap. 6, this volume and Russo, chap 7, this volume) suggests that shell rings continued to be constructed during the Early Woodland, especially in Florida.

Beyond their morphology, other cultural characteristics of the Late Archaic rings have provoked lively discussions within the archaeological community. Ceramic production first occurs during the Late Archaic, spurring archaeologists to question the motives behind this technological advancement (Jenkins et al., 1986; Sassaman, 1993b, 2002, 2004a; Milanich, 1994; Saunders and Hays, 2004b). Similarly, some of the earliest evidence for extended sedentism is found in Late Archaic sites, begging questions into the cultural, sociological, and economic ramifications of such a shift in settlement patterns (Russo, 1991a). The presumed planning and investment represented in Late Archaic shell rings also raises important questions regarding power, control, and hierarchy (Russo, 2004b; Gibson and Carr, 2004; Thompson, 2007).

NATURAL ENVIRONMENT OF THE ST. CATHERINES ISLAND RINGS

Elsewhere in this volume, one of us discusses in some detail the natural environment of St. Catherines Island (Thomas, chap. 8, see also Thomas, 2008a; fig. 3.2). Like most of the so-called Golden Isles, St. Catherines is a mixture of active Holocene beaches welded onto a more ancient Pleistocene core (Tybee and Wassaw Islands are examples of a different geologic history—both were formed out of Holocene deltaic deposits).

Because of lower sea levels, St. Catherines Island was a landlocked ridge miles from the Atlantic Ocean prior to the Late Archaic. Around 3000 cal B.C., sea levels reached very close to modern day levels (DePratter and Howard, 1977; Howard and Frey, 1980; Booth et al., 1999a; Booth, Rich et al., 1999b). Sea level change also slowed during this time period, allowing the formation of inlets, estuaries, and marshes throughout the southeast. Crusoe and DePratter (1976: 2) suggest that the marshes found on the western sides of the barrier islands did not form until sometime between 3700 and 2100 ^{14}C yr B.C. It is during this time that the shell rings are constructed and we find the first evidence for human occupation on St. Catherines Island. Like many barrier islands of the Georgia Bight, a vast estuarine marsh lies to the mainland (western) side, with the eastern margin fronting directly on the Atlantic Ocean. Several of the other barrier islands, including Wassaw, Ossabaw, and St. Simons, have a secondary smaller island connected to the eastern edge of the main island, protecting a second tidal marsh on the eastern side of the islands. While modern St. Catherines does not have such a "butterfly" configuration, we think it likely that such an island did exist during the Late Archaic (Bishop et al., 2007; Thomas, 2008a: 843). The presence of this secondary island (dubbed "Guale Island") would have protected the eastern side of the island from wave action and would have allowed the existence of an extensive marsh along this side of the island (fig. 3.3). The contemporary McQueen marsh survives as a remnant, and the McQueen Shell Ring is located on this extensive marshland.

Both shell rings thus provided ready access to marsh and terrestrial resources during the early part of the Late Archaic (3000–2000 cal B.C.). Chapter 8 (Thomas, this volume) addresses the foraging potentials of both shell rings in considerable detail. For present purposes, it seems sufficient to note that although located on opposite sides of St. Catherines Island, both rings were constructed in very similar ecological settings. Both sites provide easy access to abundant shellfish and saltwater fish that thrive in the saltwater creeks. Both shell rings are adjacent to apparently stable freshwater creeks and they both exist within the vast maritime forest that blankets the Pleistocene portion of the island.

ARCHAEOLOGICAL RESEARCH ON THE ST. CATHERINES ISLAND RINGS

The St. Catherines Shell Ring (9Li231) was first recorded in 1979 during the systematic survey of the island (Thomas, 2008a; see fig. 3.4). Chester DePratter and archaeologists from the American Museum of Natural History (AMNH) excavated three test pits at this site, recovering diagnostic Late Archaic ceramics. Radiocarbon dates processed from these tests pits were the oldest cultural dates from the island (Thomas, 2008a, chaps. 14–16, 20). The AMNH returned to this site in 2006, renaming the locality the "St. Catherines Shell Ring" and initiating multiyear excavations, a large-scale mapping project, and

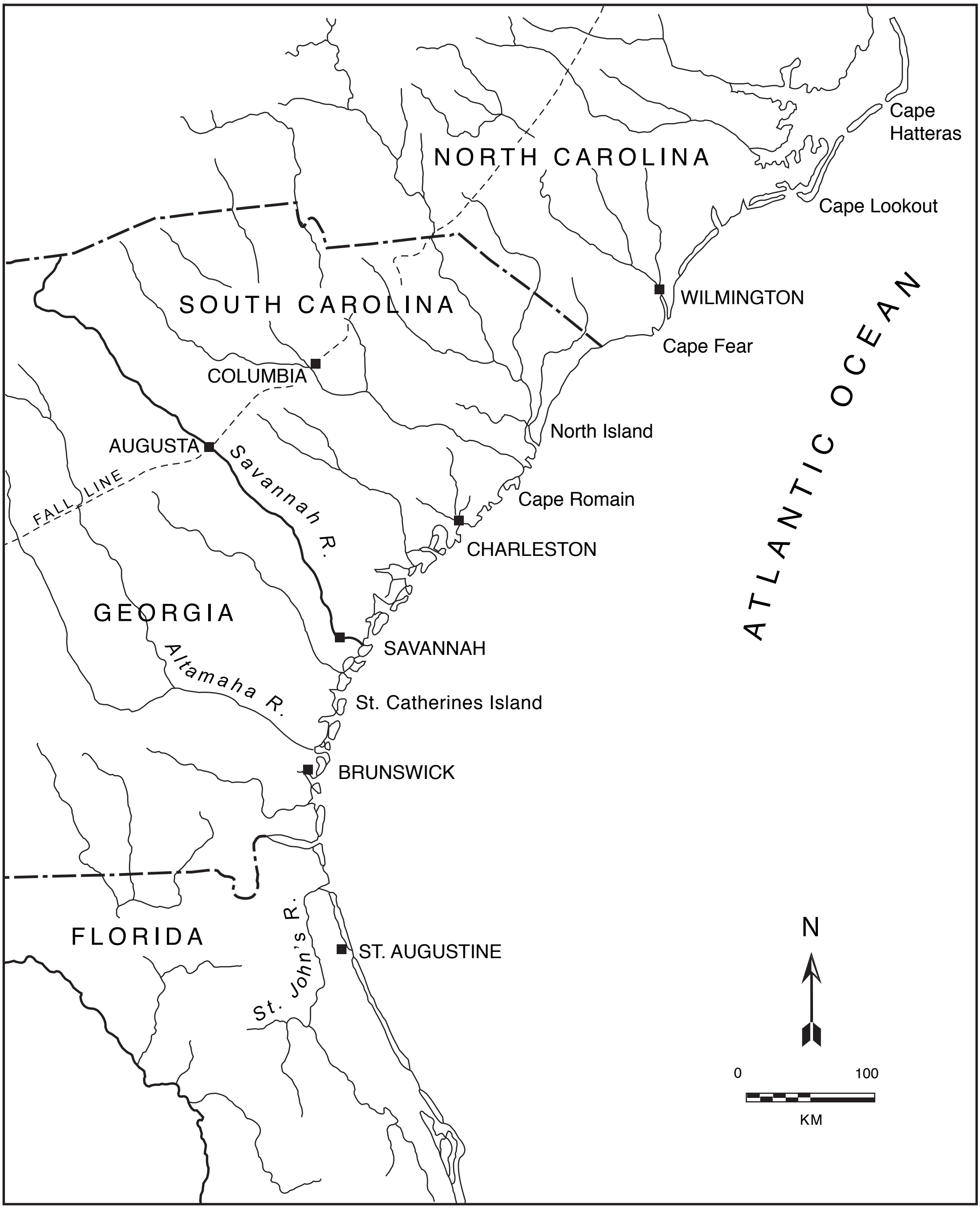


Fig. 3.2. Location of St. Catherines Island within the Georgia Bight.

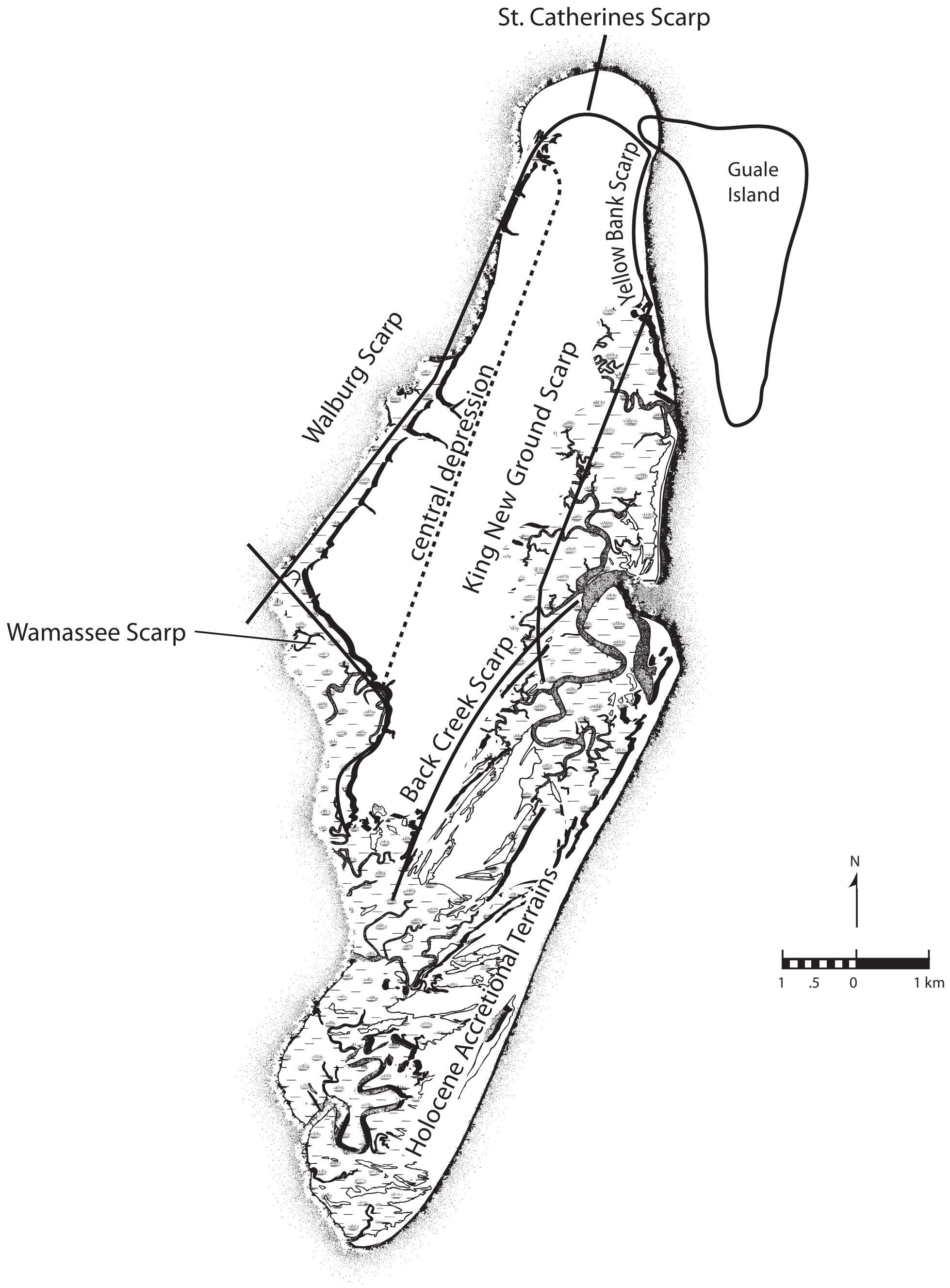


Fig. 3.3. The geomorphological structure of St. Catherines Island, showing the distribution of scarps bordering the central Pleistocene core, the Holocene accretional terrains along the northern and southern margins, and the position of the hypothesized "Guale Island" off the northeastern shoreline.

Fig. 3.4. Aerial photograph of St. Catherines Island, with the location of the two known Late Archaic shell rings.

an extensive remote sensing survey of the site.

McQueen Shell Ring was discovered during the summer of 2007 by the superintendent of St. Catherines Island, Mr. Royce Hayes, and Dr. Timothy Keith-Lucas (University of the South; see fig. 3.4). That fall, a crew from the AMNH conducted a preliminary survey of the site that confirmed its circular form. We then excavated two test pits, which produced St. Simons ceramics and three radiocarbon determinations that date to the Late Archaic period. In the spring of 2008, AMNH crews spent two field sessions conducting a remote sensing survey of the McQueen Shell Ring, followed by a large block excavation in the interior of the ring. In the fall of 2008, we excavated five one-meter square units into the shell-heavy portion of McQueen Shell Ring, and research continues at this site.

Mapping

The initial goal at both shell rings was to produce a detailed site map. This was especially critical at the St. Catherines Shell Ring because the site had been so extensively plowed during the antebellum plantation period that it was difficult to determine the ring's size and shape. The southern two-thirds of the ring are no longer visible on the surface due to the extensive plowing (see fig. 3.5). But the northern part of the ring is relatively intact, standing roughly 1.5 m higher than the current ground surface. The border between the plowed and unplowed sections of the site is marked by an antebellum boundary ditch that is roughly 20–30 cm deep.

The final topographic map clearly demonstrates that the St. Catherines Shell Ring is a nearly perfect circle, measuring 70 m between the two exterior edges of the shell. The shell that makes up the circle varies in thickness from roughly 1 m to only 25 cm in the heavily plowed area. This distinctive shell ring defines an interior, shell-free plaza that is 34 m across.

These dimensions are quite similar to those of McQueen Shell Ring, which is not perfectly circular (the north-south axis is slightly longer than the east-west dimension; see fig. 3.7). The longer axis measures 71 m from the exterior edges of the shell deposit. The shell deposit is only 30–50 cm deep, enclosing a 47 m wide plaza.

Remote Sensing

To better understand the structure and extent of the shell rings, the AMNH conducted several

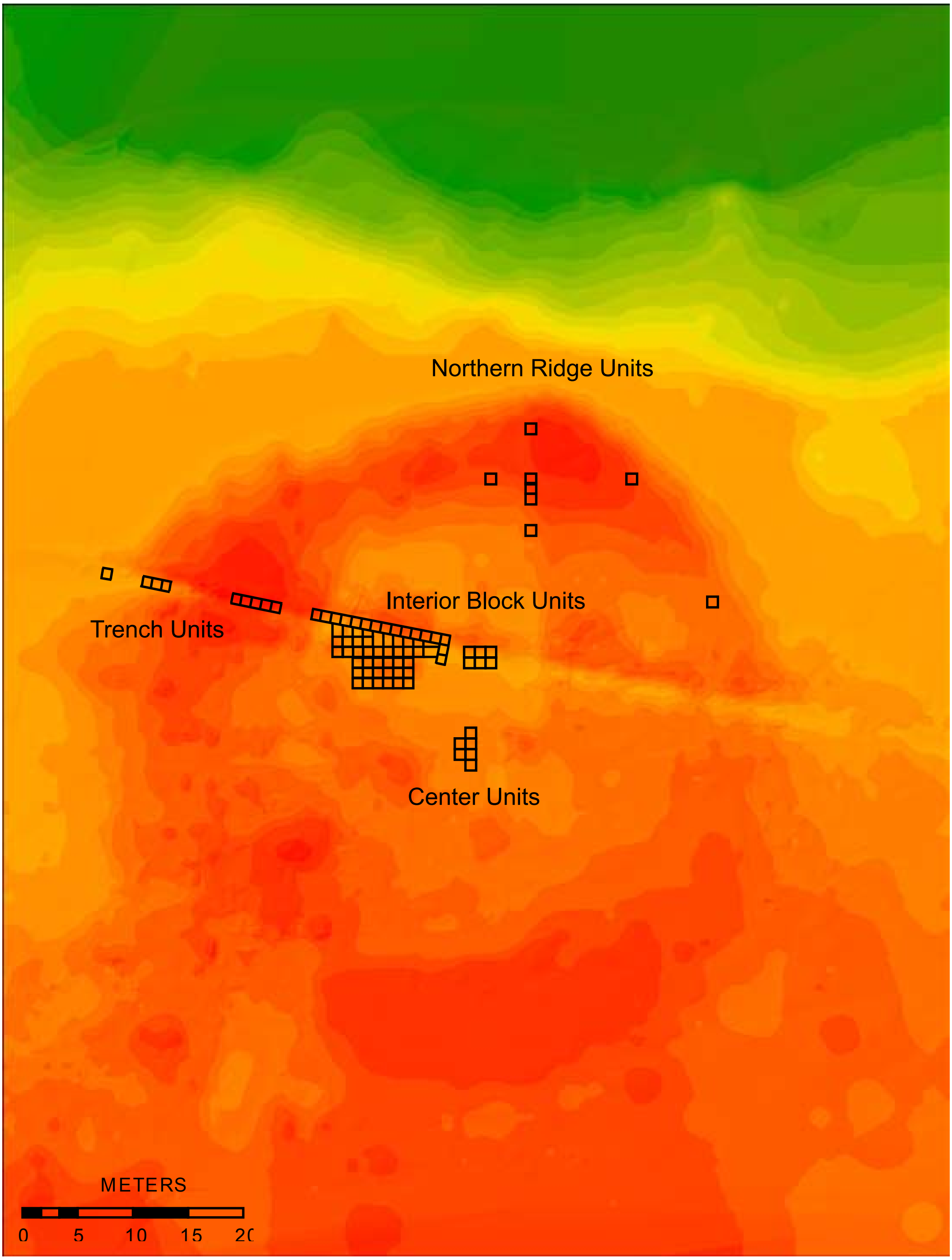


Fig. 3.5. Topographic map of the St. Catherines Shell Ring (9Li231), with the major excavation units plotted. The prominent diagonal feature is the 19th-century boundary ditch defining the Long Field. The top of the page is true north.

remote-sensing surveys at both sites. We use "remote sensing" as an umbrella term covering the various noninvasive technologies that allow investigators to "see" underground without actually excavating. We employed three different remote sensing methods at St. Catherines Shell Ring—ground-penetrating radar, resistivity, and gradiometry. Only the latter two techniques have been used to date at McQueen Shell Ring.

Ground-penetrating radar (GPR) consists of transmitting high-frequency microwave pulses into the ground and measuring the travel time of that microwave transmission as reflected and refracted by subsurface materials (Conyers and Goodman, 1997; Conyers, 2004). Travel time is a function of the permeability of the subsurface materials through which the microwave travels. We used a 500 MHz antenna to survey 7600 m^2 across the St. Catherines Shell Ring, encompassing all of the shell deposit and the interior of the shell ring. While many of the larger features of the ring are clearly visible in the radar data—including the boundary ditch and the extent of the shell deposit—we could discern little else. Several possible subsurface anomalies were identified in the data, but were not visible when we tested them. Overall, we found that the GPR did not provide particularly outstanding results, and we decided against using GPR at McQueen Shell Ring.

We have completed gradiometer surveys at both shell rings. Magnetic gradient is a measure of a local magnetic field, calculated as the difference between the total magnetic field and the earth's magnetic field (Aspinall et al., 2008). Such surveys are particularly useful in locating metal artifacts and burned features (by detecting magnetic susceptibility and remnant magnetism). At the St. Catherines Shell Ring we used a Geometrics G-858 cesium magnetometer with a two-sensor, one-meter spacing, and a vertical gradient configuration. At McQueen Shell Ring we used a FM256 single fluxgate gradiometer. Both surveys suggest the presence of numerous subsurface features, plus the presence of historic metal closer to the site surface (including a 19th-century barbed wire fence at St. Catherines Shell Ring; see fig. 3.7). Data from both sites are still being analyzed and we are currently working with only preliminary results; we should note, however, that we have tested several of the magnetic anomalies at St. Catherines Shell Ring, and each of these was a buried Late Archaic feature.

We also conducted soil resistivity surveys at both rings (see figs. 3.8 and 3.9). Soil resistivity measures how effectively an electric current passes through soil. Different types of soil will allow electrical current to pass at different rates; the higher the resistivity of a given soil, the more difficult it is for electric current to pass through. Because soil resistivity is a function of moisture and temperature, the results can vary depending on region and seasons. Soil resistivity is a very useful way of identifying subsurface features such as hearths (which tend to hold more moisture than the surrounding soil) or buried features such as foundations (which allow very little moisture to penetrate).

Figure 3.10 shows the superimposed soil resistivity and gradiometer data from the McQueen Shell Ring. The background resistance data (collected with an RM15D unit coupled with an MPX15 multiplexer) are portrayed as a grayscale-shaded relief map, with the lighter areas indicating higher resistance; all place markers for areas where data cannot be recovered ("dummy data" inserted for trees and other obstructions; and also substituted for abnormal readings, high/low spikes, and survey error) are excluded here. The gradiometer data (obtained with a single FM256 fluxgate gradiometer) have been log normalized, with the warm colors indicating negative data and the cooler colors being positive.

We are still analyzing the various remote sensing data recovered from both the St. Catherines and McQueen shell rings.

Excavation: St. Catherines Shell Ring

These topographic and remote sensing surveys heavily informed our excavation strategies at both rings. At the St. Catherines Shell Ring, we placed a trench within the historic field boundary that crossed the site, specifically to crosscut several large anomalies found during the remote sensing surveys (see figs. 3.5, 3.7, and 3.8). We also positioned our excavation trench within the plantation-era boundary ditch because that area was already disturbed, and we could minimize our further impact on the site. We also recognized that the antebellum ditch is itself an archaeological "artifact" worthy of research; by carefully excavating within the field boundary ditch, we could determine whether plowing had destroyed the precontact components of the site. We also thought that perhaps the ditch had served as a "trap" for artifacts that might have eroded out of

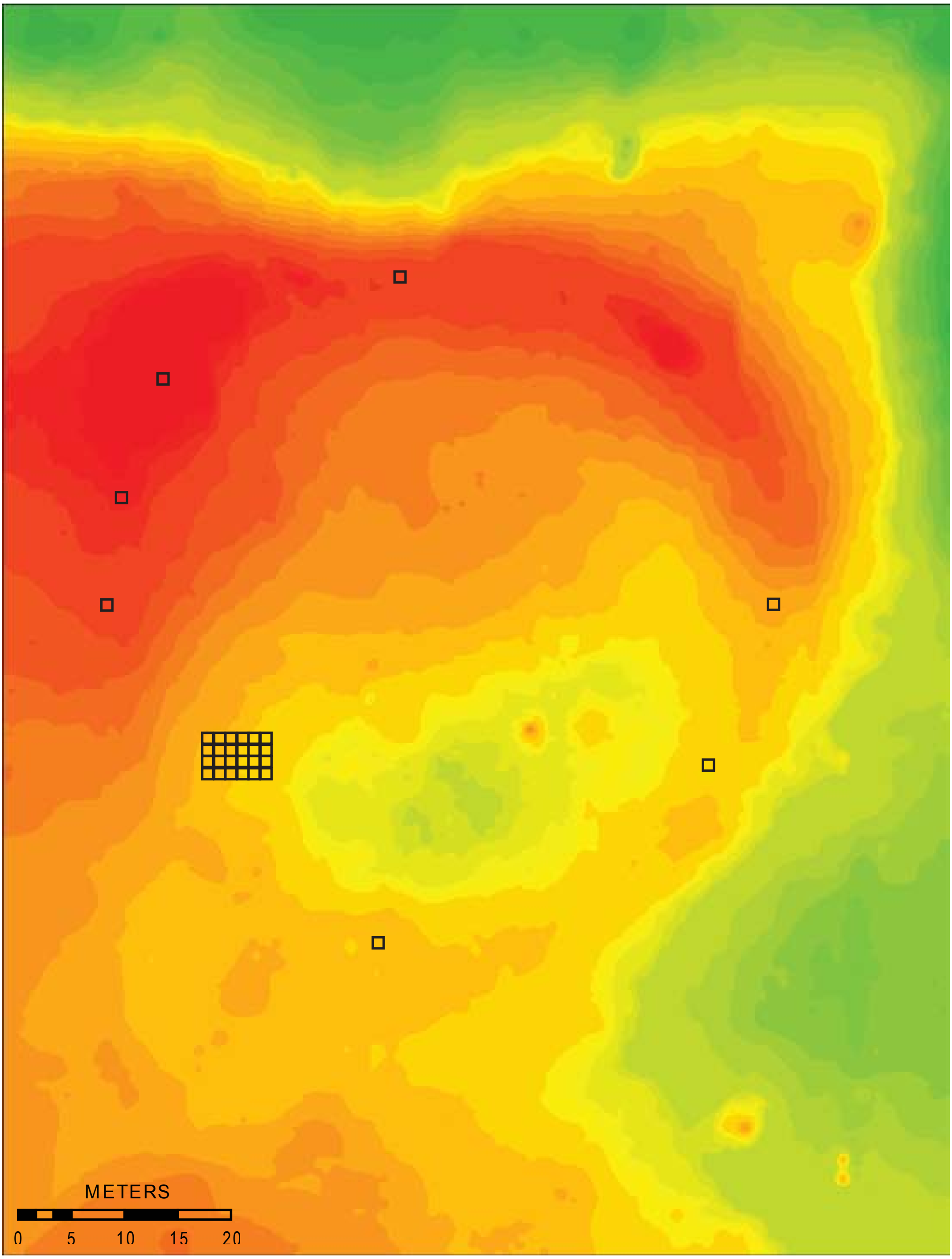


Fig. 3.6. Topographic map of the McQueen Shell Ring (9Li1648), with the major excavation units plotted (as of November 2008). The top of the page is true north.

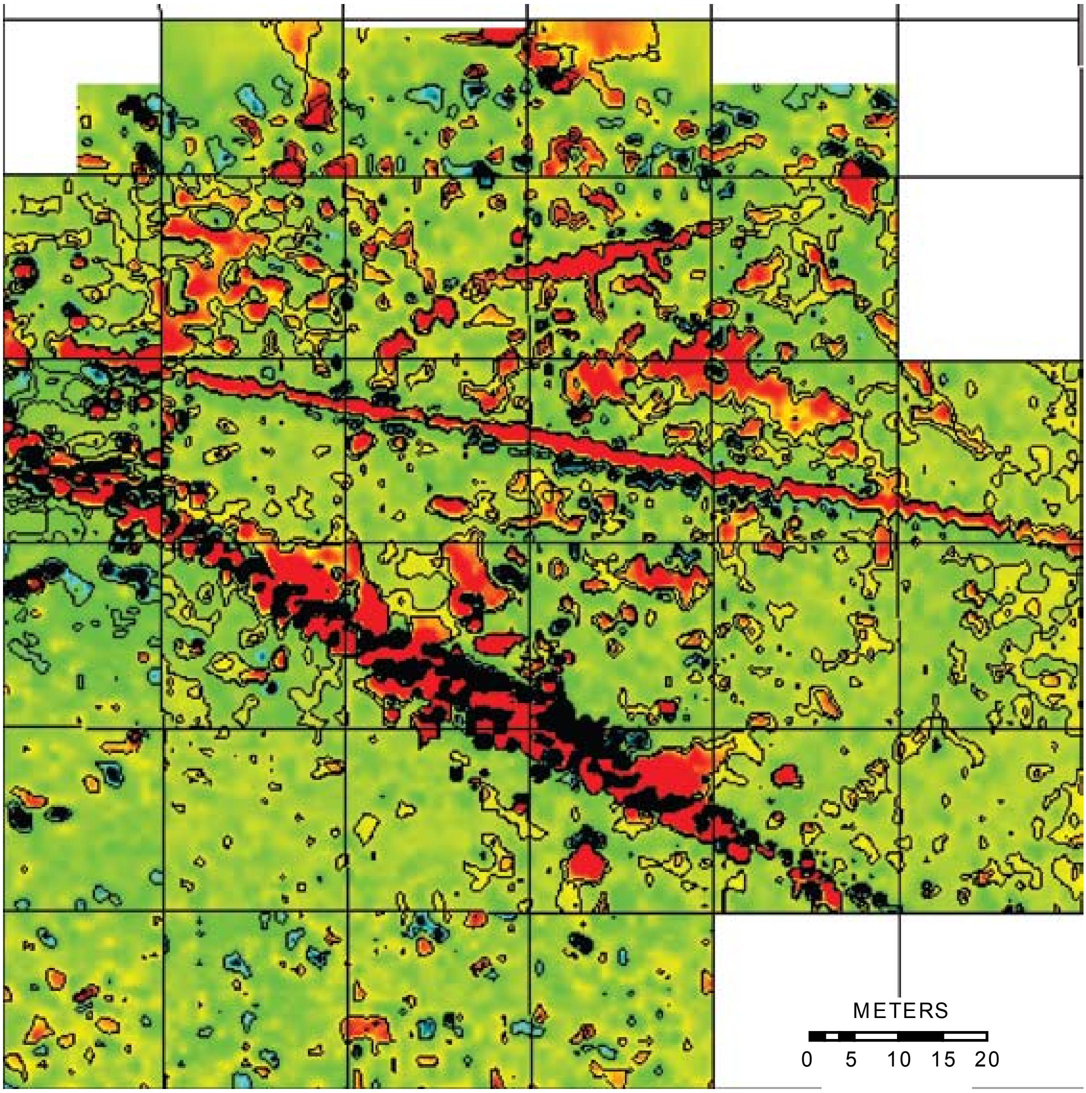


Fig. 3.7. Magnetometer gradiometer survey results at the St. Catherines Shell Ring. Note the two circular features at the center of the map, delimiting the limits of the shell ring. The uppermost diagonal line is the antebellum field boundary ditch bordering Long Field and the lower diagonal line is a decomposed and partially buried 19th-century barbed wire fence. The top of the page is true north.

other nearby areas, thereby increasing the chances of finding a diverse assortment of artifacts. In total, we dug 25 one-meter squares within the boundary ditch at St. Catherines Shell Ring.

One of the primary goals at St. Catherines Shell Ring is to better understand the depositional processes responsible for ring construction. This is why we dug the excavation trench and the units along the northern ridge of the site (see fig. 3.5). The northern ridge units consist of seven one-meter-square units sited in the unplowed section of the ring. Except for the three test pits from 1979, these were the first units excavated in St. Catherines Shell Ring, situated atop the thickest shell deposit to expose a stratigraphic window into the site's stratigraphy.

The stratigraphic sequence of St. Catherines Shell Ring is complex and the details are beyond the present scope. But in broad brush, the stratigraphy we encountered mirrors that documented from many other southeastern shell rings. In some areas, the shells appear to be mounded; elsewhere the deposition is layered, sometimes in very thin horizontal lenses. Interspersed between the shells are pockets of darker soil, occasionally forming a distinct stratum between shell concentrations. The shells are often whole and loosely packed, but sometimes crushed and densely distributed. Oyster shells always predominate, with occasional concentrations of hard clams, marsh periwinkles, or horse mussels. We are presently conducting several quantitative studies to define more precisely the geomorphic structure and to document changing vertebrate and invertebrate frequencies through the stratigraphic column and across the shell ring structure.

We encountered several large features while excavating the primary strata trench, large areas of dark soil with well-defined edges, clearly different from the surrounding light-colored sand. These features were so large that it is difficult to discern their overall shape when encountering them in a one-meter-wide trench. This is why we shifted our strategy from digging a vertical strata trench through the shell ring to a large-scale horizontal block excavation.

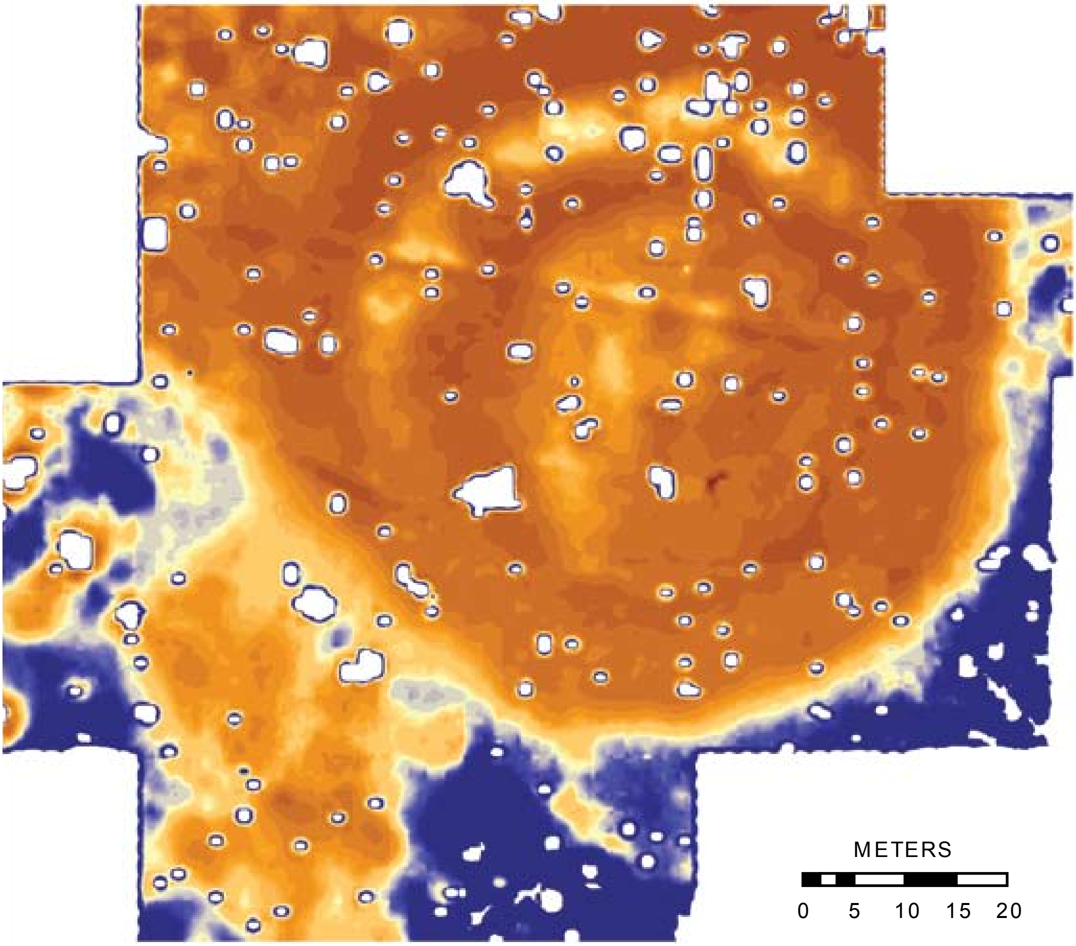


Fig. 3.8. Soil resistivity survey of the St. Catherines Shell Ring. The top of the page is true north.

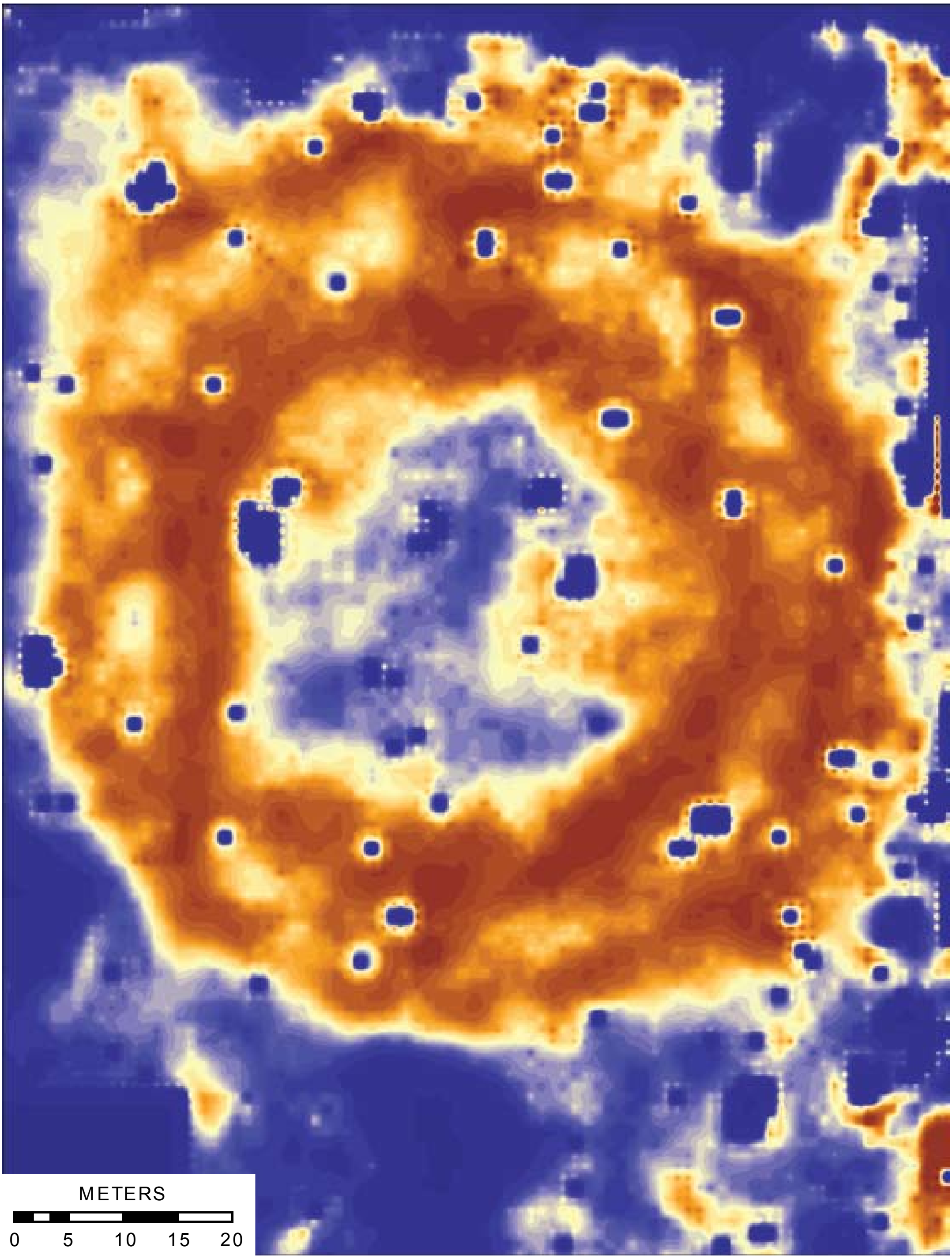


Fig. 3.9. Soil resistivity survey of the McQueen Shell Ring. The top of the page is true north.

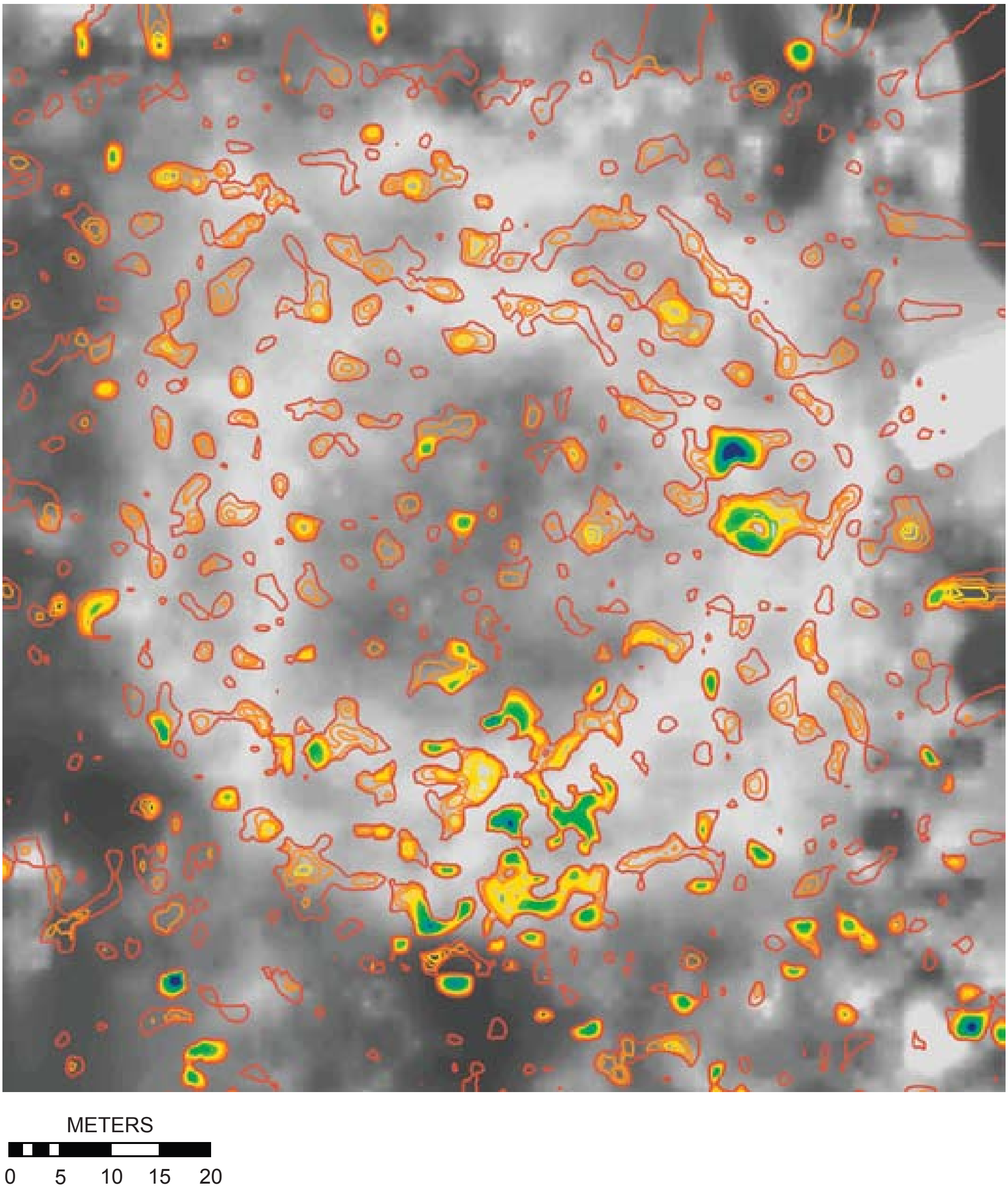


Fig. 3.10. The superimposed soil resistivity and gradiometer data from the McQueen Shell Ring. Background resistance data is portrayed as a grayscale-shaded relief map, with the lighter areas indicating higher resistance. Background resistance data (RM15D with MPX15) seen in grayscale-shaded relief map, with the scales range from lightest gray at 200 ohms to darkest gray at 2000 ohms. Gradiometer contour overlay data are log normalized, warm colors are negative data and cool colors are positive, ranging from –1 to +0.70 nanotesla. North is at top of image.

Our excavations within the boundary ditch quickly confirmed that antebellum-period plowing had only minimal impact on the southern two-thirds of the site, causing only limited damage to the interior plaza. Inside St. Catherines Shell Ring, the Late Archaic horizon shows up roughly 30–40 cm below the modern surface and plow damage appears to have been restricted to the top 20–30 cm of the ring's interior. This is why we felt confident in expanding the block excavations into the impacted portion of the site in search of buried Late Archaic features.

Over two field seasons, we excavated 54 one-meter square units within the interior of the shell ring (see figs. 3.5 and 3.11). Of these, 42 units were conjoined in a block immediately south of the antebellum trench, six units were placed just east of this block, and six more units were excavated in the exact center of the ring. As hoped, this larger horizontal window did indeed provide a more complete view of the features first encountered in the strata trench.

We uncovered 49 features inside the interior plaza of St. Catherines Shell Ring, 36 of which are large circular "pits" with straight walls and flat bottoms (fig. 3.11). The fill contained a dark organic soil and very little else (see fig. 3.11); in most features, shell was entirely absent and with only occasional pieces of nonhuman bone, lithics or ceramic objects (but fewer than recovered from adjacent nonfeature areas). The circular features often did contain more botanical remains than elsewhere (especially acorn and hickory nut shells), leading us to speculate that perhaps the pit features were used for processing mast (either through boiling or direct roasting). While this remains a logical hypothesis with ethnographic and archaeological correlates (Swanton, 1946; Chapman and Shea, 1981; Asch and Asch, 1985; Gremillion, 1998), considerable evidence calls this notion into question. We recovered relatively little carbonized material, which could perhaps be explained by the high degree of leaching and other postdepositional processes; nevertheless, we should have recovered considerable charcoal in these pits, and we did not. The consistently precise circular shape of these flat-bottom features is also difficult to correlate with roasting pits (which are usually shallower, with sloping sides and round bottoms).

Based primarily on the shape and distribution of these features, we are inclined to suggest that they might have structural origins, likely as large postholes. This hypothesis would explain the general lack of artifacts and burnt materials (but not the higher frequency of charred plant remains). Obviously, these would be rather large postholes—several of the features are more than one meter wide—implying an equally large structure (or structures). We think archaeobotanical analy-

Fig. 3.11. Photographs showing the distribution of several of the large circular pits discovered within the St. Catherines Shell Ring. Each of these features has straight walls and flat bottoms; pits generally contain only dark organic soil and very little else. A total of 49 such features have been excavated within the interior plaza of the St. Catherines Shell Ring. Photo at left, taken during the May 2007 field season, faces east; extent of excavation along the western margin is 4 m. Photo at right, taken during the November 2007 field season, also faces east; excavation area is immediately to the south of the May 2007 block excavation. Extent of excavation along the western margin is 3 m.

sis of the feature fill will clarify their function, and such analyses are presently ongoing, under the direction of Donna Ruhl (Florida Museum of Natural History).

The large, circular pit features are apparently restricted to a limited area within the interior of St. Catherines Shell Ring that corresponds with our remote sensing results. Both the resistivity and magnetometry surveys (and to a lesser degree the GPR survey) have a band of anomalous readings immediately adjacent to the interior edge of the shell deposit. The block excavations show that these circular features are packed into a 9 m wide corridor that corresponds with the anomalous remote sensing readings. To the interior of this "feature-rich" corridor is a 4–5 m wide section of the interior where no features have been encountered and the remote sensing data are relatively "quiet." A spike in remote sensing anomalies as well as the reoccurrence of features appears in the exact center of the ring. The features found in the center of the ring appear to be numerous circular pits that are superimposed upon each other (figs. 3.11 and 3.12).

Extrapolating from the remote sensing maps, and considering that we have excavated only 7.5% of this 9 m wide "feature-rich" corridor, we hypothesize that more than 500 of these large, flat-bottomed, circular features are buried within the interior of the St. Catherines Shell Ring.

Excavation: McQueen Shell Ring

Our excavation strategy at the McQueen Shell Ring was also heavily influenced by the results of the remote sensing surveys. Recalling our experiences at St. Catherines Shell Ring, we were immediately attracted to the angular anomalies evident within the interior edge of the shell deposit (see fig. 3.6), visible in the resistivity survey map, but not in the gradiometer survey (figs. 3.9 and 3.10).

To intersect one of these angular anomalies and provide a broader horizontal window, we dug a 4 × 6 m block excavation along the ring interior. The apparent angular anomaly is likely a feature of plowing that altered site drainage to the extent that it only appeared on the resistivity results, but not on those from the magnetometer. During this block excavation, we also encountered numerous large features in the interior of McQueen Shell Ring, and they are reminiscent of those documented at St. Catherines Shell Ring. The initial block excavation at the McQueen Shell Ring exposed 10 circular, relatively straight-walled features, each containing dark soil deposits. Although we have not completely excavated any of these features, it seems clear that the circular features encountered within the interiors of both the St. Catherines and McQueen shell rings are extremely similar in shape, size, frequency, and relationship to the overall site layout. We strongly suspect they had similar functions as well.

Dating the St. Catherines Shell Ring

To date, we have processed 35 ^{14}C dates from the St. Catherines Shell Ring and 15 additional dates from the McQueen Shell Ring. We have employed a variety of sampling strategies in selecting samples for radiocarbon dating and the results leave little doubt that the two rings were contemporaneous.

We have calibrated the laboratory results according to the established protocols already established for St. Catherines Island (Thomas, 2008a: table 13.4, chap. 15), namely using the CALIB 5.0.1 Radiocarbon Calibration Program (as initially presented by Stuiver and Reimer, 1993 and updated by Stuiver et al., 2005). For terrestrial samples, we used the IntCal04 curve (Reimer et al., 2004) and for marine samples, we employed the Marine04 curve, which takes into account the "global" ocean effects (Hughen et al., 2004). We also used the St. Catherines Island–specific reservoir correction of $\Delta R = -134 \pm 26$ (as derived in Thomas, 2008a: chap. 13). We have also rounded all age estimates to the nearest decade.

The St. Catherines Shell Ring radiocarbon results derive from four distinct contexts: samples from features underlying the shell ring, samples from within the shell deposit, samples on bulk soil from the plaza features, and charcoal samples from the plaza features (see table 3.1). This broad-based sampling strategy resulted in several problematic radiocarbon determinations from this site, as we discuss below.

Anomalous Dates: One suspect date (Beta-229425: 4580–4330 cal B.C.) is far older than the others from the St. Catherines Shell Ring and difficult to reconcile with our current thinking about sea level change on the Georgia Bight. According to existing paleoenvironmental models, significant shellfish resources should have appeared in the estuaries bordering St. Catherines Island only about 3700 cal B.C. (and perhaps not until 3000 cal B.C.; Thomas 2008a; see also chap. 8, this volume). While the

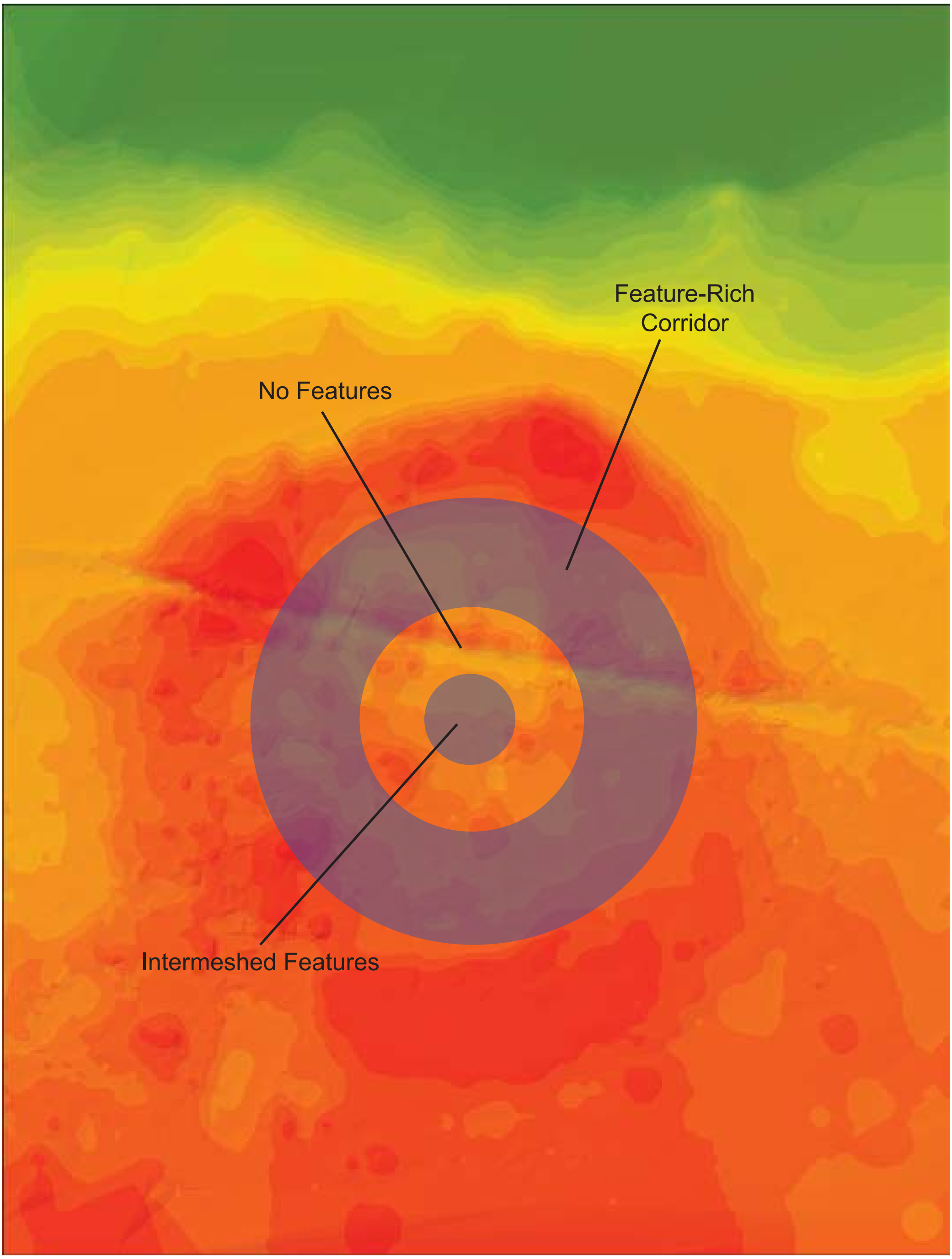


Fig. 3.12. Distribution of large, circular pits in the "Feature-Rich Corridor" of the St. Catherines Shell Ring. The top of the page is true north.

possibility exists that Beta-229425 is a laboratory error, this age is not without precedent. One of the two radiocarbon dates from Horr's Island, a Late Archaic shell ring in Florida, is an oyster shell sample predating the anomalous date from St. Catherines Island (Russo, 2006).

We attempted to test the age of Beta-229425 by processing two marine shells from the same location (Beta-231334 and 231335). The results, 2460–2140 cal B.C. and 2620–2330 cal B.C., respectively, are much later and fully consistent with most of the other radiocarbon dates from St. Catherines Shell Ring. These findings suggest that Beta-229425 was either an ancient, relic oyster intermingled with much younger shells or the result is a lab error. Accordingly, we exclude Beta-229425 from subsequent analysis of this site.

Based on context, we also exclude two additional ^{14}C dates from our discussion of St. Catherines Shell Ring. Beta-21409 (2950–2470 cal B.C.) was processed on an oyster shell that was recovered from only a few cm below the surface. Because of the numerous postdepositional processes at work at the ring—including plowing, storm surge, and rooting by pigs, we now feel that this sample may have been removed from its original context. The second date (Beta-229422: 2730–2430 cal B.C.) derives from an oyster shell sample recovered from a vibracore column that we have yet to put into relevant stratigraphic context. While these dates may figure in subsequent analyses, they are excluded from the present discussion.

PRERING DATES: Our excavations encountered, in several places, a series of semicircular, shallow features, stratigraphically beneath the shell deposit that comprises the ring structure. Other Late Archaic shell rings contain similar features (Russo, 2002, 2006; Saunders, 2004; Thompson, 2007), typically identified as roasting pits, post holes, and storage pits. The prering features at St. Catherines Shell Ring often show signs of burning, to such a degree that many of the shells are reduced to powder. We are awaiting further analysis of the artifacts and the faunal and floral materials found within these features before attempting to assess their use.

The suite of five dates from these prering features at St. Catherines Shell Ring (Beta-231335, 215821, 215824, 231334, and 238336) are statistically different than each other ($t = 17.43$, $\chi^2_{.05} = 9.49$, df = 4). But four of the dates are quite similar, and when the older outlier is excluded (Beta-238336: 2900–2570 cal B.C.), they are statistically identical ($t = 3.232211$, $\chi^2_{.05} = 7.81$, df = 3). Pooling the four statistically identical dates results in an age estimate of 2540–2290 cal B.C.

Sapelo Ring 3 contains a number of similar prering, shell-filled pits (Thompson, 2006). Thompson suggests that Sapelo 3 was under construction when it was abandoned and only the first stage of construction, the creation of shell filled pits in a circle, had been completed (Trinkley, 1980, 1985; Thompson, 2006). It is possible that a similar construction sequence took place at St. Catherines Shell Ring and these prering features are part of the process of making a shell ring.

Based on the available radiocarbon evidence, we conclude that the prering feature might have been constructed 2900–2570 cal B.C., but the majority of such features were constructed within a brief period of time, possibly a single episode, dating 2540–2290 cal B.C. These prering features have only been encountered immediately under the shell deposit at St. Catherines Shell Ring, suggesting that the features were constructed in a circle prior to the construction of the ring itself.

SHELL RING CONSTRUCTION DATES: A second set of ^{14}C determinations allows us to estimate when the massive shell deposits were added to create the primary ring structure at St. Catherines Shell Ring: five marine shell samples (Beta-229423, 229424, 215823, 21408, and 215822), and two charcoal samples (Beta-238327 and 238337; see table 3.1). These seven dates are statistically identical ($t = 8.49$, $\chi^2_{.05} = 12.6$, df = 6).

Many of the shell ring construction samples derive from contexts immediately overlying the prering features, and the construction stage dates are consistently younger than samples from the prering features. In general, the divergence between prering features and the construction-stage shell deposit is 100–300 years. Pooling the seven construction dates together results in a mean age estimate of 2230–2030 cal B.C.

Looking in more detail at the locales where ^{14}C determinations derived from prering features and initial construction stages are paired together suggests that there is a variation in the sequence of ring construction across the site. In one unit (W82 S2) four ^{14}C determinations were recovered (Beta-231334, 231355, 229423, and 229424). Two of the ^{14}C determinations (Beta-231334 and 231355) were derived from a prering feature

TABLE 3.1
Radiocarbon Dates (*n* = 50) from the Two Late Archaic Shell Rings on St. Catherines Island

Beta No.	Provenience	Material	^{14}C Age B.P. (±1σ)	^{13}C/^{12}C	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ)
St. Catherines Shell Ring (9Li231)						
Beta-21408	TP I (60-70)	*Mercenaria*	3470 ± 80	-1.7	3860 ± 80	2300–1810 B.C.
Beta-21409	TP I (10-20)	*Mercenaria*	3980 ± 90	-1.2	4370 ± 90	2950–2470 B.C.
Beta-215821	N782 E801 66 cmbs	*Crassostrea*	3780 ± 50	-3.0	4140 ± 50	2600–2270 B.C.
Beta-215822	N784 E801 67 cmbs	*Crassostrea*	3430 ± 50	-2.6	3800 ± 60	2160–1770 B.C.
Beta-215823	N789 E801 23 cmbs	*Crassostrea*	3510 ± 50	-2.5	3880 ± 50	2260–1920 B.C.
Beta-215824	N789 E801 83 cmbs	*Crassostrea*	3770 ± 50	-3.8	4120 ± 60	2580–2200 B.C.
Beta-229422	922/182-66-82	shell	3870 ± 40	-3.2	4230 ± 40	2730–2430 B.C.
Beta-229423	W82 S2 at 3.0 m	shell	3630 ± 50	-4.1	3970 ± 50	2390–2030 B.C.
Beta-229424	W82 S2 at 2.0 m	shell	3600 ± 50	-3.3	3960 ± 50	2380–2020 B.C.
Beta-229425	W82 S2 at 2.0 m	shell	5490 ± 50	-3.1	5850 ± 50	4580–4330 B.C.
Beta-231331	Feature 24 level 1.8–1.7 m	bulk soil	3660 ±40	-25.6	3650 ± 40	2140–1920 B.C.
Beta-231332	Feature 5 level 1.5–1.4 m	bulk soil	3260 ± 40	-25.4	3250 ± 40	1620–1440 B.C.
Beta-231333	Feature 36 level 1.7–1.6 m	bulk soil	3580 ± 40	-25.6	3570 ± 40	2030–1770 B.C.
Beta-231334	W82 S2 base of pit feature	shell	3670 ± 50	-2.2	4040 ± 50	2460–2140 B.C.
Beta-231335	W82 S2 base of pit feature	shell	3800 ± 40	-2.7	4170 ± 40	2620–2330 B.C.
Beta-231336	Feature 23 level 1.8–1.7 m	bulk soil	3270 ± 40	-25.6	3260 ± 40	1630–1440 B.C.
Beta-233129	Feature 20 depth 1.9–1.13 m	bulk soil	3390 ± 40	-24.6	3400 ± 40	1880–1610 B.C.
Beta-233130	Feature 23 depth 1.8–1.7 m	shell	3620 ± 60	-0.6	4020 ± 60	2460–2090 B.C.
Beta-233131	Feature 37 depth 1.9–1.8 m	bulk soil	3570 ± 40	-24.4	3580 ± 40	2030–1780 B.C.
Beta-233132	Feature 17 depth 1.9–1.8 m	bulk soil	3640 ± 40	-24.7	3640 ± 40	2140–1910 B.C.
Beta-233133	Feature 9 depth 1.7–1.6 m	bulk soil	3230 ± 40	-24.1	3240 ± 40	1610–1430 B.C.
Beta-233134	Feature 28 depth 1.6–1.5 m	bulk soil	3250 ± 40	-24.4	3260 ± 40	1630–1440 B.C.
Beta-238322	Feature 60 2.0–1.9 m	hickory nut	3880 ± 40	-25.7	3870 ± 40	2470–2210 B.C.
Beta-238323	W92 S2 2.3-2.2 m	bulk soil	3480 ± 40	-25.2	3480 ± 40	1900–1690 B.C.
Beta-238327	W92 S2 2.3-2.2 m	hickory nut	3810 ± 40	-24.2	3820 ± 40	2460–2140 B.C.
Beta-238328	Feature 76 1.9–1.8 m	burnt wood	4110 ± 40	-24.5	4120 ± 40	2870–2580 B.C.
Beta-238329	Feature 76 1.9–1.8m	bulk soil	3600 ± 40	-25.3	3600 ± 40	2130–1830 B.C.
Beta-238330	Feature 88 1.8–1.7 m	bulk soil	2920 ± 40	-25.2	2920 ± 40	1261–1010 B.C.
Beta-238331	Feature 88 1.8–1.7 m	burnt wood	3830 ± 40	-25.4	3820 ± 40	2460–2140 B.C.
Beta-238332	Feature 73 1.8–1.7 m	burnt wood	3900 ± 40	-26.0	3880 ± 40	2470–2210 B.C.
Beta-238334	Feature 73 1.8–1.7 m	bulk soil	3590 ± 40	-24.7	3590 ± 40	2120–1780 B.C.
Beta-238335	Feature 82 1.8–1.7 m	bulk soil	3630 ± 40	-24.9	3630 ± 40	2130–1980 B.C.
Beta-238336	N771 E819 2.39–2.3 m	shell	3990 ± 60	-0.9	4390 ± 60	2900–2570 B.C.
Beta-238337	N771 E819 2.39–2.3 m	burnt wood	3890 ± 40	-26.8	3860 ± 40	2460–2210 B.C.
Beta-239276	Feature 82 NE Quad 1.9–1.8 m	charred material	3930 ± 40	-25	3930 ± 40	2570–2290 B.C.

TABLE 3.1 — (*Continued*)

Beta No.	Provenience	Material	^{14}C Age B.P. ($\pm 1\sigma$)	^{13}C/^{12}C	Adjusted age B.P.	Radiocarbon age calibrated[a] ($\pm 2\sigma$)
McQueen Shell Ring (9Li1648)						
Beta-238324	TP II Top	shell	3710 ± 50	-0.9	4100 ± 60	2560–2190 B.C.
Beta-238325	TP II Bottom	shell	3420 ± 50	-3.2	3780 ± 50	2120–1770 B.C.
Beta-238326	TP II Middle	shell	3600 ± 50	-1.3	3990 ± 50	2420–2060 B.C.
Beta-244618	N229 E185 4.4-4.3 m	charred material	940± 40	-25.1	940 ± 40	A.D. 1020–1190
Beta-244619	Feature 4	shell	1470±40	-0.8	1870 ± 40	A.D. 260–520
Beta-244620	Feature 21 4.0–3.9 m	charred material	3800±40	-25.3	3800 ± 40	2460–2060 B.C.
Beta-244745	Feature 19 N 4.0–3.9 m	charred material	6050±40	-24.4	6060 ± 40	5200–4840 B.C.
Beta-251761	N243 E233 4.5–4.4m	charred material	3700 ± 40	-23.9	3720 ± 40	2280–1980 B.C.
Beta-251762	N243 E233 4.5–4.4 m	shell	3420 ± 50	-0.8	3820 ± 50	2180–1850 B.C.
Beta-251764	N272 E200 5.3–5.2 m	charred material	3710 ± 40	-25.0	3710 ± 40	2270–1980 B.C.
Beta-251765	N272 E200 5.1–5.0 m	shell	3590 ± 50	-1.0	3990 ± 50	2420–2060 B.C.
Beta-251766	N272 E200 5.1–5.0 m	charred material	3840 ± 40	-27.5	3800 ± 40	2460–2060 B.C.
Beta-251767	N243 E233 4.4–4.3 m SHELL	charred material	3680 ± 40	-24.8	3680 ± 40	2200–1950 B.C.
Beta-251768	N243 E233 4.4–4.3 m SHELL	shell	3540 ± 40	-2.4	3910 ± 40	2270–1970 B.C.
Beta-251769	N243 E233 4.3–4.2 m	shell	3490 ± 40	-4.2	3830 ± 40	2150–1870 B.C.

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

underlying the primary shell deposit. Beta-231334 has a large degree of overlap with the two ^{14}C determinations (Beta-229423 and 229424) that overlie it and date the construction stage of the ring. Beta-231334 derives from the very top of the prering feature and may actually be dating the beginning of the major shell deposit rather than the feature. In two other contexts where we have paired dates from prering features and the overlying shell deposit the divergence between the two is more drastic than seen in W82 S2.

The two ^{14}C determinations derived from N789 E801 (Beta-215824 and 215823) suggest that the prering feature was constructed shortly before the rest of the ring was deposited. The prering ^{14}C determination (Beta-215824) dates to 2580–2200 cal B.C. while the overlying shell deposit (Beta-215823) dates 2260–1920 cal B.C. While there is a small amount of overlap between the two dates, they are statistically distinct ($t = 6.735$, $\chi^2_{.05} = 3.84$, df = 1). The last paired ^{14}C determinations from prering features and overlying shell deposit come from N782 E801 and N784 E801. While the ^{14}C determinations were recovered from two different units, separated by 2 m, the stratigraphy suggests that the two ^{14}C determinations were deposited in successive stages. The ^{14}C determination recovered from the prering feature (Beta-215821) dates to 2600–2270 cal B.C. while the overlying shell deposit (Beta-215822) dates to 2160–1770 cal B.C.

Keeping in mind that these seven samples were taken from the bottom, middle, and top of the shell deposit, we conclude that the vast majority of the ring construction took place within a couple of centuries, perhaps less. This estimate is similar to that for the Rollins Shell Ring, which Rebecca Saunders suggests accumulated rapidly due to episodic feasting on site, rather than the gradual accumulation of daily food remains (Saunders, 2004b).

INTERIOR PLAZA DATES: An additional 20 radiocarbon dates were processed on samples taken from the interior plaza of St. Catherines Shell Ring (see fig. 3.11) and 14 of these dates derive from bulk soil samples; the other dates were processed on shell or charcoal samples (table 3.1). When the interior features were first encountered during our May 2007 excavations, Georgia was undergoing a serious drought. Largely because of the dry conditions, the small pieces of charcoal uncovered in the plaza features were extraordinarily friable and often turned to dust immediately after being uncovered. Because usable charcoal samples were largely lacking and marine shells were almost completely absent from the fill of the interior plaza features, we turned to bulk soil samples in the attempt to date these features. The radiocarbon results on these nine samples are significantly younger than those from the rest of the St. Catherines Shell Ring dates (table 3.1).

One pair of dates derives from a single feature (feature 23), where we processed both shell and bulk soil samples. Beta-233130 (shell) returned a 2σ age range of 2460–2090 cal B.C. while the bulk soil (Beta-231336) dated much later, 1630–1440 cal B.C.

This alarming discrepancy led us to question the validity of using bulk soil samples for dating archaeological features (at least at the St. Catherines Shell Ring). A number of potential problems plague the use of bulk soil samples for radiocarbon dating, including contamination by modern rootlets, decomposition of older carbon already present in the soil, preburial erosion of the upper portion of the soil, translocation of organic matter, nuclear age ^{14}C being absorbed, and the possible inherent erratic/poorly understood nature of soil decomposition (Martin and Johnson, 1995; Kristiansen et al. 2003; Haynes, 2008).

Concerned with the validity of our bulk soil dates, we deliberately collected paired soil and charcoal dates from St. Catherines Shell Ring during our November 2007 field season; the drought had broken by this time, making it easier to collect and process charcoal samples. Comparing five such paired samples from a variety of contexts, we find that the dates derived from bulk soil samples were consistently younger than their paired sample, the age difference between the pairs ranging from 300 to 900 years.

Feature 73 (Beta-238322 and 238334) produced paired samples with the least variation. The charcoal sample (Beta-238332) dates to 2470–2210 cal B.C. while the soil sample (Beta-238334) dates to 2120–1780 cal B.C. While the difference between the two samples was less than 300 years, based on the field notes the two samples were taken from within 5 cm of each other and should date to the same event.

The two samples from W92 S2 (Beta-238327 and 238323) were only a little farther apart than the ones in feature 73. Beta-238327, a hickory nut, returned a date of 2460–2141 cal B.C., while Beta-238323, the bulk soil, dated to 1900–1690 cal B.C. Roughly 350 years separate the two samples. The paired samples from feature 82 showed a similar variation. The charcoal (Beta-239276) returned a date range of 2570–2290 cal B.C. while the soil sample (Beta-238335) dated to 2130–1980 cal B.C.

The last two attempts to test the variation between bulk soil and other dating methods showed an extreme difference in age. In feature 76, the difference was roughly 500 years while the spread in dates in feature 60/88 is nearly 900 years. The soil sample (Beta-238329) and burnt wood (Beta-238328) from feature 76 were collected at the same level and presumably date the same event. Beta-238328 dates to 2870–2580 cal B.C., while Beta-238329 produced a date range of 2130–1830 cal B.C.

The hickory nut (Beta-238322) from feature 60/88 was collected 10 cm above the soil sample (Beta-238330) and charcoal samples (Beta-238331) but we think it likely that all three were deposited at the same time. This assumption appears to be correct based on the charcoal and hickory nut dates being statistically identical (t = .78125, $\chi^2_{.05} = 3.84$, df = 1). The two charcoal dates (Beta-238322 and 238331) create a mean pooled date range of 2460–2200 cal B.C. while Beta-238330 returns a range of 1260–1010 cal B.C.

There does not appear to be any sort of constant rate of divergence between the paired samples, thereby making any sort of correction factor impossible. We have thus decided to disregard the bulk soil dates from St. Catherines Shell Ring.

Nonetheless, six determinations (from non-bulk soil contexts) are still available to date the interior. Five of these (Beta-233130, 239276, 238322, 238331, 238332) are statistically identical (t = 8.3, $\chi^2_{.05}$ = 9.49, df = 4) and return a pooled mean of 2410–2210 cal B.C. The single feature date that is not statistically identical comes from a small piece of charcoal (Beta-238328) that was recovered from the bottom of feature 76. Beta—238328 dates to 2870–2580 cal B.C. and is 300–500 years older than the other pooled feature dates. Perhaps it dates to an earlier event responsible for the creation of the feature and is concurrent with dates from the prering features, or maybe through some taphonomic process, excavator error, or lab error, Beta-238328 does not accurately reflect the age of the feature. Setting aside the single date, it would seem that all of the dated features were created over a very small time interval (2410–2210 cal B.C.), effectively spanning the time between the creation of the prering features (2540–2290 cal B.C.) and the construction of the shell ring (2230–2030 cal B.C.).

SUMMARY OF ^{14}C DATES FROM ST. CATHERINES SHELL RING: The earliest datable event is the construction of several small, shell-filled pits, which occurred 2540–2290 cal B.C. A hundred years later, 2230–2030 cal B.C., the vast majority of the shell used in constructing the ring was deposited and buried the pre-existing shell-filled pits.

Between the construction of the prering features and the creation of the shell ring, the interior space was being populated with circular, straight-walled, flat-bottomed pits. The vast majority of these features date to 2410–2210 cal B.C**.**

The limits of radiocarbon dating do not permit us to further refine this chronology. It is possible that the construction episodes described (creation of prering features, excavation of interior features, and construction of shell ring) might not be as temporally distinct as outlined above. There are ^{14}C determinations from each of the contexts that cross over into the temporal range of the other contexts. Further analysis, especially those with finer grained temporal resolution (such as seasonal indicators) must be applied to further define the chronological sequence at St. Catherines Shell Ring.

DATING THE MCQUEEN SHELL RING

The 15 dates presently available from the McQueen Shell Ring have been derived from three different contexts: shell deposits that comprise the ring itself, features found within the interior of the ring, and later (post-Late Archaic) features encountered at the ring (table 3.1).

LATER FEATURES: A large shell deposit (6 m east-west, 3 m north-south) was found within the interior of McQueen Shell Ring. This was not anticipated as the interior of this ring, like most Late Archaic shell rings, is generally devoid of shell. Located only 20 cm below the surface, this shell deposit was relatively shallow (generally 15 cm thick). Based on its stratigraphic location and the presence of grit-tempered ceramics, we suspected that this feature postdated the construction of the shell ring. The radiometric results from this feature show that this shell deposit is 2000 years more recent than the shell ring.

Two ^{14}C determinations were processed from the shell deposit—one from the shell itself (Beta-244619) and another from a large piece of burnt wood that overlaid part of the shell deposit (Beta-244618). Beta-244619 (the shell sample) returned a date range of cal A.D. 60–520 while Beta-244618 (the wood sample) dated to cal A.D. 1020–1190.

INTERIOR PLAZA DATES: As with the features in the interior of St. Catherines Shell Ring, it was difficult to find adequate materials for radiocarbon dating within the interior features at the McQueen Shell Ring. While the features lacked any appreciable amount of shell, two small charcoal samples were processed. One of the ^{14}C determinations (Beta-244745) appears to be considerably too ancient (5060–4840 cal B.C.). This date derives from a small piece of charcoal and may be out of its original context. The other ^{14}C determination (Beta-244620) returned a date range of 2350–2130 cal B.C., which is nearly identical to the dates recovered from the interior features at St. Catherines Shell Ring (2350–2210 cal B.C.) and is very similar to the dates from the primary shell deposit at McQueen Shell Ring (see below).

SHELL RING CONSTRUCTION DATES: The 11 ^{14}C dates processed from the primary shell deposit at the McQueen Shell Ring span a relative short time interval. Beta-238324, the oldest date from the McQueen shell deposit, dates to 2560–2190 cal B.C., while the age estimate for the most recent shell deposit (Beta-238325) is 2120–1770 cal B.C.

Both of these ^{14}C dates, along with a third, were recovered from one of the first test pits at McQueen Shell Ring (TP II). The three dates, all from clamshells, were taken from the top, middle, and bottom of the shell deposit, which was only 35 cm thick in this unit. The three appear to be out of stratigraphic order—the oldest is on the top and the youngest is on the bottom of the deposit. This is actually a relatively common occurrence at shell rings (see Russo, 2006, for a list of radiocarbon samples and their stratigraphic locations) and calls into question how much we really know about the depositional histories of these sites. The three dates from the shell portion of McQueen Shell Ring all occur in a thin section of the shell deposit and were located relatively close to each other. It is conceivable that this section experienced a large amount of stratigraphic disturbance and the shells have shifted since their original deposition. The oldest date (Beta-238324) is 2560–2190 cal B.C. and was recovered from the top of the unit. The next oldest date (Beta-238326: 2420–2060 cal B.C.), was recovered 10 cm below Beta-238324. The two are statistically identical ($t = 1.6237$, $\chi^2_{.05} = 3.84$, df = 1). Beta-238325, recovered from the base of the shell deposit in TP II, has the youngest age (2120–1770 cal B.C.). The three dates create a pooled age estimate of 2310–2020 cal B.C. This 2σ range is statistically identical ($t = 1.92$, $\chi^2_{.05} = 3.84$, df = 1) to that of the primary shell deposit at St. Catherines Shell Ring (2230–2030 cal B.C.).

Three ^{14}C determinations were analyzed from the northernmost unit at McQueen Shell Ring (N272 E200; see fig. 3.6). Beta-251762, a clamshell from a secure context at the top of the shell deposit, returned a date range of 2180–1850 cal B.C. The other two ^{14}C dates (Beta-251765 and 251766) were recovered from the bottom of the shell deposit and are slightly older than Beta-251762. The two deeper samples come from the same context and are extremely similar: Beta-251765, a clam sample, dates to 2420–2060 cal B.C. and Beta-251766, the charcoal sample, dates 2440–2060 cal B.C. The pooled average of the two deepest dates (Beta-251765 and 251766) is 2300–2110 cal B.C., which, like the dates from TP II, is statistically identical ($t = 2.06$, $\chi^2_{.05} = 3.84$, df = 1) to the pooled 2σ range of the primary shell deposit at St. Catherines Shell Ring (2230–2030 cal B.C.).

The remaining five ^{14}C determinations from the shell deposit were all recovered from the easternmost unit (N243 E233) at McQueen Shell Ring (fig. 3.6). This unit had a stratigraphy unlike any other unit in that a second shell layer was found underneath the primary shell deposit. The two shell layers are separated by 3.5 cm of sand. Because we stopped excavating when the second shell layer appeared, we do not know how thick this second shell layer is. Two ^{14}C samples on charcoal (Beta-251761 and 251764) were recovered at the top of the uppermost shell deposit. Beta-251761 dates 2280–1980 cal B.C. while Beta-251764 was nearly identical at 2210–1980 cal B.C. Beta-251767, a charcoal sample from the bottom of the uppermost shell deposit, had a date range of 2200–1950 cal B.C., while its paired shell sample Beta-251768 returned a range of 2270–1970 cal B.C. The youngest sample from this unit was from the top of the second, deeper shell deposit. This shell sample (Beta-251769) returned a date range of 2150–1870 cal B.C. All five of the dates from this unit are easily within a single sigma of each other. It is unclear whether the results from marine and terrestrial sources should be combined into a single date range, as the two use different calibration curves. Erring on the side of caution, the pooled date range from the shell samples from N243 E233 is 2190–1930 cal B.C. The pooled date range of the charcoal samples is 2200–2030 cal B.C. While the ^{14}C determinations from N243 E233 are younger than most of those from the other shell units (TP II and N272 E200) there is a significant overlap.

SUMMARY OF ^{14}C DATES FROM THE MCQUEEN SHELL RING: Putting aside the extremely old date (Beta-244745) that appears to be out of context, the oldest dates from McQueen Shell Ring come from the bottom of the shell deposit in N272 E200, the majority of the shell from TP II, and one of the interior features. These dates show that the early portions of the ring were constructed 2300–2120 cal B.C. The ^{14}C determinations from N243 E233, the top of N272 E200, and the bottom of TP II suggest another construction stage about 2130–1950 cal B.C. At this point, we are unclear whether this division between earlier and later construction is an accurate representation or an artificial construction caused by the errors inherent in radiometric dating. Additional excavations should clarify these options.

COMPARING ^{14}C DATES BETWEEN THE ST. CATHERINES AND MCQUEEN SHELL RINGS: The ^{14}C records from the McQueen and St. Catherines shell rings overlap considerably. Large portions of the shell deposited at each ring occurred ca. 2250–2000 cal B.C. As this portion of each ring was being constructed, deep pits were being excavated into the center of the rings. Construction appears to have ceased at St. Catherines Shell Ring around 2000 cal B.C., but may have continued for another 50 years at McQueen Shell Ring.

To clarify this relationship further, figure 3.13 compares the cumulative probability distributions from both sites. For the St. Catherines Shell Ring, we have pooled the 18 most reliable ^{14}C dates into a single distribution (with a total probability of unity). This profile is contrasted to a similar profile of $N = 12$ radiocarbon dates from the McQueen Shell Ring.

The profiles in figure 3.13 are instructive. Clearly, the ^{14}C data from the St. Catherines Shell Ring predates that of McQueen, with the “early tail" (constrained between about 2800 cal B.C. and ca. 2300 cal B.C.) reflecting "prering" activities. The temporal span of the two shell ring sites overlaps considerably during the interval 2300 cal B.C. to 2000 cal B.C., after which the McQueen radiocarbon record spikes sharply, while that from the St. Catherines ring trails off steeply. The ^{14}C evidence shows that shell construction dates at both sites completely cease by 1800 cal B.C.

MATERIAL CULTURE

Clearly, then, the chronologies of both shell rings on St. Catherines Island overlap significantly and the site structure is quite similar. But the material culture from these two sites differs significantly. Although the artifact analysis remains preliminary, even the most cursory examination make it clear that the apparently contemporary assemblages differ considerably in the occurrence of ceramic decoration, utilization of toolstone, presence of baked clay items, and distribution of decorative items.

CERAMICS: Fiber-tempered pottery is common at both rings. We presently have about 8000 typable ceramic sherds from St. Catherines Shell Ring, and half that quantity from McQueen Shell Ring (and this number is increasing as a result of our ongoing excavations). At both rings, ceramics turn up in every context, including shell deposits, plazas, features, and interior margins and exterior edges. The ceramic assemblage at both sites is more than 90% St. Simons pottery—the most common Late Archaic ceramic type found on the Georgia

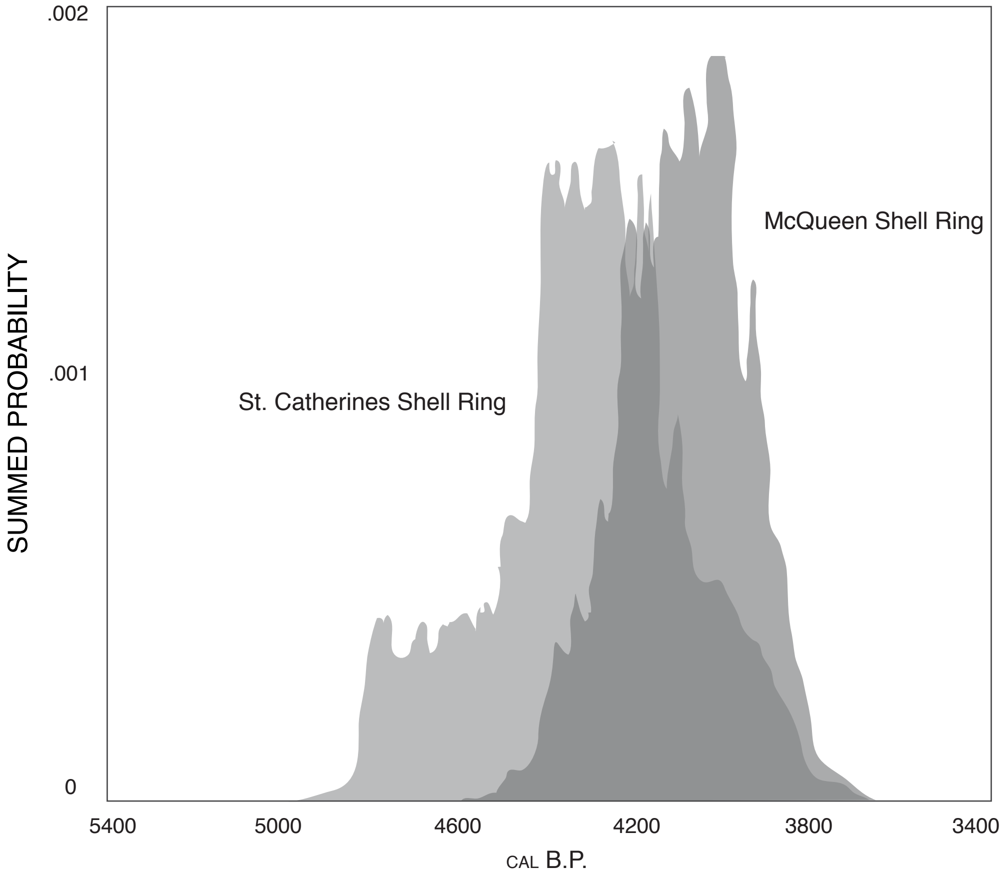


Fig. 3.13. Comparison of ^{14}C probability profiles from the St. Catherines and McQueen shell rings.

Fig. 3.14. Punctated, fiber-tempered sherd from the St. Catherines Shell Ring (catalog number 28.5/0649).

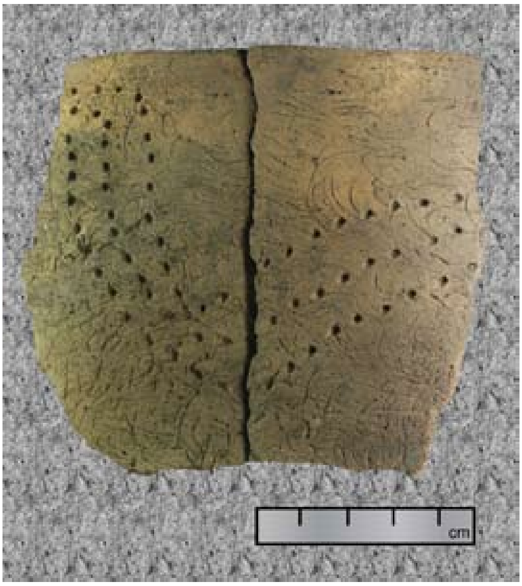


Fig. 3.15. Decorated, fiber-tempered sherd from the McQueen Shell Ring (catalog number 28.6/3579).

coast—with a small assortment of later wares, generally found in upper and/or disturbed strata. Although both assemblages are predominantly St. Simons ceramics, there is considerable variation in the quantity and quality of decorated pieces between the two rings. Only about 1% of the ceramics from the St. Catherines Shell Ring are decorated, mostly with very simple punctation (see fig. 3.14). By contrast, 14% of the St. Simons ceramics recovered at McQueen Shell Ring are decorated (see fig. 3.15), with a diverse array of incised designs, grooved surfaces, and complex punctation. The decorated wares from McQueen Shell Ring were recovered throughout the site and were not clustered in the portions of the ring that might be slightly younger than the rest of the site.

These two contemporary ceramic assemblages—which overlap significantly in time, were found on the same island, in two shell rings only 2.3 km apart. Perhaps the temporal differences are sufficient to account for the change in ceramic styles. But the significant temporal overlap begs numerous questions regarding potential differences in function, group identity, or spatial marking.

Lithics: Stone tool from the Georgia Bight are notoriously rare and homogenous. To be sure, the lack of adequate toolstone is the compelling issue, compounded by less-than-perfect excavation methods (especially the use of coarse screens). But even well-excavated sites (using fine screens) rarely recover more than a handful of stone tools or debitage (see Marrinan, 1975; Russo 1991a, 1994a; Russo and Saunders, 1999; Russo and Heide, 2000, 2002, 2004; Russo et al., 2002; Saunders and Russo, 2002; Heide and Russo, 2003; Saunders, 2002; Thompson, 2006).

Considering the scarcity of stone artifacts along the Georgia Bight, it was surprising that both shell rings on St. Catherines Island have relatively large lithic assemblages. We have recovered more than 5000 lithic items from St. Catherines Shell Ring and more than 2000 lithics from McQueen Shell Ring. The vast majority (98%) of these lithic assemblages consist of very small pieces of debitage, suggesting that the primary reduction sequence (in which large flakes or cores were knapped into initial tools forms) took place elsewhere, almost certainly closer to the raw material sources. The small flake size is diagnostic of late-stage tool reduction and/or reshaping.

Besides debitage, 18 projectile points and a drill were found at the St. Catherines Shell Ring. Nearly 80% (4 of 18) of these projectile points are classified as Savannah Stemmed.

Not surprisingly, a single material type, Coastal Plain chert, dominates the lithic assemblage recovered from St. Catherines Shell Ring. This ubiquitous toolstone is common throughout the coastal plain, especially localities exposed to fluvial erosion. Coastal Plain chert is fine-grained and relatively free of impurities except for fossils. The closest source for Coastal Plain chert is roughly 80 km north of St. Catherines Island along the Savannah River.

Although very few of the 2000+ lithics from McQueen Shell Ring have been analyzed, it is already clear that this lithic assemblage is considerably more diverse than that from St. Catherines Shell Ring. Numerous pieces of gray chert, metavolcanic materials, quartz, and quartzite, for instance, which were exceedingly rare or absent from St. Catherines Shell Ring—show up at the McQueen Ring.

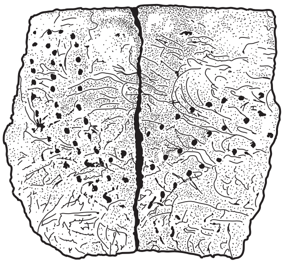
Baked Clay Objects: Beyond the ceramic and lithic assemblages, the most common artifact type recovered in most Late Archaic contexts are baked clay objects, a poorly understood artifact class whose method of manufacture and function are still debated (Heizer, 1937; Benison, 1999).

Baked clay objects are among the most common finds at the St. Catherines ring ($N > 3000$), but virtually nonexistent at McQueen ($N = 15$). This disparity is difficult to explain, particularly because they are ordinarily considered to be most functional artifacts, with few stylistic implications. The absence of baked clay objects at McQueen suggests yet another significant difference between these two shell-ring sites.

Additional Artifacts: Beyond ceramics, lithics, and baked clay objects, little additional material culture has been recovered from the rings on St. Catherines Island. Excavations at both rings recovered worked bone, mostly bone pins, shell tools, shell beads, and several pearls, possibly from a freshwater source. A tremendous amount of fauna was recovered from both rings, primarily fish remains. All of these items are currently undergoing analysis and are not available for this publication.

ONGOING RESEARCH

At this writing, we are continuing excavation and analysis at both the St. Catherines and McQueen shell rings. We believe that this additional research will augment our understanding of site formation processes and specific occupational histories at both sites. We also intend to place these two shell rings in a broader regional perspective, specifically examining issues of landscape usage and the significance of monumental construction.



CHAPTER 4

TWO LATE ARCHAIC PERIOD SHELL RINGS, ST. SIMON'S ISLAND, GEORGIA

ROCHELLE A. MARRINAN

As I sat at the conference table during the Caldwell III conference, I could not help but feel a bit like a relic from an earlier time.[1] My research in Late Archaic shell rings was conducted in the early to mid-1970s and, here I was in 2008, thrust back to questions and issues that had never been satisfactorily answered for me during my dissertation research. I also was struck by the advances made in archaeological studies in the past 30-plus years—particularly the impact of environmental change on coastal life. My dissertation research, conducted on St. Simon's Island on the southern Georgia coast, had investigated two Late Archaic shell ring sites. I had recovered a considerable collection of material culture and subsistence remains using relatively fine screening. In the early 1970s, the use of fine screens was just becoming widely adopted. The use of screens finer than ¼ in. was rare. My observations during the first field session in 1973 convinced me, as it had William E. Edwards (1965), that finer screens were necessary. Given the field methods I had used, however, no collections were available for comparison, particularly for the vertebrate fauna that became the major focus of my study. After publishing a very brief paper in the Southeastern Archaeological Conference *Bulletin* (Marrinan, 1976), I turned to other areas and time periods, given the locations and opportunities of my academic employment.

Through the years, my continuing involvement in zooarchaeological studies made me only too aware that my dissertation assemblages were woefully underanalyzed. In the mid-1970s, zooarchaeological research was an emerging subdiscipline within archaeological practice. The standards for reporting were far less developed than they are today. Until the late 1970s, few analysts reported more than the fragment counts (Number of Individual Specimens or NISP) and the estimated minimum number of individuals (MNI). Representations of dietary choice were extrapolated from MNI to average animal weights (e.g., White, 1953), a procedure that did not take into account the variable sizes of island, southern, and northern animals. The research of Reitz and collaborators (1987) on allometric scaling provided a means to estimate the biomass represented by individual species identified in a collection using the weight of their bones. This technique provided a way to bypass the obvious problem of using NISP to gain insight into the comparative contributions of various species (e.g., fish have many more elements when compared to mammals; birds are generally underrepresented because of the fragility of their bones) and weight extrapolations based on MNI.

During my analysis, I had not weighed my samples, but in 1989, I returned to the Florida State Museum (now Florida Museum of Natural History) and did so. I used these data as the basis for a paper presented in 1990 (Marrinan, 1990) at the International Conference on Archaeozoology (ICAZ). Over the years, I continued to think about this material. There were other significant developments. Diversity and equitability measures provided a means of examining choice and reflections of the prehistoric environment. Data were also available with which we might calculate the age of various species and thereby understand the composition of assemblages with respect to season of death. Studies on marine invertebrates such as hard clams (*Mercenaria* sp.) also were providing information on season of death (Quitmyer et al., 1985). Together, these advances meant that we could demonstrate what some of us had believed for many years—that these Late Archaic collections from shell ring sites represented people who lived lives considerably more sedentary than we had once suspected.

I had recently begun to reconsider this material because a number of younger colleagues, particularly Michael Russo (1994a, 1994b; Russo and Saunders, 1999; Russo and Heide, 2001, 2002, 2003; Russo et al., 2002), Rebecca Saunders (1994, 2002, 2004b), and Victor Thompson (Thompson et al., 2004), had begun working in shell rings in the 1990s and their data had become available for comparison. In 2006, through the urging of Betsy Reitz and the data available from other researchers, I began to rework my data and to try to prepare it for publication. The Third Caldwell Conference offers me the opportunity to "shake the dust off" these data in the proverbial sense. My intention in this paper is to present the data from my dissertation in brief form as a case study for use by current and future researchers. I shall present the data as if I were in the mid-1970s but reserve the right to make comments that will bring them more currency. Throughout this paper, I shall often use the collective "we" because I was privileged to have many exceptional undergraduate and graduate student collaborators and I cannot overemphasize the importance of their questions, insights, advice, and their labor. With this explanation as background, I shall set the nature of the archaeological record in the 1970s, present the data from my investigations, and comment on past and current thoughts about their interpretation.

THE STATUS OF SHELL RING ARCHAEOLOGY IN THE EARLY 1970S

In the early 1970s, when my research into shell rings began (Marrinan, 1973), a small but significant number of sites had been identified and tested. At the time, this peculiar type of site seemed to be restricted to the coastal strands of South Carolina and Georgia although a possible ring in Martin County, Florida (Joseph Reed Shell Ring) was known and another possible one in Louisiana (Big Oak Island). These annular accumulations of shell midden were located on the barrier islands and in the adjacent salt marshes. At the time of my research, some 29 rings were known (fig. 4.1). Radiocarbon dating had positioned them in a time range from 4200 to 3200 ^{14}C yr B.P. and they were believed to be the constructions of Late Archaic peoples in this area. Preliminary excavations in many of these sites had recovered sufficient material culture to make a number of observations:

- Shell rings were associated with the earliest ceramics in the Southeast, the fiber-tempered Stallings, St. Simons, and Orange series. In South Carolina, they also were associated with the early sand-tempered ceramics of the Thoms Creek Series.
- Excavations in shell rings recovered very low quantities of lithic materials, possibly because of their distance from chert sources.
- Assemblages of worked antler and bone tools, most notably plain and engraved bone pins, were standard midden constituents. Whether these artifacts were utilitarian, items of personal adornment, or had other cultural significance had not been demonstrated through archaeological context, i.e., no Late Archaic period burials had been associated with bone pins nor had any features been exposed that suggested a function.
- The overwhelming majority of midden content was oyster shell (*Crassostrea virginica*); single valves were most common, but occasional small clusters of cemented shells had been observed.
- The *origin* of shell rings, whether a Southeastern cultural development or an exotic intrusion, was unclear. James A. Ford (1969) argued that these kinds of sites were a diffused phenomenon: the intentional migration of small groups derived from the cultures of southern Central America and the northern South American coast where shell rings and fiber-tempered ceramics were present at an earlier time, around 5000 ^{14}C yr B.P. (Reichel-Dolmatoff, 1972). Thus the question of diffusion rather than independent invention seemed always to hover in the background, always a possibility but an impossibility to answer.
- The *function* of shell rings also was not known. These sites were first brought to the attention of archaeologists by William McKinley (1873) in a letter to the Smithsonian Institution reporting three shell rings on Sapelo Island, Georgia. He suggested that the largest ring "was probably the 'pow-wow' or state house, and place

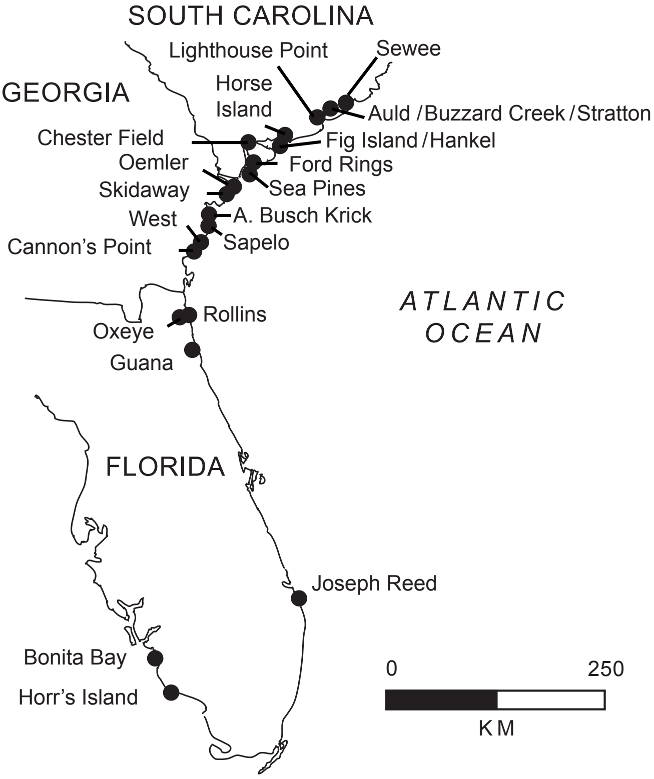


Fig. 4.1. Shell ring sites.

of torture of captives, 'chunk-yard' of the Uchees; it was certainly the most important; while the other two were perhaps for dances and athletic sports and games" (McKinley, 1873: 423). Other functional suggestions include "European fortifications" which Clarence B. Moore (1897: 71) clearly dismissed, and the debris resulting from circularly arranged pile dwellings, or fish traps (Edwards, 1965).

At the time I began fieldwork in 1973, only three sites had been investigated more substantially than minor preliminary testing: Sapelo #1, the Sewee ring, and Fig Island #2. The first professional excavation in a shell ring site was conducted by Clarence B. Moore (1897) on Sapelo Island, Georgia. His excavations of the Sapelo #1 ring, in the last years of the 19th century, resulted in the conclusion that it had been constructed by native Americans, not Europeans. Beyond describing the contents as habitation refuse, he was able to add little. Moore did report human skeletal remains, not from articulated burials, but fragments recovered from the midden fill. His failure to recover large quantities of artifacts disappointed him to the extent that he avoided these sites thereafter.

In 1950, a 30 m × 3 m (100 ft long × 10 ft wide) trench stretching from the center through the outer ring edge was excavated in the Sapelo #1 ring by Antonio J. Waring, Jr., and Lewis H. Larson, Jr. (in Williams, 1968: 264–280). This excavation followed Moore's approach, providing a profile from the ring center through the arc of the midden deposit. Plain and decorated fiber-tempered pottery, polished plain and engraved bone pins, baked clay objects, a bannerstone, a shell bead, and a ferrous sandstone bead were among the materials recovered in a single 6 m (20 ft) excavation unit that formed the basis of their analysis of the material culture. The midden was troweled, but no indication of screening is evident in the report. Waring and Larson (in

Williams, 1968: 271–273) observed lenses of material and apparent hearths within the midden fill, stratigraphy that they interpreted as domestic refuse in primary position from occupation directly on the ring.

William E. Edwards (1965) excavated the Sewee Ring in coastal South Carolina. He used ¼ in. screening with water separation initially, but changed to ⅛ in. when it became obvious to him that much was being lost. It is unfortunate that the Sewee material was not analyzed and his report was very preliminary. Ceramics, an estimated 10,000 sherds, were all of the sand-tempered Awendaw type (Thoms Creek Series). Most were reported to be plain. It is clear that recovery of vertebrate fauna was considerable and a brief species list was included, but the sample was not analyzed further.

The third site that had received attention was the Fig Island #2 ring, also in coastal South Carolina. In 1970, E. Thomas Hemmings (1970b) followed the approach of Moore and Waring and Larson by placing a trench from the ring center through the outer midden arc. Hemmings used screens for general levels (¼ in.) and features (1/16 in.). His brief reports (Hemmings 1970a, 1970b) provide information about ceramics (predominantly sand-tempered Awendaw), bone pins and antler tools, and subsistence remains. The vertebrate faunal samples were identified by technicians at the Florida Museum of Natural History. Catalog cards in the Environmental Archaeology Laboratory indicate a variety of mammals, birds, turtles, snakes, and a diverse group of fish (Zooarchaeology Laboratory, 1970).

THE RESEARCH DESIGN FOR THE CANNON'S POINT SHELL RING

The Cannon's Point Shell Ring (9GN57) was formally identified in 1972 and its investigation became part of a National Science Foundation funded project (Grant GS-37889) co-directed by Charles H. Fairbanks and Jerald T. Milanich. The ring was surrounded by active salt marsh, what the locals call "high marsh," because of its proximity to high ground maritime forest. It had a sparse cover of stunted, wind-form oaks and cedars and shrubby vegetation. It is located on the eastern edge of the north end of St. Simon's Island, Georgia (fig. 4.2). Tidal fluctuation in the Georgia coastal strand averages 2 m (7 ft) and even areas of high marsh are inundated for a few hours at all but periods of neap tides. The site is susceptible to tidal waters once or twice daily, a situation that had to be considered each day. Low areas of the ring were subject to groundwater rises that required the use of well-points and pumps during excavation. Although tidal waters surrounded the ring at high tide, during the period of my investigations, we did not witness "overtopping" of the ring by tidal or storm-driven waters. Tidal waters were commonly present in the ring interior at high tide because the northeast side of the ring was open.

My research design for the shell ring, as part of the larger project, was the excavation of several areas of the ring midden. I intended to follow previous excavators so that my sample would be comparable, but I did not complete a cross-section trench. Given tidal inundation of the ring center and our observations in two tests, I came to believe that tidal action had most likely compromised features. It seemed more important to gain a view of the stratigraphy and contents in several areas of the shell ring to evaluate the nature of the midden deposit, recover a more diverse sample, and address several questions.

- Was the composition of the ring midden similar from location to location?
- Had the midden deposit been higher in the past than it appeared in 1973, i.e., could we identify slumping?
- Could we determine ring function?
- How did this shell ring fit into the chronology of these coastal sites?
- Could we recover adequate vertebrate and invertebrate samples to gain an understanding of subsistence strategy and season of occupation?
- Could we develop a broader understanding of Late Archaic period lifeways by blending subsistence evidence with material culture?

A number of findings broadened the project considerably. During our work, we identified a second ring, the West Ring (9GN76) lying in the maritime forest approximately 100 m southwest of the Cannon's Point Shell Ring. We also identified a cultural level lying beneath the salt marsh outside the ring at a depth of 0.6 to 1.0 m. Excavations in these areas required time originally intended to be spent on investigations of the Cannon's Point ring.

In the early 1970s, the ideas of the "New Archaeology" were ascendant and subsistence and environmental reconstruction became centerpieces of many projects. The call for more rigor-

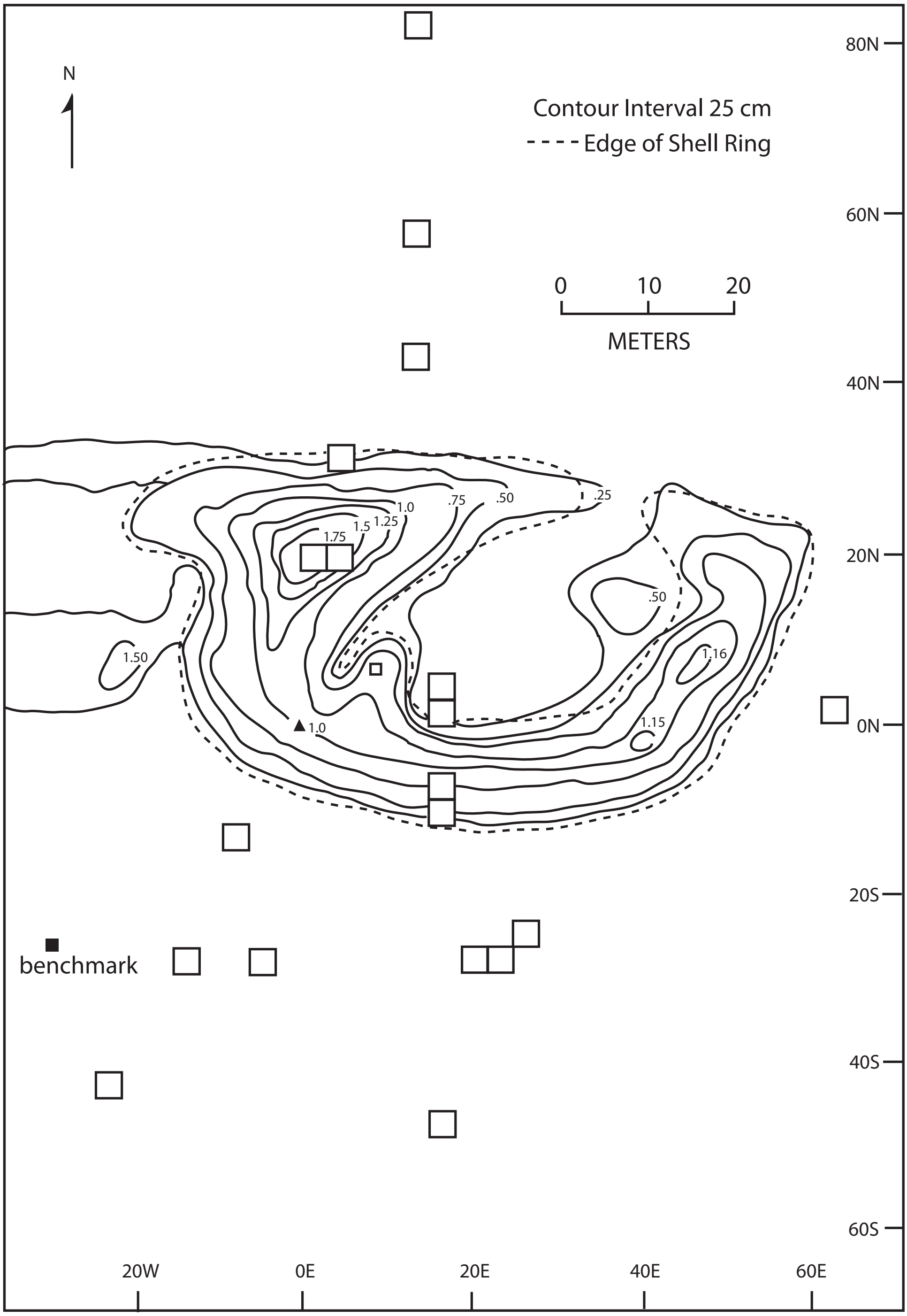


Fig. 4.2. The Cannon's Point Shell Ring and excavation units. Shell Ring is surrounded by active salt marsh. The benchmark is on high ground. The transit station (0N, 0E) is marked by a triangle. (Adapted from Marrinan, 1975: 26)

ous field techniques meant the implementation of screening and the addition of flotation to recover minute floral and faunal remains. From prior work, the chronological placement of shell rings was known as was the material culture of the people who deposited them, but little had been developed regarding their subsistence base. When my fieldwork began in 1973, subsistence analysis was a missing dimension in the investigations of shell ring sites. In general, our understanding of the subsistence base of the Late Archaic and these types of sites was really a characterization, a result of the high visibility of molluscs. In the interior, the Archaic cultures of the Green River of Kentucky and Tennessee were designated as belonging to a "Shell Mound Archaic" and this terminology was being extended to the Georgia coast (Crusoe and DePratter, 1972, 1976). I planned to test this characterization by determining what else people ate with their shellfish, what environments they exploited, what strategies served in hunting, fishing, and collecting, and in what seasons they were resident. My research design was admittedly broad and perhaps naive, in retrospect, but studies of subsistence in shell middens were rare at that time. Struever's (1972) work at Koster in the late 1960s and early 1970s had demonstrated the need to use flotation to recover small midden inclusions. Pat Watson's investigations of the Green River shell heaps had begun in 1972 (Marquardt and Watson, 2005c: 13). Other changes in archaeological practice affected fieldwork. American archaeologists had formally changed to metric measurement in 1970 and many of us were excavating in 3 m units and 15 cm levels because these were the closest to the previous 10 ft units and 6 in levels that had been common practice.

EXCAVATIONS IN THE CANNON'S POINT SHELL RING: 1973 TO 1975

The amount of time required to excavate a shell midden is many magnitudes higher than that required for a comparable terrestrial site lacking shellfish because broken shells do not pass through screens, and in-field processing is necessary and practical. The amount of time required to separate categories of material can be reduced by the use of water-screening, but it is necessary to have a field crew trained in recognizing the varieties of material that will be produced. Although it was clear that a controlled sample was needed and screening would play an important role, I did not have the resources to collect quantitative (volumetric) samples of molluscs during excavation. In fact, there was concern about the time that would be required to excavate a meaningful area of the ring using screens, particularly screens finer than ¼ in. Even with such concern, I was privileged to have support for almost four quarters of excavation time, equipment, and personnel. It should be noted that, with the exception of winter 1975, all of the field sessions involved mostly first-time students in the archaeological field schools of the University of Florida. The need to train a series of students in field techniques, particularly those specific to shell midden excavation, was constraining.

SUMMER 1973

A temporary transit station was established on the southwest arc of the ring tied to a benchmark (nail) in a large cedar tree on high ground to the south, approximately 35 m distant. The transit station was designated 0N,0E and the grid set up on magnetic coordinates. We opened two contiguous units on the south arc of the ring at 6S,15E and 9S,15E. The selection of this area was based on the absence of tree cover. The units were 3 × 3 m in size, excavated by troweling horizontally in approximate 5 cm slices, and collected in 15 cm levels. Initially we used ¼ in. screens but found that we lost significant amounts of fauna. One unit (6S,15E) was taken to a 90 cm depth and the other (9S,15E) to a 40 cm depth where groundwater and tidal waters were a factor. We recovered a fragment of a human femur in the midden fill (9S,15E) around 15 cm below surface, but no other human remains. Ceramics, all fiber-tempered, worked bone, and vertebrate fauna were recovered. Excavation was suspended in the two south ring units because of difficulties with groundwater intrusion; it was not completed until 1975.

We also opened two units in the center of the ring at 0N,15E and 3N,15E in an attempt to determine if there were features present or, at least, the degree of disturbance present. This area was constantly wet, either from tides or rain. As a result, our excavations were limited to 1 × 1 m tests in the southwest corner of each unit as the field session drew to a close. These tests revealed no cultural features and indicated a deep deposit of silty soil to approximately 94 cm below the surface. The silty soil was gray in color and contained the active and decaying roots of marsh grasses. We recovered a single potsherd and faunal bone (0N,15E). At 94 cm, a change to yellowish sandy soil was noted.

To secure a source of water for our screens, we dug two reservoirs in the marsh about 10 to 15 m from the south arc. In the second of these, a tree stump was exposed and ceramics, nutshells, vertebrate fauna, and charcoal were recovered. We enlarged this excavation, making it a regular excavation unit (27S,18E). A cultural level was identified at a depth of approximately 60 to 80 cm.

At the end of this first field session, we had exposed an area on the south arc of the ring that showed no real cultural stratigraphy, i.e., no discernible lenses of charcoal or crushed shell that might indicate a floor. The midden was dominated by whole oyster valves and contained small amounts of cultural materials, primarily fiber-tempered pottery and worked bone. Our excavations in the ring center revealed almost 1 m of silt deposited over a yellow sandy soil, sparse cultural material, and no identifiable features. South of the ring, we had identified a cultural level that contained a mix of sandy, gritty tempered ceramics and fiber-tempered ceramics, vertebrate fauna, charcoal, and tree stumps. These latter findings suggested that the shell ring was not surrounded by salt marsh when it was deposited and indicated the presence of an early Woodland component in the area adjacent to the ring.

Spring 1974

As a result of our findings in summer 1973, we changed our research design to avoid the constant groundwater innundation problems we experienced in the south arc excavations and our recovery strategy for vertebrate fauna (which also resulted in the recovery of lithic debitage). The excavation approach was modified in the following ways:

- Screening with ⅛ in. screen with water separation was adopted to increase the recovery of vertebrate and floral remains. This added considerable time and the need for a higher level of technical competence among crew members who were asked to make separations of ceramic, lithic, floral, and faunal materials in the field.
- A change to 5 cm levels was made in an effort to determine if changes in faunal and floral exploitation could be identified within the midden. The levels were controlled by use of a transit.
- In an effort to determine if we could identify meals or feasts, we would map all whole hard clams and whelks as they were encountered in the midden. This change also added more time to our field procedures since we measured levels more frequently and bagged the field specimens from more numerous levels individually.

Two contiguous units were opened on the northwest arc of the ring at 18N,0E and 18N,3E. We chose this area because we thought that groundwater intrusion would not be a factor and tree cover was minimal. A 30 × 30 cm column sample for very fine screen quantification was retained in the southeast corner of each unit as excavation proceeded. A 30 cm baulk was retained between the two units. Although invertebrates were not quantified, a sample was taken from each level for presence/absence assessment. Excavation reached level 6 (18N,0E) and level 7 (18N,3E) in these units by the end of the field season.

Three units were opened in the marsh to the north of the ring (41N,12E; 56N,12E; and 80N,12E). All produced ceramics and evidence of drowned trees, but no fauna. These units became reservoirs for water screening since maintaining an adequate supply of water for our screens was a constant problem. The site was not located close enough to a tidal creek to obtain water constantly. We relied on high tides to refill our reservoirs. We consulted local tide charts to determine what days we would excavate in the ring midden and days in which tides were very low or absent when excavation in the salt marsh would be possible.

Two units were opened in the marsh south of the ring (33S,15E and 33S,12E) with findings similar to 1973. The elevation of cultural materials in unit 33S,12E was higher suggesting an upward sloping toward high ground in the west.

One of the questions we hoped to answer this field session involved the degree of slumping—was the ring higher in the past than it currently appeared? To answer this question, we placed a 3 m unit at 30N,3E at the intersection of the shell midden and marsh on the north, outer edge of the ring. Although never excavated deeply, our exposure suggested that the shell midden receded toward the ring. Probing in the northern part of the unit, where shell midden was absent, did not encounter a more deeply buried shell midden deposit.

Summer 1974

Excavation continued in the two northwest units (18N,0E and 18N,3E). Excavation in these units reached the base of level 17 and level 15, respectively. Five units (15S,6W; 30S,3W; 30S,18W; 30S,12W; and 30S,6W) were opened in the marsh. Cultural materials were present in each. We also opened a 1 × 1 m test at 6N,8E on a shell midden "apron" that jutted out into the ring center. Our reason for opening this area was to test for contemporaneity. The soil beneath the "apron" was gray sandy soil consistent with the type of soil we encountered in the 1 × 1 m tests in the ring center. It was not clear, from our limited view, whether this area represented in-place midden deposit, or displaced midden that had been deposited over some silt deposition. The latter might indicate some sort of prior excavation, perhaps looting. Based on the soil type and color, and the recovery of only small plain fiber-tempered potsherds, this explanation may be more plausible. The material culture and subsistence remains were similar to the general ring midden fill.

Winter 1975

The majority of my field crew for this field session had previous experience on the site. Excavation of northwest unit 18N,0E and the southern half of 18N,3E was completed. We encountered a human calvarium at a depth of 1.47 m against the northwest baulk in 18N,0E. To determine if we had an articulated burial, we removed an adjacent area (19.5N,2W). This unit was 1.5 × 2 m in size and taken down quickly without screening. We made a visual collection but mapped the locations of whelk shell tools and potsherds. We exposed no further human remains in that area and concluded that it was an isolated find. We also recovered part of a human pelvis in the east profile of 18N,0E.

The two units (6S,15E and 9S,15E) on the south arc of the ring were completed with ⅛ in. screen and a wellpoint and pump. The basal exposure was sand that was gray in color. No evidence of marsh grass was identified beneath the midden deposit of the south arc of the ring and no postmolds or pit features were found.

Three other 3 × 3 units were opened in the marsh (45S,15E; 42S,24W; and 24S,24E) to obtain material for radiocarbon dating. At the time, the University of Miami taught a course in radiocarbon dating and I was contacted by one of the students who wanted to collect "fresh" samples for his course project. My student later dropped the course and the radiocarbon dates were run by the staff technician in the laboratory which became Beta Analytic, Inc.

A unit (9N,15E) was opened to determine the extent of midden deposit in the area between the north arc of ring midden and apron of shell previously tested. On the surface, there was no shell, but we encountered shell midden deposit at a depth of 28 cm. Midden composition appeared similar to areas we had previously opened.

At the end of the winter 1975 excavation session, a number of observations could be made regarding the Cannon's Point ring and the surrounding salt marsh:

- The quality of the midden deposit appeared to be similar in each of the areas opened. It was dominated by oyster shells, specifically single valves, fiber-tempered pottery, a small quantity of lithic material, worked bone and antler, plant remains, and vertebrate fauna. On the northwest side near the highest elevation (18N,0E), we encountered a substantial lens of cemented shell that appeared to represent the location of a fire, possibly repeated fires.
- When culturally sterile submidden soils were reached, they were gray to yellow sands. There was no evidence of previous salt marsh grasses having grown beneath the shell midden deposit, suggesting that when deposition began, a salt marsh environment was not present. Thus local sea level rise or changes in the relationship of tidal creeks, salt marsh, and high ground (or both) had occurred in the past 3500 years.
- Limited investigation in the ring center revealed a deposit of gray silty, sandy soil to a depth of 94 cm. No discernible features were noted in the 1 × 1 m units that were carried to that depth.
- Excavation at the northwest intersection of the midden deposit and salt marsh indicated that slumping of the midden had occurred. This finding suggested that the ring had been higher in the past than its appearance in 1975.
- In the salt marsh surrounding the shell ring, a widespread deposit of Early Woodland period cultural material was present. Fourteen units were opened and all but one (0N,58E) contained cultural materials. Most contained both fiber-tempered ceramics and gritty sand-tempered ceramics, plant remains, vertebrate fauna, and lithic materials. No evidence of associated shell midden was observed in any of the units opened.
- Human remains recovered from the midden deposit were dispersed, not articulated burials.

A human calvarium (skull cap without the basal area or face) was recovered from the lowest levels of the midden on the northwest side of the shell ring.

- Radiocarbon dates indicated that the Cannon's Point shell ring (9Gn57) dated between 4710 ± 120 basal and 4150 ±140 cal B.P. upper.
- Radiocarbon dates from the marsh cultural level indicated dates of 2920 ± 110 and 2920 ± 100 cal B.P. from a wood sample and a charcoal sample associated with fiber-tempered ceramics and gritty sand-tempered ceramics.

EXCAVATIONS IN THE WEST RING: 1973 TO 1975

This site lay approximately 100 m southwest of the Cannon's Point Shell Ring. It was located on high ground near the marsh edge. In some places, active erosion of the site was occurring. The site was covered with a dense growth of shrubby and woody plants and was noticed because we walked next to it daily and observed the presence of oyster shells. When time permitted, we traced its extent and found that it was horseshoe-shaped, given the loss of the southeast edge. Testing of this ring midden began over Christmas Break (December 29 to 30, 1973). Test 1 (formerly designated 0N,0E), a 2 × 2 m unit, was located on the west side of the ring. Testing revealed that the midden contained fiber-tempered ceramics and fauna, both invertebrate and vertebrate, comparable to the Cannon's Point Shell Ring. The depth of deposit, however, was much shallower, only 59 cm. Our purpose in testing this site was to determine if the materials contained within the midden fill were contemporaneous with those of the Cannon's Point ring. Oyster shells for radiocarbon dating were taken from this unit.

During the spring field session in 1974, a second 2 × 2 m unit was opened (5S,30E) on the east side of the ring near the marsh edge. The midden fill was excavated in 5 cm levels and water-screened over ⅛ in. mesh, providing a quantitative comparison to the deepest 3 × 3 m unit in the Cannon's Point ring (18N,0E). This unit was taken to a depth of approximately 70 cm below the surface where sterile yellow sand was reached. Excavation of this unit was completed during the winter 1975 field session.

Our observations of the quality of midden fill and the contents indicated that this second shell ring was a Late Archaic period site with predominantly fiber-tempered ceramics. The recovery of a number of gritty sand-tempered sherds in the upper levels suggested that the site would date later than the Cannon's Point ring.

A SUMMARY OF EXCAVATION FINDINGS

In the following section, brief discussions of stratigraphic observations, chronological information, ceramic and lithic inventories, and worked bone will be presented.

Stratigraphy

One facet of excavation that is not clear is the effect of groundwater on the deposits in the Cannon's Point shell ring. It is difficult to say whether the yellowish discoloration of shells in the lowest levels results from centuries of repeated groundwater rise and fall. It is also unclear whether the gray-colored sand lying beneath the southern ring arc was discolored (from yellow to gray) by successive precipitation, groundwater, and tidal rises and falls that have leached organic materials from higher to lower levels.

Because Waring and Larson (in Williams, 1968) reported "floors" in their excavation of the Sapelo #1 ring, I was interested in documenting cultural stratigraphy. The matrix in each excavation unit placed in both ring sites indicated that the deposits consisted of large quantities of single valves of oyster, with an admixture of pottery, vertebrate fauna, floral remains, and minor quantities of other invertebrates. The single stratigraphic feature that was clearly cultural was an area of cemented shells (feature #19 in 18N,3E and feature #21 in 18N,0E) that appeared at approximately 36 cm below surface. Its total extent is not known since adjacent units to the north were not excavated. Intense heat was most likely responsible for its cemented condition since surrounding shellfish refuse was not cemented. In fact, in no other excavation area did we encounter cemented shells.

In an effort to identify unusual deposits that might represent feasting, we mapped the locations of all hard clam valves in both shell rings (in units 18N,0E and 5S,30 E, specifically). Some clustering of hard clam valves was clearly evident in the Cannon's Point ring, but it is not clear if these represent episodes of seasonal abundance or specialized consumption. Large numbers of marsh periwinkles *(Littorina irrorata)* were recovered in test 1 of the West Ring. Because the spires of these shells had been removed, this feature appeared to be a dump, perhaps resulting from the use of these small gastropods in a broth. Throughout the midden in both sites, we observed fragments of Atlantic ribbed mussel (*Geukensia demissa*). Both marsh periwinkles and Atlantic ribbed mussels can be gathered in the salt marsh.

Submidden soils were light yellow Pleistocene sands. Whether the area was prepared before midden formation began was not clear. Certainly the height of the soils on the north arc may indicate an original, slightly higher elevation than on the south arc or conversely, a prepared elevation made by dumping large quantities of sandy soil. The presence of an A or B horizon was difficult to assess and may indicate its removal before deposition or it may have been obscured by leaching of organic remains from the forming midden above. In these excavations, our view of the submidden surface was very limited. No submidden postmolds or other structural evidence were observed.

A cultural stratigraphy was not observed during excavation, but several pit features were identified and their material segregated. One area of cemented shell, suggesting the presence of a hearth or merely a very hot fire, was identified in the northwest corner of unit 18N,3E and the northeast corner of unit 18N,0E but it was not completely exposed since it extended into unexcavated areas. What could be observed did not suggest a living floor, i.e., a lens of crushed shell or darker organic layer was not associated.

Another reason for using 5 cm levels was to determine whether there had been changes in species compositions through time. My experience in these sites does not convince me that this level of accuracy is possible, however. This kind of midden is a porous assemblage of shells, vertebrate fauna, flora, ceramics, lithics, windblown or tidally deposited soils, and other debris. As the shells were deposited, there was considerable space among them that remained unfilled. Through time, denser objects (e.g., fish otoliths and bones) settled in the matrix, pushed by water moving through the midden, filling up the spaces among the shells. Even the act of excavation can cause materials to settle as the shells are peeled away. In the excavation of these two ring sites, a considerable number of fish otoliths were recovered from the lowest levels. From the Cannon's Point Shell Ring, levels 1 through 20 contained 33 otoliths compared with levels 21 to 35 with 135 otoliths. In the West Ring, the upper levels (1 through 6) contained 62 otoliths; levels 7 through 12 produced 188 otoliths. These findings suggested that efforts to examine changes in species use through time would be compromised.

CHRONOLOGY

A Late Archaic affiliation was supported by radiocarbon dates from both shell ring sites (table 4.1). Dated materials from the ring middens were predominantly oyster shell and from the marsh, noncarbonized wood and charcoal. In the Marsh Cultural Level, we encountered both charcoal and noncarbonized wood, principally what appeared to be tree stumps. Because it was conceivable that the trees died as the area was inundated, it was important to determine if the stumps and cultural materials were contemporaneous. Thus a sample from a tree stump was paired with charcoal recovered in association with ceramics and vertebrate fauna. Their radiocarbon dates were virtually identical, suggesting that the area was being used during the time that salt marsh began encroaching on the high ground where the shell rings were located. This period of use, in the Early Woodland period, was not directly associated with shellfish deposition in any area of the marsh that was examined.

Waring and Larson (in Williams, 1968: 254) contended that engraved bone pins were a later phenomenon than plain pins. An engraved bone pin was recovered in the deepest level of unit 18N,0E, thereby associated with a 4710 ± 120 cal B.P. date, indicating that a plain-to-decorated sequence may not be present or may not be a generally confident chronological indicator.

Lithic tools, particularly projectile point/knives have been the subject of typology since the early 20th century. The only identifiable projectile point recovered from any of the excavation units was an Arredondo point (Bullen, 1975: 39), which has a suggested affiliation with the Pedernalis Indented Base points of Texas dated to 6000 ^{14}C yr B.P.

The traditional time period assigned to the Woodland period is 1000 B.C. to A.D. 600 (or 1000). An Early Woodland affiliation is indicated for the Marsh Cultural Level by radiocarbon dates and also by the presence of coil-manufactured gritty sand-tempered pottery. The

TABLE 4.1

Radiocarbon dates for St. Simon's Island sites
(calibration with University of Cologne Calpal program [2007])

Code/Lab No.	Provenience	Material	^{14}C Age B.P. (±1σ)	Adjusted age B.C.	Radiocarbon age calibrated[a] (±2σ)	Comments
Cannon's Point Shell Ring						
UM-521	Unit 18N, 0E 13cm	*Crassostrea*	3770 ± 90 B.P.	1820 B.C.	2200 ± 140 B.C.	Shell sample #118; field specimen # 848. Sample dates upper midden deposit.
UM-520	Unit 18N, 0E 1.46 -1.56m	*Crassostrea*	4190 ± 90 B.P.	2240 B.C.	2760 ± 120 B.C.	Field specimen #663. Sample recovered from vicinity of human cranium against west baulk. Sample dates the lower midden levels, but is not basal.
West Ring						
UM-523	Test 1 19cm	*Crassostrea*	3610 ± 110 B.P.	1660 B.C.	1970 ± 160 B.C.	Shell sample #15; field specimen #83. Sample dates the upper midden deposit.
UM-522	Test 1 46cm	*Crassostrea*	3860 ± 90 B.C.	1910 B.C.	2320 ± 120 B.C.	Sample dates lowest level of midden deposit. Shell sample #16; field specimen #84.
Marsh Cultural Level						
UM-519	Unit 27S, 18E 61cm	wood	2770 ± 100 B.P.	820 B.C.	970 ± 110 B.C	Field specimen #40. Sample taken from a tree stump associated with fiber-tempered and grit-tempered ceramics, floral, and faunal remains. Sample dates the demise of the tree.
UM-518	Unit 33S, 12E	carbonized material	2785 ± 80 B.P.	840 B.C.	970 ± 100 B.C	Field specimen #279. Sample consisted of carbonized material from a carbon concentration associated with faunal remains. Sample dates the fiber-tempered/grit-tempered ceramic association and was run to check whether the tree sample and the other cultural remains were contemporaneous.

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

absence of molluscan remains from the cultural deposits that were exposed by our excavations suggests that shellfish collecting was not part of the subsistence activities. It is not clear whether this signals that the local environment was not conducive to shellfish collecting—because, for example, oyster bars or mud flats were absent, harder to reach, or more distant than they had been earlier—or whether subsistence activities featured other resources for some reason or the site was used only ephemerally for hunting and fishing. Vertebrate faunal remains were present in the deposit.

Ceramics

Fiber-tempered pottery dominates the assemblages from both ring sites (table 4.2). Decorations are predominantly combinations of rectilinear incision and punctation, but lines of single punctation and incised lines without accompanying punctations are also present. Absent entirely from these collections is drag-and-jab decoration, the hallmark of the Stallings Series. Although I did not indicate whether I would categorize these ceramics as Stallings or St. Simons in 1975, today I would place them squarely within the St. Simons Series as do Waring and Larson (in Williams 1968: 268–275). Justification for this assignment is the observation that drag and jab (linear punctation) vessel decoration clearly dominates Stallings Series decorated ceramics in the Savannah River drainage and at the river mouth. As one goes south along the coast, however, the occurrence of drag-and-jab is generally less and a wide variety of incised and punctated (and combinations) dominates. Given collections to sort in a blind test, I believe it would be possible to sort Stallings from St. Simons based on decorative motifs.

Several sherds (three rim, four body sherds) from the West Ring have decorative elements reminiscent of the Florida Orange Series subtype Tick Island Incised (Sears and Griffin, 1950: 1; 8–3). Orange Series ceramics feature combinations of incision primarily, but the Tick Island Incised subtype combines curvilinear incisions with punctations (Jahn and Bullen, 1978: fig. 5a–b). Orange Series wares appear in northeast Florida around cal 4000 to 3500 B.P. (Saunders, 2004a: 42). The preference for incision (and punctation) may indicate contact with, or knowledge of, Florida ceramic styles.

Ceramics from the Marsh Cultural Level adjacent to the Cannon's Point Shell Ring include both fiber-tempered and grit-tempered wares in relatively equal amounts (316 and 314 sherds, respectively). The surfaces of most of the sherds from these excavation units were eroded. Many of the fiber-tempered sherds contained noticeable amounts of grit. A single drag-and-jab decoration on a grit-tempered paste was also present (table 4.3).

Lithics

Waring and Larson (in Williams, 1968) remarked on the absence of lithic artifacts in their excavations at Sapelo Ring #1. This absence seems to be the norm in the coastal strand rather than the exception. In addition to the single Arredondo-type point of whitish chert mentioned previously, two other projectile point/knife specimens were recovered. One was symmetrical with a snapped base; the other was stemmed and strongly chipped on one side, suggesting use as a knife or scraper. Both specimens were made from a dark gray chert. A single expended chert biface of whitish chert was recovered that appeared to have been reworked until it was no longer useful. Use of ⅛ in. screen was adequate to recover a number of small flakes and debitage (*N* = 34), indicating that edge retouching of tools occurred at the site. At least six specimens were clearly thermally altered. Table 4.4 lists the lithic materials recovered.

Worked Bone

A total of 118 specimens of worked bone were recovered from all units during the excavations. Plain and decorated bone pins were recovered; most were fragmentary. The majority of specimens that could be categorized as pins or awls (*N* = 32 from all proveniences) appear to have been made by splintering the metapodials of white-tailed deer, then abrading and polishing them. These specimens were varied in cross section, but displayed no medullary area. Many fragments of turtle carapace (*N* = 69) evidenced interior scraping of the marginals and pleurals. They often had edge polish, most of which was on the bridge marginal edges, which may have resulted during the initial alteration of the carapace or from use-wear. Altered turtle fragments were recovered from both rings and the Marsh Cultural Level. Antler tines (*N* = 4) were recovered from the Cannon's Point Ring (*N* = 2), West Ring (*N* = 1), and Marsh Cultural Level (*N* = 1).

The Subsistence Base

The subsistence data for vertebrate fauna and crabs presented here were recovered from two units that received the same screening treatment from uppermost to basal levels, one from the Cannon's Point Shell Ring and the other from the West Ring. Both units were troweled and materials separated in the field using water-screening over ⅛ in. screen. Unit 18N,0E was located at the highest elevation of the site, on the northwest arc of the ring. It was a 3 × 3 m unit excavated in 5 cm levels to a total depth of 1.7 m. The volume excavated was approximately 14 cubic m (discounting the baulk and column samples). Standard zooarchaeological measures—Number of Identified Specimens (NISP), Minimum Number of Individuals (MNI), estimated biomass using skeletal mass allometry (Reitz et al., 1987; see Reitz and Wing, 2008 for a discussion of this method; also Jackson, 1989b, for a discussion of its problems).

TABLE 4.2
Fiber-Tempered and Grit-Tempered Ceramics from the Cannon's Point and West Ring Excavation Units

Fiber-Tempered							Grit-Tempered					
Unit	Total	Total Wt. (g)	Plain	Decorated	Rim	Body	Total	Total Wt. (g)	Plain	Decorated	Rim	Body
Cannon's Pt.												
6S,15E	194	3696.2	169	25	38	156	1	2.0	1	—	—	1
9S,15E	68	948.3	64	4	9	59		—	—	—	—	—
18N,0E	239	3274.9	231	8	14	225	2	11.5	2	—	—	2
18N,3E	83	1831.0	79	4	16	67	3	8.1	3	—	—	3
0N,15E	2	67.3	2	—	—	2	3	20.0	—	3	1	2
3N,15E	—	—	—	—	—	—	—	—	—	—	—	—
30N,15E	4	106.5	4	—	1	3	—	—	—	—	—	—
6N,8E	28	184.1	28	—	—	28	—	—	—	—	—	—
19.5N.2W	21	333.3	21	—	1	20	—	—	—	—	—	—
Total	**639**	**10441.6**	**598**	**41**	**79**	**639**	**9**	**41.6**	**6**	**3**	**1**	**8**
West Ring	47	808.9	45	2	3	44	22	69.9	17	5	—	22
Test 1 (0N,0E)	45	687.0	33	12	11	34	3	3.5	2	1	—	3
Total	**92**	**1495.9**	**78**	**14**	**14**	**78**	**25**	**73.4**	**19**	**6**	—	**25**

TABLE 4.3
Fiber-Tempered and Grit-Tempered Ceramics from the Marsh Cultural Level

Fiber-Tempered							Grit-Tempered					
Unit	Total	Total Wt. (g)	Plain	Decorated	Rim	Body	Total	Total Wt. (g)	Plain	Decorated	Rim	Body
24S,24E	14	312.4	13	1	3	11	15	130.6	13	2	2	13
27S,18E	4	295.8	4	—	—	4	12	146.1	9	3	3	9
27S,21E	—	—	—	—	—	—	1	5.0	1	—	—	1
33S,12E	103	1593.7	103	—	9	94	97	700.8	85	12	10	87
33S,15E	11	382.2	11	—	11	—	49	364.2	44	5	10	39
45S,15E	1	62.9	1	—	—	1	—	—	—	—	—	—
15S,6W	46	671.9	41	5	2	44	9	86.0	9	—	2	7
30S,3W	35	626.4	33	2	3	32	21	224.9	16	5	4	17
30S,12W	49	756.7	44	5	10	39	34	199.1	25	9	2	32
42S,24W	43	395.6	30	13	9	34	75	271.4	31	44	5	70
41N,12E	5	283.5	5	—	2	3	1	15.3	1	—	1	—
56N,12E	3	115.0	3	—	1	2	—	—	—	—	—	—
80N,12E	2	79.2	1	1	2	—	—	—	—	—	—	—
Total	**316**	**5293.2**	**289**	**27**	**39**	**277**	**314**	**2143.4**	**234**	**80**	**39**	**275**

TABLE 4.4

Lithic Materials from the Cannon's Point Ring, West Ring, and Marsh Cultural Level

Unit	Chert	Chert Wt. (g)	Chert, Worked	Chert, Worked Wt. (g)	PPK	PPK Wt.	Quartzite Cobble	Cobble Wt.	Quartzite Pebble	Pebble Wt.
Cannon's Pt										
6S,15E	5	0.3	—	—	1	12.9	—	—	84	4.5
18N,0E	3	0.3	—	—	—	—	—	—	365	19.1
18N,3E	6	0.4	1	8.7	1	22.5	1	185.2	145	7.6
30N,3E	—	—	—	—	—	—	—	—	2	0.4
Total	**14**	**1.0**	**1**	**8.7**	**2**	**35.4**	**1**	**185.2**	**596**	**31.6**
West Ring										
Test 1 (0N,0E)	4	2.9	—	—	—	—	—	—	4	0.2
5S,30E	3	0.3	—	—	—	—	—	—	43	2.2
Total	**7**	**3.2**	—	—	—	—	—	—	**47**	**2.4**
	—									—
Marsh										—
15S,6W	4	2.3	—	—	1	6.2	—	—	3	0.8
30S,3W	1	0.1	—	—	—	—	1	64.7	2	0.5
30S,12W	2	0.4	1	15.0	—	—	—	—	—	—
42S,24W	6	3.5	—	—	—	—	—	—	—	—
Total	**13**	**6.3**	**1**	**15.0**	**1**	**6.2**	**1**	**64.7**	**5**	**1.3**

Coastal subsistence samples differ markedly from their inland counterparts in the use of diverse fish species in contrast to a heavier reliance on mammalian fauna. Table 4.5 quantifies the analysis results by faunal class relative to the excavated area. Although the Cannon's Point Shell Ring is currently surrounded by active salt marsh, submidden soils suggest that it was located atop sandy soils. Whether the space was cleared or in maritime forest when deposition began is not clear. The West Ring, with substantially less midden volume, is currently located in maritime forest, but its southeast edge has been eroded by tidal action. These shell ring sites are situated in or adjacent to tidal marshes within estuaries. As such, there is immediate access to tidal creeks of varying sizes that become tidal rivers that empty into open sounds between islands. Whether by dugout canoe or on foot, a variety of resources could be hunted, fished, or collected in this area. Although ancient dugouts have not been identified from the vicinity, in Florida they have been radiocarbon dated to the Middle Archaic (Wheeler et al., 2003). Dugouts enabled marsh/island dwelling people to hunt, fish, and collect marsh resources, but evidence for activity in mainland or riverine areas is not strong.

A wide variety of species was identified. Many of these are represented by a single MNI indicating that they most likely were not dietary staples. Table 4.6 presents a composite species list for fauna recovered from the Cannon's Point ring, the West ring, and the Marsh Cultural Level.

MAMMALS: The mammalian fauna does not

evidence the wide variety of species available in the mainland Southeast. Given the site location on an island, some decrease in available species is expected. The only large mammal in these collections is the white-tailed deer. Other large mammals, such as bear or panther, have not been identified and may not have been indigenous to the marsh/island area in the Late Archaic. Opossums (*Didelphis virginiana*) and raccoons *(Procyon lotor*) are the constituents of these assemblages that one could characterize as medium sized, but they are not numerous in these collections. The remaining animals, particularly rabbits (*Sylvilagus* sp.), squirrels (*Sciurus carolinensis*), and mink (*Mustela vison*) are relatively small mammals and also present in low numbers. Several shrews (*Cryptotis parva*) and smaller rodents (*Oryzomys* sp. and *Peromyscus* sp.) most likely represent commensal species in these sites.

Among white-tailed deer remains, a single male was identified from cranial fragments. A number of antler fragments were also present, but other cranial fragments were not. There are few (2) recovered elements that can inform about relative age of deer at death. From the Cannon's Point ring, both indicate a less than 26-month lifespan (Reitz and Wing, 2008: 72) and three unfused limb elements indicate that at least two subadult opossum individuals and a single subadult rabbit are present in the sample. From the Cannon's Point ring, no raccoons appear to have been subadult, but a single individual from the West ring is indicated by an unfused proximal femur.

TABLE 4.5

Faunal Categories and Analysis Results

Upper values: Unit 18N,0E; values in italics, below: Unit 5S,30E.

Biomass							
Group	NISP	Wt. (g)	Biomass (g)	Biomass (%)	Burnt	Worked	MNI
Mammals	387 *225*	314.1 *78.1*	5214.4 *1472.7*	28.80 *23.74*	— *36*	6 *3*	11 *7*
Birds	81 *51*	8.1 *3.9*	147.2 *73.3*	0.81 *1.18*	— *1*	— —	5 *2*
Turtles	637 *230*	140.9 *32.5*	1432.2 *437.1*	7.91 *7.05*	3 *20*	21	6 *4*
Snakes	75 *23*	3.2 *0.7*	44.2 *9.6*	0.24 *0.15*	— —	— —	4 *2*
Amphibians	7 *14*	0.6 *0.3*	8.2 *4.1*	0.05 *0.07*	— —	— —	1 *1*
Bony fish	18,459 *8,828*	727.7 *248.3*	9917.0 *4008.2*	54.78 *64.61*	27 *12*	— —	313 *234*
Sharks and rays	324 *82*	13.4 *1.7*	1203.0 *198.7*	7.40 *3.20*	— —	— —	6 *1*
Unidentified vertebrates	495 *65*	45.5 *4.1*	— —	— —	1 *3*	— *2*	— —
Totals (vertebrates)	20,465 *9,518*	1253.5 *369.6*	17,964.2 *6,203.7*	99.99 *100.00*	31 *72*	27 *5*	346 *251*
Crabs	1,668 *111*	344.8 *6.5*	4,133.9 *162.3*	100.00 *100.00*	— *8*	— —	79 *4*

TABLE 4.6
Composite Species List: 9Gn57, 9Gn76, and Marsh Cultural Level
An "x" indicates remains of fauna present.

Taxonomic Name	Common Name	9Gn57	9Gn76	Marsh
Didelphis virginiana	Eastern opossum	x	x	x
Soricidae	Shrews	x	x	
Cryptotis parva	Least shrew	x		
Blarina brevicauda	Short-tailed shrew	x	x	
Scalopus aquaticus	Eastern mole		x	
Sylvilagus sp.	Rabbits	x	x	x
Rodentia	Unidentified rodents	x	x	x
Glaucomys volans	Flying squirrel	x		
Sciurus carolinensis	Gray squirrel	x		
Microtinae cf., *Neotoma*	Probably eastern wood rat		x	
Neofiber alleni	Round-tailed muskrat		x	
cf. *Neotoma*	Probably wood rat	x		
cf. *Peromyscus*	Probably deer mouse	x		
Oryzomys sp.	Rice rat	x		
Peromyscus sp.	White-footed mouse	x	x	
Sigmodon hispidus	Hispid cotton rat	x	x	
Lutra canadensis	River otter	x		
Mustela vison	Marsh mink	x		
Canis familiaris	Domestic dog	x	x	x
Procyon lotor	Raccoon	x	x	x
Odocoileus virginianus	White-tail deer	x	x	x
Phalacrocorax auritus	Double-crested cormorant	x		
Ardea herodias wardi	Great blue heron	x		
Bucephala clangula	Common goldeneye	x		
Buteo lineatus alleni	Red-shouldered hawk	x		
Rallidae	Rails	x	x	
Larus argentatus	Herring gull	x		
Anolis carolinensis	Chameleon	x		
Natrix sp.	Water snakes	x		
Coluber constrictor	Black racer	x		
Lampropeltis sp.	Kingsnake	x		
Chelydra serpentina	Snapping turtle			x
Kinosternon sp.	Mud turtle	x	x	x
Terrapene carolina	Eastern box turtle			x
Malaclemys terrapin	Diamondback terrapin	x	x	x
Pseudemys sp.	Pond sliders, cooters	x	x	
Pseudemys, cf. *floridana*	Coastal plain cooter	x		
Deirochelys reticularia	Chicken turtle	x		x
Alligator mississippiensis	American alligator			x
Siren lacertina	Greater siren	x		
Lepisosteus sp.	Gar	x	x	x
Amia calva	Bowfin	x		x
Elops saurus	Ladyfish	x	x	

TABLE 4.6 — (*Continued*)

Taxonomic Name	Common Name	9Gn57	9Gn76	Marsh
Clupeidae	Herrings	x	x	
Brevoortia sp.	Menhaden	x		
Siluriformes	Catfishes	x		
Ictalurus sp.	Freshwater catfish	x		
Ariidae	Marine catfishes	x	x	x
Ariopsis felis	Hardhead catfish	x	x	
Bagre marinus	Gafftopsail catfish	x	x	x
Micropterus sp.	Bass	x		
Opsanus sp.	Toadfish	x	x	
Mugil sp.	Mullets	x	x	x
Pomatomus saltatrix	Bluefish	x		
Carangidae	Jacks	x	x	
Sparidae	Porgies	x		
Lagodon sp.	Pinfish	x		
Archosargus probatocephalus	Sheepshead	x	x	x
Sciaenidae	Drums	x	x	x
Baridella chrysura	Silver perch	x	x	
Cynoscion sp.	Sea trout	x	x	
Leiostomus xanthurus	Spot	x	x	
Menticirrhus americanus	Southern kingfish	x		
Micropogonias undulatus	Atlantic croaker	x	x	x
Pogonias cromis	Black drum	x	x	x
Sciaenops ocellatus	Red drum	x	x	x
Stellifer lanceolatus	Star drum	x	x	
Prionotus sp.	Sea robin	x		
Pleuronectiformes	Flounders	x	x	x
Carcharhinidae	Sharks	x		
Galeocerdo cuvieri	Tiger shark	x		
Sphyrnidae	Requiem sharks	x	x	
Sphyrna sp.		x	x	
Rajiformes	Rays	x		
Dasyatis sp.	Stingray	x		
Aetobates narinari	Spotted eagle ray	x		
Decapoda	Crabs	x	x	
Callinectes sapidus	Blue crab	x	x	

Domestic dog (*Canis familiaris*) remains were recovered from the Cannon's Point ring and from Marsh Cultural Level units. In both circumstances, the bones were fragmented and appeared no different than other food remains.

Birds: The avian faunal assemblage is very small by contrast to other faunal classes. All of those identified, great blue heron (*Ardea herodias wardi),* rails (Rallidae), and red-shouldered hawk (*Buteo lineatus alleni)* are present in the salt marsh and along its margins. All are year-round residents. Although no migratory waterfowl are reported from these units, both common golden eye (*Bucephala clangula*) and herring gull (*Larus argentatus*) were recovered from other excavation units in the Cannon's Point Shell Ring. These two species suggest a November to March period of availability. Another common coastal species, the cormorant (*Phalacrocorax auritus*) was identified from a unit in the Cannon's Point Shell Ring. Rails were the only species present in both samples.

TURTLES: When estimated biomass is considered, the contribution of turtles is 5% to 8% in these samples. The diamondback terrapin (*Malaclemys terrapin*) is a salt marsh dweller and important component of the turtle assemblage. Pond sliders (*Trachemys* sp.) and chicken turtles (*Deirochelys reticularia*) are also present. Diamondback terrapins, pond sliders, and chicken turtle remains all exhibit scraping and polish of the interior of the carapace, suggesting their further use, perhaps as bowls. These turtles also have marked natural sculpting of the exterior carapace, which may have made them an aesthetic choice. Turtle remains do not evidence much burning of the carapace; sooting of either interior or exterior was not observed. In the Cannon's Point Shell Ring, 21 fragments (3.3%) were burnt. In the West Ring, 20 fragments were burnt (8.7%).

Also present are mud or musk turtles (Kinosternidae) in small numbers. Present in other collections from the marsh excavation units adjacent to the Cannon's Point ring were snapping turtles (*Chelydra serpentina)* and alligator (*Alligator mississippiensis*). Absent from these assemblages were sea turtles (Cheloniidae) and soft-shell turtles (*Apalone ferox*), which are common constituents in many coastal assemblages. Also absent is the gopher tortoise (*Gopherus polyphemus*), which usually favors upland, sandy soils for its burrows. Box turtle (*Terrapene carolina*) remains were absent from the rings, but recovered in the marsh excavations. These turtles are generally terrestrial and common in southeastern faunal assemblages.

OTHER REPTILES: Snakes were represented by small numbers of specimens in these collections. The black racer (*Coluber constrictor*), kingsnakes (*Lampropeltis* sp.), and water snakes *(Nerodia* sp.) were identified. Chameleon (*Anolis carolinensis*) remains in the samples are commensal.

AMPHIBIANS: The greater siren (*Siren lacertina*) is frequently identified in inland sites with freshwater marshland regimes (e.g., Cumbaa, 1972; Keel, 1990). Other amphibian remains may all be commensal. Absent from these collections are frogs and toads.

RAY-FINNED FISHES *(*ACTINOPTERYGII, FORMERLY OSTEICHTHYES*)*: The ray-finned fishes may be divided into two categories—fish preferring fresh to brackish water and fish generally characterized as being marine species. In the first category, there are very few taxa and most are present in small numbers: gars (*Lepisosteus* sp.), bowfins (*Amia calva*), and bass (*Micropterus* sp.). The presence of these species might indicate the exploitation of ponds or small lakes on the island. Gars are not uncommon in environments that mix fresh with saline waters, but bowfin and bass prefer freshwater. The overwhelming majority of bony fishes in these collections are marine species from a small number of families. Most important are the marine catfishes. Although the hardhead catfish (*Ariopsis felis*) is not currently considered a food item (Hoese and Moore, 1998: 161), it seems that they were eaten along with the gafftopsail catfish (*Bagre marinus*). The MNI calculations for these species are complicated by the ease with which some parts of the gafftopsail catfish can be identified, particularly the neurocranium, and the difficulty of confidently separating hardhead and gafftopsail catfish elements. Pectoral spines provided some idea of relative numbers and indicated that in the Cannon's Point Shell Ring, the number was equal (MNI = 18 and 18, respectively) while in the West Ring, the use of gafftopsail catfish surpassed the hardhead catfish by a ratio of 2:1 (MNI = 16 and 8, respectively). The hardhead catfish contains a neurotoxin that may have found use among Late Archaic peoples (Hoese and Moore, 1998: 161).

In the faunal samples, four families of ray-finned fishes provide the majority of the estimated biomass: the herrings (Clupeidae), the marine catfishes (Ariidae), the drums (Sciaenidae), and the mullets (Mugilidae). Catfishes are the most important contributors in both assemblages and drums are a consistent second.

SHARKS AND RAYS: Because of their fragility, the most common elements recovered from sharks and rays are teeth, mouth plates, and vertebrae. Stingray (*Dasyatis* sp.) was identified, but most ray remains were grouped as Myliobatidae, the family that includes eagle rays. Weinand et al. (2000) have recently reported large concentrations of one member of this family, the cownose ray (*Rhinoptera bonasus)* from Little St. Simons Island north of the shell rings and equated its presence with spring and early summer migrations. It is not uncommon for shark and ray elements to retain evidence of use for personal adornment or utilitarian needs, but none of the specimens in either collection could be identified as serving these needs. Rather, the shark and ray remains seem to have been deposited along with the bones of other animals and not retained for use.

INVERTEBRATES: The majority of crabs in these assemblages are blue crabs (*Callinectes sapidus)*, but several pincers (chelipeds) may be from other crabs. These fragments were lumped into a Decapoda category since they were very small elements and not diagnostic of fiddler crabs (*Uca* sp.) or stone crabs (*Menippe mercenaria*), for example. Crabs were distributed throughout the midden accumulation and present in every level.

Oysters (*Crassostrea virginica)* comprise an overwhelming majority of invertebrates in these midden deposits. Among the separated valves, a number of other invertebrates were recovered (table 4.7). Hard clams (*Mercenaria*

TABLE 4.7
Cannon's Point and West Ring Invertebrate Species List

Taxonomic Name	**Common Name**
Stenotrema fraterna (Pillsbury)	Fraternal pill snail
Triodopsis hopetonensis (Shuttleworth)	Hopeton forest snail
Polygyra cereolus (Muller)	Ceres polygyra
Euglandina rosea (Ferrusac)	Elongate cannibal snail, rose snail
Haplotrema concava (Say)	Disk cannibal snail
Mesomphix vulgatus (Baker)	Common great zonite
Melampus bidentatus (Say)	Common marsh snail
Detracea floridana (Gmelin)	Floridan marsh snail
Neritina reclivata (Say)	Olive nerite
Polynices duplicata (Linnaeus)	Moon snail
Littorina irrorata (Linnaeus)	Common periwinkle
Busycon carica (Gmelin)	Knobbed whelk
Busycon carica eliceans (Montfort)	Keiner's whelk
Busycon caniliculatum (Linnaeus)	Channeled whelk
Ilyanassa obsoleta (Say)	Eastern mud nassa
Urosalpinx cinerea (Say)	Atlantic oyster drill
Eupleura caudata (Say)	Thick-lipped drill
Terrebra sp.	Auger shell
Odontostoma	Snail
Limopsis sp.	Clam
Anadara ovalis (Bruguiere)	Blood ark
Tagelus plebius (Lightfoot)	Stout tagelus
Mercenaria mercenaria (Linnaeus)	Northern quahog clam
Mercenaria campechiensis (Gmelin)	Southern quahog clam
Dinocardium robustum (Lightfoot)	Giant Atlantic cockle
Crassostrea virginica (Gmelin)	Eastern oyster
Geukensia demissa (Dillwyn)	Atlantic ribbed mussel
Crytopleura costata (Linnaeus)	Angel wing

mercenaria and *Mercenaria campechiensis*) were frequent constituents, occasionally observed in clusters. Also important, and usually exhibiting modification for use were whelks (*Busycon carica*). The contribution of Atlantic ribbed mussels (*Geukensia demissa*) is more difficult to understand because of their extreme fragility. Stout tagelus (*Tagelus plebius*) were also recovered in considerable numbers. Most of the recovered species were marine but several terrestrial snails were recovered. The latter are detritivores and considered commensal in the collections.

Diversity and Equitability: Diversity and equitability measures can be used to examine the subsistence strategies of human groups (Grayson, 1984; Cruz-Uribe, 1988; Reitz and Wing, 2008). Diversity measures reflect the variability of choices made by human groups and equitability reflects preference. Diversity is expressed as a number between 0 and 5 with low values having the least diversity and high numbers having the greatest. Equitability is expressed as a number falling between 0 and 1, with low numbers indicating less evenness of choices. Calculations for these collections were made on MNI and estimated biomass (only taxa having an MNI calculation were used).

In these samples, diversity is moderate in the Cannon's Point Shell Ring sample but higher in the West Ring sample when MNI calculation is used. Equitability is higher in both cases when MNI is used. These measures may reflect the higher MNI calculations for some of the ray-finned fishes and a low calculation for many of the taxa represented by only one or two individuals. The West Ring sample has many fewer taxa with high MNI numbers. When biomass estimate is used, diversity is moderate and equitability values have fallen slightly. The higher equitability values may be a reflection of higher MNI numbers with relatively low weights involved. For example, mullet vertebrae are very diagnostic and very lightweight. MNI values were based on the number of atlas vertebrae. The West Ring weight for all herrings is less than 10 g but the MNI is high among the bony fish (MNI = 30).

Seasonality: Several kinds of evidence can be used to address seasonality in these deposits. From 1984 to 1985, experimental beds of living hard clams were set out as part of archaeological investigations at Kings Bay locality near St. Mary's, Georgia. Modern hard clams were sampled monthly to observe growth rings and create a profile of clam growth for the Kings Bay locality (south of the St. Simons Island shell rings). During excavation of the Cannon's Point Shell Ring, the locations of whole hard clams (*Mercenaria* sp.) were piece-plotted. A sample of 30 of these hard clams were sectioned by Quitmyer et al. (1985: 35–37) to serve as examples of Late Archaic specimens in their study and their seasons of death determined based on incremental rings. These specimens were taken from excavation units 18N,0E and 18N,3E. The sample indicated that the most intense period of collecting occurred during the spring, but all phases of clam growth were observed, suggesting that year-round collecting was evidenced by specimens from the site.

Seasonal availability of species and relative size of individuals can suggest the period of collection by comparison to modern counterparts. Making the assumptions that these relationships have continued relatively unchanged through the millennia, we can use fisheries data for insights. Trawl data gathered in the 1970s provide insights about seasonal availability for several families (Mahood et al., 1974: table 5). Sciaenid fishes (silver perch, sea trout, croakers, spots, black drum, redfish, and star drum) are available year-round in tidal creeks, but present in highest quantities during the summer and fall seasons. Marine catfishes are most available during the summer. Menhaden and anchovies (Clupeidae) are most available in the creeks during the winter season, and flounders are present in small numbers throughout the year. When contrasted with the data for the same bony fish families from the sound around St. Simon's Island, it seems clear that the tidal creeks provided a concentrated source of food year-round, by contrast to the more open waters of the sounds, and would have figured significantly in resource scheduling (Mahood et al., 1974: table 5). Salting or smoking of fish would also extend their period of use.

Migratory waterfowl are excellent indicators of a fall-to-winter period and, although not abundantly represented in these collections, are present in excavated shell ring collections. American eels (*Anguilla rostrata*) are also absent from this sample, suggesting that the river mouths are not being fished by groups responsible for creating these rings. Eels are catadromous fish that return through freshwater rivers to the sea to spawn and die. Adults would

TABLE 4.8
Diversity (H´) and Equitability (V´) Calculations from the Cannon’s Point Shell Ring and the West Ring Based on Minimum Number of Individuals (MNI) and Estimated Biomass (Bio)

Cannon’s Point Shell Ring		West Ring	
Diversity	Equitability	Diversity	Equitability
(MNI) H´= 2.615675	V´ = .6831861	(MNI) H´= 2.90466	V´ = .8381123
(Bio) H´= 2.405792	V´ = .6283671	(Bio) H´= 2.50463	V´ = .7163237

TABLE 4.9
Seasonal Availability of Identified Flora
An “x” indicates floral presence during that month.

		MONTH												
Species	Common Name	J	F	M	A	M	J	J	A	S	O	N	D	Comments
Pinus spp.	Pines										x	x		shed seeds
Juniperus spp.	Red cedar										x	x		mature berries
Carya sp.	Hickory										x	x		mature nuts
Quercus spp.	Oaks								x	x	x	x		mature acorns
Celtis sp.	Hackberry	x	x								x	x	x	berries may persist through winter
Prunus serotina	Black cherry							x	x					mature fruit
Ilex vomitoria	Yaupon holly										x	x	x	leaves available year-round
Bumelia lycoides	Buckthorn									x	x	x	x	fruit available
Foresteirera spp.	Swamp privet		x	x										fruit available
Vitus sp.	Grape								x	x	x	x	x	fruit available
Brassica spp.	Mustards													tentative identification

be available on their outward migration in the fall to spring (Hoese and Moore, 1998: 146). Sturgeon *(Accipenser* sp.) are also absent in this sample, another indication that the river mouths are not being fished by the people responsible for the creation of these shell rings.

Among the plant components of the samples, acorns (*Quercus* sp.) and hickory nutshells (*Carya* sp.) suggest a fall collection period (table 4.9). Other species identified included red cedar (*Juniperus* sp.), pine (*Pinus* sp.), hackberry (*Celtis* sp.), blackberry (*Prunus serotina*), yaupon holly (*Ilex vomitoria)*, buckthorn (*Bumelia lycoides*), swamp privet (*Foresteiera* sp.), and grape (*Vitus* sp.). These plants suggest a late summer through fall collecting period. Because nuts can be stored, the period of use could be extended.

Concentration on the resources of tidal creeks within the saltmarsh is indicated by massive quantities of oysters and the abundance of small fishes available during all seasons of the year. The small fish size, indicated by otolith sizes, also suggests the use of seines, cast nets, or basketry traps held by a weir. Table 4.10 shows that the majority of Sciaenid fishes were less than 20 cm in length. Eighty-eight percent of the Cannon's Point Shell Ring and 94% of the West Ring measurable otoliths suggest a concentration on subadult fish. Research using the annular rings of otoliths and fish scales (Maceina et al., 1987; Ross, 1988; Nieland et al., 2002) indicates that fish of this size range are in their first year of life. Although seines, nets, and traps are proposed methods of procuring small fish, the use of fish poisons is also possible in remnant pools or intentionally dug holes in the marsh surface could have trapped fish at low tide. Buckeye (*Aesculus* sp.) is one possible fish poison.

On the basis of fish size, clam data, migratory waterfowl, and floral availability, it is reasonable to conclude that year-round occupation of the locality has been demonstrated. The density of occupation and the duration of occupation in any season remain issues to be pursued.

Discussion

Russo (2002b: 144) has noted that most consumable oysters can be separated from other constituents using ½ in. screen. This is also true for hard clams *(Mercenaria* sp., whelks (*Busycon* sp.), razor clams (e.g., *Tagelus plebius*), and other less frequently recovered invertebrates such as angel wing and arks. More difficult to assess with this screen size is the importance of Atlantic ribbed mussels (*Geukensia demissa*) and marsh periwinkles (*Littorina irrorata*). To recover the fragile mussels and the smaller marsh periwinkles, finer screen is necessary. Russo and Saunders' work at a number of sites has shown the value of fine-screening in providing a more realistic view of the relative quantities and dietary significance of shellfish. One of the drawbacks of fine screening, however, is the cost (time and personnel) to actually process fine-screened samples. Most of their work (Saunders, 2002: 141) is predicated on the analysis of very small samples, usually a subsample of column samples from an excavation unit level or feature. This has the effect of emphasizing small taxa over large taxa. When I compare species lists from my data (appendix 4.1 and 4.2), using ⅛ in. screen and Fig Island #3 data using 1⁄16 in., ¼ in., and ½ in. screen (Russo, 2002b: tables 17–19), I see great similarity in the taxa identified, but considerable divergence in representation of mammals, birds, and turtles, which are virtually absent. The Fig Island data are drawn from three column samples that are 50×50×10 cm in volume.

In 1973, when I began my dissertation fieldwork, the use of fine screens in shell midden sites was unusual. In fact, I had to argue that the recovery of constituents other than oysters, potsherds, and large vertebrate faunal remains would only be possible if screening were used. Of the vertebrate fauna in these collections, mammals contribute relatively low estimated meat weights. Russo (2002b: 150) has criticized, as unfounded, my statements (Marrinan, 1975) that fish were more important contributors to diet for Late Archaic populations at shell rings than mammals, particularly deer. I accept this criticism as very reasonable given the fact that I did not quantify invertebrates (except crabs). I would note, however, that the samples he recently has quantified from Fig Island #3 indicate the overwhelming contribution of invertebrate fauna as well as, among the vertebrate fauna, the importance of fish over every other class of animals. Whether deer were more important as symbolic or ideological contributors to diet than fish is yet another dimension for discussion.

Saunders (2002: 156) briefly considered the Late Archaic coastal subsistence adaptation with regard to the gathering of large quantities of foods for feasting. The proposal, by Saunders and Russo, that these sites were intentionally created architecture using the refuse of feasting events is an interesting one and we should consider some of its implications. Archaeologists (Blitz, 1993; Hayden, 1996a; Dietler and Hayden, 2001) who have interests in feasting behaviors have provided measures that can be used to identify feasting and to measure its importance. In some societies, feasting requires the manufacture and use of large ceramic containers. These vessels are larger than those required for usual domestic activities and comparing such vessels to household debris makes this compelling evidence of feasting. In other societies, the quantity of ceramic vessels discarded may indicate activity in excess of normal domestic activities and suggest feasting events. In yet other situations, the context of the cultural remains suggests high-status use or feasting. There are other (ethnographic) examples, but as archaeologists, we are limited to the available excavated materials.

In shell ring sites, we are at a distinct disadvantage in some ways. If the development of fiber-tempered pottery was an indigenous accomplishment and not an exotic introduction, the social groups of the Late Archaic would have been new to ceramic technology, having come to its use relatively recently. In their past, wooden containers and soapstone bowls probably served

TABLE 4.10

Length Estimates for Marine Catfishes and Sciaenid Fishes (Drums) from Allometric Scaling of Otoliths (Reitz and Wing, 2008: 68; Colannino-Meeks, 2010)

All values given in mm.

Cannon's Point Shell Ring												
Species	50-100	101-150	151-200	201-250	251-300	301-350	351-400	401-450	451-500	501-550	551-600	Totals
Bairdiella sp.	1	16	2	—	—	—	—	—	—	—	—	19
Cynoscion sp.	—	—	4	2	2	2	1	1	—	—	—	12
Leiostomus xanthurus	—	1	—	—	—	—	—	—	—	—	—	1
Micropogonias undulatus	—	33	35	1	—	—	—	—	—	—	—	69
Sciaenops ocellatus	—	—	—	2	2	—	—	—	—	—	—	4
Stellifer lanceolatus	1	2	—	—	—	—	—	—	—	—	—	3
Ariidae	—	—	1	12	1	7	13	11	10	6	3	64
Totals	2	52	42	17	5	9	14	12	10	6	3	172
%	1.16	30.23	24.42	9.90	2.90	5.23	8.14	6.98	5.81	3.49	1.74	100.00

West Ring												
Species	50-100	101-150	151-200	201-250	251-300	301-350	351-400	401-450	451-500	501-550	551-600	Totals
Bairdiella sp.	5	20	—	—	—	—	—	—	—	—	—	25
Cynoscion sp.		8	7	2	1	4	1	—	—	—	—	23
Micropogonias undulatus	1	28	97	2	1	—	1	—	—	—	—	130
Stellifer lanceolatus	2	11	—	—	—	—	—	—	—	—	—	13
Ariidae	—	—	5	13	9	7	4	1	1	4	1	45
Totals	8	67	109	17	11	11	6	1	1	4	1	236
%	3.40	28.39	46.19	7.20	4.66	4.66	2.54	0.42	0.42	1.70	0.42	100.00

many of the functions ascribed to ceramic vessels. They would lack a long history of ceramic vessel use and it is possible that appropriate uses in feasting activities might not be developed to the extent that they would be recognized in an archaeological context. Fiber-tempered ceramics have not been studied to the extent that we can make statements about their special function in feasting, as Rolland (2005) has recently done with vessel quantity and context for an early Mississippi period Florida assemblage from a mound-vicinity deposit. The fiber-tempered ceramics from both the Cannon's Point Shell Ring and the West Ring did not suggest common decorative motifs, common sizes, or common shapes. In fact, variability seemed to characterize the assemblages. That impression, however, may result from experience with a relatively small sample; it might change when the remaining unexcavated bulk of the sites is considered.

It is possible that decorative variability may tell us something about intergroup contact or group interactions within the coastal strand locality. As archaeologists, we are accustomed to using decorative motifs, temper, and vessel form to propose contact between or among groups. Revolutionary in its day, Deetz's (1968) Arikara ceramic study showed how ceramics could be used to understand changes in residence and descent rules in the prehistoric-to-historic transition on the Plains. A stylistic study of decorative motifs on ceramics from the shell rings of the Georgia coastal strand might suggest whether motifs are clustered or widely distributed in occurrence.

Another class of artifacts that can provide decorative motifs is polished, engraved bone pins. These pins, created from splinters of long bone (particularly white-tailed deer metapodials), are not numerous in midden content, but there probably are sufficient numbers from previous excavations for a preliminary study. Saunders (2002: 127) suggests that the study of bone pins may assist in determining group affiliation. She also has noted the similarity of many of the designs on Fig Island #3 bone pins to rectilinear Orange incised ceramic motifs (Saunders, 2002: 127). Given that this is the only other source of decorative motifs from this period, a distributional study of engraved bone pin motifs would not only assist in answering questions regarding the Late Archaic period, but also provide some ideas about the longevity of motifs incised into bone artifacts.

Another kind of evidence of feasting is based on food (Jackson and Scott, 1995, 2003; Kelly, 2001). Although most of these studies consider later cultures where social stratification is implicit, some of the ideas may be fruitful for Late Archaic groups. Are there prestige foods, rare or unusual animals, or unusual absences or concentrations of taxa in the assemblages? In general, subsistence remains reported from shell ring sites can be characterized by the observation, "lots of oysters and many fish." The available subsistence data from shell ring sites are not numerous and have not been gathered so as to make them comparative. Using subsistence data reported from any shell ring site (specifically Flannery, 1943; Edwards, 1965; Waring and Larson [in Williams, 1968]: Calmes, 1968; Hemmings, 1970a; Zooarchaeology Laboratory, 1970; Marrinan, 1975; Russo, 2002a: 141–153; Russo and Heide, 2002, 2003), there are several observations I can make. First, the largest mammal reported is white-tailed deer. I find no mention of bears, panthers, or wolves in these reports. Given the low MNI of deer in these admittedly small samples, perhaps deer is a "prestige food." Perhaps "prestige" is not as appropriate a term as "preferred"; or "special" might convey the sense that deer are harder to obtain, fewer in the environment, and provide other nutrients, texture, and taste to the diet. Other mammals also have low MNIs but all are present on the marsh and barrier islands. The dog is the only animal domesticate available and, while its role relative to humans is not clear, its remains may be typical fare or represent special, festive or ceremonial fare. Thus we are left to consider whether the most appropriate scenario (model) is one of intramarsh cultural developments adapted to the resources of the coastal strand and relatively separated from mainland groups. A feasting event for such people might mean amassing more of the locally available plant and animal resources and thus not exhibit some of the more expected differences seen in inland, stratified societies.

Over the years, I have asked myself whether I envision these people as primarily mainland groups who come to these places in the marsh or on the barrier islands episodically to feast. It is a scenario that I find no means of evaluating except to note that strictly mainland subsistence resources do not appear in the assemblages nor do lithic artifacts and debitage appear in any quantity. Until we conduct DNA studies on available skeletal remains, we will have little insight into the relative relatedness of coastal populations responsible for the creation of shell rings to contemporary inland peoples.

If Late Archaic "communities" of people are responsible for the intentional construction of shell ring sites, is the ring evidence of the location of a fishing village? How was collection of food resources organized and the obviously directed deposit of food remains and residential debris decided? How were use rights of particular areas determined and what kinds of cooperative ventures might have been necessary, for example, in the ownership of nets? Saunders (2002: 156) has also posed these questions. Although her inspiration may have come from documentation of the Northwest Coast Lillooet people by Hayden (1996b), these questions are reminiscent of Steward's work in the 1930s among the Shoshoni of the Great Basin. In the patchy and arid Great Basin (Steward, 1938: 10–46), the family was the fundamental economic unit and a sexual division of labor existed for task responsibility. Men hunted, built the houses, and fabricated the tools needed for these tasks. Women collected plant foods, prepared food, made clothing, baskets, and pottery. Men and women cooperated in some seed collecting activities and in other activities such as the acquisition of stone by men for use as metates by women. Intimate knowledge of the location and seasonal availability of plant resources meant the difference between starvation and survival. Because animal resources were neither abundant nor concentrated in the environment, plant resources were the mainstays of a very precarious lifeway. Cooperative communal activity was centered around jackrabbit hunts, but other festivities might be held as conditions permitted. The carefully tended and mended family rabbit net joined those of other families to create the large surrounds in which jackrabbits would be captured. Family members functioned in setting up the nets, moving the rabbits toward the nets from the surrounding countryside, dispatching the rabbits, and processing them. Leadership, in the time of the ethnographer (Steward, 1938: 55–56), was vested in a capable man and the role passed to his son if capable. Otherwise, a brother or nonrelated capable man assumed the leadership responsibilities.

The salt marshes of the lower coastal strand of the southeast provided a rich floral and faunal environment in the Late Archaic period. However, there too, mammalian resources were not abundant but invertebrate resources, such as oysters and clams, and a variety of fish were present in the tidal creeks that wound through the salt marsh. In the marshes, an intimate knowledge of seasonal availability and appropriate technology was critical to amassing the abundance of food that is evidenced in shell rings. If Russo and Saunders are correct, that these sites represent intentional constructions of celebratory debris, cooperative behavior was imperative in both acquisition and disposal.

I shall briefly consider what a sexual division of labor relative to subsistence might be in this kind of environment. In this scenario, men would construct canoes, make and mend nets, and fashion other fishing and hunting equipment. Most tools would be made from bone, shell, or plant products. Men would fish and hunt but also assist women in the construction of weirs in tidal creeks. Women would create basket traps, maintain weirs, and collect shellfish on oyster bars and mud flats at low tide. Women would collect and process plant products needed for a variety of uses, from food to shelter to pharmacological needs. It is likely that at peak times of nut or fruit production, men, women, and children moved to those resources and took part in the harvest. Net technology is very time-consuming; from creation of the fiber elements to the manufacture of the net. Men and women may have collaborated in this technology (e.g., women producing the cordage and men fabricating the net) or taboos may have obtained as is true in other fishing societies.

Russo (2002a: 85–88) proposes that the acquisition of status or leadership had occurred in these populations. If true, it would be these privileged individuals, or families, or even clans that decided the use rights of other families or clans to resource areas, or made changes in the historic rights of groups to a collecting, hunting, or fishing area. It would be these leaders who conducted festivities and directed the collection of resources for feasting. They decided fishing and collecting responsibilities and assembled groups, based on the appropriate sexual division of labor, and assigned cooperative net use.

We do not know about the settlement pattern because, in a sense the ring *is* the settlement pattern. There are uninvestigated shell middens in the vicinity of some shell rings that might be temporally related to rings. We ask whether most of the population lived apart in smaller groups and massed for festivities in ring locales, whether higher status families lived in the vicinity of rings and were perceived as the "managers" of these locales, or whether mainland populations participated in any way in the activities that resulted in the construction of shell rings. Given the presence of year-round clam collection and the possibility of year-round fishing, one may argue for occupation of these locales on an annual basis whether the occupiers are a "managerial" family or clan, or a larger population. These are classic questions that have been asked for other cultures—the "empty ceremonial center" with dispersed population as opposed to a more nucleated population living in the vicinity of the site—and it is to be hoped that insight may be gained for these sites as well.

We know little of ritual behavior during the Late Archaic period. Mortuary ritual, so informative in later periods, is virtually lacking for this area and period. Investigations at the Windover site in Florida (Doran, 2002) have shown that a mature burial pattern was a part of the cultural repertoire of groups in the upper St. Johns River drainage by about 7400 cal B.P. Excavations in shell rings have produced nonarticulated human remains but not burials (e.g., Moore, 1897; Saunders, 2002: 140). Excavations in the Cannon's Point Shell Ring produced a human femur (diaphysis only), a pelvis, and a calvarium (cranium lacking the bones of the face and base of the skull) from at least two individuals. These remains were not located in close proximity. Whether they represent displaced burials or the remnants of some other sort of ritual activity is not clear.

SUMMARY REMARKS

When my research in these sites began, I posed several questions. I shall reconsider them and evaluate the information that was generated by my investigations.

Was the composition of the ring midden similar from location to location? We tested the larger of the shell rings in four different locations and found that the midden composition appeared to be relatively similar. These are, after all, accumulations of midden refuse and while there were some differences, they did not appear to indicate differences in relative material culture or subsistence content. The cemented lens exposed in the northernmost unit (18N,0E) was not seen elsewhere.

Had the midden deposit been higher in the past than it appeared in 1973, i.e., could we identify slumping? The 3×3 m unit placed at 30N,3E indicated that slumping had occurred. Thus we have the suggestion that the ring height was greater in the past and that settling or slumping had occurred.

Could we determine ring function? This has been the perennial question. Although I do not believe that we identified ring function, we were able to rule out the fish trap hypothesis. It is clear that the Cannon's Point shell ring, now surrounded by salt marsh, was not located in such an environment when it was deposited. Thus other sites currently surrounded by salt marsh are likely so located because of eustatic sea level rise or local geological interactions between land and water.

How does this shell ring fit into the chronology of these coastal sites? Radiocarbon dates indicate consistent Late Archaic dates for both shell rings. Their ceramic inventories also are consistent with a Late Archaic affiliation. The West Ring ceramic inventory contains more later (Early Woodland) grit-tempered types. The area around the ring, now under active salt marsh, indicates a continued use of the area in Early Woodland times, but is not associated with shell midden deposit. From the few radiocarbon dates available at present, a hiatus of perhaps a thousand years is indicated. Whether this is truly the situation or whether there are other sites in the area dating to the period between 1600 yr B.C. and 600 yr B.C. is not clear. Additional site survey and testing is needed to confirm a hiatus.

Could we recover adequate vertebrate and invertebrate samples to gain an understanding of subsistence strategy and season of occupation? The vertebrate samples and plant remains indicated year-round deposition of midden constituents. This assessment was strengthened by the hard clam data. These findings suggested a greater degree of sedentism in the Late Archaic than previously believed.

Could we develop a broader understanding of Late Archaic period lifeways by blending subsistence evidence with material culture? The midden deposits composing the shell rings indicated an intense harvesting economy based on fishing, gathering, and hunting. As mentioned above, the analysis of these materials also indicated that Late Archaic people had achieved a more sedentary existence. The subsistence base is not unlike that for later periods in the coastal strand (see Marrinan, 2005; Ashley et al., 2007). We do not have, at this time, any evidence that this subsistence base and lifeway was established at an earlier time. It is possible that such evidence exists but is present in deeply buried deposits. The nonceramic levels at the Bilbo site (Waring in Williams, 1968) near Savannah suggest that this is not an impossibility for the late Middle Archaic period. Ceramic variability and some affiliation with Florida fiber-tempered ceramic styles is clearly demonstrated. Lithic evidence is sparse, suggesting that the people of this area had a more limited access to chert sources and soapstone than contemporary inland and interior people.

Further excavations in shell rings must address the current problems and propositions that have been made regarding function, construction sequence or approach, status achievement, and perhaps even origins. There are other samples, even material generated by my own work, that remain unanalyzed. These collections, current projects, and future work improve the prospects of tackling many of our questions.

THE LATE ARCHAIC TO WOODLAND TRANSITION

Cultural materials recovered from the Marsh Cultural Level suggest that approximately 1000 years passed between the last deposits in the West Ring and the deposits now lying beneath active salt marsh. Whether the area was abandoned, or there are uninvestigated sites in the area that represent this time period, is unknown. The ceramic materials suggest that ceramic technology was changing from fiber-tempered pastes to gritty sand-tempered pastes. Coil manufacturing is clearly present in these ceramic collections. Ceramic design continues to be varieties of incising, but some simple stamping is present. The latter type of ceramic is characteristic of the Refuge and Deptford ceramic types of the coastal strand.

The faunal remains were recovered without associated shell midden. The species recovered suggest that hunting and fishing were the primary activities of the occupants. Charcoal was also associated with the ceramic and faunal remains, suggesting that the use of the site probably involved food preparation. Perhaps hunting/fishing camps of short duration are represented by these deposits. The season of use is not clear since most of the indicators (floral and faunal) are absent. The only floral remains recovered were hickory nutshells suggesting a fall occupation.

This period of time, cal 1970 B.C. to 970 B.C., may fall within a period of temperature oscillation such as de Menocal et al. (2000: 2199) have calculated for the Holocene. It is not clear whether oyster beds were depressed, but colder temperatures or more freshwater entering the estuary because of colder, wetter conditions might be factors. It is clear that the configuration of the marsh was changing and that trees in the vicinity of the shell rings were being inundated.

In general, it is clear that our grasp of cultural development during the Late Archaic period and the succeeding Early Woodland period is relatively narrow. We have focused on shell rings to the general exclusion of midden sites that might be contemporaneous. We have depended on extremely small samples to characterize the social conditions of people who created shell rings and to understand the material culture of this very critical period of time. Although the number of sites known to be shell rings is much greater today, and we now understand that they survive into Mississippian times (Ashley et al., 2007), we continue to have many of the same questions that formed the basis of my dissertation research in the 1970s. I am heartened by the increased interest in these sites, however, and the promise that climatological, isotopic, and geological data hold for understanding sea level and water temperature changes in the coastal zone. We have new techniques, particularly various kinds of remote sensing, that are generating data about site formation. I am also pleased by the willingness of colleagues to propose interesting and varied cultural interpretations. We can look forward, I think, to gaining insights about the conditions for human occupation of the coastal strand and why shell rings became a dominant settlement feature.

NOTES

1. Charles H. Fairbanks and Jerald T. Milanich made my involvement in shell ring archaeology possible and their support was unfailing even though the length of field time I required was much longer than their other students. Elizabeth S. Wing made workspace and the collections of the Zooarchaeology Laboratory (now Environmental Archaeology) available to me as well as sage advice. All were, and continue to be, mentors, friends, and inspirations. I also am grateful to the many University of Florida and Florida Atlantic University students whose field school participation made the work possible.

Appendix 4.1

Scientific Name	Taxonomic Name	NISP	%	Wt. gm	%	Biomass gm	%	Burnt	%	Worked	%	MNI	%
Mammalia	Unidentified mammal	247	1.21	63.7	5.08	1105.925	6.11	—	0.00	3	11.11	—	0.00
Mammalia cf. Rodentia	Probably rodent	2	0.01	0.2	0.02	6.179	0.03	—	0.00	—	0.00	—	0.00
Mammalia cf. *Neotoma*	Probably wood rat	1	0.01	0.2	0.02	6.179	0.03	—	0.00	—	0.00	1	0.29
Mammalia cf. *Procyon*	Probably raccoon	1	0.01	1.0	0.08	26.303	0.15	—	0.00	—	0.00	—	0.00
Mammalia cf. *Odocoileus*	Probably white tail deer	1	0.01	0.4	0.03	11.531	0.06	—	0.00	—	0.00	—	0.00
Didelphis virginiana	Eastern opossum	26	0.13	17.8	1.42	351.057	1.94	—	0.00	—	0.00	1	0.29
Soricidae cf. *Blarina* or *Cryptotis*	Shrews	3	0.01	0.1	0.01	3.311	0.02	—	0.00	—	0.00	—	0.00
Cryptotis parva	Least shrew	2	0.01	0.2	0.02	6.179	0.03	—	0.00	—	0.00	1	0.29
Sylvilagus sp.	Rabbits	7	0.03	1.3	0.10	33.308	0.18	—	0.00	—	0.00	1	0.29
Rodentia	Rodents	13	0.06	0.9	0.07	23.923	0.13	—	0.00	—	0.00	—	0.00
Rodentia cf., *Peromyscus*	Probably white-footed mouse	1	0.01	0.1	0.01	3.311	0.02	—	0.00	—	0.00	—	0.00
Oryzomys sp.	Rice rat	2	0.01	0.3	0.02	8.900	0.05	—	0.00	—	0.00	1	0.29
Peromyscus sp.	White-footed mouse	4	0.02	0.4	0.03	11.531	0.06	—	0.00	—	0.00	2	0.58
Sciurus carolinensis	Gray squirrel	5	0.02	0.5	0.04	14.095	0.08	—	0.00	—	0.00	1	0.29
Procyon lotor	Raccoon	17	0.08	25.4	2.03	483.449	2.67	—	0.00	—	0.00	2	0.58
Odocoileus virginianus	White tail deer	55	0.27	201.6	16.08	3119.187	17.23	—	0.00	3	11.11	1	0.29
All Mammals		387	1.89	314.1	25.06	5214.369	28.80	0	0.00	6	22.22	11	3.18
Aves	Unidentified birds	66	0.32	6.1	0.49	105.840	0.58	—	0.00	—	0.00	—	0.00
Ardea herodias wardi	Great blue heron	1	0.01	0.3	0.02	6.826	0.04	—	0.00	—	0.00	1	0.29
Rallidae	Rails	13	0.06	1.4	0.11	27.732	0.15	—	0.00	—	0.00	3	0.87
Buteo lineatus alleni	Red-shouldered hawk	1	0.01	0.3	0.02	6.826	0.04	—	0.00	—	0.00	1	0.29
All Birds		81	0.40	8.1	0.65	147.224	0.81	0	0.00	0	0.00	5	1.45
Testudines	Unidentified turtles	319	1.56	42.0	3.35	386.881	2.14	1	3.23	2	7.41	—	0.00
Testudines cf. Kinosternidae	Probably mud or musk turtle	1	0.01	0.2	0.02	10.757	0.06	—	0.00	—	0.00	—	0.00
Testudines cf. *Trachemys*	Probably pond slider	2	0.01	1.7	0.14	45.123	0.25	—	0.00	2	7.41	—	0.00
Testudines cf. *Malaclemys*	Probably diamondback terrapin	1	0.01	0.6	0.05	22.457	0.12	—	0.00	—	0.00	—	0.00
Kinosternidae	Mud or musk turtles	65	0.32	38.1	3.04	362.426	2.00	—	0.00	—	0.00	2	0.58
Trachemys sp.	Pond slider	128	0.63	25.1	2.00	274.019	1.51	1	3.23	15	55.56	2	0.58

Appendix 4.1 — (*Continued*)

Scientific Name	Taxonomic Name	NISP	%	Wt. gm	%	Biomass gm	%	Burnt	%	Worked	%	MNI	%
Malaclemys terrapin	Diamondback terrapin	121	0.59	33.2	2.65	330.493	1.83	1	3.23	2	7.41	2	0.58
All turtles		637	3.11	140.9	11.24	1432.157	7.91	3	9.68	21	77.78	6	1.73
Serpentes	Unidentified snakes	61	0.30	2.2	0.18	30.609	0.17	—	0.00	—	0.00	—	0.00
Natrix sp.	Water snakes	1	0.01	0.1	0.01	1.349	0.01	—	0.00	—	0.00	1	0.29
Coluber constrictor	Black racer	4	0.02	0.2	0.02	2.717	0.02	—	0.00	—	0.00	1	0.29
Lampropeltis sp.	Kingsnake	4	0.02	0.2	0.02	2.717	0.02	—	0.00	—	0.00	1	0.29
Iguanidae	Lizards and chameleons	1	0.01	0.1	0.01	1.349	0.01	—	0.00	—	0.00	—	0.00
Anolis carolinensis	Chameleon	4	0.02	0.4	0.03	5.471	0.03	—	0.00	—	0.00	1	0.29
All snakes		75	0.37	3.2	0.26	44.211	0.24	—	0.00	0	0.00	4	1.16
Amphibia	Unidentified amphibian	6	0.03	0.5	0.04	6.854	0.04	—	0.00	—	0.00	—	0.00
Salientia	Possibly salamander	1	0.01	0.1	0.01	1.349	0.01	—	0.00	—	0.00	1	0.29
All snakes		7	0.03	0.6	0.05	8.203	0.05	0	0.00	0	0.00	1	0.29
Actinopterygii	All ray-finned fishes	12216	59.69	331.4	26.44	3247.024	17.94	—	0.00	—	0.00	—	0.00
Lepisosteus spp.	Gar	58	0.28	4.0	0.32	90.287	0.50	—	0.00	—	0.00	1	0.29
Amia calva	Bowfin	4	0.02	0.5	0.04	17.466	0.10	—	0.00	—	0.00	1	0.29
Elops saurus	Ladyfish	9	0.04	0.7	0.06	22.784	0.13	—	0.00	—	0.00	1	0.29
Clupeidae	Herrings	1154	5.64	11.7	0.93	210.798	1.16	—	0.00	—	0.00	40	11.56
Brevoortia sp.	Menhaden	2	0.01	0.2	0.02	8.469	0.05	—	0.00	—	0.00	—	0.00
Ameiurus sp.	Freshwater catfish/bullhead	1	0.01	0.2	0.02	4.325	0.02	—	0.00	—	0.00	1	0.29
Ariidae	Marine catfishes	2383	11.64	204.4	16.31	3125.769	17.27	22	70.97	—	0.00	38	10.98
Ariopsis felis	Hardhead catfish	58	0.28	12.4	0.99	218.148	1.20	—	0.00	—	0.00	—	0.00
Bagre marinus	Gafftopsail Catfish	490	2.39	68.7	5.48	1109.453	6.13	—	0.00	—	0.00	—	0.00
Cyprinodontidae	Killifishes	101	0.49	0.8	0.06	25.319	0.14	—	0.00	—	0.00	4	1.16
Opsanus sp.	Toadfish	10	0.05	0.6	0.05	20.172	0.11	—	0.00	—	0.00	3	0.87
Pomatomus saltatrix	Bluefish	1	0.01	0.1	0.01	4.074	0.02	—	0.00	—	0.00	1	0.29
Carangidae	Jacks	2	0.01	0.2	0.02	9.439	0.05	—	0.00	—	0.00	1	0.29
Sparidae cf., *Lagodon*	Possibly pinfish	1	0.01	0.1	0.01	1.905	0.01	3	9.68	—	0.00	1	0.29

Appendix 4.1 — (*Continued*)

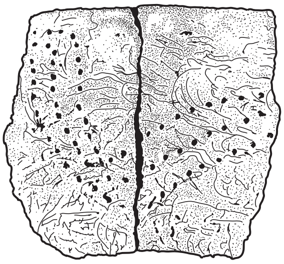
Scientific Name	Taxonomic Name	NISP	%	Wt. gm	%	Biomass gm	%	Burnt	%	Worked	%	MNI	%
Sciaenidae	Drums	70	0.34	4.2	0.34	112.513	0.62	—	0.00	—	0.00	—	0.00
Sciaenidae cf. *Pogonias*	Probably black drum	1	0.01	0.1	0.01	7.079	0.04	—	0.00	—	0.00	—	0.00
Bairdiella sp.	Silver perch	71	0.35	3.6	0.29	100.384	0.55	—	0.00	—	0.00	31	8.96
Cynoscion spp.	Seatrout	33	0.16	4.9	0.39	126.109	0.70	—	0.00	—	0.00	11	3.18
Leiostomus xanthurus	Spot	34	0.17	1.6	0.13	55.087	0.30	—	0.00	—	0.00	32	9.25
Menticirrhus americanus	Southern kingfish	3	0.01	0.4	0.03	19.748	0.11	—	0.00	—	0.00	2	0.58
Micropogonias undulatus	Atlantic croaker	133	0.65	8.7	0.69	192.861	1.07	—	0.00	—	0.00	51	14.74
Pogonias cromis	Black drum	12	0.06	1.7	0.14	57.615	0.32	—	0.00	—	0.00	5	1.45
Sciaenops ocellatus	Redfish	43	0.21	24.3	1.94	412.428	2.28	—	0.00	—	0.00	5	1.45
Stellifer lanceolatus	Star drum	4	0.02	0.2	0.02	11.824	0.07	—	0.00	—	0.00	2	0.58
Mugil spp.	Mullet	1495	7.31	31.2	2.49	478.794	2.64	1	3.23	—	0.00	79	22.83
Prionotus sp.	Searobin	1	0.01	1.0	0.08	27.542	0.15	—	0.00	—	0.00	1	0.29
Paralichthyidae	Flounders	69	0.34	9.8	0.78	200.535	1.11	1	3.23	—	0.00	2	0.58
All bony fishes		18459	90.20	727.7	58.05	9917.950	54.78	27	87.10	0	0.00	313	90.46
Carcharhinidae	Requiem sharks	4	0.02	0.2	0.02	31.542	0.17	—	0.00	—	0.00	—	0.00
Galeocerdo cuvieri	Tiger shark	95	0.46	2.8	0.22	305.180	1.69	—	0.00	—	0.00	1	0.29
Sphyrna sp.	Bonnethead shark	1	0.01	0.1	0.01	17.378	0.10	—	0.00	—	0.00	1	0.29
Myliobatidae	Eagle rays	223	1.09	9.2	0.73	848.902	4.69	—	0.00	—	0.00	3	0.87
Aetobatus narinari	Spotted eagle ray	1	0.01	1.1	0.09	136.646	0.75	—	0.00	—	0.00	1	0.29
All sharks and rays		324	1.58	13.4	1.07	1339.648	7.40	0	0.00	0	0.00	6	1.73
Unidentified Vertebrate	All Unidentified Fragments	495	2.42	45.5	3.63	—	0.00	1	3.23	—	0.00	—	0.00
Totals		20465	100.00	1253.5	100.00	18103.763	100.00	31	100.00	27	100.00	346	100.00
Decapoda	Crabs	28	1.68	2.0	0.58	59.820	1.45	—	0.00	—	0.00	—	0.00
Decapoda cf. *Uca*	Probably fiddler crab	3	0.18	0.4	0.12	15.984	0.39	—	0.00	—	0.00	1	1.27
Callinectes sp.	Blue crab	1637	98.14	342.4	99.30	4058.053	98.17	—	0.00	—	0.00	78	98.73
All crabs		1668	100.00	344.8	100.00	4133.857	100.00	0	0.00	0	0.00	79	100.00

Appendix 4.2

Scientific Name	Taxonomic Name	NISP	%	Wt. gm	%	Biomass gm	%	Burnt	%	Worked	%	MNI	%
Mammalia	Unidentified mammal	187	1.96	24.4	6.60	466.284	7.52	34	47.22	1	20.00	—	0.00
Didelphis virginiana	Eastern opossum	4	0.04	1.0	0.27	26.303	0.42	—	0.00	—	0.00	1	0.40
Soricidae	Shrews	1	0.01	0.1	0.03	3.311	0.05	—	0.00	—	0.00	—	0.00
Blarina brevicauda	Short-tailed shrew	1	0.01	0.1	0.03	3.311	0.05	—	0.00	—	0.00	1	0.40
Sylvilagus sp.	Rabbits	4	0.04	1.6	0.43	40.152	0.65	—	0.00	—	0.00	1	0.40
Rodentia	Rodents	3	0.03	0.3	0.08	8.900	0.14	—	0.00	—	0.00	—	0.00
Rodentia cf., *Peromyscus*	Possibly white-footed mouse	1	0.01	0.1	0.03	3.311	0.05	—	0.00	—	0.00	1	0.40
Sigmodon hispidus	Hispid cotton rat	1	0.01	0.1	0.03	3.311	0.05	—	0.00	—	0.00	1	0.40
Procyon lotor	Raccoon	6	0.06	2.9	0.78	68.574	1.11	1	1.39	—	0.00	1	0.40
Odocoileus virginianus	White tail deer	17	0.18	47.5	12.85	849.228	13.70	1	1.39	2	40.00	1	0.40
All Mammals		225	2.36	78.1	21.13	1472.686	23.75	36	50.00	3	60.00	7	2.79
Aves	Unidentified birds	46	0.48	3.3	0.89	60.513	0.98	1	1.39	—	0.00	1	0.40
Rallidae	Rails	5	0.05	0.6	0.16	12.827	0.21	—	0.00	—	0.00	1	0.40
All Birds		51	0.54	3.9	1.06	73.340	1.18	1	1.39	0	0.00	2	0.80
Testudines	Unidentified turtles	142	1.49	16.9	4.57	210.225	3.39	20	27.78	—	0.00	—	0.00
Kinosternon sp.	Mud or musk turtle	4	0.04	0.9	0.24	29.467	0.48	—	0.00	—	0.00	1	0.40
Trachemys sp.	Pond slider	1	0.01	0.1	0.03	6.761	0.11	—	0.00	—	0.00	1	0.40
Malaclemys terrapin	Diamondback terrapin	83	0.87	14.6	3.95	190.597	3.07	—	0.00	—	0.00	2	0.80
All turtles		230	2.42	32.5	8.79	437.050	7.05	20	27.78	0	0.00	4	1.59
Serpentes	Unidentified snakes	21	0.22	0.6	0.16	8.240	0.13	—	0.00	—	0.00	1	0.40
Anolis carolinensis	Chameleon	2	0.02	0.1	0.03	1.349	0.02	—	0.00	—	0.00	1	0.40
All snakes		23	0.24	0.7	0.19	9.589	0.15	—	0.00	0	0.00	2	0.80
Amphibia	Unidentified amphibian	14	0.15	0.3	0.08	4.092	0.07	—	0.00	—	0.00	1	0.40
Actinopterygii	All ray-finned fishes	5568	58.50	105.5	28.54	1284.797	20.72	1	1.39	—	0.00	—	0.00
Lepisosteus spp.	Gar	51	0.54	2.2	0.60	56.301	0.91	—	0.00	—	0.00	1	0.40

Appendix 4.2 — (*Continued*)

Scientific Name	Taxonomic Name	NISP	%	Wt. gm	%	Biomass gm	%	Burnt	%	Worked	%	MNI	%
Elops saurus	Ladyfish	5	0.05	0.3	0.08	11.666	0.19	—	0.00	—	0.00	1	0.40
Clupeidae	Herrings	783	8.23	6.6	1.79	134.103	2.16	—	0.00	—	0.00	30	11.95
Ariidae	Marine catfishes	725	7.62	54.5	14.75	890.383	14.36	5	6.94	—	0.00	28	11.16
Arius felis	Hardhead catfish	113	1.19	6.8	1.84	123.277	1.99	1	1.39	—	0.00	—	0.00
Bagre marinus	Gafftopsail Catfish	126	1.32	17.8	4.82	307.538	4.96	—	0.00	—	0.00	—	0.00
Carangidae	Jacks	1	0.01	0.1	0.03	5.129	0.08	—	0.00	—	0.00	1	0.40
Archosargus probatocephalus	Sheepshead	1	0.01	0.1	0.03	1.905	0.03	5	6.94	—	0.00	1	0.40
Sciaenidae	Drums	57	0.60	2.3	0.62	72.057	1.16	—	0.00	—	0.00	—	0.00
Bairdiella sp.	Silver perch	53	0.56	1.6	0.43	55.087	0.89	—	0.00	—	0.00	25	9.96
Cynoscion spp.	Seatrout	47	0.49	5.5	1.49	137.363	2.22	—	0.00	—	0.00	14	5.58
Leiostomus xanthurus	Spot	13	0.14	0.5	0.14	23.294	0.38	—	0.00	—	0.00	11	4.38
Micropogonias undulatus	Atlantic croaker	145	1.52	19.5	5.28	350.450	5.65	—	0.00	—	0.00	71	28.29
Pogonias cromis	Black drum	19	0.20	2.0	0.54	64.977	1.05	—	0.00	—	0.00	2	0.80
Sciaenops ocellatus	Redfish	17	0.18	4.0	1.08	108.524	1.75	—	0.00	—	0.00	4	1.59
Stellifer lanceolatus	Star drum	24	0.25	0.9	0.24	35.986	0.58	—	0.00	—	0.00	13	5.18
Mugil spp.	Mullet	980	10.30	13.4	3.63	237.409	3.83	—	0.00	—	0.00	30	11.95
Paralichthyidae	Flounders	100	1.05	4.7	1.27	104.272	1.68	—	0.00	—	0.00	2	0.80
All bony fishes		8828	92.75	248.3	67.18	4004.518	64.59	12	16.67	0	0.00	234	93.23
Myliobatidae	Eagle rays	82	0.86	1.7	0.46	198.695	3.20	—	0.00	—	0.00	1	0.40
Unidentified Vertebrate	All Unidentified Fragments	65	0.68	4.1	1.11	—	0.00	3	4.17	2	40.00	—	0.00
Totals		9518	100.00	369.6	100.00	6199.970	100.00	72	100.00	5	100.00	251	100.00
Decapoda	Crabs	1	0.90	0.2	3.08	9.054	5.58	—	0.00	—	0.00	1	25.00
Callinectes sp.	Blue crab	110	99.10	6.3	96.92	153.271	94.42	8	100.00	—	0.00	3	75.00
All crabs		111	100.00	6.5	100.00	162.325	100.00	8	100.00	0	0.00	4	100.00



CHAPTER 5

THE ARCHAIC ABOVE CHOCTAWHATCHEE BAY: HYDRODYNAMICS, ADAPTATION, AND ABANDONMENT

REBECCA SAUNDERS

In this paper, I will address the data we (Saunders et al., 2009) have generated concerning human adaptation to environmental change from the Middle to the Late Archaic above Choctawhatchee Bay, in panhandle Florida (fig. 5.1). Our archaeological and paleoenvironmental data suggest that the area, occupied fitfully between 7200 and 3500 cal B.P., was abandoned after the latter date. Independently derived data on mid-Holocene megaflooding (Brown et al., 1999) and paleotempestology (Liu and Fearn, 2000) indicate that major climatic changes at 3500 cal B.P. were likely responsible for the abandonment.

Before presenting these data, I will weigh in very briefly on some aspects of the overarching themes we have been asked to consider:

- whether the terms “Late Archaic” and “Early Woodland” are still meaningful or useful;
- what the nature of the transition between the Late Archaic and Early Woodland was like; and
- what the causes of the transition might have been, especially in light of recent data which indicate that in some areas of the Southeast, the transition produced Early Woodland societies that were considerably less complex than their forerunners.

Ford and Willey (1941: 332[538]) sanctified the use of the term “Archaic” for what was, in the early 1940s, the earliest formally described “Stage” in southeastern culture history. The two stressed the appropriateness of the term, in the denotive and especially the connotive sense: “The cultures of this period were ‘archaic’ in the true sense; horticulture was lacking; pottery was either absent or makes its appearance late in the stage, and the abundance, variety, and quality of the artifacts do not compare with the more complex later developments.” Though Ford and Willey noted the association of many Archaic cultures with shell mounds, they described Archaic folk as predominantly nomadic hunters and gatherers. Importantly, they stressed both the variability of Archaic cultures across space and the deep embeddedness of Archaic characteristics in later cultural adaptations.

Until recently, the transition to the Early Woodland was viewed as a gradual change, as technological and social tools that were “lacking” in the Late Archaic slowly trickled into the southeast from the north. In the northeast, pottery is the most visible horizon marker for the Early Woodland. In the southeast, pottery was known to have existed in the Late Archaic at the outset of the definition of the stage (see Ford and Willey, above); the most visible horizon marker is the wholesale replacement of fiber tempering in pottery with sand, grog, or sponge spicule temper. (The processes involved and probable time-transgressive nature of this transition has received remarkably little attention.) With Poverty Point willfully ignored, the model of the transition from Archaic to Early Woodland involved no devolution, and no great leap forward, either. Willey and Phillips (1958: 118), for instance, were underwhelmed by the Early Woodland, describing it as “Archaic with pottery.” Milanich’s (1994) reference to an “Archaic Way of Life” that persisted for millennia after the Archaic is a reaffirmation of Ford and Willey’s conception of a bedrock Archaic lifeway persisting throughout prehistory.

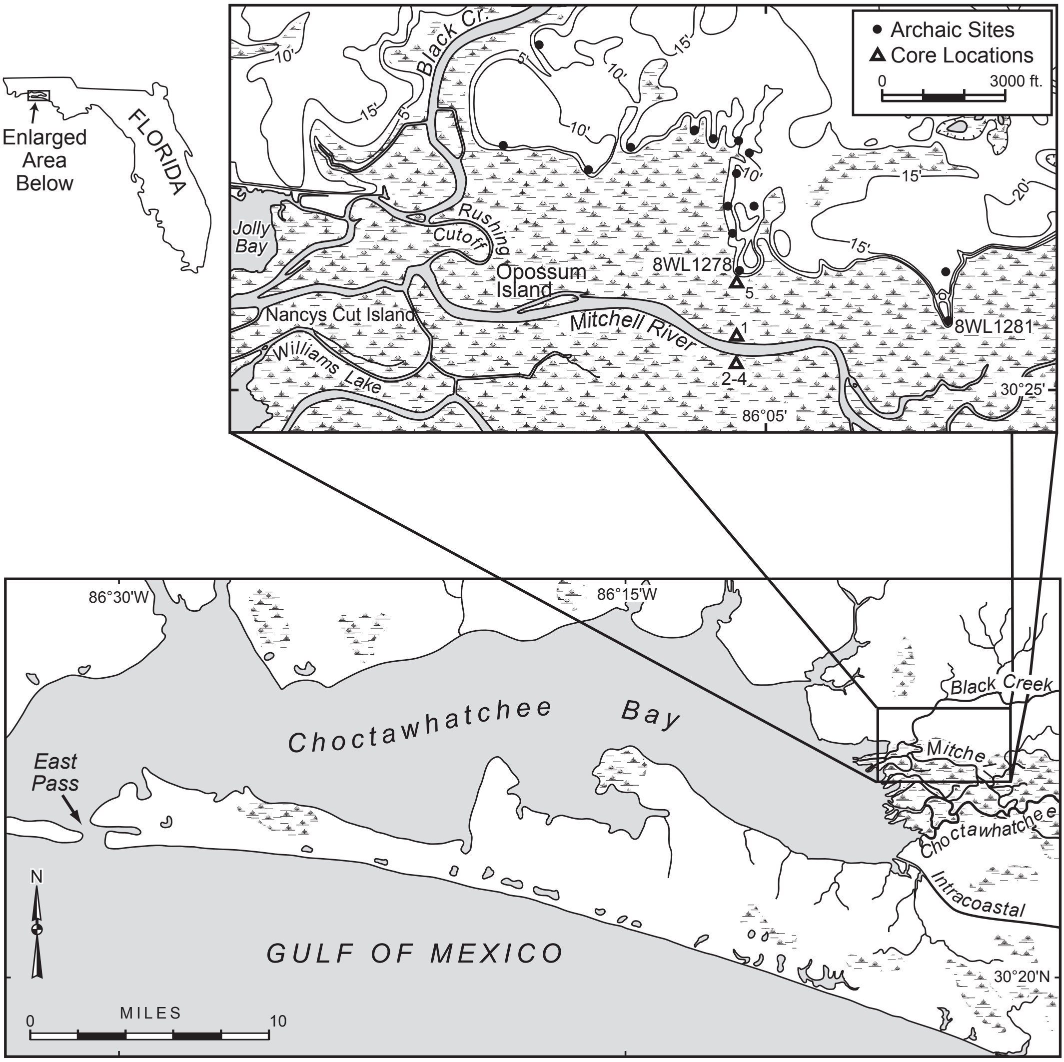


Fig. 5.1. Location of the Mitchell River sites and core locations.

The relatively recent[1] demonstration of considerable cultural complexity in the Middle and Late Archaic has forced a redefinition of the relationship between the Late Archaic and the Early Woodland. Rather than a gradual rise in complexity, the Early Woodland now seems more like a collapse, at least in terms of the social structures that favor mound building, population nucleation, and long distance trade. But as the previous sentence indicates, I don't believe that replacing the stage terms with alternatives will aid our understanding of the cultures that "inhabit" them, or of the transitions between the two. As our knowledge of specific culture histories has grown over the last 70 years or so, we have readjusted our common understandings of these stages. For future use, it would probably be best to use the stage (and conjoined period) names as temporal rather than cultural designations (see Jeter et al., 1989, for a discussion of the history of wrangling with this issue). In the lower Mississippi River

Valley, the stage names (Paleoindian, Archaic, Woodland, Mississippi [note ending])—along with their tripartite internal divisions—are used as broad temporal boundaries into which different cultures (Late Archaic, Poverty Point, Tchefuncte, Troyville, Coles Creek, Caddo, Plaquemine, Mississippian [note ending]) are organized. This allows for cultures within a stage to vary widely in terms of complexity and other characteristics. For instance, in the lower Mississippi River Valley Late Archaic, not all cultures were Poverty Point cultures; many, as far as we can tell, conformed more or less with Ford and Willey's original conception. Indeed, we must take care that, in our current conceptual revisions of Late Archaic and Early Woodland cultures, we retain an appreciation of variability. Not all Late Archaic cultures were involved in extensive trading networks and mound building and there is a good deal of evidence (in, for instance, Early Woodland pottery surface decorations) that information networks were widespread after the Late Archaic. And, of course, the temporal boundaries of these stages will continue to shift—in 1946, the earliest (prepottery) cultures in Florida were thought to date to the "after the beginning of the Christian era" and pottery appeared around A.D. 500 (Griffin, 1996: 47). We have pushed these developments, and their attendant stages, back in time with no lasting damage.

Our reevaluation of the content of cultures on either side of the permeable divide has, naturally, forced a reappraisal of the processes by which the transition from the Late Archaic to the Early Woodland took place. Kidder (2006) reviewed four models for the transition. Most of us were probably schooled in the gradualist model, as described above. However, over the last decade or so, geological and other paleoenvironmental data have suggested to a number of researchers (e.g., Sandweiss et al., 2007) that at ca. 3000 cal B.P., climatic perturbations associated with the El Niño/Southern Oscillation produced significant culture change regionally, if not globally. For the Southeast, a number of authors, including Kidder (2006) and Anderson et al. (2007a, 2007b; these authors cite 3200 cal B.P. as the temporal boundary), have suggested that the transition from the Late Archaic to the Early Woodland was due to catastrophic climate change. Kidder (2006) has recently proposed that megaflooding in the Mississippi River Valley between 3000 and 2600 cal B.P. caused the fall of Poverty Point and the abandonment of the lower Mississippi River Valley for 400 years.

THE MITCHELL RIVER ARCHAIC OCCUPATIONS

Information from a set of Middle to Late Archaic sites on the sandy terrace above the Mitchell River floodplain, east of Choctawhatchee Bay on the Florida panhandle, can be used to look at issues of the timing of possible climatic changes and site abandonment in the Late Archaic. There are 16 Middle to Late Archaic sites on the sandy terrace overlooking the Mitchell River floodplain. Twelve of the 16 have evidence of substantial estuarine resource exploitation. None of the 16 has evidence of an Early Woodland component. The fact that these sites are in what is now a freshwater environment suggested that there was significant environmental change at the end of the Late Archaic. Armed with an NSF grant, Gregory Mikell and I did extensive testing at two of the sites, Mitchell River 1 (8WL1278) and Mitchell River 4 (8WL1281), where midden was most developed (deepest), and more intensive excavation at Mitchell River 1, which had better integrity than Mitchell River 4. The project included paleoenviromental reconstruction using information derived from cores taken in a north-south transect across the floodplain south of Mitchell River 1.

At the beginning of the project, these sites were thought to date exclusively to the Late Archaic. However, radiocarbon dates from the terrestrial excavations at Mitchell River 1 and 4 indicated initial occupations around 7200 cal B.P. Mitchell River 1 had a long occupational sequence, from 7200 to 3600 cal B.P. with radiocarbon dates clustering in discrete groups: 7200–6700, 5900–5300, 4800–4200, and 4000– 3500.

Several articles are now (Mikell and Saunders, 2007; Saunders et al., 2009) available on different aspects of this research. What concerns us here is the abandonment date—our latest date (of 13) at Mitchell River 1 is 3720–3560 cal B.P. (1σ)—and whether the abandonment was due simply to local hydrological (or other) changes, or whether the abandonment in the Mitchell River area is symptomatic of a larger, regional, or even global phenomenon.

Our ability to present a complete recounting of the environmental history of the Mitchell

TABLE 5.1

Radiocarbon Dates from 8WL1278, Oldest to Most Recent

Calibrated with Calib 5.0; Delta R 36±14; calibrated dates are rounded.

Code/Lab No.	Provenience	Material	^{13}C/^{12}C	Adjusted age B/P.	Radiocarbon age calibrated[a] (± 1σ)		Radiocarbon age calibrated[a] (± 2σ)	
						%		%
Beta-139264 (AMS)	TU 3/ Fea. T-7/ Level 7	soot on steatite sherd	-25.2	6260 ± 40	7250–7170 B.C.	1.0	7270–7150 B.C. 7268–7150 B.C.	0.85 0.15
Beta-143030	TU 3/Level 7/Str. IV	charcoal	-26.1	5950 ± 70	6860–6720 B.C. 6685–6680 B.C. 6700–6690 B.C. 6880–6870 B.C.	0.85 0.04 0.07 0.04	6970–6640 B.C.	1.0
WK-9652	EU 6/Level 7/Str. V	shell	-2.1	5500 ± 50	5890–5760 B.C.	1.0	5950–5700 B.C.	1.0
WK-9649	EU 1/Level 9/Str. IIIb	shell	-1.3	5450 ± 50	5860–5730 B.C.	1.0	5900–5660 B.C.	1.0
WK-9646	EU 5/Level 7/Str. IV	shell	-1.6	5270 ± 50	5660–5550 B.C.	1.0	5710–5470 B.C.	1.0
WK-9650	EU 7/Fea. 13/Level 9	shell	-1.8	5030 ± 50	5420–5300 B.C.	1.0	5470–5230 B.C.	1.0
WK-9645	EU 1/Level 8/Str. III	charcoal	-25.5	4180 ± 50	4760–4690 B.C. 4640–4630 B.C. 4680–4640 B.C. 4830–4800 B.C.	0.5 0.05 0.02 0.02	4840–4570 B.C.	1.0
WK-9644	EU5/Level 4/Str. III	shell	-1.4	4280 ± 50	4420–4180 B.C.	1.0	4520–4240 B.C.	1.0
WK-9648	EU 4/Fea.7b/Level 7	charcoal	-25.3	3880 ± 50	4360–4250 B.C. 4410–4370 B.C.	0.73 0.27	4420–4210 B.C. 4210–4150 B.C.	0.88 0.12
WK-9647	EU 4/Fea. 7/Level 7	shell	-1.8	4190 ± 50	4320–4140 B.C.	1.0	4400–4070 B.C.	1.0
WK-9651	EU 6/Level 3/Str. III	shell	-0.9	4140 ± 50	4240–4080 B.C.	1.0	4330–3990 B.C.	1.0
WK-9689	EU 8/Fea.19/Level 6	charcoal	-25.9	3520 ± 50	3800–3720 B.C. 3870–3810 B.C.	0.60 0.40	3930–3690 B.C. 3960–3950 B.C. 3660–3650 B.C.	0.98 0.01 0.01
Beta-139437	TU 1/Level 3/Str. II	charcoal	-25.0	3390 ± 80	3720–3560 B.C. 3500–3490 B.C. 3520–3510 B.C. 3810–3800 B.C.	0.85 0.05 0.06 0.05	3840–3450 B.C.	1.0

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

River floodplain is limited by the fact that only one of our five cores penetrated the floodplain deeply enough (6.12 m) to obtain sediments deposited as early as the earliest occupations. In addition, though the Choctawhatchee Bay area has good potential for preservation from Gulf erosion, there was a good deal of scouring of sediments, probably from the bayhead delta of the Mitchell River as it was forced east by rising sea level. Nevertheless, we did retrieve important paleoenvironmental information that can be used to address a number of our questions about the relationship of human occupation to the development of the Choctawhatchee hydrological system. I will indulge in just a brief recounting of all components here, before returning to the issue of abandonment.

Pollen in the basal deposit in Core 1 indicates that, at around 7200 cal B.P., during the initial occupation of the site, the Mitchell River floodplain was an open, shallow (15-18 cm deep), fresh-to-brackish water sedge marsh (table 5.2). One inclusive feature within an estuarine shell midden at Mitchell River 1 dated to this period, as did an oyster midden lens at Mitchell River 4. Without dwelling on the sea level data in this paper, it is reasonably clear that the early inhabitants at Mitchell River were willing to travel some distance for estuarine resources (Saunders, n.d.).

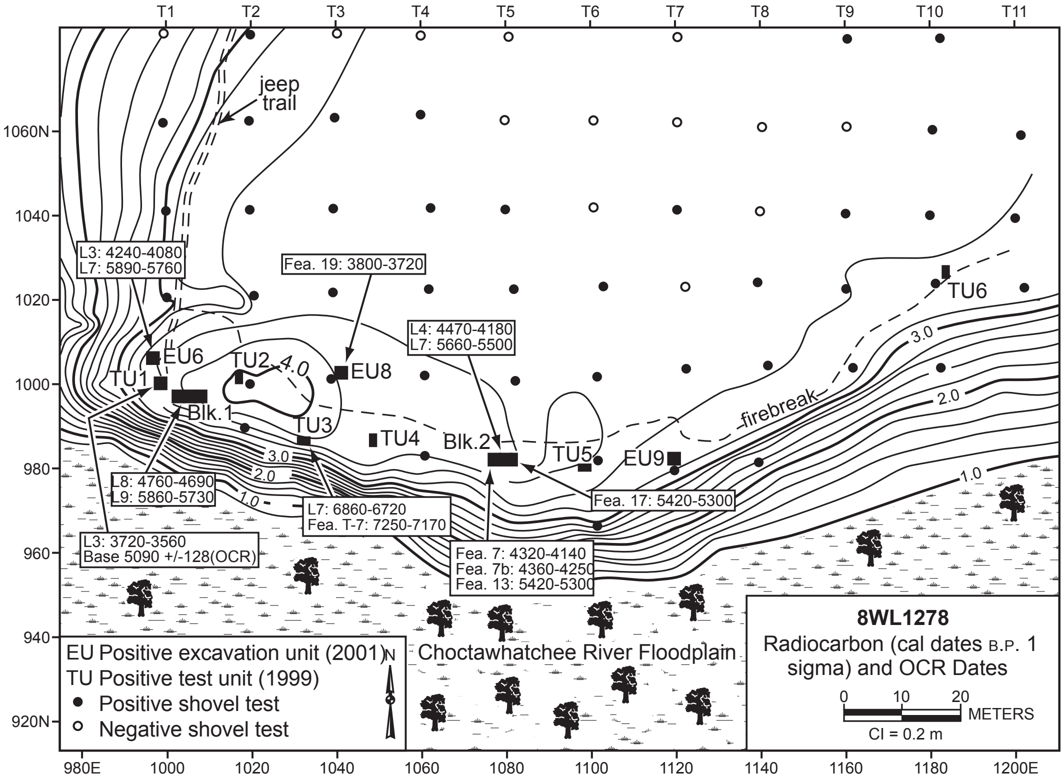


Fig. 5.2. Excavation locations and 1 cal radiocarbon dates at Mitchell River 1.

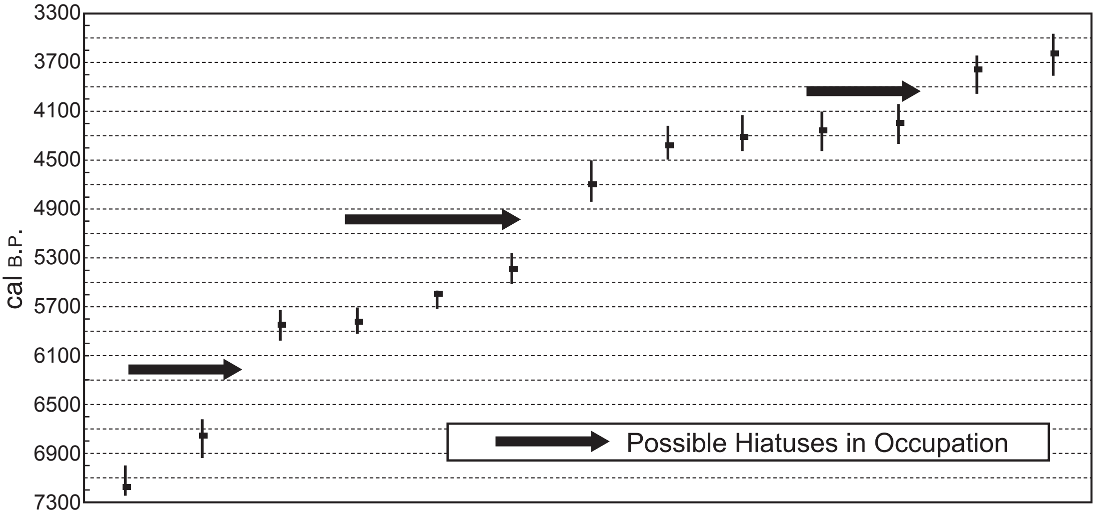


Fig. 5.3. Radiocarbon dates from the Mitchell River #1 site.

There was a dramatic change in the hydrological regime sometime after 7200 cal B.P. Sediments at the site shifted from a silty clay to a medium to medium-fine sand, water deepened, and the local sedge marsh habitat was replaced by a cypress (*Taxodium*/*Nyssa*) swamp. These are the deep sand deposits likely associated with the bayhead delta mentioned above. Sediments also suggest periodic freshwater flooding. The Mitchell River 1 site was abandoned, and no other sites in the immediate area date to the interval between ca. 6680 and 5890 cal B.P. (1σ). Conditions were apparently too turbid (diatoms do not flourish in cloudy water) or too turbulent for diatom growth and preservation; however, the pollen profile indicates a gradual deepening of waters through time, as *Nyssa aquatica* (water tupelo) replaced cypress in the floodplain.

The area around the Mitchell River 1 site was inhabited again around 5900 cal B.P.—presumably when the area was a cypress or tupelo swamp. Curiously, if the midden deposits accurately reflect consumption (and they may not [see Bird et al., 2004]), initially, the inhabitants principally exploited nerites (*Neritina reclivata*). The nerite midden stratum is relatively widespread across the site; two dates on this stratum from two separate excavation units attest to the date (table 5.1, WK-9652 and WK-9649). Though proportions of species vary, in one fine-screened sample from this stratum, nerites comprised 96% of the MNI, oyster 3.6%, fishes 0.1%, and

TABLE 5.2

AMS Dates from Core 1

Calibrated using Calib 5.0; calibrated dates are rounded.

Code/Lab No.	Provenience (mbs)	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (±1σ)		Radiocarbon age calibrated[a] (±2σ)	
						p		p
WK-12170	0.64	soil organics	-27.6 ± 0.2	740 ± 40	700–660 B.C. 710–700 B.C. 720–720 B.C.	0.91 0.06 0.03	740–650 B.C. 590–570	0.95 0.05
WK-12169	0.8	soil organics	-28.0 ± 0.2	620 ± 40	650–620 B.C. 610–580 B.C. 570–560 B.C.	0.41 0.39 0.20	660–540 B.C.	1.0
WK-12162	0.96	soil organics	-28.3 ± 0.2	1160 ± 40	1140–1050 B.C. 1030–1000 B.C. 1170–1160 B.C.	0.71 0.22 0.07	1180–970 B.C. 1220–1210 B.C.	0.99 0.007
WK-12163	1.52	soil organics	-27.9 ± 0.2	1010 ± 40	970–910 B.C. 850–830 B.C. 810–800 B.C.	0.86 0.12 0.02	980–890 B.C. 880–800 B.C. 1050–1040 B.C.	0.70 0.27 0.02
WK-12165	2.25	soil organics	-28.2 ± 0.2	1910 ± 40	1900–1820 B.C. 1920–1910 B.C.	0.96 0.04	1930–1730 B.C.	0.99
WK-12164	2.25	soil organics	-25.3 ± 0.2	1770 ± 40	1730–1610 B.C.	1.0	1820–1590 B.C. 1590–1570 B.C.	0.96 0.04
WK-12166	2.75	soil organics	-27.9 ± 0.2	4120 ± 40	4650–4570 B.C. 4670–4710 B.C. 4810–4760 B.C.	0.49 0.21 0.30	4740–4530 B.C. 4820–4750 B.C.	0.73 0.27
WK-12167	3.98	soil organics	-25.3 ± 0.2	4110 ± 40	4650–4570 B.C. 4560–4530 B.C. 4690–4680 B.C. 4800–4760 B.C.	0.48 0.21 0.10 0.24	4730–4520 B.C. 4460–4450 B.C. 4740–4730 B.C. 4820–4750 B.C.	0.73 0.02 0.01 0.24
WK-12168	6.02	soil organics	-28.2 ± 0.2	6290 ± 60	7280–7160 B.C. 7290–7280 B.C.	0.98 0.02	7330–7150 B.C. 7030–7010 B.C. 7370–7360 B.C. 7410–7400 B.C.	0.82 0.16 0.004 0.01

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

mammals 0.04% (Quitmyer, 2002; there were no reptiles or amphibians). Farther upcolumn, the midden remains became more characteristic of the site as a whole, with oyster (and a trace of other bivalves) comprising 76.3%, gastropods 6.9%, fishes 14.7%, and all other classes at <1% (Quitmyer, 2002).

Apparently, oyster consumption increased as water in the adjacent floodplain was deepening, and *Nyssa aquatica* replaced cypress. In addition to relatively low salinity (there is no indication that waters are becoming more brackish at this point), frequent flooding evidenced in sand grain size would seem to preclude a stable oyster population in the immediate area of the site—doses of freshwater interrupt the reproductive cycle of oysters and oysters do not thrive in turbid waters. The apparent increase in oyster consumption by the occupants at the Mitchell River 1 site after 5900 cal B.P. (e.g., in an oyster midden date of 5420–5300 cal B.P.; 1σ) may reflect a willingness on the part of the population to exploit resources farther away from the site than their predecessors at 5900 cal B.P. Radiocarbon dates suggest another abandonment sometime after 5300 cal B.P. There is no environmental evidence in the bayhead delta sands to explain this apparent abandonment; the bayhead delta remained in place until ca. 4600 cal B.P.

Clayey sediments replaced sand at 3.98 mbs; this transition was dated to 4650–4570 cal B.P. (1σ), around the beginning of the Elliotts Point phase (Campbell et al., 2004). Pollen and especially diatoms recovered at 3.92 mbs indicate a very different environment at that time. A brackish marsh had been established. The date of the transition to brackish marsh and the date of reoccupation of the site (4760 cal B.P.) are quite close, though scouring of the sediments makes it impossible to conclude that Native Americans reoccupied the site as soon as brackish marsh conditions were established. Though brackish conditions were maintained for thousands of years, the environment at this time was the most saline in the history of the floodplain. It is notable that a complex hearth and posthole feature dates to this time period. Nevertheless, conditions were not saline enough to support the monospecific stands of marsh grass, spartina (*Spartina alterniflora*), or juncus (*Juncus* sp.) that might be envisioned (see salt marsh pollen profiles in Chmura, 1994). In addition, reef oysters do not seem to have been available, or at least were not exploited. Quitmyer's (2002) analysis of the height-to-length ratio of oysters from two zooarchaeological samples dating to this time period indicate that all were gathered in loose clusters or as individual shells from a substrate of mixed muddy sand.

Occupation continued until ca. cal 4200 B.P. when there may have been a short period of abandonment between that date and cal 4000 B.P. Our youngest radiocarbon dates, 3800–3720 and 3720–3560 cal B.P., are from a hearth filled with baked clay objects and charcoal fragments in the northern, nonshell area of the site (EU 8), and from a test pit (TU1) excavated during the initial testing of the site. That test pit produced the most abundant and diverse artifact assemblage from the site, including six projectile point/knives, a plummet, and another lithic ornament, an anvil, and worked antler (2) and bone (29). This bespeaks a healthy Elliotts Point presence. Thirteen fiber-tempered potsherds were recovered from contexts throughout the site, substantiating dates to this period. Flexed burials in shell-filled pits in the same area are undated, but points of origin of the pits suggest that these interments were some of the latest Archaic activity at the site. Apparently, shortly after 3500 B.P., these folk abandoned the site, never to return. (There is ephemeral Late Woodland use of the site.)

Unfortunately, sediments from Core 1 cannot address reasons for abandonment. They are heavily truncated after 2.75 mbs (ca. 4500 cal B.P.). Our next dates, at 2.25 mbs, (1930–1730 and 1820–1590 cal B.P., 1σ), indicate that upper sediments were laid down long after the Archaic inhabitants abandoned the site. Gregory Stone, our coastal geomorphologist, opined that all of the deposits above 3.0 mbs could be storm deposits, but he did not pursue this.

There is, however, other evidence for tempestuous weather along the Florida panhandle at about the time the Mitchell River Archaic peoples left the area. According to Forman et al. (1995), by 3000 ^{14}C B.P., a change in atmospheric circulation patterns—a shift of the jet stream to the south and of the Bermuda High to the southwest—created a meridional air flow that pumped more moisture into the northern Gulf of Mexico. Liu and Fearn (2000) believe that this weather pattern produced warmer, moister conditions that provoked a spate of 11 catastrophic hurricanes (Category 4–5) in the western Florida panhandle between 3400 and 1000 B.P. Calibrated, Liu and Fearn's dates dovetail quite well with the abandonment of Mitchell River 1 (3630–3450 to 1340–1230 cal B.P. [1σ]; 3720–3370 to 1390–1070 cal B.P [2σ], calibrated using Calib 5.0). The evidence for these storms was recovered from a series of cores in (among other areas) Western Lake, located behind the 200 m wide barrier beach south of Choctawhatchee Bay, a mere 10 km (6.5 mi) from the Mitchell River sites. The local environment would have been severely affected by these putative storms; it is unclear whether estuarine resources could recover from such an onslaught. Though Livingston et al. (1999) have shown that oyster colonies are quite resilient after hurricanes, much depends on the timing of storms with respect to the natural history (especially spawning) of oysters. Taking into account the fact that Liu and Fearn documented only Category 4 and 5 storms, we concluded that repeated catastrophic hurricanes could have created a collapse of estuarine resources.

The Liu and Fearn study has been criticized by Otvos (2002), who argued that what Liu and Fearn (2000) interpreted as storm-surge overwash is actually normal estuarine sedimentation along with redeposition of material from sand dunes. I can't contribute to the geological aspects of this debate, and can simply observe that the beginning of the period of meridional air flow pattern as dated by Liu and Fearn (2000) is contemporaneous with the abandonment of the Mitchell River study area and that the same air flow that created catastrophic hurricane activity in the Choctawhatchee Bay area also pumped moisture into the midcontinent and produced the 300-year period of megaflooding of the Mississippi River identified by Brown et al. (1999) at 3500 cal B.P.

DATING THE FALL

A final (for this paper) topic to be considered is the date of the onset of weather extremes implicated in the Late Archaic collapse hypothesis. Mitchell River data suggest that ca. 3500 cal B.P. was the breaking point, while others cite 3000 B.P. At one level, quibbling about 500 years in geologic time (or 300 years in Anderson et al.'s [2007a, b] calibration) is not a useful exercise; abandonment probably occurred over a period of some hundred years. In this case, however, tighter dating is critical, because explanations for the fall of Poverty Point have ramifications far beyond the culture history of the Southeast. Thus, in the spirit of continuing this important inductive research, I would like to question some of the data marshaled by Kidder for his 3000 cal B.P. boundary date.

Kidder's argument contained two independent sources of data. The first was an exhaustive compilation of radiocarbon dates from the lower Mississippi River Valley (Kidder, 2006: table 1; all eastern Louisiana and southwestern Mississippi); southeastern Missouri (Kidder, 2006: table 2); and the upper Tennessee and Little Tennessee valleys (Kidder, 2006: table 3). The second set was comprised of geological data indicating megaflooding conditions from 3000–2600 cal B.P. To create the radiocarbon dataset, Kidder used a Bayesian analysis to set conditions for the acceptance of radiocarbon dates and an OxCal "agreement index"—"a calculation of the overlap of the simple calibrated distribution with the distribution after Bayesian modeling." With outlier radiocarbon dates discarded, Kidder created a dataset of 67 Late Archaic dates and 21 Early Woodland dates that, he contended, nullified the hypothesis of temporal and cultural continuity between the Late Archaic and the Early Woodland. Kidder has made a valiant attempt to create coherency in an intractable database replete with larger error ranges, poor provenience information, apparent stratigraphic reversals, and the like. However, I would like more information on how the Bayesian modeling was set up, as well as an account of the effect of imposing phase boundary conditions in OxCal, before fully accepting the date range as given. Bayesian modeling of radiocarbon dates carries its own set of biases. The basic model combines the probability distribution of the radiocarbon date with a probability distribution based on additional independent (prior) information generated through, e.g., artifact typology, stratigraphy, and/or chronological order, into Bayes' theorem, which then produces a posterior probability distribution. Steier and Rom (2000) have argued that, even using "neutral" prior conditions, the method can display a strong bias toward larger age differences if the number of samples exceeds two. "The algorithm improves the precision but reduces the accuracy!" (Steier and Rom, 2000: 197).

In terms of the geological data, Kidder relied on a number of studies that addressed megafloods in different areas of the Mississippi River Valley.

The most germane to the lower Mississippi River Valley is that of Brown et al. (1999), who used evidence of coarse siliciclastic grain-size peaks, planktonic faunal turnovers, and "negative ^{13}C excursions" (more negative Δ^{13} values in selected planktonic foraminifera) in cores from the northern Gulf of Mexico (Orca basin) to identify a series megaflooding periods that occurred in the lower Mississippi River on a cyclic (500–1200 year) basis. With a core sampling strategy that had a resolution of 30 years (Brown et al., 1999: 499), Brown et al. did identify a megaflood period beginning at 3000 cal B.P., but they also identified megaflood periods at 4.7, 3.5, 2.5, 2.0, 1.2, and 0.3 ka (dates are calibrated). Each of these was caused by vigorous gulf loop current activity that exported extremely moist gulf air to the midcontinent. Each was preceded by "submillenial" warming intervals (visible through a rise in tropical plankton frequencies and decreasing Δ^{18}O values for the tropical foram *Globigerinoides sacculifer*) which culminated in "historically unprecedented" (Brown et al., 1999: 509) precipitation and flooding (i.e, flooding between 3000 and 2500 was not singularly "historically unprecedented" as might be inferred from Kidder's, 2006: 215 discussion). These episodes had different durations, from less than 30 years to over 300 years for the interval beginning at 3.5 cal ka. Thus, the Brown et al. data indicate severe and relentless flooding at 3500 cal B.P., when Poverty Point was flourishing (this flooding is substantiated to a certain extent by Kidder's own data which provide a TPQ for crevasse splays along Joes Bayou of 3580 cal B.P. [Kidder, 2006: 218; Adelsberger and Kidder, 2007]). Another period of megaflooding began at 2.5 cal ka, when, according to Kidder's scenario, cultures should have been returning to the lower Mississippi River Valley. Thus, while Kidder's hypothesis is plausible, it remains to be explained why megaflooding at 3000 cal B.P. had such severe cultural consequences while cultures flourished or were rebuilding in other flood cycles.

CONCLUSIONS

Data from the Mitchell River area suggest that significant climatic/hydrologic perturbations affected human habitation in the area throughout the millennia, culminating in abandonment after 3500 cal B.P. These data are consistent with that presented by Brown et al. (1999) that demonstrated megafloods in the lower Mississippi River Valley at 3500 cal B.P. and with hurricane data compiled by Liu and Fearn for the immediate area. Data from elsewhere also suggest that 3500 cal B.P. should be considered in assessing climatic and cultural change in the Late Archaic. Dates from shell ring proveniences on undisturbed sites (which exclude the heavily disturbed Lighthouse Point (38CH12) shell ring [Trinkley, 1985]) indicate little to no shell ring construction after 3500 cal B.P. (Russo, 2006: table 9; extreme south Florida appears to be different, Russo, this volume). As noted, the TPQ of crevasse splays of Joes Bayou near Poverty Point is closer to 3500 than 3000 cal B.P. In addition, the youngest terminal dates for the final Poverty Point culture stratum at Jaketown are around 3350 – 3300 1 cal B.P. (Arco, 2009, table 1; 1σ calibrations done using Calib 5.0 on Beta 236318 and 253789, respectively).

I applaud Kidder, Anderson et al., and others, who have compiled and interpreted massive amounts of data from numerous disciplines and extrapolated a testable hypothesis for the fall of Poverty Point and the cessation of Late Archaic mound building. I can imagine that even entertaining the idea that Poverty Point was up and running during times of heavy flooding would be anathema to some. But, casting about for other explanations in archaeological theory, could one not propose that the hypertrophy seen at Poverty Point was an attempt at risk reduction in the face of a deteriorating climate? Put another way, could the flood of artifacts at Poverty Point be a result of megaflooding?

In this scenario, one might envision a vigorous Poverty Point occupation (either as a Great Town or a Trade Fair) fully established by ca. 3500 cal B.P. As evidenced in trade goods, clearly Poverty Point had a reach that extended considerable distances up and down the lower Mississippi River Valley, and it is probable that distant groups had an emotional, and perhaps a financial (either in labor or goods), investment in the perpetuation of Poverty Point. As weather conditions deteriorated, the site itself may have begun to deteriorate. With respect to the possibility of weather-related injuries to the Poverty Point site, Gibson (personal commun., 2008; see also chap. 2, this volume) observed that "Deep gullies were filled in [throughout the site] before construction but the problem persisted during construction. 'Deep Six,' the exposure at the northeastern terminus of N1 was patched/infilled at least 3 times and possibly 6." Of course, loess, the substrate of Poverty Point, is notoriously unstable, but it would be interesting to determine when the Deep Six problem appeared. In the event, perhaps as weather threatened the integrity of the site, external relations were extended and/or intensified, and were solidified through the movement of increasing numbers of exotic goods to Poverty Point. Both consumers and suppliers may have believed that a large number of powerful symbols could save "the navel of the earth" (Gibson, 2008; the insinuation, mine).

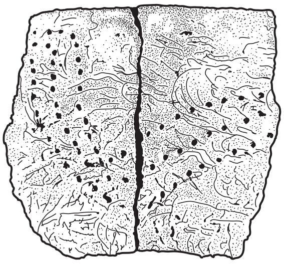
Inserting an aspect of risk reduction into the exchange of exotic materials in the Poverty Point interaction sphere doesn't necessarily interfere with the operation of either of the two currently competing models for the presence of so much exotic stone at Poverty Point. Sassaman (2005) proposed that distant cultures were directly involved in the conception, construction, and reproduction of Poverty Point as a multicultural, cosmopolitan society, and that exotic artifacts could have been brought to the site during pilgrimages, or some other kind of ritual journey. In one formulation of his model, mounds were erected to honor new exchange alliances forged through pilgrimages. Using long-distance exchange networks for risk reduction would be particularly effective if, as in another of Sassaman's scenarios, pilgrims were routinely integrated into Poverty Point society. Indeed, Sassaman (2005: 360) proposed that "ritual institutions for integrating diversity were reproduced through the regular acquisition of nonlocal materials (knowledge) and with the contacts with 'foreigners' such acquisition most likely entail."

Gibson (2007) is having none of it. For Gibson, Poverty Point—site, culture, and constituency—was local. He maintains that the tons of exotic lithics imported into the site came predominantly as raw materials or blanks, not as finished products as might be expected if items were to be immediately pressed into services. Further, with very few exceptions, exotic materials were fashioned into artifacts that are stylistically Poverty Point—not stylistically reminiscent of the raw material point of origin. A stratigraphic analysis of artifact material type and style indicated that stylistic fidelity to local precedents was true of even the earliest, preconstruction artifacts. "He [Sassaman] is right about Poverty Point people being worldly, but I construe their worldliness as deriving from political economic ventures, especially long-distance exchange, whatever that entails. . . " (Gibson, 2007: 518). "Since all stone had to be imported anyway, it is reasonable that residents would opt for distant material with its greater potential for making bigger, better and more efficient tools, growing the economy, creating more indebtedness, and promoting intergroup alliances. The physical and social links . . . to far-off lands [space] were a major source of Poverty Point's social ebullience and material engagement" (Gibson, 2007: 514).

I suggest that, whatever else they entailed, alliances established through long-distance exchange at Poverty Point, as elsewhere in time and space, functioned to reduce risk. As risk increased, the system went into overdrive, and the hypertrophy apparent in the lithic assemblage at Poverty Point was created. Of course, all this depends on when conditions deteriorated along Macon Ridge, but the effects of the 300-year interval of massive flooding that began around 3500 cal B.P. may have been a start.

NOTES

1. Cf. Gagliano (1963) and Waring (in Williams, 1968), both of whom argued for ceremonial architecture in the Late Archaic).



CHAPTER 6

PREHISTORIC LANDSCAPES OF COMPLEXITY: ARCHAIC AND WOODLAND PERIOD SHELL WORKS, SHELL RINGS, AND TREE ISLANDS OF THE EVERGLADES, SOUTH FLORIDA

MARGO SCHWADRON

In some models of south Florida cultural evolution (Goggin, 1949a; Cockrell, 1970), the Late Archaic to Woodland transition simply did not occur. This is because the Woodland period culture, called the *Glades*, and the Archaic, are viewed as two different and separate cultures. No "transition" occurred, because one culture (the Archaic) came and left, and was replaced by the subsequent Woodland period culture, the Glades. Even if this simple model of multigroup cultural migration is accepted, it still does not explain how and why the timing of the transition from one group to another, or from one cultural stage to another, seems to have occurred with such pan-regional consistency.

Others (Clausen et al., 1979: 612–613; Widmer, 1988: 75) view the Glades culture as a strongly independent, conservative Archaic culture "compressed" into south Florida by northern agricultural groups, successfully retaining strong cultural ties with their previous Archaic lifeways. Still, this does not explain how, and why, the Late Archaic cultures of south Florida transitioned into a Woodland way of life in tandem with the greater Southeast.

So, what happened in the Late Archaic in south Florida? In this paper, I will present evidence from two recent large-scale archaeological investigations within Everglades National Park and adjoining land, which challenges existing models of Archaic and Glades period cultural development in south Florida, in particular, the notion of two separate and distinct cultural groups, and the idea that Glades groups replaced the Archaic after their abandonment of the area.

Conversely, I will address new evidence indicating that Late Archaic cultures were present within both the interior wetlands and southwest Florida coast in far greater numbers than previous models considered. I argue that the south Florida landscape evidences a long tradition of shell ring and shell work architecture, suggesting the persistence of monumentality, ceremonialism, and perhaps sacred places and landscapes, which reflects a growing complexity and a cultural continuum between the Late Archaic and Early Woodland cultures. Other data suggest the possibility that broad-scale environmental changes occurred in south Florida during 3800 cal B.P. to 2700 cal B.P., correlating with other known regional and world climatic trends, suggesting that the timing of regional environmental fluctuations may have been a causative factor during the greater southeastern Late Archaic to Early Woodland transition.

SOUTH FLORIDA ENVIRONMENT AND CULTURE AREAS

South Florida has a varied subtropical system of marshes, swamps, rivers, and estuaries. The central feature is the Everglades (fig. 6.1), a unique, vast wetland that spans the entire southern half of Florida, the largest subtropical wetland in North America. The gulf coastal portion of the Everglades contains the Ten Thousand Islands, a remote archipelago of mangrove islands stretching for some 50 mi along the coast, forming a dense coastal forest several kilometers wide. This extensive maze of lagoons, mangrove swamps, marine meadows, and shallow, protected embayments permitted the development of extensive estuaries, providing abundant fish and shellfish to native populations.

The interior portion of the Everglades forms a mosaic of temperate and tropical plant communities, including cypress hammocks, wet prairies, pinelands, and sawgrass marshes strewn with small, elevated tree islands. Indeed, the vast, subtropical hydric nature so characteristic of the south Florida region is unique within the Southeast (Widmer, 2002: 374), and is found nowhere else within North America. Archaeologically, the entire south Florida region has traditionally been considered to be one culture area, called the *Glades*.

Ironically, while the Glades region has been called one of the best defined culture areas in Florida (Goggin, 1948a: 105; 1949b: 28), and is considered to have one of the best documented ceramic chronologies in all of North America (Widmer, 1988: 75), we still lack a basic understanding of south Florida cultures, and how settlement patterns, subsistence adaptations, interaction, and sociopolitical organization may have changed over time, particularly during the Late Archaic to Woodland transition. Compounding this deficiency, there has been a long and problematical practice of naming south Florida cultural areas after the protohistoric Calusa and Tekesta tribes, contributing to a widely accepted but erroneous assumption of prehistoric cultural continuity over time. This practice may have inadvertently perpetuated an archaeological bias toward studying the region within the context of Calusa and Tekesta cultural history, with particular interest paid to the rise of the Calusa to a powerful, nonagricultural chiefdom, or a weak, tributary state during the Mississippian era. Conversely, the earlier occupations of the Glades region are viewed as marginal due to the unproductive, unstable environment incapable of supporting any sizable, sedentary or complex cultures prior to 3200–2700 B.P. (Widmer, 1988: 177, 213; 2002: 374), only after which sea levels and present-day conditions were thought to have become established, allowing for the development of the more complex Woodland period Glades culture.

MODELS OF WOODLAND AND ARCHAIC CULTURES IN SOUTH FLORIDA: PREGLADES AND GLADES

During the 19th and 20th centuries, Florida archaeologists largely focused on defining archaeological culture areas. Stirling first described south Florida as the Calusa region (1935), but by the next year he had wisely abandoned that term and proposed a scheme based on ceramic distributions and variations found throughout the state, establishing four distinct archaeological areas for the Florida peninsula (1936: 354). One of these, the Glades area, named after the dominating wetland ecosystem of south Florida (the Everglades), was geographically based, and encompassed all of south Florida. The defining cultural characteristics of the Glades area were material remains, including a poorly fabricated "inferior grade of pottery" as well as perforated shell hoes, plummets, antler adze sockets, and bone projectile points (Stirling, 1936: 355). Stirling thought that the Calusa ancestors had migrated into the peninsula from the north and represented "the first important cultural invasion of the peninsula" (Stirling, 1936: 351). Kroeber (1939: 67–70) provided a similar view of south Florida cultures, concluding that south Florida was a distinctive environmental and cultural area, but was an "inferior" part of the greater Southeastern culture.

Goggin (1947) presented a definition of archaeological areas and periods in Florida, revising Stirling's scheme into areas, regions, and subareas, including the Gulf Coast, St. Johns, and Glades areas. Goggin's Glades area included three subareas: the Tekesta, Calusa, and Okeechobee (Goggin, 1947: 120). He envisioned the Glades area comprising one distinct cultural unit encompassing all of south Florida, with local cultures reflecting an adaptation to the unique south Florida environment (Goggin, 1947: 119). Subareas developed where some areas were isolated enough within the region to allow for the development of regional variants (Goggin, n.d.). Isolated areas bounded by natural barriers such as the Everglades interior were viewed as places that were not completely impenetrable, but were difficult enough to pass through, so that the barriers would have presented an impediment to groups living around them.

Subsequently, Goggin argued that south Florida cultures comprised a pan-regional *Glades Tradition*, reflected in a nonagricultural, marine-oriented adaptation employing broad, strategies for the tropical coastal waters of south Florida, and showing a great diversity of artifact forms present over a long period of time (Goggin, 1949a: 17, 29). Goggin noted a secondary dependence on hunting and gathering, mostly

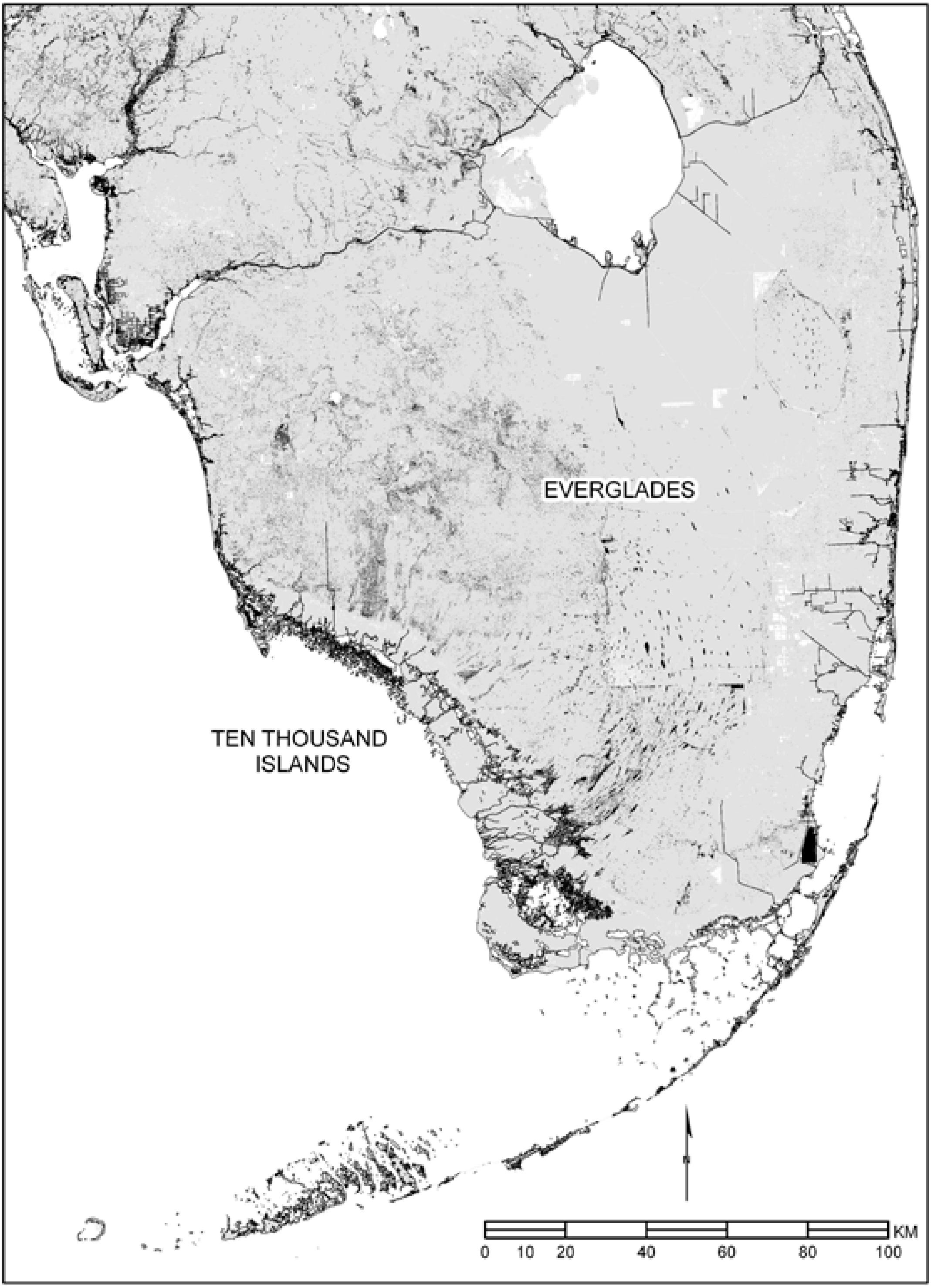


Fig. 6.1. South Florida interior Everglades and coastal Ten Thousand Islands.

wild plant foods, but he stressed that a marine subsistence was primary. He noted very little change in material culture over time, giving the Glades Tradition a conservative, "Archaic cast" (Goggin, 1949a: 28).

However, after finding small amounts of fiber- and semi-fiber-tempered pottery in the region, types that did not fit into the newly established Glades pottery series (*Glades Gritty Ware*), Goggin concluded that there must have been an earlier, outside Archaic group present in small numbers within the region; he called this group the pre-Glades horizon (1948a: 106). Clearly, Goggin did not consider the presence of a pre-Glades horizon to suggest the possibility that the later Glades cultures may have been related to or had developed out of this earlier culture. Instead, he viewed the Archaic and Glades cultures as separate, unrelated groups that settled the region at different times, an idea that has permeated south Florida "culture history" since Goggin's time.

The Glades culture was thought by Goggin to have originated with groups that migrated south into the Florida peninsula along the Gulf Coast, possibly as early as the end of the Late Archaic. He noted that the earliest expressions of the Glades Culture may have occurred in other regions (e.g., the Central Gulf Coast), however, he was unsure if the presence of early Glades culture in other regions represented evidence of early Glades cultures moving through the area, or was the result of Glades influence, or both (Goggin, 1949a: 30).

Although Goggin (1948a: 106, 1950: 15, 1951: 65) first introduced the idea of a preceramic, pre-Glades horizon within south Florida, Cockrell (1970) provided the first evidence for deeply stratified, radiocarbon-dated pre-Glades sites. Cockrell discussed the locations of small, pre-Glades campsites as occurring on the tops of sand dunes, but he did not provide any in-depth analysis of pre-Glades and Glades settlement patterns. Cockrell concluded that the area was settled first by Archaic peoples who resided in small, temporary campsites, and were terrestrially based hunter-gatherers, who did not utilize marine resources. In Cockrell's thesis, the Archaic were followed by the Glades culture, whose people learned how to successfully exploit the marine environment, allowing for sedentism and the development of sociopolitical complexity. Cockrell's interpretation of pre-Glades and Glades period subsistence patterns has been cited as misinterpreted and problematic (Russo, 1991a), with contradictory evidence indicating that both pre-Glades and Glades occupations shared an *equally* marine-based subsistence.

Following much of Cockrell's conclusions, Widmer (1974) concurred that the pre-Glades settlement pattern on Marco Island was marked by small shell midden campsites located along the tops of tall dune ridges, reflecting a hunter-gatherer subsistence based equally on terrestrial and marine resources. The Glades period, he thought, represented a new stage and a marked settlement pattern shift characterized by the emergence of a tropical marine-based society, sedentary villages, and a very specialized exploitation of marine resources.

More recently, interest in south Florida focused on the protohistoric Calusa's reported hegemonic dominance over all south Florida tribes, and the apparent anthropological paradox of a sociopolitical hierarchy and hereditary chiefdom that were nonagriculturally based. The question of how such a nonagrarian culture could have developed into such a complex, politically dominant society within the subtropical wetlands of south Florida became the focus of several models and theories, providing the most recent, and important advances in interpreting south Florida cultures (Goggin and Sturtevant, 1964; Sears, 1982; Marquardt, 1987, 1988, 1991, 1992a; Widmer, 1988; Russo, 1991a; Walker, 1992a, 1992b; Patton, 2001).

Widmer (1983, 1988) offered a much-cited, ecological, cultural-materialist model for Calusa development. Key to his diachronic model is that around 2700 ^{14}C yr B.P., south Florida's sea level became stable, with the first development of extensive, highly productive estuaries. Widmer argues that environmental change, not cultural innovations or shifts (Widmer, 1983: 361), led to foraging groups shifting focus to aquatic resources, allowing for sedentism, increased carrying capacity, and population growth. With sedentism, population rapidly increased, and critical carrying capacity was reached around A.D. 800 (1150 ^{14}C yr B.P.). This allowed for population size and density to be sufficient for the development of ranking and a chiefdom level of social organization.

More recently, specifics on the timing of Widmer's model (1983, 1988) have come into serious question (Russo, 1991a; Marquardt, 1992a:

426). While he had recognized the presence of a few possible sites in the area that predated his predicted date of cal 2700 B.P. for the stabilization of sea level, he argued that the environment was not productive *enough* at the time to support large, sedentary fishing villages (Widmer, 1983: 359), and therefore, large sedentary villages would not have occurred before this time. Russo (1991a) argued that previous researchers (McMichael, 1982; Widmer, 1983) had erred in not identifying sedentism and complexity in Late Archaic settlements, as demonstrated at Horr's Island, a large, Late Archaic coastal village and ceremonial mound complex dating to as early as 5590 cal B.P. (3960 cal B.C.). Seasonality studies of zooarchaeological data, examination of village site and mound structural complexity, and artifact and paleoenvironmental data indicated that some level of complex social organization and sedentism had been established, significantly predating Widmer's predicted date of 2700 ^{14}C yr B.P. for the region.

For some, Horr's Island continues to be viewed as the one exception to Widmer's model, with many concluding that any additional evidence for Late Archaic sites would likely have been submerged by rising sea levels. However, other Late Archaic coastal sites, such as Ussepa Island and Bonita Shell Works, have since been located in south Florida, and two recent, intensive surveys of two subregions of the Everglades indicate that Late Archaic settlement of the region has been greatly underestimated.

REVISITING SOUTH FLORIDA SETTLEMENT PATTERNS

As previously discussed, current models of south Florida hold that prior to 3200–2700 ^{14}C yr B.P. (Widmer, 1988; 2002), the environment was much drier, and hence there was much less rainfall, less access to surface water, and estuaries with productive shellfish beds were not yet fully formed. Coupled with an unstable sea level, south Florida prior to this time is viewed as incapable of supporting any large, sedentary populations. It was only after the Late Archaic to Woodland transition that the south Florida environment is viewed as stable, and capable of supporting any sizable population, as evidenced by a sudden profusion in Glades period sites after 2700 ^{14}C yr B.P. Many south Florida models maintain that at around cal A.D. 800 (1150 ^{14}C yr B.P.), the appearance of hierarchical occupations, the establishment of substantial population aggregates, and an increase in the mounding of shell work features in the region are viewed as evidence for the emergence of social complexity, the rise of the Calusa, and the first chiefdoms in the region.

Recent examination of Everglades interior freshwater tree islands and Ten Thousand Islands coastal shell middens, however, suggests the contrary: the environment of south Florida was stable enough to have attracted, supported, and allowed for intensive use and occupation of interior freshwater tree islands during the Late Archaic, suggesting much greater populations than previously thought. In the Ten Thousand Islands, evidence of a long tradition in shell ring and shell work architecture spans the Late Archaic through Woodland Transition, up through the Glades period, suggesting cultural continuity reflected in monumental constructions, and that the emergence of social complexity occurred much earlier than during the previously thought protohistoric Calusa's political dominance over the region.

LATE ARCHAIC SETTLEMENT AND CLIMATE SHIFTS WITHIN THE EVERGLADES INTERIOR

In 2004–2005, an archaeological investigation of the interior freshwater tree islands within Everglades National Park's Shark River Slough identified a total of 42 archaeological sites (Schwadron, 2006a; fig. 6.2). All sites identified were prehistoric black earth middens located on raised tree islands, and are composed of dark brown to black organically stained soil intermixed with very dense vertebrate faunal remains, ceramics, and other midden debris. While marine shell was present, it was incidental to the black earth midden. These sites, like their coastal shell midden counterparts, are domestic accumulations of debris, and are typically viewed as evidence of coastal populations that maintained coastal settlements but occasionally used interior freshwater tree islands as special use sites (Athens, 1983), like camps for hunting and extraction. Following Widmer's (1988) model for south Florida settlement, interior sites were not thought to have been used until after 2700 ^{14}C yr B.P.

Conversely, five Late Archaic sites (see fig. 6.2) were identified during the survey that challenge the notion that the interior Everglades

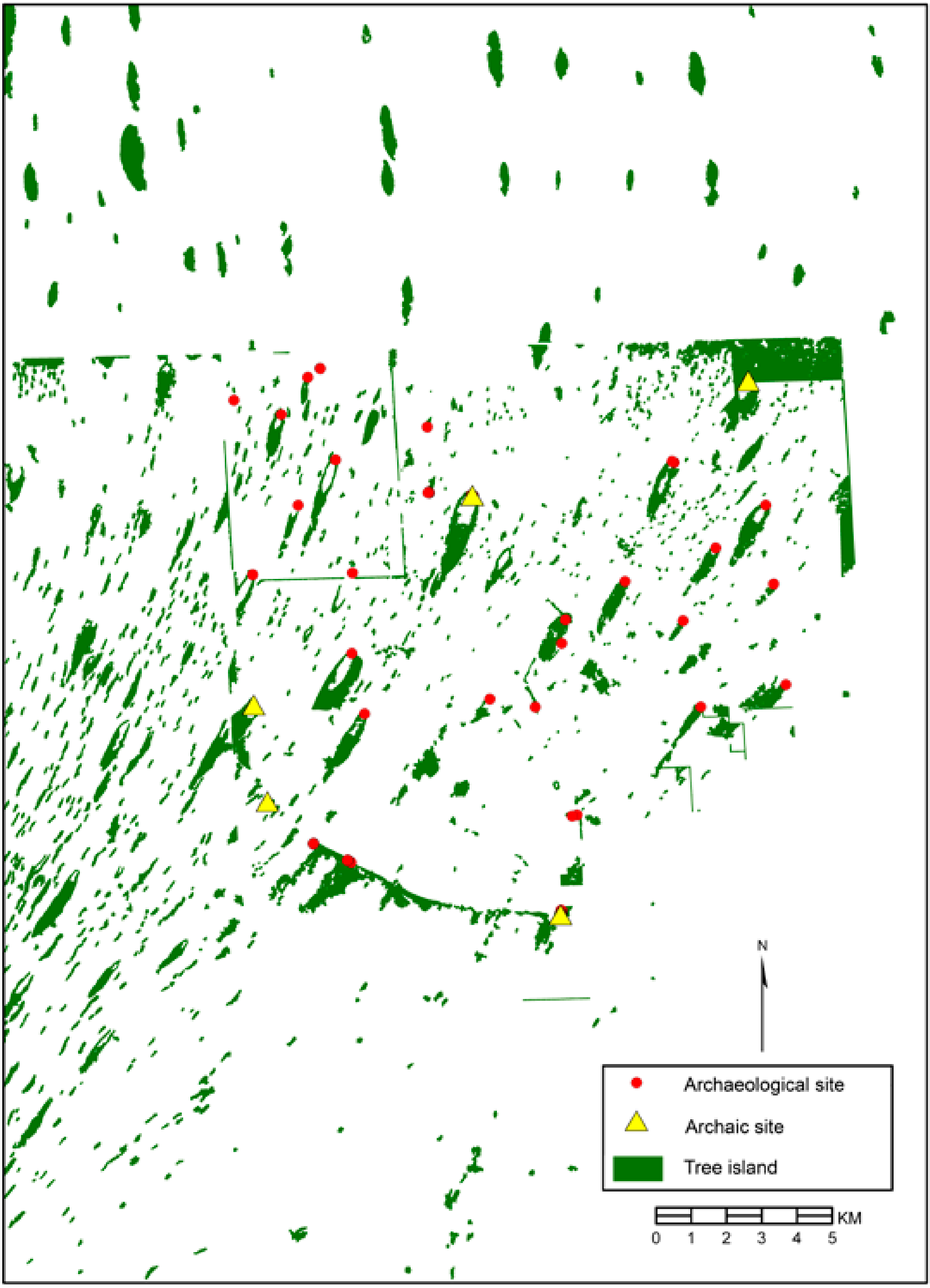


Fig. 6.2. Overview of 2004–2005 tree-island survey area, showing newly identified Late Archaic sites.

were uninhabitable during this time. Sour Orange, Poinciana, Irongrape, Heartleaf, and Grossman's Hammocks all contained deeply buried, well-preserved archaeological deposits indicating that Late Archaic peoples in fact hunted, fished, processed food, manufactured marine shell tools, built fires, and lived along the developing Everglades tree island landscape over 5000 years ago. Several sites produced small samples of fiber-tempered pottery, while others are preceramic.

Another significant find from the survey was the presence of a buried, hardened, mineralized carbonate soil layer within the midlevel positions of all but a few tree islands tested. This layer, temporarily identified as a form of calcrete (fig. 6.3), was too hard to break through with hand tools or cores. At two tree islands, a concrete saw was used to break through the layer, and at both sites, well-preserved organic soil, sediment, faunal remains, and archaeological deposits were found deeply buried beneath the layer. Radiocarbon dates above and below the layer at several sites bracket the formation of the layer from about 4400 cal B.P. to 2700 cal B.P. (fig. 6.4). Artifacts above the layer date to the Woodland (Glades) period, whereas underneath the layer, artifacts and radiocarbon dates indicate Late Archaic period occupations. Absence of artifacts within the layer suggests an occupational hiatus, and that human use and settlement of tree islands shifted, perhaps influenced by changes in water levels, climate, or other environmental conditions.

Thin section analysis, Scanning Electron Microscope (SEM) study, and an Electron Microprobe analysis suggest that the layer appears to be a form of organic, laminar calcrete, consisting of many fine, laminated bands of micrite or mudstone, which probably formed during repeated episodes of subaerial exposure, possibly during seasonal wet and dry cycles. This indicates that the calcrete is authigenic (naturally grown in place), and did not form due to weathering or being transported in. Since a thick layer of purer carbonate cannot "ingrow" cleanly into existing sediment (Stone et al., 2006), the calcrete therefore formed in situ, during the time in-between the Late Archaic and Woodland (Glades) occupations of tree islands. The radiocarbon dated artifacts from above and below the layer, the absence of artifacts from within the layer, and various geological analyses support the premise of an occupational hiatus of tree islands during roughly 4400 cal B.P. to 2700 cal B.P.

Other south Florida sites have also been reported to have a similar mineralized layer (Laxson, 1962, 1970; Mowers, 1972; Mowers and Williams, 1972, 1974; Williams and Mowers, 1977, 1979: 26; Graves, 1982; and Masson et al., 1988), but none has been systematically examined in depth, and all have been interpreted as an anthropogenic formation, the results of humans intentionally piling up marsh marl soils. Artifacts and radiocarbon dates above and below some of these sites also indicate a similar temporal correlation, suggesting that the layers formed from around 3800 to 2700 ^{14}C yr B.P. (Mowers, 1972: 129; Mowers and Williams, 1972: 7; Masson et al., 1988). The layer therefore appears to mark a potentially important regional cultural shift in the prehistoric settlement of south Florida.

While no definite conclusions can yet be

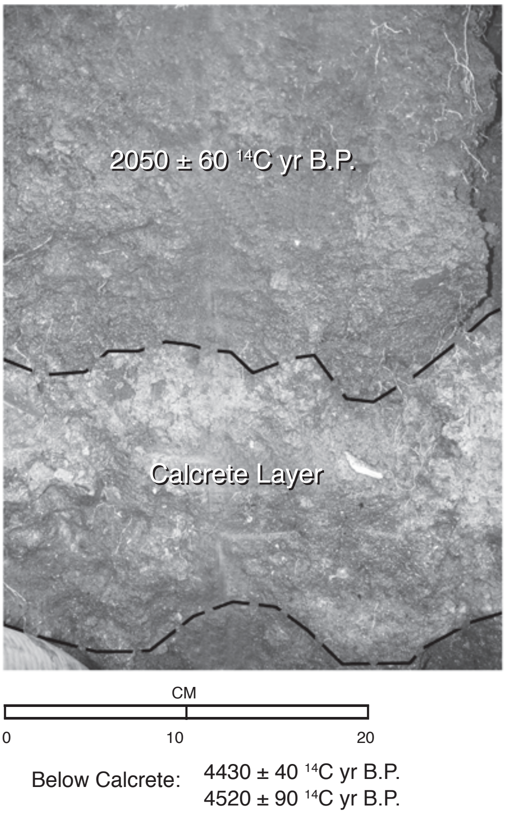


Fig. 6.3. Poinciana Hammock excavation unit profile showing calcrete layer.

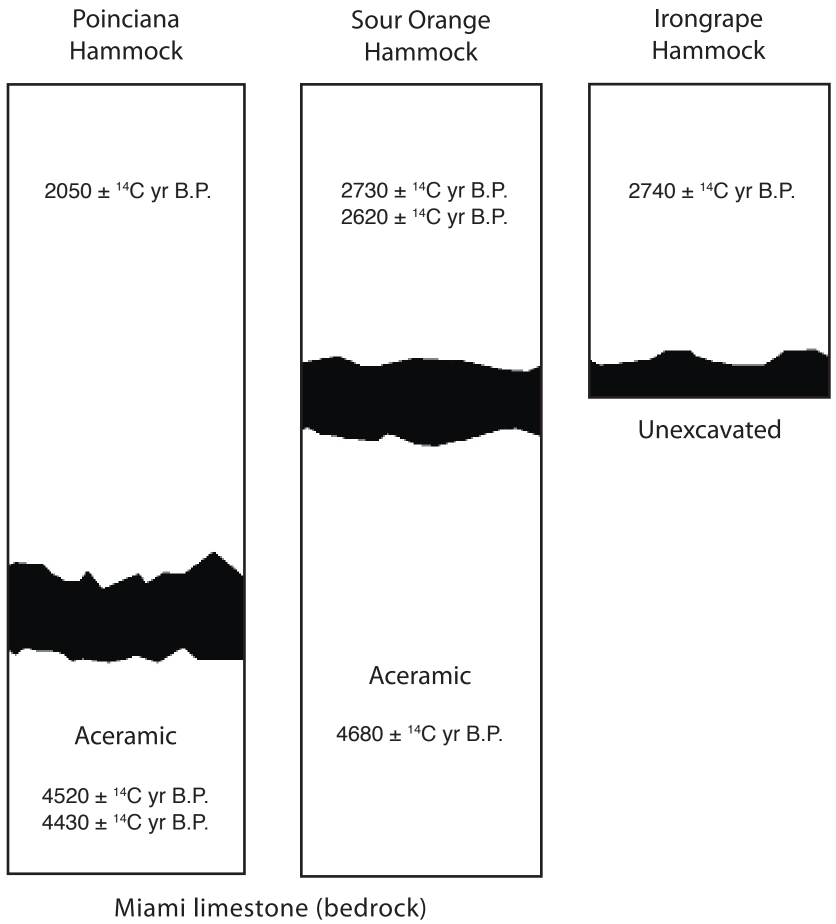


Fig. 6.4. Bracketed radiocarbon dates from above and below the calcrete layer at three sites.

made, several correlations are offered. Recent palynological work from southwest Florida suggests that changes in El Niño intensity lead to an increase in water inputs and wetland vegetation, possibly during the time of the layer's formation. Pollen records and radiocarbon-dated peat cores from nearby Fakahatchee Preserve indicate a significant shift from a drier, pine dominated wet prairie to a wetter swamp forest between 3500 B.P. and 2000 B.P. (Donders et al., 2005). The Everglades interior site data concur with other world datasets, which indicate that a general shift to wetter conditions caused by an El Niño intensification occurred between 3500 and 3100 ^{14}C yr B.P. (Grosjean et al. 1995, 1997; Bradley et al., 2003: 107). Other examples from Venezuela and Peru also suggest that high-amplitude fluctuations in El Niño intensity and precipitation occurred during the time interval 3800 to 2800 ^{14}C years ago, causing increased climate variability (Sandweiss, 1996; Sandweiss et al., 1996: 1531; Haug et al., 2001).

While the origin of the layer is still not well understood, continued investigations into its nature and formation are ongoing, including geochemical, geological, palynological, and sediment studies (Bernhardt et al., 2006; Coultas et al., 2008; Graf et al., 2008). Understanding what paleoenvironmental processes and possible climate changes may have occurred during the formation of the layer will assist in understanding how interior wetlands were first settled, why they were abandoned, and how Holocene variability may have effected both tree island formation and human settlement in the region.

Most importantly, this study determined that deeply buried Late Archaic deposits occur within Everglades tree islands, and are likely located below the mineralized layers on most, if not all, tree islands in south Florida. This indicates that, contrary to current models stating that they were *not* settled until after 2700 cal B.P., interior Everglades were intensively occupied during the Archaic (see table 6.1). Subsequent to this potentially climate-driven Late Archaic/ Woodland Transition hiatus seen within interior Everglades freshwater tree islands, Glades period occupations returned to interior tree islands, resuming an almost identical subsistence pattern based on intensive exploitation of local freshwater aquatic resources (Schwadron and Russo, 2005; Russo, 2005; Fradkin, 2007).

We now know that contrary to current models, Late Archaic peoples intensively exploited interior south Florida wetlands since the incipient formation of the Everglades ecosystem. However, a dramatic regional occupational shift or hiatus occurred sometime during 3800 to 2700 cal B.P., perhaps due to large-scale environmental or climate fluctuations. This pattern clearly coincides with not only an increasing body of paleoenvironmental data, but with recent, important archaeological syntheses suggesting that world climate events contributed to large-scale human cultural movements (Kidder, 2006), and perhaps the perceived “collapse” of Late Archaic cultures and subsequent emergence of the Woodland within the greater Southeast.

So then, what happened in south Florida during the Late Archaic to Woodland Transition? While freshwater tree island sites certainly suggest a cultural shift, or abandonment, of these sites during this time, where did the Late Archaic populations migrate to, and how did they adapt to broad-scale environmental changes? If a general shift to wetter conditions caused by an El Niño intensification did occur between 3800 and 2800 ^{14}C yr B.P. as some suggest (Bradley et al., 2003: 107, Grosjean et al., 1995, 1997; Haug et al., 2001; Sandweiss, 1996, Sandweiss et al., 1996: 1531), coastal south Florida may have become a more attractive resource base during this time. Increased precipitation may have lead to the formation of more productive coastal estuaries from increased freshwater inputs, perhaps allowing for the formation of larger, more stable shellfish beds, able to support larger populations. It is important to recognize that while environment does not dictate culture, per se, clearly, large-scale changes in resources effect cultural responses and elicit adaptive strategies. This may be evident in a shift from interior freshwater tree islands to the southwest Florida coast and the newly forming Ten Thousand Islands during the Late Archaic to Woodland transition.

EVERGLADES ARCHAIC AND WOODLAND SHELL RINGS AND SHELL WORKS: EMERGENCE OF COMPLEXITY

As discussed previously, prevailing models of south Florida cultural evolution hold that the first populations in the region were different and separate pre-Glades Archaic groups that were marginal, very small in population, nonsedentary, and noncomplex, mostly due to unstable sea levels, the immature development of estuaries, and an inefficient adaptation by terrestrially oriented hunter-gatherers to a marine environment. Nevertheless, these models hold that occupation by the first people in the area were along the coast, as the interior held even fewer potential resources. Pre-Glades shell middens are viewed as very rare, consisting of small, temporary campsites that evidence a nonsedentary, terrestrially based culture.

Recent investigations of the Ten Thousand Islands region of southwest Florida challenge these conceptions, and suggest several contradictions to these long established views of Glades and pre-Glades cultures in the region. First, as argued previously, it appears that Late Archaic cultures intensively used the interior freshwater tree islands of south Florida, as well as the coast. Although the earliest dated sites in the Everglades so far appear within the interior, Late Archaic sites also appear in greater numbers along the coast than was previously thought. Not only are Late Archaic coastal sites evident within the Ten Thousand Islands, but many of the complex Glades period shell works sites are predicted to contain Late Archaic period components, suggesting the existence of a significant coastal shell ring and shell work tradition documenting a long-term cultural continuum bridging Late Archaic and Early Woodland cultures.

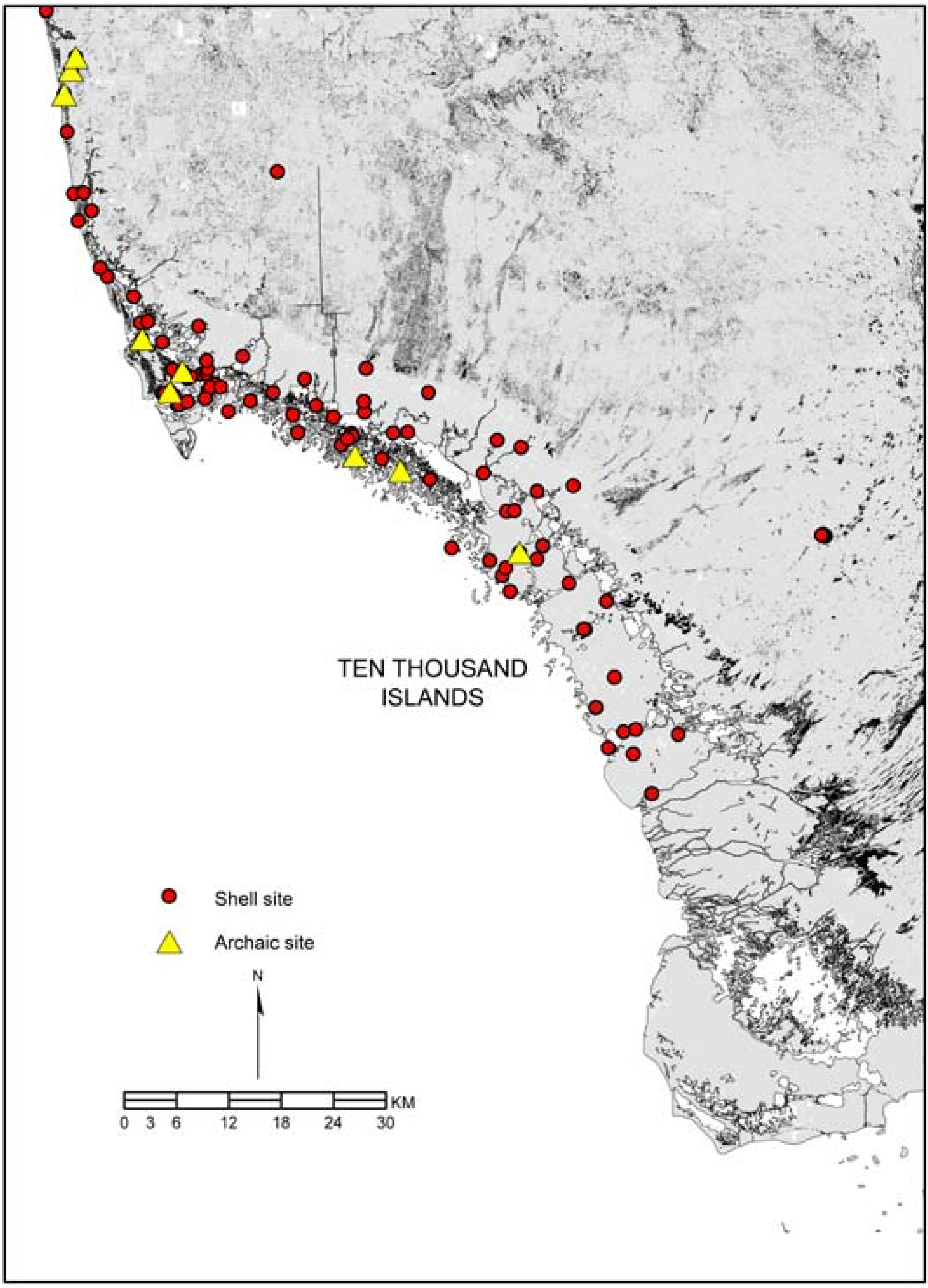


Fig. 6.5. Southwest Florida coastal shell midden, ring and shell work sites, and known Archaic shell sites.

Ten Thousand Islands Shell Rings and Shell Works

The south Florida region contains over 400 shell midden sites that take many forms, including consolidated heaps, piles, mounds, and amorphous and linear shaped accumulations (fig. 6.5). These have been typically viewed as either primary or secondary haphazard refuse accumulations, the results of domestic food refuse, not unlike the Danish concept of "kjökkenmödding" or "kitchen middens."

Many horseshoe, crescent, ring, and U- and C-shaped shell middens occur within the region, and while they have been noted by several researchers (Fradkin, 1976; Carr and Beriault, 1984; Taylor, 1985; Carr, 1988: 32; Patton, 2000: 59–62; Beriault et al., 2003: 92), most authors dismiss these as later, Glades, Calusa, or Belle Glade-related site forms (Fradkin, 1976: 51; Patton, 2000: 59–62; 2001: 53). Only one researcher even mentions the fact that such forms are reminiscent of the Late Archaic shell rings (Carr, 1988: 38); and, to date, no author has considered the possibility that these sites could actually be Late Archaic constructions.

A review of data reported from these sites indicates that fiber- and semi-fiber-tempered ceramics occur in the lower portions of several sites (Fradkin, 1976; Luer and Archibald, 1988; Patton, 2000: 59–62; Torrence, 2003), however these findings have consistently been dismissed as incidental. Accordingly, I argue that earlier Late Archaic components to shell works and shell ring sites have been overlooked within the region. This is significant, because the full settlement pattern and history of the region, the developmental history of shell work and shell ring sites, and the very timing and formation of the Late Archaic to Early Woodland Glades Tradition would be significantly altered based on this finding.

A third type of shell midden occurring in south Florida is called "Shell Works," an admittedly awkward term used as early as Cushing's time, meant to be a counterterm to "Earthwork." Not all archaeologists accept this term but it is a useful construct—shell works are more than just large shell midden complexes, they are purposefully constructed features composed of primary or secondary shell refuse intentionally borrowed, piled, or arranged to form mounds, ridges, rows of mounds, rings, platforms, and depressions (Schwadron, 2008). Some shell works suggest planned architectural features and landscape terraforming to define public, domestic, and ceremonial spaces, and reflect organized labor, community planning, monumentality, and ceremonialism. This indicates a high level of social complexity, and changes in shell work settlements over time throughout the region are argued to potentially reflect changes in sociopolitical complexity.

While some early researchers noted that large shell work sites represented monuments (Moore, 1905: 304) or great public works reflecting organized labor (Cushing, 2000: 84, 85, 86), shell works have not been thoroughly examined in their spatial, temporal, and functional contexts. Spatially, it appears that Ten Thousand Islands shell works sites have similar spatial patterns, ranging from small, simple, architecturally noncomplex sites, to massive sites containing complex, monumental architecture. More elaborate shell works may include features such as canals, fishponds, water courts, public plazas, and ceremonial or residential mounds. Is it possible that some of these features may have functioned to support corporate labor activities needed to maintain an increasing population dependent on a coastal foraging economy? Does similarity or diversity in site layouts suggest a hierarchical settlement pattern, and do the presence or absence of certain architectural features indicate changes in site functions, or social organization over time?

Temporally, shell work sites have been viewed as Woodland period Glades constructions, mostly found within the Calusa subarea (Goggin, n.d.: 398). Goggin thought that shell works were mainly late Glades period (Mississippian) constructions (n.d.: 398), and represented the climax of the Glades ceremonial complex (Goggin, 1949a: 28). Later, Carr (1988: 37) argued that shell works potentially dated from Glades I through Glades III periods. Griffin warned against assuming that shell work sites were necessarily Calusa or Glades III period constructions (2002: 291), as did Marquardt (1984), who cautioned against the assumption that shell works are to be automatically associated with the Calusa. Torrence (1996: 29) attributed shell work constructions to the later Calosshatachee II to III period (A.D. 800 to 1350, 1150–600 ^{14}C yr B.P., as did Patton, 2001). The chronology of the shell work sites is still, however, very poorly known.

To date, systematic archaeological testing has been conducted at 12 Ten Thousand Islands shell ring and shell work sites, within Everglades National Park, and include excavation, controlled surface collecting, mapping, and radiocarbon dating (Schwadron, 2006b). A total of 123 radiocarbon dates provide excellent temporal data (table 6.2); artifact analyses on shell-tools, ceramics, and lithics, as well as limited faunal and botanical analyses have produced over 40,000+ cataloged artifacts.

Results of this study have determined that Late Archaic shell ring sites are in fact present throughout the Ten Thousand Islands, as both isolated sites, and conjoined (and perhaps partially buried or completely obscured) to larger shell work complexes. It is my contention that the earliest extant shell midden sites in the region took the form of crescents and rings, reflecting similar social arrangements of settlements, potentially reflecting egalitarian groups. As populations expanded over time throughout the region, the smaller crescent and ring sites were abandoned, and/or these earlier settlements or new settlements grew in size and complexity to become massive shell work sites. Sea level rise may also have been a factor, perhaps inundating the earlier ring sites, and compelling occupants to move to higher ground.

Shell works are also common in the Ten Thousand Islands. These comprise complex prehistoric landscapes, palimpsests that are significant examples of the extent to which humans have shaped, engineered, and transformed their environments. Shell works reflect a unique, prehistoric architectural tradition of landscape terra-forming using shell that served an array of domestic, economic, ceremonial, and symbolic functions. These range from defined spaces and places (domestic, public, and sacred spaces; residential and activity areas); structures (house pediments, docks, piers, ramps, etc.); burial places; walkways, canals and watercourses; and feasting locations, ceremonial constructions, and monuments. Other shell work features are not as easily interpreted, and their purpose and meaning can only be surmised at this point. Basins and depressions, known collectively as water courts, may have served various purposes, such as for freshwater storage; as cooking pits, feasting, or processing areas; or as fish weirs, impoundments, or ponds for temporary storage of surplus live marine food resources. Sites such as Russell Key, Dismal Key, and Fakahatchee Key all contain multiple sets of these features as well as finger ridges and platforms, and at Russell Key, they appear to be mostly contemporaneous, dating from around cal A.D. 500 to cal A.D. 900 (1450 cal B.P. to 1050 cal B.P.). Whatever their function, these features reflect an intensification in their construction and use. They may have supported corporate labor activities (fishing, shell fish production, or water storage), or discrete arrangements of households to accommodate a growing population.

Mapping shell work sites along the southwest coast of Florida revealed that they are concentrated in only two areas: the Charlotte Harbor area; and further south within the Ten Thousand Islands (where there are 17 known sites). The sites range from very small rings and linear middens (less than half an acre) up to the largest shell work sites exceeding 20 to 24 ha (50 to 60 acres; fig. 6.6). Large shell work sites occur with a certain spatial frequency, with eight of the largest sites occurring at every 3 to 4 miles (4.8–6.4 km) within the northern part of the region, becoming less frequent toward the southern end of the region. The largest sites may represent large, nucleated villages, perhaps the political seats of local chiefdoms. These sites often have smaller shell work sites and villages within 2 to 5 miles (3.2 – 8 km) surrounding them, as well as other smaller sites traditionally thought to represent fishing hamlets or collection stations. Interestingly, there was a strong tendency to locate large settlements opposite the mouths of major rivers, probably to take advantage of the most highly productive estuarine zones. These settlements may have developed a system of corporate labor to control and manage access to the most productive fishing grounds surrounding their sites.

Determining the number and distribution of shell rings is more challenging, as many potential shell rings appear to be conjoined and partially, if not completely, obscured by subsequent shell work complexes that expanded out and over the earlier rings. Many shell rings are also partially, if not completely, submerged by a postdepositional rise in sea level, and/or buried by encroaching sediments and mangrove colonization. Nevertheless, up to 20 potential Ten Thousand Islands shell rings have been identified during this study (Schwadron, 2006b). Whether these rings date to the Late Archaic, Early Woodland Transition, or Glades periods remains to be determined. Of the 20 potential shell rings, seven appear to be conjoined to

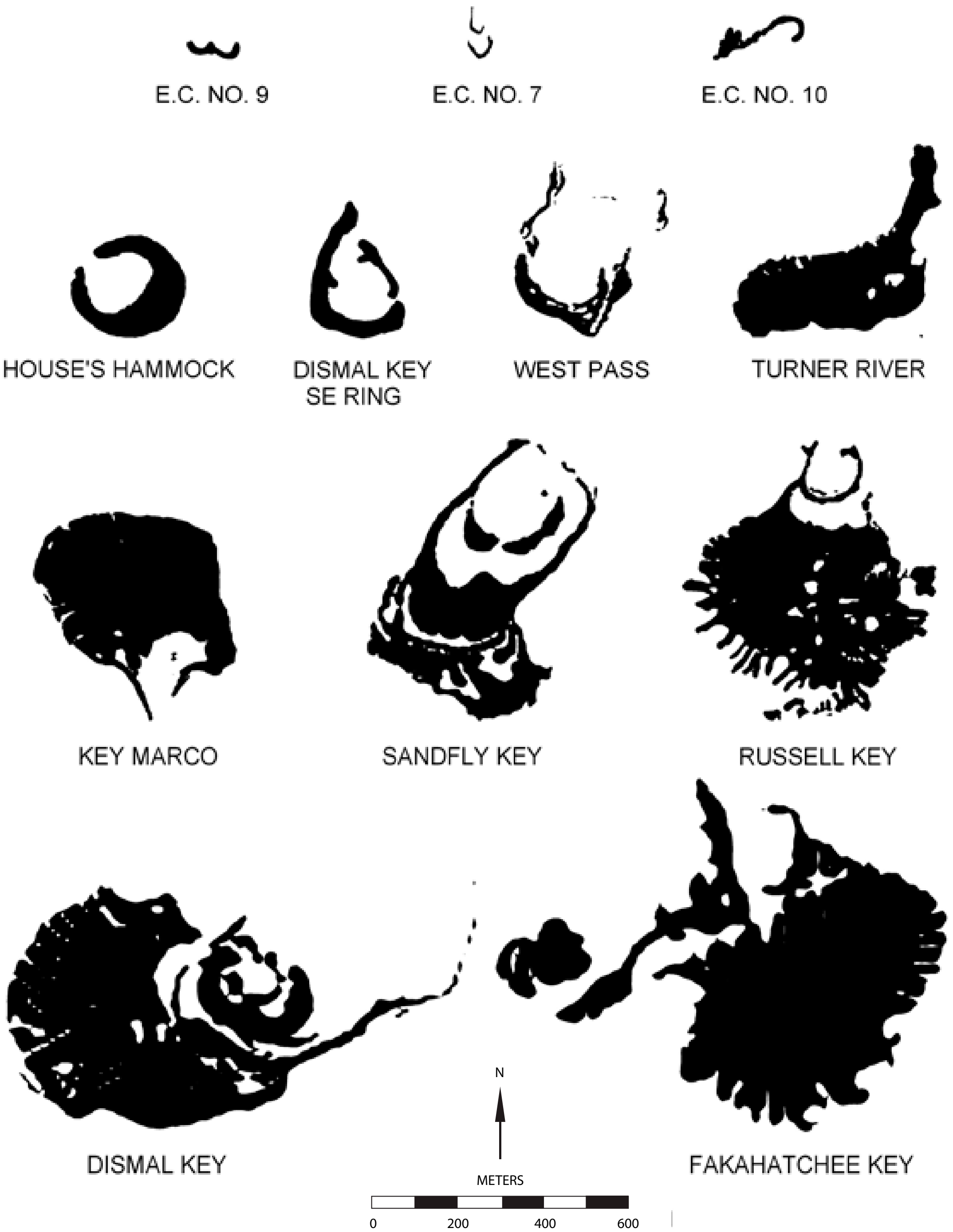


Fig. 6.6. Comparative shapes and sizes of select Ten Thousand Island linear shell ring and shell work sites.

larger shell work complexes, while 13 appear to be completely isolated rings.

Everglades City Linear Ridges and Rings

Descriptively, moving from the smallest, more "simple" shell midden ridges and ring sites to the largest and most complex shell works sites within the Ten Thousand Islands, we find a series of small ridges and rings clustered near one another in the northern Ten Thousand Islands.

The Everglades City No. 7 site was first recorded by Taylor (1984: 279), and was classified as a relic shell ridge. The site consists of two shell ring features (fig. 6.7) situated within the mangroves. The southernmost shell ring is a crescent-shaped ridge measuring approximately 62 m long (east to west) and varies from 1 to 10 m wide (north to south). The ring was noted to be widest toward the center of the ridge and narrowest at its ends. The highest elevation of the ridge is about 1.75 m near its center.

About 25 m north of the shell crescent is a second "J" shaped shell ring, approximately 33 m long north to south and about 7 m in width. It measures about 0.75 to 1 m in elevation. Taylor concluded that the site was a relic shell ridge, with perhaps an intermittent or isolated artifact scatter, and was not a shell midden site. However, no archaeological testing was conducted at the site.

Preliminary archaeological testing (Schwadron, 2006b) of the feature determined that this is in fact a shell midden site and not a relic beach ridge, consisting of deeply buried and intact oyster shell midden, including worked shell tools. Four radiocarbon dates determined that the site was occupied between 2800 cal B.P. and 1400 cal B.P., during the "transition" between the Late Archaic and Woodland period.

The Everglades City No. 9 site was also recorded by Taylor (1984: 281), and thought to be a relic shell ridge. The site is 62 m in length (east to west) and 15 m in width, with an elevation of about 1.5 m in height at the center (fig. 6.8). Four radiocarbon dates suggest that the site was occupied between 3630 cal B.P. and 1880 cal B.P., fully spanning the period between the Late Archaic and Woodland period.

Everglades City No. 10 was also thought to be a relic shell ridge (Taylor, 1984: 282). The site contains several shell-ring shaped ridges (fig. 6.9), with the northernmost ridge measuring 172 m east to west, 15 m in width, and 1.2 to 1.6 m in height. Taylor (1984: 282) concluded that these ridges were natural in origin.

Preliminary archaeological testing (Schwadron, 2006b) determined that the ridges comprise oyster shell midden, and are not natural formations. Three radiocarbon dates place the occupation of the northern ridge between 3320 cal B.P. and 1320 cal B.P., during the Late Archaic and Early Woodland periods.

Testing of the three Everglades City shell ridges and rings determined that they are in fact shell middens and not natural beach ridges, and that they date from the Late Archaic through the Early Woodland periods. It should be noted that all three sites had deeply buried strata that were not sampled because they were submerged, and that basal layers for these sites may indicate much earlier occupations than those sampled. Nevertheless, at these three ridge and ring sites, coastal occupation of the Ten Thousand Islands began by at least 3630 cal B.P. (even earlier at Horr's Island), roughly coinciding with the timing of the temporary abandonment of the interior Everglades. The occupation at these sites continued until at least 1320 cal B.P., suggesting the possibility of a cultural continuum between the Late Archaic and Woodland/Glades cultures. Additional testing is needed, however, to determine if these sites were continuously inhabited over time.

House's Hammock

House's Hammock is a very large, crescent-shaped shell ring located in the central Ten Thousand Islands (fig. 6.10). Today, the site is remotely situated, surrounded by several miles of mangrove swamp, over 2 mi (3.2 km) from the present shoreline, and can only be reached by helicopter. The site forms an almost perfect crescent, oriented with its opening toward the west. The site measures 220 m at its widest point. The arms of the ring are estimated to be 20 m wide at its narrowest points, at the western end of the site, and as much as 80 to 100 m at its broadest (eastern) extent, with an elevation ranging from 0.5 to as much as 4 m at its highest point, along the middle, central portion of the ring. Other than its crescent shape, no shell work elaboration or features are present at this site.

One excavation unit and a shovel test determined that the site is predominantly composed of clean oyster shell mixed with other marine shell and very little sediment, some faunal bone, and occasional shell tools, but it is completely lack-

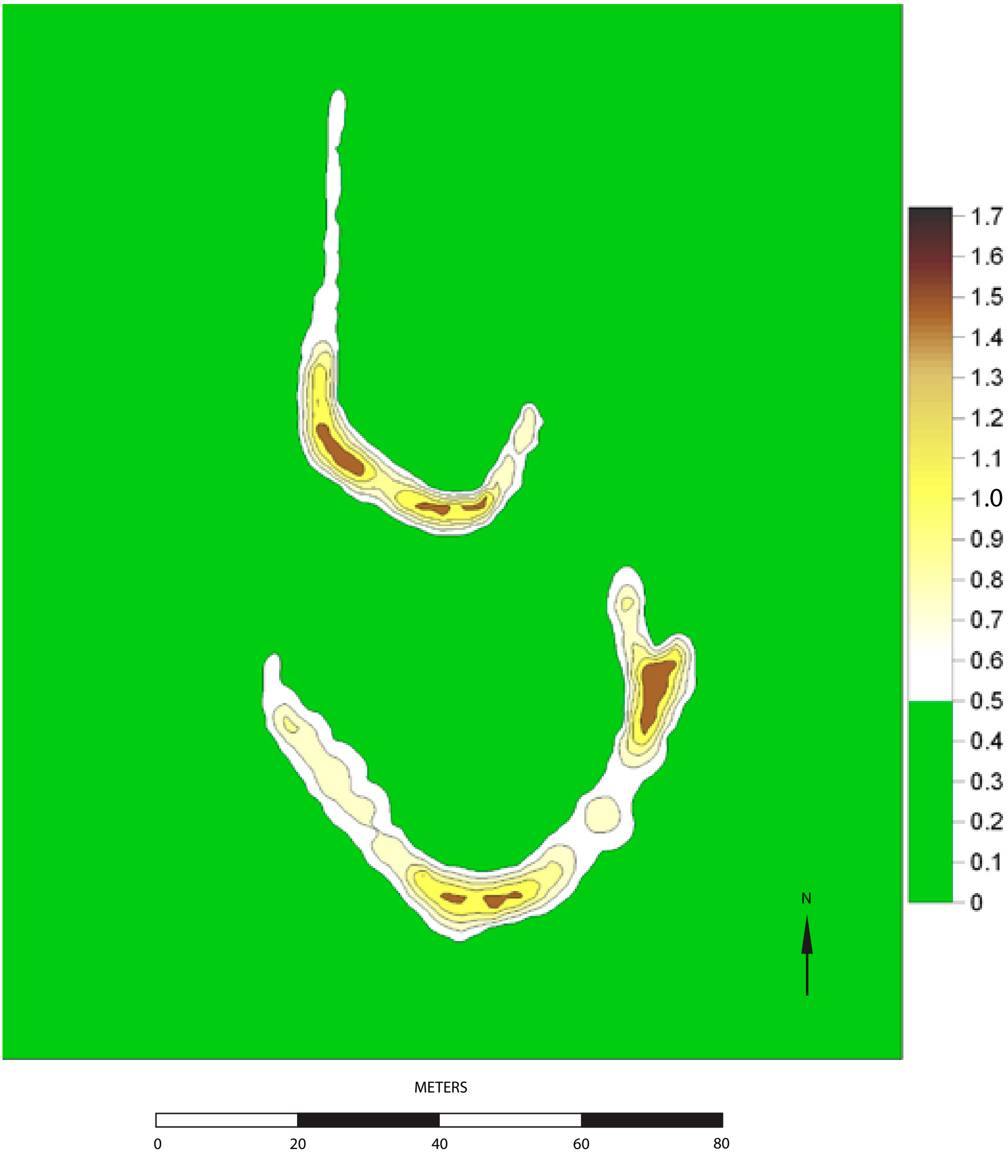


Fig. 6.7. Preliminary site map of Everglades City No. 7, a Late Archaic–Early Woodland period site.

ing in pottery. Three radiocarbon dates from different parts of the ring indicate that the site was occupied from 3540 cal B.P. to 2790 cal B.P. These dates imply that the site is most definitely a Late Archaic shell ring, postdating its nearest south Florida Archaic shell ring neighbors, Joseph Reed and Horr's Island (4400 cal B.P. to 3800 cal B.P.) by a few hundred years.

RUSSELL KEY

Russell Key is the larger, more complex of the shell work sites, about 60 acres in extent, and enormous in its complexity (fig. 6.11). Several days of field walking and reconnaissance were used to produce a preliminary map of the site, confirming that the entire island is constructed out of shell. Features include mounds, ridges, rings,

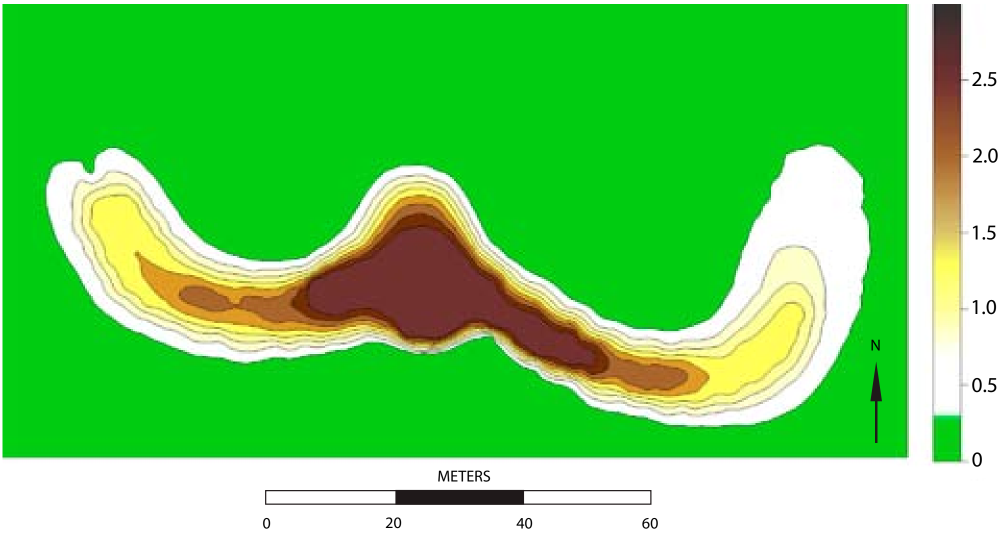


Fig. 6.8. Preliminary site map of Everglades City No. 9, a Late Archaic–Early Woodland period site.

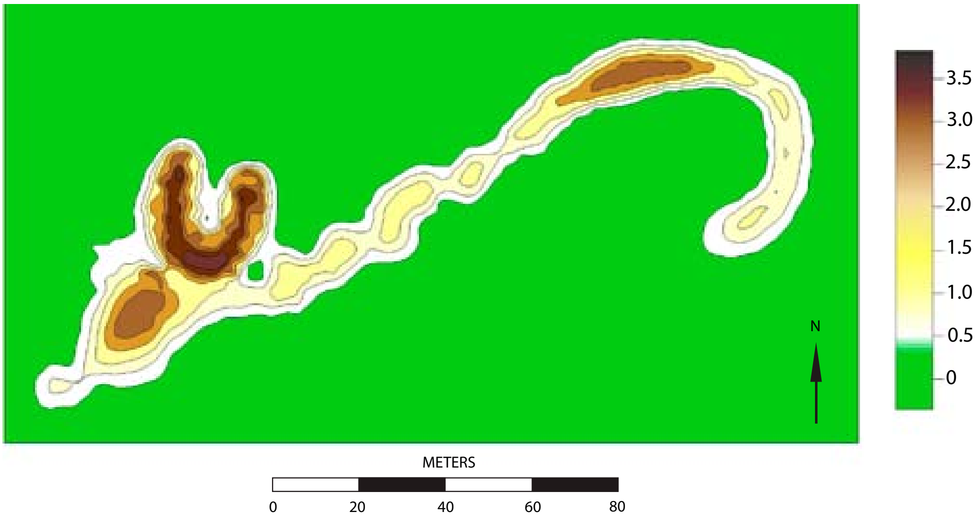


Fig. 6.9. Preliminary site map of Everglades City No. 10, a Late Archaic–Middle Woodland period site.

plazas, canals and depressions. Archaeological testing, controlled surface collections, and dating of a variety of features throughout the site consisted of 10 excavation units, 27 radiocarbon dates, and nearly 3000 piece-plotted surface artifacts, providing important spatial and temporal data on how Russell Key's inhabitants may have engineered, terra-formed, and lived within the island over time.

At the northern end of the site is a large, low shell ring that is nearly completely buried by an encroaching mangrove swamp, suggesting a postoccupational sea level rise. Testing of the shell ring could only reach its upper portion, as the unit was quickly inundated with water. A radiocarbon date of 2330 cal B.P. to 2070 cal B.P. indicates that this is the earliest dated component of Russell Key, and that the first occupants of the site may have lived in a large, open ring-shaped formation. Shell may have been deposited around living areas as refuse, marking the locations around a small, arcuate settlement. Alternatively, the shell ring may mark the location where communal feasts were made. Since basal portions of the midden were not sampled, it remains possible that this area of the site may have had an even earlier occupation.

South of the shell ring, separated by deep mangrove swamp, is the main portion of the site. It shows an overall bilateral symmetry, with a central, flat, open interior area constructed of undulating low shell fields, possibly functioning as a central plaza, and dating from 1520 cal B.P. to 1150 cal B.P. This central area of the site is flanked on the east, west, and south sides with a complex series of radiating, protruding shell midden finger ridges. These shell ridges occur in distinct groupings, suggesting that they were constructed as part of organized activity areas, residential zones, or habitation areas. Archaeological testing and dating of the east and west features indicate that they were built rapidly and are contemporaneous, with seven radiocarbon dates suggesting they were constructed sometime between 1400 cal B.P. and 940 cal B.P. That they appear bilaterally placed on either side of the central plaza area suggests that these groupings may reflect a moiety or other clan social organization.

Between these raised finger ridges are long, low depressions, which are similar to the ridges between the mounds at many other shell work sites. This series of ridges and depressions raises the question of whether they could have functioned as canoe portals or docks, or held platform structures on top of the ridges or

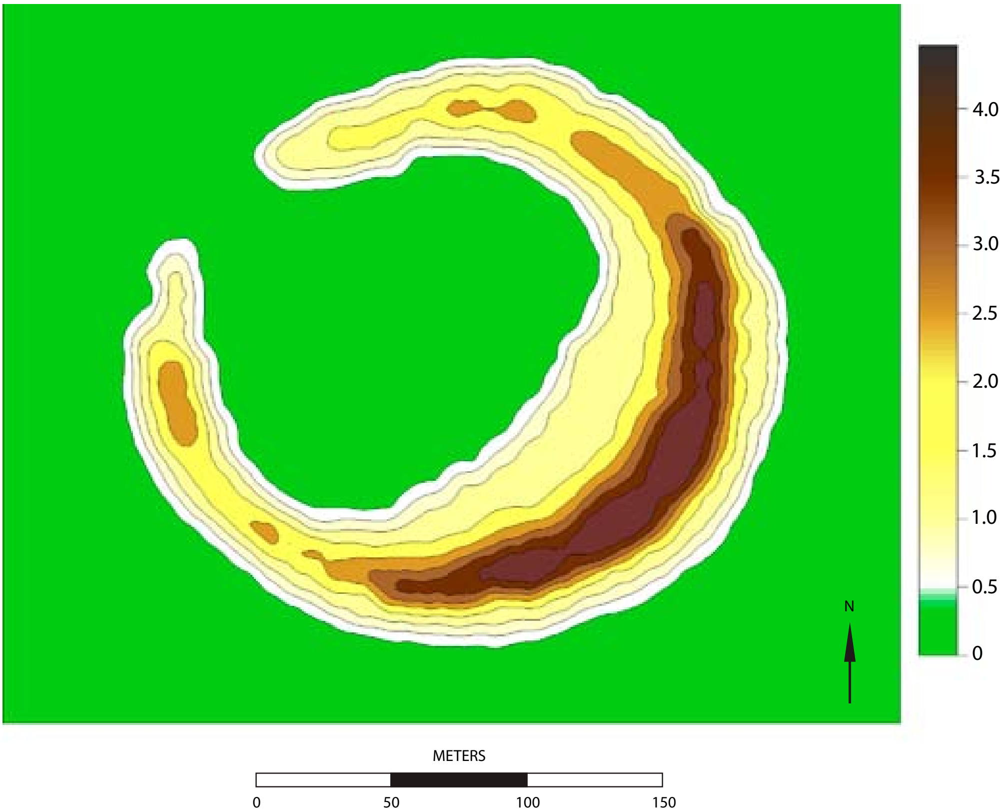


Fig. 6.10. Preliminary site map of House's Hammock, a Late Archaic shell ring.

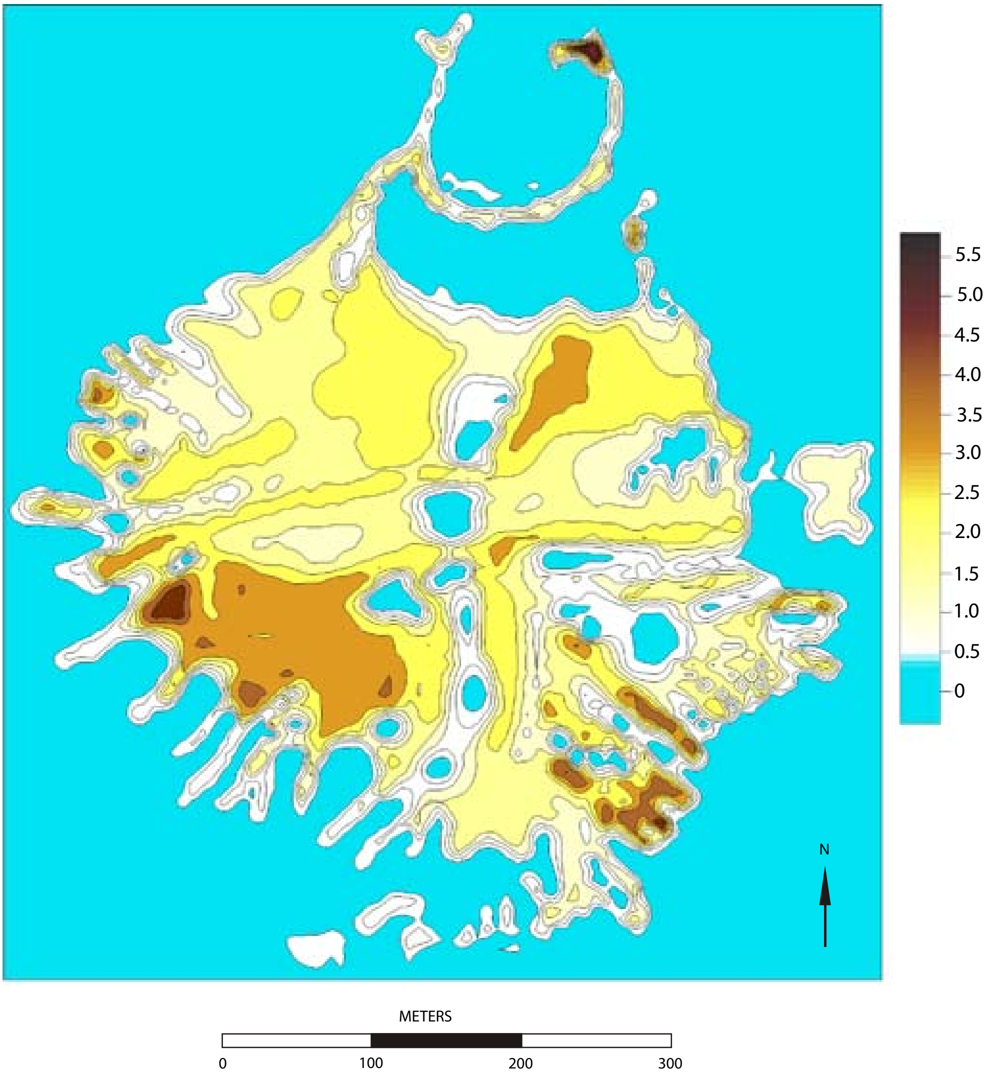


Fig. 6.11. Map of Russell Key shell works site, an Early–Late Woodland site.

between the lower depressions. The finger ridges and features at the southern edge of the site were determined to date most recently, as indicated by five radiocarbon dates ranging from 920 cal B.P. to 650 cal B.P. These suggests that Russell Key's inhabitants continually expanded the site over time in a southern direction, constructing more habitable island by continuing to build new site areas out of shell, in a seaward direction.

One of the most intriguing features at Russell Key is an impressive series of basins and depressions found around the margins of the site. Collectively called "water courts" (Cushing, 1897), it is not yet known how these features functioned. The size and shapes of the water courts range from small, low, teardrop-shaped basins measuring from 5×7 m, to very large, steep-sided and deep, circular or oblong-shaped rings measuring up to 20–30 m in diameter.

Two distinct clusters of water courts occur at Russell Key, along the east and west sides of the site, in association with and adjacent to the series of finger ridges. In both areas there are six individual, very large water courts lined up in a curvilinear row, but separated by tall walls or ridges of shell. A sample of these was tested and found to be contemporaneous with the shell ridges and with each other, dating from 1400 cal B.P. to 940 cal B.P. One excavation unit determined that Water Court 1 was built rapidly, with 5 m of shell having been deposited within 380 years, between 1320 cal B.P. and 940 cal B.P.

Water courts also occur around other margins of the site, but tend to be isolated, smaller, teardrop shaped, and shallow-basin types. Some water courts currently hold hypersaline water and are filled with mangroves, while others remain completely dry. In the dry water courts, surface scatters of artifacts are always noted, including ceramics and a variety of shell tools, such as shell hammers, cutting-edged tools, and vessels (like shell scoops and cups).

Based on the variety of shapes, sizes, and their distribution around the site, it may be that water courts served a variety of purposes, such as fish traps, impoundments, ponds for aquiculture, or to capture and store live marine food resources. Other possibilities are that they functioned as large shellfish roasting or steaming pits, shellfish production locales, tool manufacturing locals, or feasting pits. It is also possible that these features may mark the locations of former habitation structures, perhaps some type of ovate platform structure that was raised above the shell, and because the raised platforms served as living floors, there are no remnants of crushed or trampled shells on the surfaces of these features.

It is also possible that these features served to store freshwater, however this remains problematic, since shell is permeable and probably could not have held freshwater without the addition of an impermeable barrier, such as a clay lining. Archaeological testing of two water courts did not evidence any lining or substrate, nor did it indicate any subsurface features such as floor layers, hearths, or pits. It should be noted, however, that since freshwater is less dense than salt water, if undisturbed, freshwater can “float” on top of saltwater (known as the Ghyben-Herzberg lens). It remains possible then that these basins were constructed with this knowledge, effectively engineering a device to capture and store freshwater. This is not unfeasible, as there is strong evidence for sophisticated engineering knowledge of water control devices found throughout the region, evidenced in large-scale prehistoric canals that effectively controlled water levels and flow over long distances (Luer, 1989).

At Water Court 6, a sluice was found on the edge of the water court facing the water, suggesting that this particular water court functioned as a fish trap, where fish would enter the water court through the open sluice during high tide, the sluice could then be closed off, and fish could be easily collected. However, this was the only example of a fish trap found at any site, with no other water courts having any discernible sluices. In fact, all other water courts appear to have tall, built-up walls of shell that are at their highest elevation facing against the sides of the sea.

Along the southern edge of the site we identified one single water court, the largest found on Russell Key, measuring 15×50 m. Two radiocarbon dates place the construction of this feature to 900 cal B.P. to 640 cal B.P., the last dated occupation of the site. The presence of one large water court at the later component of the site, in contrast to the two earlier, bilateral groupings of six individual water courts on the east and west edges of the site, suggests a possible shift toward the centralization or control of resources. Not only is this the largest water court found on Russell Key, but evidence of artistic elaboration or symbolism was found, with several large *Busycon* shells placed inverted in rows into the inside and outside walls of the water court.

Russell Key includes two distinct mounds separated from the main part of the site. Their separation across water from the domestic area of the site indicates a possible cultural preference for separating a ceremonial, sacred, or chiefly structure. A large, flat-topped, 4 m tall mound with a ramp was tested and determined to be built rapidly, between 1300 cal B.P. and 1040 cal B.P. The mound was purposefully constructed out of clean oyster shell with no evidence of accumulated domestic refuse. The top few centimeters of the mound evidenced a lens of extremely crushed and compacted shell, suggesting that it served to house some type of structure, or that the trampled and compacted shell was a result of heavy foot traffic. Based on the existence of other flat-topped mounds in south Florida, this mound may have held a sacred temple or the residence of a chief or religious leader.

The second mound, also isolated from the main part of the site, is much smaller than the flat-topped mound, and only about 3 m in height. One radiocarbon date from the upper portion of the mound suggests that it was constructed earlier, at around 1610 cal B.P. to 1320 cal B.P.

West Pass

West Pass is the closest site to Russell Key, at less than half a mile. This site was subjected to field walking, mapping, and archaeological testing. The shape of West Pass (fig. 6.12) is reminiscent of the shell ring at Russell Key, suggesting a large, open, almost crescent-shaped configuration. While West Pass does contain a few examples of shell work constructions, including one very large, rectangular water court; two small depressions that may be water courts; and a large, open central plaza area; no other elaborate or complex architectural features were found at West Pass. Typical shell work features found at other sites, such as rows of large mounds, radiating finger ridges, platform mounds, or multiple canals were not present. According to some models (Widmer, 1988), the smaller, simple, crescent-shaped configuration of the site, as well as the lack of any elaborate shell works, may suggest that this was a special-use site, such as a fishing or shellfish collecting station or hamlet, and not a permanent village site. Others may suggest that this was a satellite or subsidiary site to Russell Key (Beriault et al., 2003). However, the large, open plaza of the site contained dense surface concentrations of a variety of domestic refuse, and the construction of features (like the large and small water courts) suggests that it may have been a smaller, yet permanent, habitation site.

Results from five excavation units and eleven radiocarbon dates indicate that the main occupation of West Pass occurred earlier than that of Russell Key, from about 1810 cal B.P. to 1200 cal B.P. Evidence for the beginning of shell work mounding and construction at the site begins around 1600 cal B.P., with evidence for the greatest shell work elaboration toward the end of the site's occupation, at around 1210 cal B.P. By 1200 cal B.P., West Pass appears to have been completely abandoned.

It is not known how West Pass and Russell Key settlements interacted or if they were related, though at times, West Pass and Russell Key had contemporaneous occupations. It is possible that the earlier populations of Russell Key and West Pass eventually amalgamated settlements at Russell Key after the abandonment of West Pass after 1200 cal B.P. Perhaps this shift in social organization is evidenced by the establishment of contemporaneous east and west moiety or residential zones at Russell Key, which appear to date sometime between 1400 cal B.P. and 940 cal B.P.

Dismal Key

The Dismal Key site is the largest and possibly one of the most complex of shell work sites, with monumental architecture covering up to 73 acres (30 ha) of the island (fig. 6.13). The two tallest mounds measure 6 m in height and are very steep sided, with flat platforms at their summit. The two tallest mounds suggest the possibility of a chiefly residence, placed front and center to the entrance to the site, or perhaps these were vantage points. These two mounds are bisected by a long canal that leads into the central portion of the site, suggesting a controlled entrance, perhaps with ceremonial or symbolic significance. Construction of this canal suggests a great amount of coordination and effort to build and maintain it.

The site also contains many protruding finger ridges, which may have served as house platforms, canoe docks, or other purposes. A smaller, crescent-shaped shell ring is located in the interior of the site, measuring 200×300 m, with the open end facing the east toward a plaza. Several other features are possible ramps or expansions of the ring. The ring is consistent in size and shape with other known Late Archaic shell rings in the Southeast, suggesting the possibility that this may be an earlier Archaic period component of the site, perhaps a ceremonial subsite built as a public monument or created during public feasting and ceremonies. This remains to be determined by future testing and radiocarbon dating, to be conducted later this year.

Dismal Key Shell Rings

Located about 1 km southeast of the Dismal Key site is the Dismal Key Shell Ring, a crescent-shaped shell ring with its open end oriented toward the east (fig. 6.14). The site

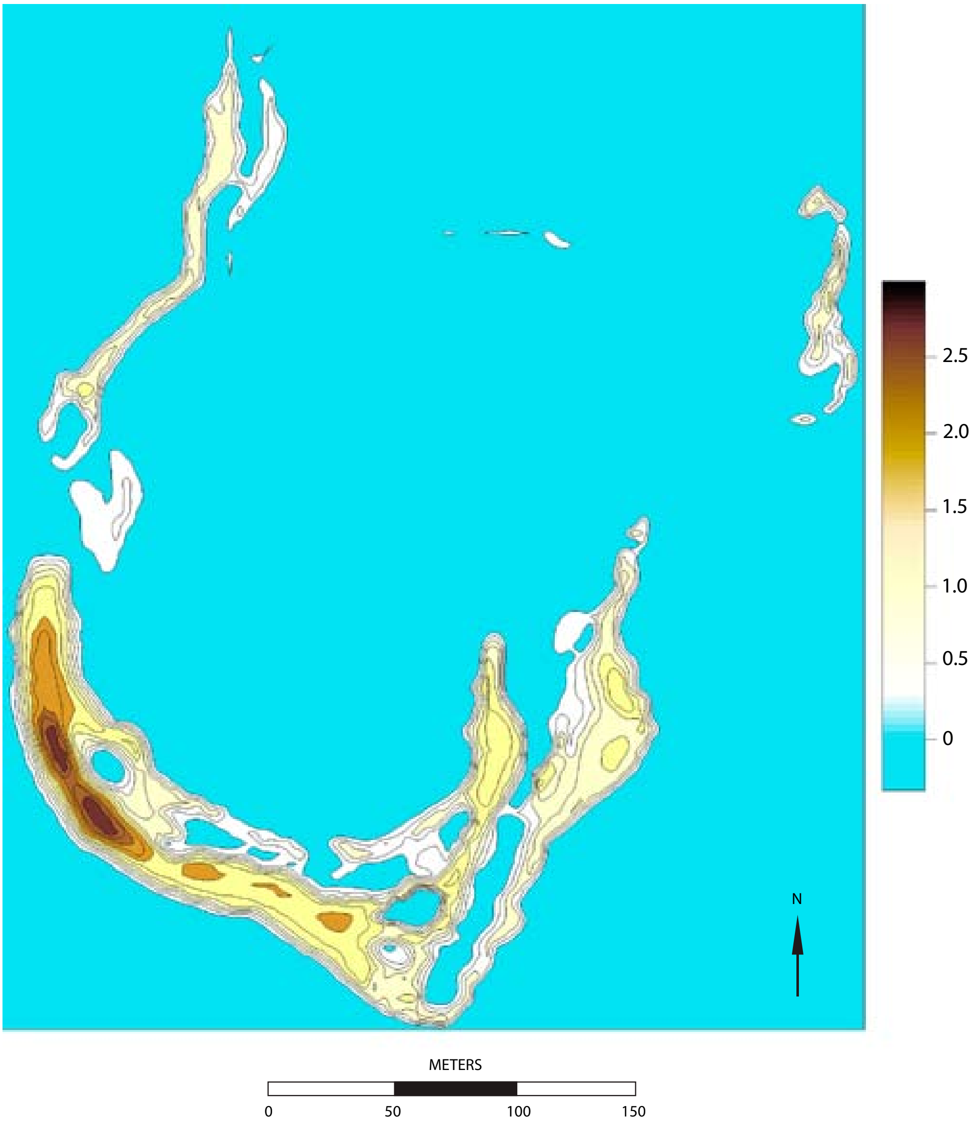


Fig. 6.12. Map of West Pass shell works, an Early Woodland site.

measures 320 m across at its widest point, with its arms measuring a maximum of 40 m wide. The interior of the site is open and flat, and is reminiscent of a plaza. Two mounded areas in the central outer portion of the ring are the highest elevated areas of the site, at 2–2.5 m in height. As noted at other shell rings in the Southeast, these raised areas located back and center on the ring may indicate preferential social positions within arcuate communities (Russo, 2004b).

Beriault et al. (2003) thought that this site may be a subsidiary structure to the larger Dismal Key shell works site, or may have functioned as a special use site, such as a large fish trap. However, the possibility that this may be an earlier Archaic shell ring should not be overlooked, and testing of this possibility will occur later this year.

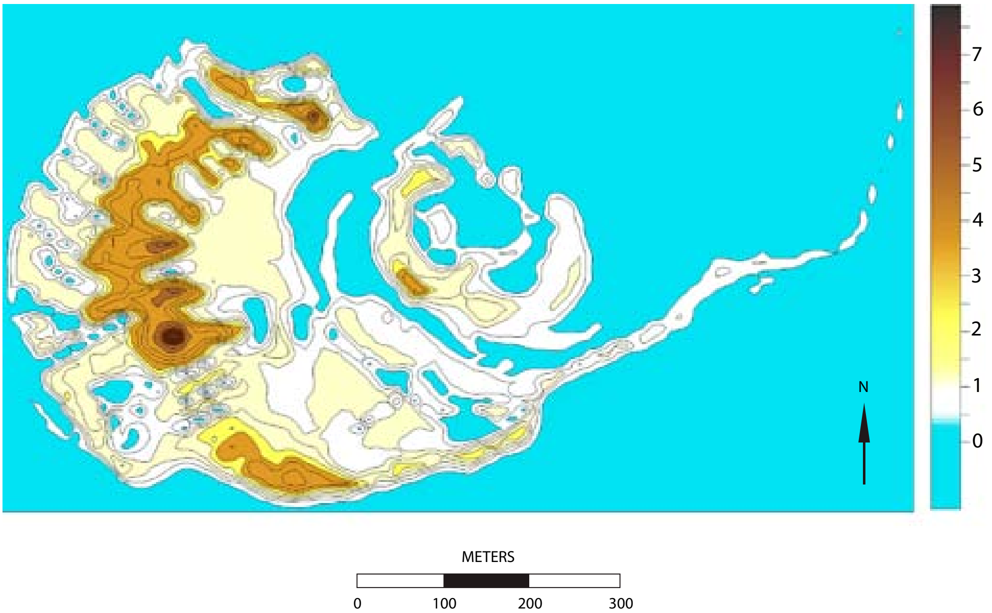


Fig. 6.13. Map of Dismal Key shell works, a Transitional–Early/Middle Woodland site. (Adapted from Beriault et al., 2003)

Fakahatchee Key

Shell works were also constructed to separate domestic areas from burial places, as demonstrated at Fakahatchee Key, a huge 23 ha (56 acre) site, which exhibits an enormous curvilinear shell midden ridge with multiple shell midden mounds, platforms, and radiating finger ridges and canals. The curvilinear arrangement appears to be oriented toward the inside of the site, facing a low, central area of shell fields, and a large plaza or water court.

The domestic and social areas of the site are separated by a large, linear midden ridge running north to southwest, which bisects the site from an isolated burial mound located to the west. A ramp or graded walkway leads up into an elevated area that contains a slightly sunken open plaza about 0.4 ha (1 acre) in diameter. It is flanked by two 7 m tall conical mounds, from which locals report that human remains were recovered. This mound complex is likely the village burial or ceremonial center, and its separation suggests a distinct cultural preference for separating domestic and sacred areas.

Sandfly Key

Mapping of the Sandfly Key site was completed last year, and the site shows a curious set of nested crescents and rings (fig. 6.15). Shell work elaboration occurs along the southern margins of the site. Two radiocarbon dates from the upper portion of the shell ring suggest that it was constructed between 2790 cal B.P. and 1900 cal B.P. Two small, low sand and shell mounds were found deeply hidden within the mangrove swamp and within the interior of the rings. One radiocarbon date taken from the upper portion of one mound returned a date of 2690 cal B.P. and 2380 cal B.P., suggesting that the mounds were constructed during the transition between the Late Archaic to Woodland (Glades) periods.

Although relegated to the southern margin of the site, Sandfly Key also contains impressive shell work features, including a flat-topped mound, possible house platforms, fish traps, canals, water courts, and extensive shell fields. The open shell fields may have functioned as a plaza or a communal village activity or habitation area. Various elaborate shell work features in the southern portion of Sandfly Key were tested and dated to the later Woodland period, from 1900 cal B.P. to 1300 cal B.P. Like Russell Key, it appears that Sandfly Key was first settled in the time during the Late Archaic to Woodland transition, with large, crescent-shaped shell ring formations. Through time, Sandfly Key continued to be occupied, with populations moving and perhaps building additional sites in a southerly direction, ultimately reflected in complex mound building and the creation of shell work features that reflect an array of functions.

Johnson's Mound

Johnson's Mound is the most southerly located shell work site in the Ten Thousand Islands. Today the site is distantly secluded, located over a mile from the current shoreline within a dismal, dense mangrove forest that is nearly impossible to penetrate. The site comprises 16 ha (40 acres) of

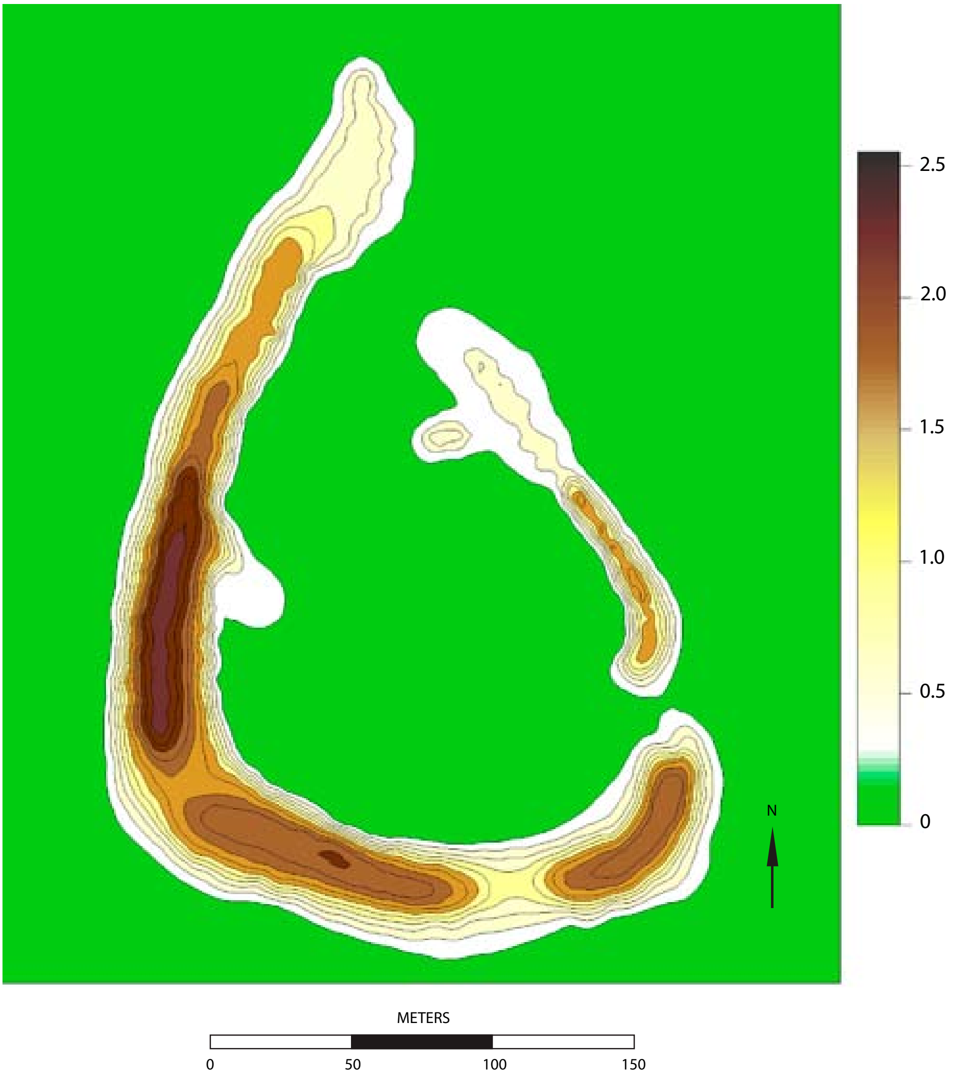


Fig. 6.14. Map of Dismal Key SE Ring, a Transitional–Early Woodland site. (Adapted from Beriault et al., 2003)

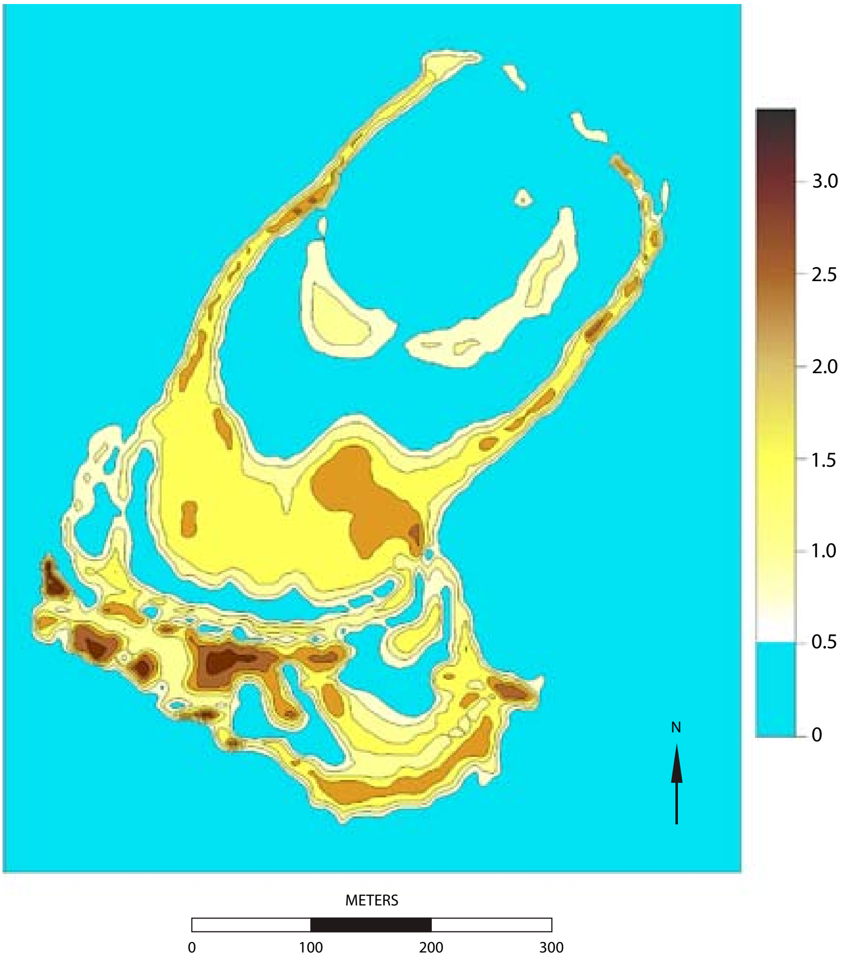


Fig. 6.15. Sandfly Key shell works, Transitional–Early Woodland site.

some of the most imposing, impressive shell work features found at any of the Ten Thousand Island sites, with extremely tall, 4–6 m high mounds suggesting monumentality, arranged around a low, interior central plaza. One radiocarbon sample taken from the low central plaza returned a date of 1980 cal b.p. to 1740 cal B.P. Two radiocarbon samples taken at the top of one of the tallest mounds resulted in dates of 1680 cal B.P. to 1030 cal B.P. , suggesting that mound building at the site may have been completed before 1000 cal B.P., and that the rest of the site may largely predate this time period.

While it has yet to be mapped, the site appears to be arranged in several large, nested crescents, with a potential shell ring at its eastern edge. This is one additional site that needs to be tested to determine its full occupational history, and if its shell ringlike features may date from the Late Archaic. If so, this may be additional evidence of an in situ Late Archaic to Glades period continuum, supporting the theory that changes in shell work site forms evidence emergent complexity.

CONCLUSION

Preliminary data from the Ten Thousand Islands shell ring and shell work sites studied to date suggest that shell work sites were purposefully constructed and evidence changes in their forms over time, suggesting that some site occupations initiated with simple, crescent or ring shaped middens, perhaps reflect circular (egalitarian?) living arrangements. These ring-shaped middens appear to have their antecedents in, or even date directly to, the Late Archaic period, providing important evidence for a Late Archaic to Early Woodland Glades period cultural continuum within the region.

Shell ring sites begin appearing in greater numbers in the Ten Thousand Islands during the Late Archaic period, though evidence from Horr's Islands certainly suggests that Archaic shell mound building began in the Middle Archaic (Russo, 1991a). That many shell ring sites are conjoined and possibly even obscured by later shell work sites suggests that potentially, many more Late Archaic shell ring sites occupied the coast of south Florida, and our view of Late Archaic settlement in the region is greatly underdeveloped. The discovery of Late Archaic interior freshwater tree island sites, and their subsequent abandonment between 3800 cal B.P. and 2700 cal B.P. —which correlate with the timing of other regional and world climate data and archaeological trends (see Kidder, 2006)—is significant. In south Florida, it appears, the Late Archaic to Woodland transition was characterized by the movement from the interior freshwater tree islands out to the coast, and the beginning of a long tradition of shell ring and shell work construction.

The repetition of certain architectural forms at shell ring and shell work sites over time throughout the region suggests a strong cultural tradition for designing, managing, and constructing multifunctional, ceremonial, monumental features along the landscape, and suggests a continuity in forms between the Late Archaic, Early Woodland, and Glades periods. Multiple crescents and rings often appear as repeated forms at the same sites, such as at Dismal, Russell, and Sandfly Keys, suggesting that these places were continually inhabited or returned to over generations, implying a persistence of memory tied to the landscape. Repeated and expanded rings, conjoined to larger shell work sites, also suggest the possibility of expanding populations, and the expansion of functional activity areas and growth along the landscape over time. Other features, such as plazas, and purposefully flat, open fields occur as central features at most shell ring and shell work sites, suggesting community planning that subscribes to common architectural forms and layouts. The addition of more complex shell work features, such as multiple shell midden ridges, canals, water courts, and flat-topped mounds is an expansion of earlier shell building traditions reflecting increasingly complex social organization to coordinate, build, and maintain these features, perhaps resulting from increased economic production at shell work sites.

Shell work sites are shown to have expanded in structural complexity and size over time, reflecting a need to construct new features in new locations, sometimes larger and more centralized than the former. This may support the theory of an increasing population, as well as expanding social complexity. Though much more work needs to be done to further date the timing of changes in shell work construction, it appears that the earliest evidence begins around 1900 cal B.P. At large shell work sites such as Russell Key, Sandfly Key, and Johnson's Mound, the majority of monumental construction seems to have occurred from about 1900 cal B.P. to 900 cal B.P., with a possible peak in construction dated to around 1600 cal B.P. to 1300 cal B.P., indicating that these were not Calusa or Mississippian constructions.

Looking at the material culture of the Ten Thousand Islands shell ring and shell work sites, there appears to be one major predicted difference: the absence of pottery (other than small amounts of fiber-tempered pottery) within shell ring sites, and the presence of Glades pottery at shell work sites. At the sites tested to date, this has been substantiated. Shell tools are present at both types of site, however, and certain shell tool forms appear to be common at both, with a few exceptions, notably, hafted shell tools are absent in Middle and some Late Archaic sites, and large *Strombus* celts are relegated to the Archaic. Many shell tool forms are common on both Late Archaic and Glades period sites, most notably shell vessels, dippers, spoons, columella hammers and cutting edges, plummets/pendants/sinkers, pounders, adzes, anvils, and notched shell and net gauges. With the exception of pottery and a few types of shell tools, there appears to be minimal material culture change between the Late Archaic and Early Woodland Glades cultures in the Ten

Thousand Islands.

Based on zooarchaeological analysis of Late Archaic and Glades periods freshwater tree island black earth middens, there also appears to be virtually no difference in subsistence strategies, species targeted, or environmental conditions during these two different periods (Russo, 2005; Fradkin, 2007). Again, the only material culture difference is the presence of *Strombus* celts and lack of pottery (other than scant fiber-tempered sherds) in Archaic contexts; and the presence of Glades period pottery within Glades period contexts. It appears materially, that little else can be used to differentiate these two periods.

The shell work sites in the Ten Thousand Islands region certainly attest to the existence of complexity among hunter-gatherers in the region, well predating the rise of the protohistoric Calusa. Evidence is mounting that examples of early complex hunter-gatherers will increase concomitantly as archaeologists increase their awareness of this potential, and make efforts to look for such examples in the archaeological record, namely, below hardened calcrete lenses, within submerged contexts, and below deeply stratified shell mound and shell work complexes. The shell ring and shell work sites of the Ten Thousand Islands, as well as those of the Caloosahatchee region have an *incredible* potential for documenting changes in hunter-gatherer social complexity over time, and will likely support the notion that protohistoric Calusa and Ten Thousand Islands chiefdoms certainly have their antecedents in the earlier Archaic groups that first settled the region.[1]

NOTES

1. I am indebted to Dave Thomas and Matthew Sanger for inviting me to participate in this important conference and publication. Much appreciation is given to William Marquardt for his interest and support of this work, and for sharing his ideas on radiocarbon calibrations. I appreciate their patience, encouragement, and interest. Several of the site maps included in this chapter were adapted from the excellent work of John Beriault and Bob Carr, Archaeological and Historical Conservancy, Inc., through a partnership with the NPS Southeast Archeological Center. Support for much of this work was provided by the NPS Southeast Archeological Center, National Geographic's Committee for Scientific Research and Exploration, the Florida Department of Environmental Protection, Rookery Bay National Estuarine Research Preserve, U.S. Fish and Wildlife, Ten Thousand Islands NWP, Everglades National Park, and Big Cypress National Preserve.

TABLE 6.1
Radiocarbon Results From Interior Tree Island Sites
All dates cited were calibrated using CALIB 5, marine samples using Marine04 (local Delta R value of 33 ± 16) and terrestrial samples using Intcal04.

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ)	Radiocarbon age calibrated[a] (± 2σ)
Poinciana Hammock (08DA0071)						
Beta-201930	EU1, 50 x 70 subunit, 130–145 cm, ¼"	shell	-3.2	4430 ± 40	4410–4709 B.P.	2760–2460 B.C.
Beta-215793	EU 1, 86 cmbs	calcrete	-5.7	9070 ± 60	9960–10420 B.P.	8470–8010 B.C.
GX-31684	EU1, 50 x 50, 100–110 cmbs	shell	-0.9	4250 ± 90	4410–4860 B.P.	2910–2470 B.C.
GX-31686	EU1, LV5B, 47–50 cmbs	shell	-2.9	2050 ± 60	1410–1740 B.P.	A.D. 210–540
Irongrape Hammock (08DA0072)						
Beta-201931	ST 1, 40–50 cm	shell	0	2740 ± 40	2300–2580 B.P.	630–350 B.C.
Bog Island (08DA2178)						
Beta-201932	ST 2, 80–90 cm	shell	-4.9	1620 ± 40	1040–1260 B.P.	A.D. 700–910
Floating Heart Island (08DA2179)						
Beta-201933	ST 1, 20–60 cm	shell	-0.5	1100 ± 40	540–700 B.P.	A.D. 1250–1410
Sour Orange Hammock (08DA2181)						
Beta-201934	CS 90N80E, 80–100 cm, ¼"	shell	1.8	4680 ± 40	4790–5000 B.P.	3050–2840 B.C.
GX-31687	N60 E120, 40–70 cmbs	shell	-1.3	2730 ± 60	2270–2660 B.P.	710–320 B.C.
GX-31688	N90 E120, 40–50 cmbs	shell	-5.9	2620 ± 60	2100–2430 B.P.	480–150 B.C.
Bitten Hammock (08DA2184)						
Beta-201935	ST 1, 20–30 cm	shell	1	1060 ± 40	530–670 B.P.	A.D. 1290–1420
Heartleaf Hammock (08DA2192)						
Beta-201936	ST2, CS, 0–10 cmbs	shell	-4.5	2110 ± 40	1530–1780 B.P.	A.D. 180–420
Beta-201938	ST2, 170–180 cmbs	bone	-23	3950 ± 50	4250–4520 B.P.	2580–2300 B.C.
Buzzard's Roost (08DA2199)						
Beta-201940	ST 1, 50–60 cm	shell	-1.8	1650 ± 40	1070–1270 B.P.	A.D. 680–880
Musa Hammock (08DA9993)						
GX-31685	ST1, LV5, 40–50 cmbs	shell	-1.1	1820 ± 50	1240–1470 B.P.	A.D. 480–710

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

TABLE 6.2

Select Radiocarbon Results from Ten Thousand Islands Shell Works and Ring Sites

All dates cited were calibrated using CALIB 5 Marine04 curve, with a local Delta R value of 33 ± 16.

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
House's Hammock (08M00071)						
Beta-10300	ST 1, 77 cmbs	shell	—	3240 ± 70	1300–840 B.C.	2790–3250 B.P.
Beta-227119	Surface	shell	-2.2	3300 ± 80	1370–930 B.C.	2880–3320 B.P.
UGAMS-2895	ST 1, 77 cmbs	shell	-2.8	3560 ± 40	1590–1370 B.C.	3320–3540 B.P.
Russell Key (08CR0017)						
Beta-221579	Excavation Unit 1, South Wall, 10–15 cmbs	shell	-2.5	1760 ± 60	A.D. 550–810	1150—1400 B.P.
Beta-221580	Excavation Unit 1, South Wall, below water, 115 cmbs	shell	-3.2	1850 ± 70	A.D. 430–710	1240—1530 B.P.
Beta-221581	Excavation Unit 2, North Wall, 150 cmbs	shell	-3.1	1890 ± 50	A.D. 430–660	1290—1520 B.P.
Beta-221582	Excavation Unit 3, West Wall, 15 cmbs	shell	-1.6	1770 ± 60	A.D. 530–800	1150—1420 B.P.
Beta-221583	Excavation Unit 4, ST, 70 cmbs	shell	-4.0	2570 ± 50	380–120 B.C.	2070—2330 B.P.
Beta-221584	Excavation Unit 5, N Wall, 0 to 10 cmbs	shell	-3.6	1710 ± 50	A.D. 610–840	1110–1340 B.P.
Beta-221585	Excavation Unit 5, N Wall, 90 cmbs	shell	-4.3	1750 ± 60	A.D. 560–810	1140–1400 B.P.
Beta-221586	Shovel Test 3, Water Court 1, 0–10 cmbs	shell	-3.6	1550 ± 50	A.D. 750–1010	940–1200 B.P.
Beta-221587	Surface collection Around clam cache	shell	-3.4	1400 ± 50	A.D. 910–1170	780–1040 B.P.
Beta-221588	S central bifurcated "ring," surface	shell	-3.4	1760 ± 40	A.D. 590–770	1180–1360 B.P.
Beta-221589	S crescent "ring," surface	shell	-3	1270 ± 50	A.D. 1050–1270	680–900 B.P.
Beta-221590	NW terminus "shell ring," surface	shell	-3.9	2440 ± 50	240 B.C.–A.D. 70	1890–2190 B.P.
Beta-221591	Water Court 5, Surface	shell	-3.7	1710 ± 50	A.D. 610–840	1110–1340 B.P.
Beta-221592	Water Court 8, surface	shell	-1.9	1670 ± 50	A.D. 660–880	1070–1290 B.P.
Beta-221593	Mar's Mound, EU 8, N wall, above "hash," 10 cmbs	shell	-6.5	1650 ± 50	A.D. 670–900	1050–1280 B.P.
Beta-221594	Mar's Mound, EU 8, 10–15 cmbs	shell	-3.7	1680 ± 60	A.D. 640–890	1060–1310 B.P.

TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
Beta-221595	Mar's Mound, EU 8, W Wall, 180 cmbs	shell	-3.8	1660 ± 60	A.D. 650–910	1040–1300 B.P.
Beta-221608	EU 6, 180 cmbs	shell	-3	1700 ± 50	A.D. 630–850	1100–1320 B.P.
Beta-227110	Excavation Unit 9, south wall, zone A, 10–15 cmbs	shell	-2.8	1630 ± 70	A.D. 670–970	990–1290 B.P.
Beta-227111	Excavation Unit 9, north wall base of unit, 58cmbs	shell	-3.3	1460 ± 60	A.D. 820–1120	830–1130 B.P.
Beta-227112	Water Court 6, top of SW edge, 2 m high surface, conch lined	shell	-3.2	1220 ± 60	A.D. 1070–1310	640–880 B.P.
Beta-227113	Finger Ridge 2, 20 cmbs	shell	-3.5	1750 ± 60	A.D. 560–810	1140–1400 B.P.
Beta-227114	Water Court H, Excavation Unit 10, Level 1, 0–10cmbs	shell	-2.9	1100 ± 70	A.D. 1200–1440	510–750 B.P.
Beta-227115	Water Court H, Excavation Unit 10, Level 6, 60 cmbs	shell	-2.8	1260 ± 60	A.D. 1050–1290	660–900 B.P.
Beta-227116	South end of walkway, surface to 5 cmbs	shell	-4.6	1240 ± 60	A.D. 1060–1300	650–890 B.P.
Beta-227117	Southernmost shell midden, 0 to 5 cmbs	shell	-3.5	1300 ± 60	A.D. 1030–1270	680–930 B.P.
Beta-227118	Em's Mound, Center, 8–11 cmbs	shell	-3.0	1950 ± 60	A.D. 340–640	1320–1610 B.P.
UGAMS-2906	Beach landing east 67 cmbs at low tide	shell	-2.1	1910 ± 40	A.D. 430–640	1320–1520 B.P.
UGAMS-2907	WC H east bank	shell	-2.5	1900 ± 40	A.D. 440–640	1310–1520 B.P.
UGAMS-2908	WC H west bank	shell	-1.3	2030 ± 40	A.D. 270–520	1430–1680 B.P.
UGAMS-2909	Water Court H, Excavation Unit 10, Level 2, 10–20 cmbs	shell	-1.4	1590 ± 40	A.D. 720–950	1000–1230 B.P.
UGAMS-2910	East arm water court high bank N end	shell	-1.5	2290 ± 40	30 B.C.–A.D. 210	1740–1980 B.P.
UGAMS-2911	EU 11, S Wall, 20 cmbs	shell	-2.8	2170 ± 40	A.D. 110–350	1600–1850 B.P.
UGAMS-2912	EU 11, S wall, 218 cmbs	shell	-3.2	1980 ± 40	A.D. 340–570	1380–1610 B.P.
UGAMS-2913	RC sample, Mar's Mound, 1 m above base of mound, 30 cmbs	shell	-2.3	2080 ± 40	A.D. 210–450	1510–1740 B.P.

TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
UGAMS-2914	RC sample, Water Court K, Center, 10 cmbs	shell	-2.2	2040 ± 40	A.D. 260–500	1450–1700 B.P.
UGAMS-2915	RC sample, Water Court K, East Edge Ridge, 10 cmbs	shell	-3	2070 ± 40	A.D. 230–460	1500–1720 B.P.
UGAMS-2916	RC sample, Water Court K, West Edge Ridge, 10 cmbs	shell	-2.9	2090 ± 40	A.D. 200–440	1510–1750 B.P.
UGAMS-2917	RC sample, Water Court A, center, 10 cmbs	shell	-2.2	2120 ± 40	A.D. 160–410	1540–1790 B.P.
UGAMS-2918	RC sample, south tip, ridge between WC A and WC B, 0 to 5 cmbs, 1 m above water	shell	-2.4	1980 ± 40	A.D. 340–570	1380–1610 B.P.
West Pass (08CR0012)						
Beta-227093	Excavation Unit 2, levels 5 to 7, 40–70 cmbs	shell	-3.7	2060 ± 70	A.D. 170–540	1410–1780 B.P.
Beta-227094	Shovel Test 1, shoreline, 180–190 cmbs	shell	-3.5	2090 ± 70	A.D. 140–500	1450–1810 B.P.
Beta-227095	Excavation Unit 1, west wall, 20 cmbs	shell	-2.4	2010 ± 70	A.D. 240–590	1360–1710 B.P.
Beta-227096	Excavation Unit 1, east wall under plaza, 170 cmbs	shell	-4.5	2000 ± 70	A.D. 250–600	1350–1700 B.P.
Beta-227097	Excavation Unit 2, north wall, 10–20 cmbs	shell	-2.7	2000 ± 70	A.D. 250–600	1350–1700 B.P.
Beta-227098	Excavation Unit 2, north wall, base, under water, 120 cmbs	shell	-3.8	1830 ± 60	A.D. 450–710	1240–1500 B.P.
Beta-227099	Excavation Unit 3, south wall, 0–10 cmbs	shell	-3	1820 ± 70	A.D. 440–750	1210–1510 B.P.
Beta-227100	Excavation Unit 3, south wall, 130–140 cmbs	shell	-4.4	1810 ± 60	A.D. 470–740	1210–1480 B.P.
Beta-227101	Excavation Unit 4, north wall, 10–15c mbs	shell	-3	1980 ± 50	A.D. 310–590	1360–1640 B.P.
Beta-227102	Excavation Unit 4, north wall, 10 cmbs	shell	-3.7	2040 ± 60	A.D. 230–550	1400–1720 B.P.
Beta-227109	Top of ridge/bank next to WC	shell	-3.2	1820 ± 70	A.D. 440–750	1210–1510 B.P.

TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
UGAMS-2919	Landing 2 m bs at low tide	shell	-2.1	2350 ± 40	110 B.C.–A.D. 130	1820–2050 B.P.
Johnson's Mound (08MO0053)						
GX-31689	Top of 6 m mound, 0–15 cmbs	shell	-3.3	1650 ± 60	A.D. 660–920	1030–1290 B.P.
UGAMS-2935	ST 1, top of shell mound, 30–35 cmbs	shell	-3.6	2030 ± 40	A.D. 270–520	1430–1680 B.P.
UGAMS-2936	ST 2, plaza area, 35-40 cmbs	shell	-3.7	2290 ± 40	30 B.C.–A.D. 210	1740–1980 B.P.
Everglades City No. 7 (08CR0236)						
UGAMS-2896	Shell Ring, SW corner, 40 cmbs, 50 cm site elevation	shell	-2.1	2880 ± 40	770–510 B.C.	2460–2720 B.P.
UGAMS-2897	Shell Ring N end, surface to 5 cmbs, 10 m to water	shell	-3.1	2250 ± 40	A.D. 30–250	1700–1930 B.P.
UGAMS-2898	Shell Ring, SE edge, shorter arm, 50 cmbs, 20 cm site elevation	shell	-2.7	2960 ± 40	860–610 B.C.	2560–2810 B.P.
UGAMS-2899	Ridge 1, SW edge, surface	shell	-2.6	2010 ± 40	A.D. 290–540	1410–1660 B.P.
Everglades City No. 9 (08CR0236)						
UGAMS-2901	W end ridge, 3 m from end, 10 cmbs, 10 cm site elevation	shell	-1	3630 ± 40	1660–1430 B.C.	3380–3610 B.P.
Everglades City No. 9 (08CR0237)						
UGAMS-2900	E edge ridge, 10 m W edge, 60 cmbs, 60 cm site elevation, tannic	shell	-2.1	2410 ± 40	170 B.C.–A.D. 70	1890–2120 B.P.
UGAMS-2902	Middle of site, south slope, surface	shell	-1.6	3450 ± 40	1450–1220 B.C.	3170–3400 B.P.
Everglades City No. 10 (08CR0238)						
UGAMS-2903	North ridge, north back central edge, treefall, 40 cmbs	shell	-2.5	3360 ± 40	1370–1100 B.C.	3050–3320 B.P.
UGAMS-2904	NE inside interior shell ring arm, 10 cmbs, 60 cm site elevation	shell	-2	2940 ± 40	820–570 B.C.	2520–2770 B.P.
UGAMS-2905	Ridge 1, E end, top ridge, surface	shell	-1.7	1910 ± 40	A.D. 430–640	1320–1520 B.P.
Sandfly Key (08CR0011)						
UGAMS-2920	Triangular mound, SW site	shell	-2.4	2180 ± 40	A.D. 100–340	1610–1850 B.P.

TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
UGAMS-2921	Sand Mound 1, center, surface	shell	-2.8	2830 ± 40	740–430 B.C.	2380–2690 B.P.
UGAMS-2922	NE Ridge Terminus	shell	-2.7	2950 ± 40	830–590 B.C.	2540–2780 B.P.
UGAMS-2923	NW ridge end	shell	-1.7	2420 ± 40	180 B.C.–A.D. 60	1900–2130 B.P.
UGAMS-2924	SW edge of mound, 5–10 cmbs	shell	-2.2	1890 ± 40	A.D. 440–650	1300–1510 B.P.
UGAMS-2925	West edge eroding bank, top of mound, 5 cmbs	shell	-2.3	2220 ± 40	A.D. 50–280	1670–1900 B.P.
UGAMS-2926	West edge eroding bank, side of bank, 260 cmbs	shell	-3.1	1920 ± 40	A.D. 420–630	1320–1530 B.P.
Dismal Key (08CR0022)						
UGAMS-3787	RC sample, Water Court, S bank, 2 m el., top, 10 cmbs	shell	-1.9	1300 ± 20	A.D. 1060–1220	730–890 B.P.
UGAMS-3788	RC sample, Temple Mound, top, 0–5 cmbs	shell	-1.8	1640 ± 20	A.D. 700–860	1090–1250 B.P.
UGAMS-3789	RC sample, Moore Mound, 20 Ft El., top, center, 5 cmbs	shell	-3.8	1800 ± 20	A.D. 580–690	1260–1370 B.P.
Dismal Key (08CR0025)						
UGAMS-3786	RC sample, tail, 10 m west of major cut, 1 m above mangroves, 10 cmbs	shell	-1.9	2020 ± 20	A.D. 300–500	1460–1650 B.P.
Dismal Key (08CR0027)						
UGAMS-3770	EU 1, RC, N corner wall, 114 cmbs	shell	-3	2560 ± 30	350–150 B.C.	2100–2300 B.P.
UGAMS-3771	EU 1, RC, N corner wall, 10 cmbs	shell	-2.1	2500 ± 30	310–50 B.C.	2000–2260 B.P.
UGAMS-3772	EU 2, RC sample, NE wall, outside unit, 20 cmbs	shell	-4.8	2510 ± 30	330–80 B.C.	2020–2280 B.P.
UGAMS-3773	EU 3, RC, Zone B, N wall, 7 cmbs	shell	-4.3	2550 ± 30	350–140 B.C.	2090–2300 B.P.
UGAMS-3774	EU 3, RC, Zone E, N wall, 126 cmbs	shell	-1.9	2590 ± 30	370–180 B.C.	2130–2320 B.P.
UGAMS-3775	EU 4, RC, NW wall, 90 cmbs	shell	-2	1690 ± 30	A.D. 660–810	1140–1290 B.P.
UGAMS-3776	EU 5, RC, S wall, 85 cmbs	shell	-3.1	2660 ± 30	470–230 B.C.	2180–2410 B.P.
UGAMS-3777	EU 6, RC, Zone C, bottom, W wall, 100 cmbs	shell	-2.5	1950 ± 30	A.D. 400–590	1370–1550 B.P.

TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
UGAMS-3778	RC sample A, central bench, upland, midbench, 10 cmbs	shell	-2.1	1380 ± 30	A.D. 990–1160	790–960 B.P.
UGAMS-3779	RC sample, N edge bank, main canal, 10 cmbs	shell	-2.2	1380 ± 30	A.D. 990–1160	790–960 B.P.
UGAMS-3780	RC Sample #4, tail base, 9 ft above shell fields, 10 cmbs	shell	2.1	1900 ± 20	A.D. 450–620	1330–1500 B.P.
UGAMS-3781	RC sample #6, N canal mound, 20 cmbs	shell	-0.8	1800 ± 20	A.D. 580–690	1260–1370 B.P.
UGAMS-3782	RC sample #7, S canal mound, top, 20 cmbs	shell	-2	1710 ± 20	A.D. 660–780	1170–1290 B.P.
Dismal Key (08CR0862)						
UGAMS-3783	RC sample #10, shell midden ridge, 5 cmbs	shell	-3.1	1690 ± 20	A.D. 670–790	1160–1280 B.P.
UGAMS-3784	RC sample #12, breakwater Edge, 10 cmbs	shell	-1.9	1220 ± 20	A.D. 1160–1290	660–790 B.P.
UGAMS-3785	RC sample, ring, 10 cmbs	shell	-1.6	1990 ± 30	A.D. 340–550	1400–1610 B.P.
Dismal Key SE Ring (08CR0022)						
UGAMS-3790	EU 1, RC, SW corner, 80 cmbs	shell	-2.4	2530 ± 20	330–120 B.C.	2070–2280 B.P.
UGAMS-3791	EU 1, RC, W wall, 10 cmbs	shell	-2.2	2440 ± 30	190 B.C.–A.D. 10	1940–2140 B.P.
Dismal Key SE Ring (08CR0027)						
UGAMS-3792	Base shell ring interior, 5 cm above mangroves, 30 cmbs	shell	-2.6	2450 ± 20	190–20 B.C.	1970–2140 B.P.
Fakahatchee Key (08CR0022)						
UGAMS-3794	EU 1 plaza, W wall, 10 cmbs	shell	-1.7	1970 ± 30	A.D. 370–570	1380–1580 B.P.
UGAMS-3795	EU 1 plaza, NW wall, 63 cmbs	shell	-2.6	1870 ± 20	A.D. 480–650	1300–1470 B.P.
UGAMS-3796	EU 2, RC, N wall, 0–10 cmbs	shell	-2.5	1990 ± 30	A.D. 340–550	1400–1610 B.P.
UGAMS-3797	EU 2, RC, NE corner wall, 100 cmbs	shell	-2.3	1940 ± 20	A.D. 420–580	1370–1530 B.P.
UGAMS-3798	EU 3, top, tallest ridge, RC, NW wall, 2–10 cmbs	shell	-3.6	1750 ± 20	A.D. 620–740	1210–1330 B.P.

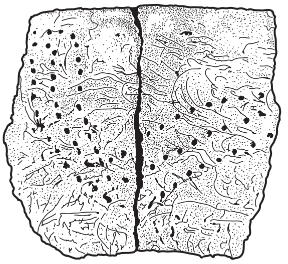
TABLE 6.2 — (*Continued*)

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)	Radiocarbon age calibrated[a] (± 2σ) (ΔR 33 ± 16)
UGAMS-3799	EU 3, top, tallest ridge, RC, NW wall, 106 cmbs	shell	-2.4	1770 ± 20	A.D. 600–720	1230–1350 B.P.
UGAMS-3800	EU 4, midden spur, RC, NE corner, 10 cmbs	shell	-3	2110 ± 20	A.D. 210–400	1550–1740 B.P.
UGAMS-3801	EU 4, midden spur, RC, NE corner, 110 cmbs	shell	-3.1	2120 ± 20	A.D. 190–390	1560–1760 B.P.
UGAMS-3804	EU 7, ridge 1, RC, W wall, 100 cmbs	shell	-3.1	2530 ± 30	340–110 B.C.	2060–2290 B.P.
UGAMS-3805	EU 8, ridge 2, RC, SE wall, 10 cmbs	shell	-3.4	2550 ± 30	350–140 B.C.	2090–2300 B.P.
UGAMS-3806	EU 8, ridge 2, RC, SE wall, 100 cmbs	shell	-3.5	1780 ± 20	A.D. 590–710	1240–1360 B.P.
UGAMS-3807	EU 9, ridge 1, RC, W wall, 10 cmbs	shell	-4.4	1770 ± 20	A.D. 600–720	1230–1350 B.P.
UGAMS-3808	EU 9, ridge 1, RC, W wall, 83 cmbs	shell	-2.9	2210 ± 20	A.D. 100–260	1690–1850 B.P.
UGAMS-3809	RC sample, ridge NW Hart's Grave, 10cmbs	shell	-3.1	2490 ± 20	260–40 B.C.	1990–2210 B.P.
UGAMS-3810	RC sample, Finger Ridge 1, 0–10 cmbs	shell	-3.9	1900 ± 20	A.D. 450–620	1330–1500 B.P.
UGAMS-3811	RC sample, Finger Ridge 2, 10 cmbs	shell	-3.6	1240 ± 20	A.D. 1130–1280	670–820 B.P.
UGAMS-3812	RC sample, "Fish Weir," 10 cmbs	shell	-3.3	1400 ± 30	A.D. 950–1150	800–1000 B.P.
UGAMS-3813	RC sample, "Fish Weir," 10 cmbs	shell	-2	1630 ± 20	A.D. 710–880	1070–1240 B.P.
Fakahatchee Key/Ellis (08CR0021)						
UGAMS-3802	EU 5, RC, SW corner, 10–20 cmbs	shell	-3.1	2180 ± 20	A.D. 130–310	1650–1820 B.P.
UGAMS-3803	EU 5, RC, SW corner, 100 cmbs	shell	-3.9	2010 ± 30	A.D. 310–540	1410–1640 B.P.
UGAMS-3814	ST 1, base of S side inner ring, 1 m above swamp, 40 cmbs	shell	-2.1	2060 ± 20	A.D. 270–430	1520–1680 B.P.
Fakahatchee Key/Youman's Mound (08CR0870)						
UGAMS-3815	RC sample, S conical mound, top, 25 ft el., 0–3 cmbs	shell	-2.5	2380 ± 20	130 B.C.–A.D. 80	1870–2080 B.P.
UGAMS-3816	RC sample, ramp, S end, 2.5 m from end, 10 cmbs	shell	-3.3	2340 ± 30	70 B.C.–A.D. 130	1820–2020 B.P.
UGAMS-3818	RC sample, exterior of outer ridge, base, 20 cm above swamp, 40 cmbs	shell	-2.8	2400 ± 20	140 B.C.–A.D. 50	1900–2090 B.P.

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

* Delta value not available for this sample run in 1985.

PART III
COMPARISONS AND CONTRASTS



CHAPTER 7

SHELL RINGS AND OTHER SETTLEMENT FEATURES AS INDICATORS OF CULTURAL CONTINUITY BETWEEN THE LATE ARCHAIC AND WOODLAND PERIODS OF COASTAL FLORIDA

Michael Russo

Many archaeologists believe that between 3500 and 2500 years ago universal and catastrophic climate changes occurred that brought Late Archaic cultural traditions to a halt in the southeastern United States. The natural conditions were of such magnitude, particularly along coastlines, that large-scale, permanent settlements were not seen again until the rise of Early Woodland societies, reorganized along different structural lines than those of their Late Archaic predecessors. This premise hinges primarily on observable differences in the archaeological record—Late Archaic cultural traditions, particularly those related to Poverty Point in the lower Mississippi and the coastal shell ring builders in South Carolina, Georgia, and Florida, left behind large monumental earthen and/or shell architecture; while subsequent Early Woodland cultures such as Tchefunctee, Refuge, and Deptford did not. These widespread changes are seen as having resulted from a collapse of nucleated, permanent patterns of settlement in societies with intensive economies. These earlier groups were sufficiently hierarchically organized to manage large-scale monumental construction projects. After 3500 ^{14}C yr B.P. however, settlement patterns reflect small, mobile, family groups apparently incapable of applying, or otherwise not compelled to sink, their limited abilities and resources into organizing large-scale public constructions.

This view of the Late Archaic as relatively complex and the Early Woodland as more simply organized differs from the earlier and still popular stage concepts wherein the Archaic was seen as the simpler of the two stages of cultural evolution. Some 70 years ago when the eastern U.S. stages were formalized, the material record of the Archaic period was largely limited to lithic artifacts and Archaic peoples were seen as wandering hunter-gatherers who lived in small family groups, incapable of settling in one place for extended periods. The Woodland record, on the other hand, was filled with much larger sites, many of which contained earthen tumuli, and nearly all of which were associated with a new technology—pottery. The reigning hypothesis held that Woodland people had adopted agriculture and invented pottery to facilitate the processing of crops. In turn, the agricultural economy allowed the Woodland peoples to stay sedentary, increase their population density, and manage the construction of large-scale public works such as earthen mounds, plazas, and enclosures.

Recent discoveries, of course, have challenged these stage constructs. Domesticated crops have been recovered at many Archaic period sites. Pottery was invented first in the Archaic, not Woodland period. Archaic period peoples, not Woodland period peoples, turned out to be the first to construct large earthen mounds. And Archaic period peoples were the first to become sedentary in many places in the southeastern U.S., particularly near wetland environments. One would think that these discoveries had sounded the death knell for the stage concepts known as Archaic and Woodland. But even now the terms have become so heuristically useful that they cannot easily be discarded. Under the pressure of the new discoveries, qualifiers have been added. Rather than marking the period when the first cultures in the Southeast adopted pottery, the Woodland is now seen as the period in which pottery first became "widespread." Rather than being the first mound builders, Woodland peoples are seen as the first to initiate the "increased mound construction," or the first to build mounds associated with *elaborate* ceremonialism, (as if mound-building was not elaborate in and of itself). Rather than being the first cultures to inhabit the landscape in permanent settlements, Woodland peoples have become the first to occupy "well-defined" villages. Rather than inventing agriculture, Woodland cultures are now seen as the first to participate in "*intensive* cultivation of crops" (emphasis added) (Anderson and Mainfort, 2002b: 4–5; Sassaman, chap. 11, this volume).

These tweaks to the stage concept of Archaic and Woodland cultures were, perhaps necessary. Without them, or some similar concepts in their stead, archaeologists would be reduced to talking about hundreds of historical cultures with little hope of obtaining nomothetic understanding. Nonetheless, the continued use of the terms does obscure the increasingly obvious facts that some Archaic cultures were equal to or greater than some Woodland cultures in terms of population density, settlement permanency and size, technological prowess, and complexity in social organization. In turn, some Early Woodland cultures invented the first pottery, built large-scale monumental constructions, and lived in large permanent villages for the first times in their particular localities.

I describe below some of the interpretations of the coastal Florida archaeological record 5000 to 2000 years ago, the time that constitutes the Late Archaic and Early Woodland periods. In parts of Florida, some authors have called the latter part of these millennia the Transitional Period, ca. 3000 to 2500 ^{14}C yr B.P. (Atkins and MacMahan, 1967; Bullen, 1971), while others recognize no specific culture for this period that differs from cultures recognized before and after, or offer less teleological labels (Thomas and Campbell, 1993; Milanich, 1994; Russo and Heide, 2000). Specifically, I look for coastal sites that date to the time 3500 to 2500 ^{14}C yr B.P. when lower sea levels have been hypothesized in this volume. I compare the nature of the archaeology before and after the period to the archaeology during the period in an attempt to ascertain the degree to which the proposed climate/sea level changes may have altered settlement during the Transitional period or what I will call the millennium in question.

WHAT IS THE LATE ARCHAIC?

The symposium organizers suggest that the Late Archaic period "was a time of population growth, innovative developments in subsistence strategies, and increased social complexity." Most archaeologists would agree with the first trait, particularly as it relates to Late Archaic coastal cultures of South Carolina, Georgia, and Florida relative to earlier Middle Archaic cultures in the same areas. Sites are often larger, more abundant, and more widely distributed. The presumed cause of the increases in sizes and numbers of sites is, of course, greater populations. But the coastal Middle Archaic archaeological record, whatever its extent may have once been, has largely been drowned by risen seas, and the apparent differences in population reflected by simple site counts may not accurately reflect the real record (DePratter and Howard, 1980; Widmer, 1988; Milanich, 1994). I have suggested elsewhere that some evidence for Middle Archaic coastal collectors does exist. Early radiocarbon dates from 7000 to 5500 years ago at Horr's and Useppa islands and Spencer's Midden in Florida suggest intensive use of coastal resources including fish and shellfish far before the record of settled Late Archaic communities appears on the coastal landscape (Russo, 1996b; see also R. Saunders, chap. 5, this volume) There is little doubt (only a paucity of empirical evidence) that the Middle Archaic populations were exploiting the coastal environments (e.g., Faught, 2004).

Apparent population increase in the Late Archaic may be linked "innovative development in subsistence strategies" (Thomas and Sanger, 2008) such as the invention of pottery (no Middle Archaic people are known to have used fired clay pottery vessels); the switch to more diverse patterns of hunting and gathering that included fish and shellfish; and the switch from mobile foraging to settled collecting (e.g., Trinkley, 1980; Russo, 1991a, 2004b). Certainly, all these traits are present (e.g., Russo, 2006), if not universal, among Late Archaic coastal cultures (cf., Thomas and Campbell, 1991, 1993; Thompson, 2006). But I might quibble that fired clay technology (in the form of baked clay objects) and intensive fisheries exploitation were also used during the Middle Archaic. Thus of the three "innovations," it is the year-round occupation of the coasts that seems to have been the most innovative.

The comparison of Late Archaic peoples in terms of population increases and innovations different from their Middle Archaic predecessors leads us to the question—do Late Archaic period settlements also reflect greater populations and more settled and complex societies than their immediate descendants, peoples of the period 3500 to 2500 ^{14}C yr B.P., and the earliest Woodland cultures that followed? That is, many Late Archaic coastal sites are known for their large, seasonally extended or permanent occupations as reflected in shell middens, and for their monumental architecture as reflected in shell rings and mounds. Below I look to see if these large shell features common in the Late Archaic disappear in Florida from 3500 to 2500 ^{14}C yr B.P. or the earliest Woodland landscapes that followed. In the process I discuss the strength of the archeological evidence for seal level change and cultural persistence.

NORTHEASTERN FLORIDA LATE ARCHAIC AND EARLY WOODLAND PERIODS

In 1998, Miller searched the Florida Master Site Files to assess the number of sites in northeast Florida for the Late Archaic Mt. Taylor (5000–4000 ^{14}C yr B.P.) and Orange (4000–3000 ^{14}C yr B.P.) periods, the Transitional period (3000–2500 ^{14}C yr B.P.), and the Early Woodland St. Johns Ia period (2500–1500 ^{14}C yr B.P.). He identified only six Mt. Taylor (preceramic Late Archaic) sites, but 45 Orange (ceramic Late Archaic) sites—a sevenfold increase. In contrast, for the Transitional period (3000–2500 ^{14}C yr B.P.), he identified only 11 sites, but 63 sites for the subsequent Early Woodland, St. Johns I and Ia periods (2500–1500 ^{14}C yr B.P.). Taking into account the length of each of the cultural periods, he concluded that the Mt. Taylor culture established on average 0.35 sites per century; Orange, 4.5; Transitional, 2.2; and St. Johns I and Ia, 6.3 sites (fig. 7.1). That is, there were fewer Transitional period sites than found in the periods immediately preceding it and following it.

Miller concluded that both the Mt. Taylor and Orange Late Archaic populations were smaller than the Early Woodland, St. Johns period populations because the Late Archaic groups practiced a mobile strategy, seasonally moving between the coast and the interior St. Johns River (Milanich and Fairbanks, 1980: 150–155; Miller, 1998: 74). Their mobility, dependence on seasonally available natural resources, and smaller populations presumably resulted in social manifestations needless of organizational hierarchies capable of managing and maintaining large-scale public works. That is, any large Late Archaic sites were interpreted as palimpsests of frequent occupations by small groups rather than permanent settlements by more socially complex groups. On the surface, Miller's data indicated that populations plummeted immediately following the end of the Orange period (3000 ^{14}C yr B.P.), with sites dropping from 45 to 11. But Miller (1998: 76) drew no conclusions about the drop, only suggesting that the "pattern" of settlement remained the same between the periods. That is, most of the 11 Transitional sites were found in places where earlier Orange occupations occurred, not in different environments.

Although Miller presented a useful summary of site distributions in northeast Florida, he made no suggestion that the environment may have been the cause of an apparent drop or movement in populations during the Transitional period. In part, he was reluctant to use site numbers as proxies for populations because he felt that sites of the Transitional period lacked diagnostic artifacts and that surveys were too scanty to conclusively state that the Transitional period was accurately represented (Miller, 1998: 71). But he did suggest that populations increased more during the Late Archaic because of changes in the environment that allowed for the flooding of the St. Johns River valley and a concomitant increase in shellfish [Miller, 1998: 65]). Given that his distribution of preceramic sites (Miller, 1998: 62) presages the general pattern, if not the fewer numbers, of the Transitional period so closely (Miller, 1998: 75), a similar sea level stand might be assumed. But the question would remain as to why there would be fewer Transitional sites if sea levels (and river levels) were the same during the Late Archaic sites.

By the Early Woodland, and increasingly thereafter, St. Johns populations dramatically expanded, and in this case, the increased numbers of sites are accepted as proxies for population increase (Miller, 1998: 80). No credit for this increase is given to changing environmental conditions. Rather, a sweeping pan-regional innovation—agriculture—is afforded the status as pri-

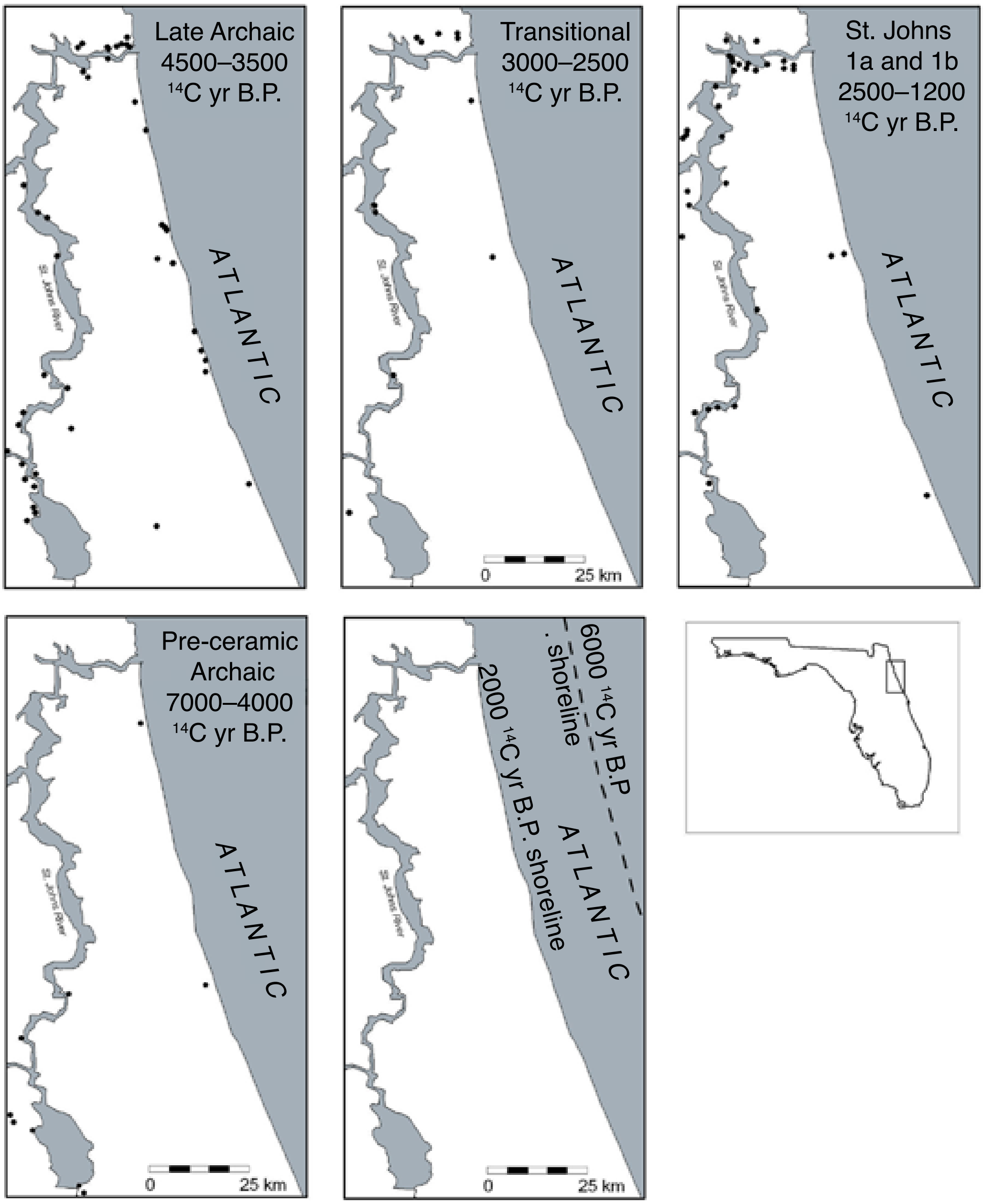


Fig. 7.1. Distributions of sites of four periods, Preceramic Archaic, Late (ceramic) Archaic, Transitional, and Early Woodland (St. Johns Ia and Ib) periods; with proposed sea level shorelines. (After Miller, 1998)

mary mover (Miller, 1998: 76, 79, 85). Although a reliance on marine and freshwater resources is noted, any connection to their abundance or to the idea that during the Transitional, any natural abundance may have been lacking, is not made. Within half a millennium (2500 ^{14}C yr B.P.) of the end of the Late Archaic, early in the St. Johns I period, populations were sufficiently large to allow for permanent settlement (Miller, 1998: 77–79). These people are seen as the first in the region to have organized under social hierarchies capable of constructing large-scale public works, namely burial mounds (Miller, 1998: 76).

While Miller's well-researched study summarized and brought current decades-long thought on mid-Holocene environment and cultural coevolution in northeast Florida (e.g., Goggin, 1952; Milanich and Fairbanks, 1980), subsequently a survey was conducted near the mouth of the St. Johns River in the St. Marys Region that borders the coastal zone of Florida and Georgia (Russo et al., 1992). Relative to the environmental model, the survey produced some surprising early sites and settlement data. A number of large Mt. Taylor and Orange period sites were found. These consisted of extensive deposits of coastal/estuarine shellfish buried in and near estuarine marsh environments. The size and configurations of these sites suggested that larger and more sedentary populations than previously thought may have lived along the coast 6000 to 3800 years ago. These sites included a large shell ring, Oxeye, the earliest and only Mt. Taylor ring. In addition, among the numerous Orange sites was the largest and most architecturally complex shell ring identified at that time in the Southeast—the Rollins shell ring. It actually was not a single ring, but consisted of one large ring with 13 shell rings attached to it (fig. 7.2). Seasonality studies demonstrated it to have been occupied or otherwise used year-round.

Rather than small, mobile family migrations to and from the coast, new seasonality studies indicated that Late Archaic sites reflected a

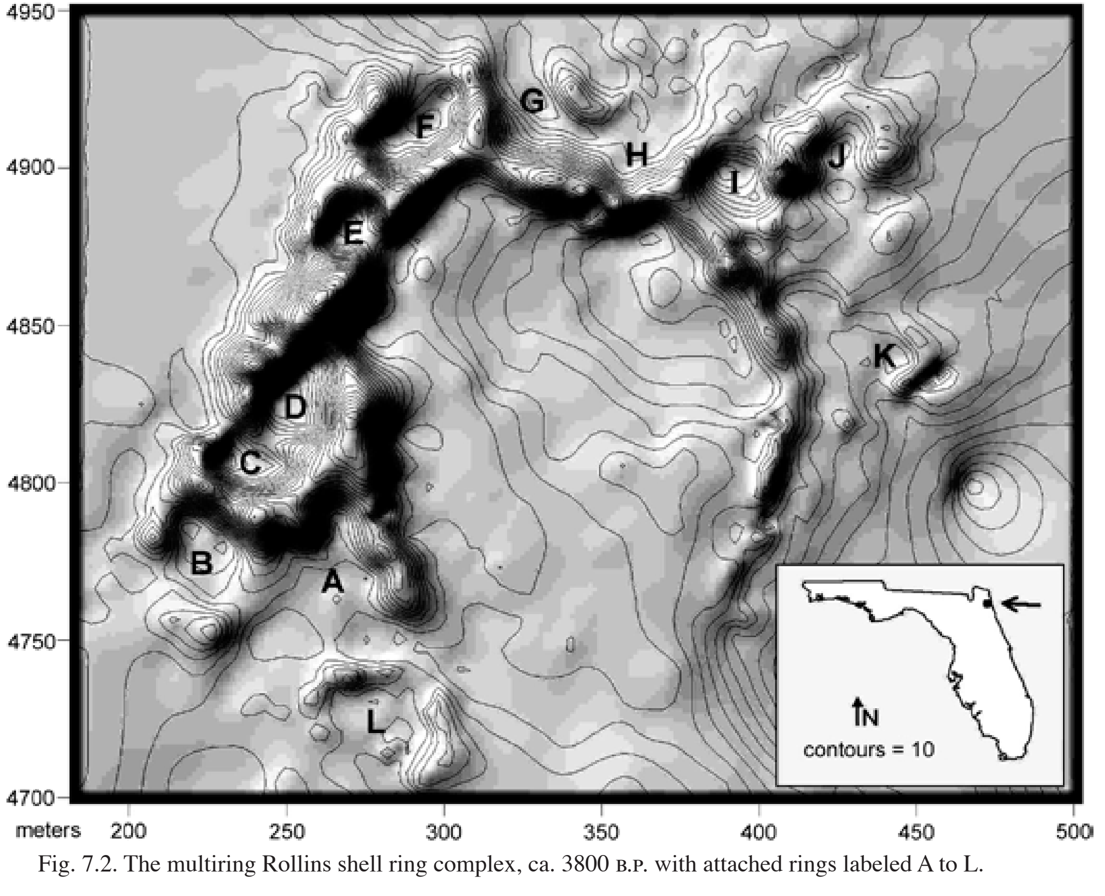


Fig. 7.2. The multiring Rollins shell ring complex, ca. 3800 B.P. with attached rings labeled A to L.

settlement pattern of year-round occupation on the coast, with permanent settlement also found in the interior reaches of the middle St. Johns River valley by related but separate groups (Russo et al., 1992; Sassaman, chap. 11, this volume). The contemporary sites along the coast and those along the interior rivers were not the seasonal manifestations of the same mobile groups. Rather, fishery resources both along the coast and in the interior provided stable resources for population growth and permanent settlement in each area. Achieved asymmetrical social organization was reflected in the monumental shell ring and shell mound architecture and in the differential distribution of artifacts found in the ritual and quotidian settings (Piatek, 1994; Russo and Saunders, 1999; Russo et al., 2002; Russo, 2004b; Sassaman, chap. 11, this volume). However, no suggestions of the more complex heritable hierarchies are evident.

The St. Marys survey also identified the presence of Early Woodland sites not previously reported that included St. Johns I, Deptford, and Colorinda occupations. These data suggested that more diverse Early Woodland populations existed in at least parts of northeast Florida than had been previously modeled. These groups constructed monuments in the form of burial mounds. Some burial furniture within the mounds indicated participation by these societies in the exchange networks of the Hopewell, revealing that use of the mounds extended into the Middle Woodland period. These material data supported Bullen's (1959) proposal for a "Transitional" period in which Late Archaic pottery-making traditions (e.g., Orange, Tick Island) were replaced by external and new ideas relating to subsistence (e.g., agriculture), trade, and the spiritual world (e.g., burial mounds; see also Miller, 1998: 76).

As a result of these recent studies, today we have two conflicting models of the Late Archaic to Early Woodland transition in Northeast Florida. The earlier model (e.g., Milanich and Fairbanks, 1980; Miller, 1998) sees the Orange, Late Archaic population as simple egalitarian, mobile family groups who moved among two environments, seasonally foraging both interior and coastal resources in their annual cycle. The people of the Transitional period followed the same basic pattern of life, with their reduced presence on the landscape being largely unexplicated. Following the Transitional period, Early Woodland peoples were characterized by greater populations due to the inclusion of agriculture into their subsistence strategies. The earliest of the Woodland groups may have lived in settled villages whose populations were dependent to some extent on domesticated food production. These people built only relatively small community monumental constructions (small sand burial mounds), and participated in wide-ranging exchange networks; both of these traits reflected some form of sociopolitical hierarchy in the differential distribution of material wealth among sectors of the populations (Bullen, 1971; Miller, 1998).

Alternatively, the newer model sees both Orange and Early Woodland cultures as fisherfolk who (1) lived in permanently settled villages along the coast and St. Johns River; (2) were sufficiently populated and organizationally complex to build public monuments of shell and earth; and (3) allowed achievable social status that differentiated individuals and groups. To date, there is no evidence that permanent social hierarchies arose from controlling the exchange of rare or exotic goods, which are absent at most Late Archaic sites. Social status distinctions have been linked to shell rings and mounds, where valued objects and separate kin groupings have been suggested (Piatek, 1994; Russo et al., 2002; Russo, 2006; Sassaman, chap. 11, this volume). In the Late Archaic, public monuments were large, varied, and occasionally complex. They consisted of shell rings or crescents built near the mouth of the St. Johns River and along the middle St. Johns River valley (Russo and Saunders, 1999; Russo et al., 1993; Sassaman, chap. 11, this volume). Other Late Archaic monuments included large conical and ridge-like shell heaps and earthen and shell burial mounds both along the coast and within the river valley (Goggin, 1952; Piatek, 1994; Russo, 1994b; Aten, 1999; Endonino, 2008b; Sassaman, chap. 11, this volume). By the Early Woodland period, monumental shell ring construction had been long abandoned both in the northeast Florida, St. Marys region and in the broader eastern Florida, although small sand burial mound construction persisted. These may have differed from Late Archaic mounds in their increased numbers and in the numbers and kinds of exotic artifacts, reflecting the pan-regional spread of the mound burial ceremonialism (Bullen, 1971; Miller, 1998).

Arguably, the alternative model better explains the newly discovered and investigated Late Archaic sites along the coast and St. Johns River.

But it arises from data provided by archaeologists chiefly interested in the Late Archaic. As such, and because of no new data, no description of, or model for the "Transitional" period in terms of culture or environment, has been forwarded.

East Florida "Transitional" Period

Bullen (1959, 1971) called the interface between the Late Archaic and Early Woodland in Florida, the "Transitional" period. He saw it as a time when local Archaic populations abandoned their pottery making traditions and adopted those of others from across the Southeast. One might hope that with the name "Transition," readers would have received an explanation of the things in, and causes for the "transitioning." But Bullen's goal was primarily to characterize new pottery types found in Florida that were made during this period. Some of these types, he noted, held tempers, vessel forms, or surface designs common to Archaic pottery types, and hence, he surmised, the pottery types, and by extension, the cultures, must have been in transition. But describing why the "transition" took place received relatively little of his attention, save to suggest that people and ideas were moving about at the time (Bullen, 1971: 64). Nonetheless, the name, if not the concept, has received some acceptance among archaeologists, particularly by those who seek a mnemonic for this little known period (Milanich and Fairbanks, 1980: 23, 62–63; cf. Russo et al., 1993; Milanich, 1994: 35, 88; cf. Russo and Heide, 2000: 53; Heide, 2000: 81).

Certainly during this period in Florida, material culture changed. Such receptivity to new ideas, whether by those coming into a region or those receiving the ideas from without the region, had infra- and structural support, if not causations. The acceptance of these ideas could have been connected to changes in environment, subsistence, settlement, or social organization. Unfortunately, the problem with gaining a deep understanding of this period has been the same as gaining a superficial enumeration of its material culture items—sites of the period are few and have yielded a relatively meager archaeological record. As noted, the period is characterized by smaller and fewer sites, only 11 in total (Miller, 1998). None of these include any of the public architecture (e.g., mounds or rings) that preceded and followed the period. Radiocarbon dates suggest that shell rings and mounds were no longer built along the coast after 3700 or 3600 ^{14}C yr B.P. (Piatek, 1994; Russo et al., 2002; R. Saunders, 2004b; Saunders and Rolland, 2006; Russo, 2006), well before the proposed beginnings of the Transitional period, and only a few centuries later than similar structures ceased being built in the middle St Johns River valley (Sassaman, chap. 11, this volume).[1] This abandonment of the traditions of large-scale monumental construction suggests a change in organizational structures of societies in the region. One explanation for such changes is a reduction in regional populations—due, to either a wholesale movement out of the region, or widespread dying off of social groups.

As a number of authors suggest in this volume (Sanger, chap. 9, this volume; Thomas, chap. 8, this volume), sea level may have dropped significantly during this period. If true, populations may have followed the shoreline east as it receded. Subsequently, as sea level rose, shoreline archaeological deposits would have disappeared beneath or been destroyed by the transgressing Atlantic. This might help account for the paucity of sites during the period.

While coastline transgression may explain the movement of peoples and subsequent paucity of coastal sites, such sea level fluctuations would seem not to have had as intensive or direct effects on the archaeological patterns of interior settlements. Along the middle St. Johns River, the proposed lower sea level would have produced a greater stream gradient and, perhaps, a reduction in the piezometric spring flow that feeds the river, likely resulting in a lowering of water levels (Miller, 1998: 38–40). As such, the extent and primary productivity of marshes and lakes may have been greatly diminished. Given that the previous Late Archaic periods along the river were dominated by wetland-oriented subsistence regimes (Russo et al., 1992; Wheeler and McGee, 1994; Miller, 1998), human populations would have suffered under the diminished carrying capacity of the riverine environments supposed for a lower sea stand.

Under this scenario, there is no evidence that the river would have entirely dried up during a period of lower sea stand of only 2 m (Miller, 1998: 45). In fact, the piezometric surface of the numerous springs that feed the St. Johns River is significantly higher than the present-day mean sea level, and, was likely higher than the lowest sea levels that one might propose for the Transitional period (Miller, 1998: 65–69). It is probable that the artesian input from the deep Floridan aquifer would have been little affected by the drop in sea level during the period. In fact, Transitional period wetland archaeological shell middens have been found along the edges of the basin (Miller, 1998: 75), attesting to at least some of the river's continued flow and productivity during that period. This contrasts with Atlantic coastal site distribution where prograding shorelines and has resulted in few sites being preserved (fig. 7.1). Overall, the general decrease in site types and numbers for the region, suggests a significant natural and/or cultural occurrence that affected both the coast and parallel interior river valley.

Northeast Florida and Environmental-Population Models

Environmental models for the rise and fall of Late Archaic and Early Woodland populations in northeast Florida have been forwarded for decades. They variably link changes in precipitation, sea levels, artesian flow, and valley flooding to subsistence success and fluctuating populations (e.g., Goggin, 1952; Milanich and Fairbanks, 1980; Miller, 1998). In these views, surface water levels and their relative stability are serendipitously in synch along coastal and interior valley topographies during the Late Archaic and Early Woodland periods to allow for population growth. Evidence for these models includes increased numbers and sizes of sites along the St. Johns River during the Late Archaic and along both the river and coasts during the Early Woodland.

Despite these cultures occupying the same landscapes at the same or proximate sea level stands (fig. 7.1), Late Archaic and Early Woodland archaeological sites differ dramatically from each other due to the particular historical circumstances under which they were deposited. The Late Archaic period produced cultures that intensified wetlands exploitation, invented or adopted pottery, and built large public monuments for the first time in the region. The Early Woodland aspects of these same phenomena were informed by centuries of change pursuant to technological improvements brought about by usage and interaction with like and dissimilar traditions. That is, Early Woodland sites look little like Late Archaic sites, most obviously in the differences of their constructed goods (pottery, lithics), but also less obviously, in their use of subsistence remains. As figure 7.1 demonstrates, Late Archaic and Early Woodland sites are found in the same general areas along the coast and river. Most of these sites are associated with shell middens. Oyster predominates along the coast and estuaries at the mouth of the St. Johns, with mystery snail being the most numerous constituent in middens along the middle St. Johns. Few detailed faunal analyses have been undertaken on Late Archaic sites in the region, and fewer yet on St. Johns I, Swift Creek, Deptford, or other Early Woodland middens (e.g., Russo et al., 1989, 1992, 2002). However, those studies are sufficient to indicate, that both Late Archaic and Early Woodland peoples captured and consumed the same vertebrate and invertebrate fauna, just as one might expect for hunter-fisher-gatherer cultures occupying the same landscapes. The major differences lie not in what was consumed, but in how it was consumed and disposed.

Both Late Archaic and Early Woodland cultures deposited their faunal remains (bone and shell) in sheet middens. These deposits are, presumably, places of occupation, or at least the places of disposal of refuse from occupations, whether permanent or transitory (e.g., villages or shell collecting stations, respectively). The Late Archaic cultures, however, also deposited their remains in large mounds, forms of which included conical mounds, linear and curvilinear ridges, rings, and combinations thereof. Such deposition patterns result from conscious decision-making, and archaeologists have suggested a number of social imperatives that Late Archaic (and other) cultures must have had in mind when choosing to construct these kinds of edifices. The most commonly held belief is that the mounded structures functioned as refuse dumps. But rarely are reasons for the varied shapes of the proposed dumps ever offered (cf. Trinkley, 1985). That is, why do these dumps vary in shape or size? Others suggest that the often hypertrophic pilings are purposefully shaped for ritual and other social reasons (Russo, 2004b, 2006; Sassaman, chap. 11, this volume). Ethnographic analogies are often given in support (Russo, 2004b). The truth likely lies in the middle—certainly all large mounded shell deposits consist of shell and other refuse from consumption activities; and many of these activities were associated with feasting, which, by definition, is a social and ceremonial activity. Thus hypertrophic shell rings or shell mounds or linear shell ridges held dual functions, as refuse dumps and as intentionally shaped and sized monuments.

The absence of these mounded structures during the Transitional period as well as their paucity, if not complete absence, among the varied Early Woodland cultures in northeast Florida suggests dramatic changes in discard (i.e., kinds of dump sites) and ceremony (e.g., feasting and monument construction). Large-scale shellfish feasting associated with large public constructions are social bonding ceremonies noticeably absent among later Early Woodland groups who had access to the same kinds of wetland resources. This suggests that the Late Archaic groups practiced social imperatives and held the organizational means to exploit and display their access to shell that Early Woodland societies did not.

By Early Woodland time in northeast Florida, the iconic public works of the Late Archaic were supplanted by another community-bonding practice—burial mound construction and ceremonies. Of course, the construction of burial mounds got its start in the Middle Archaic (e.g., Russo, 1994a; Endonino, 2008b; Sassaman, chap. 11, this volume) and continued throughout the Late Archaic (Piatek, 1994; Russo 2006; Endonino, 2008b). But these public monuments were usually smaller when compared to the large shell mound constructions and fewer in number. By the Early Woodland, however, burial mounds were found across the region. Clearly, feasting and conspicuous display of food remains had been supplanted by burial ceremonies as social bonding practice.

With the expansion of burial mound ceremonies into the ritual life of Early Woodland societies, a different kind of approach to ceremonialism can be seen than that found at Late Archaic shell rings. As reflected in their U-shaped rings, Late Archaic groups were dualistic societies, with competing groups occupying and maintaining opposing sections of the rings. At these rings, potential fissioning and stress within and among communities was lessened through communal acts of ritual, feasting, and monumental construction. Disparate and potentially conflicting groups were symbolically united into a single corporate entity through sharing the feast and construction of the ring.

By the Early Woodland (if not earlier—see Sassaman, chap. 11, this volume) smaller, fissioned groups held sway. Corporate identity was synonymous with kin identity, which was reified through funerary rituals and burial mound construction. Ritual life and public works were reflected in burial mounds and associated rites rather than in community feasts and monuments to those feasts. As in nearly every known tribal society, feasts undoubtedly continued to attend funerary rituals among Early Woodland societies. But Late Archaic feasting, as the central focus of community ritual, had largely been supplanted by rituals associated with ancestor veneration.

I speculate that the lowering of sea level some time during the Late Archaic began to compromise dual societies' abilities to host feasts at ring sites. Large-scale feasting was, of course, dependent on natural abundances of shellfish. As shorelines receded, certainly the immediate environments in which shellfish had been located changed in character. Competitive feasting communities would have had to pull up roots to chase receding resources, travel farther to get them, or change resources. The paucity of Transitional sites suggests movement of populations from the formerly productive areas. Most likely, as sea level lowered, traditional, hard-earned and defended shellfishing territories figuratively and literally would have dried up. It may have been difficult to reestablish resource territories to proclaim and defend as one's own, when the resources kept moving. If, as some have suggested for other areas of Florida, sea level movement was too rapid to allow for the development of productive estuaries, people may have been left with nothing to chase (Widmer, 2005).

Building a community's identity and corporate integrity on its abilities to gather enormous surpluses of bountiful shellfish had always been a dicey enterprise for Late Archaic populations. Few Archaic rings, for example, existed for more than a couple generations (e.g., Saunders, 2002; Russo et al., 2002; Russo 2004b). For the most part, Late Archaic shell rings were built on the ability of self-aggrandizers, entrepreneurs, and kin leaders to inspire communities to greater feasting efforts. Feasting in the case of shell rings was not so much a redistributive effort as it was a ritual of conspicuous and wasteful consumption that demonstrated a community's power (Hayden, 2004). In times of want, such wasteful acts were difficult to maintain. As such, with a few notable exceptions, shell rings were relatively short-lived phenomena, being abandoned after a few decades, if not immediately, upon the death of a feast's host or a community's dissolution. A lowering sea would have dealt a terrible blow to any large-scale feasting strategy dependent on community-owned oyster beds and charismatic leadership. If we can assume that Early Woodland communities were in whole or part descended from the local Transitional period groups, then a switch to smaller monumental/public works such as small sand burial mounds, whose construction required little or no reliance on the abundance of food resources or the necessary cooperation of competing kin groups, makes organizational sense.

SOUTH FLORIDA

Widmer (1988) presented the operative settlement model for the Archaic/Woodland transition period that has long dominated research on south Florida and today remains as one of two prevailing views of the period. Before 1990, virtually no Late Archaic sites were known for the coast or interior zones of the extreme south Florida, and Widmer argued that prior to 5500 ^{14}C yr B.P., the coastline lay as much as 5 mi (8 km) west of the present-day shore, resulting in the absence of productive marine and estuarine environments sufficient to allow for human occupation (fig. 7.3). He concluded that Archaic populations simply had not and could not have settled along the coast's unstable estuaries. At the same time, interior portions of the peninsula, which today are dominated by freshwater marshes and cypress swamps, were arid and incapable of supporting large human populations. Consequently, interior zones were only occasionally visited by a few hardy hunter/gatherers. As sea level rose, however, both the coastal and interior zones began to change as all of south Florida began a slow transformation to modern environmental conditions between 5500 and 2700 ^{14}C yr B.P. Finally, Widmer argued that at ~2700 ^{14}C yr B.P., coastal southwest Florida contained the first ecological zones in the region capable of supporting substantial numbers of people.

Widmer's well-detailed model was, in part, developed from earlier, less-detailed considerations of Holocene settlement in south Florida (e.g., Goggin, 1948b; Cockrell, 1970). The various archeologists posited that Archaic populations were delayed in their entry into south Florida due to the region's slow response to the effects of a gradual rise in sea level. Widmer's particular version of the model indicated that it took at least 2300 years, until 2700 ^{14}C yr B.P., for the complete infiltration of marine waters into the present-day coastal configuration, a critical point in transgression seen as necessary before estuaries were sufficiently stable to allow for their intensive exploitation by humans (Widmer, 1988: 207). Even after this period, however, the human response to these new estuarine resources continued to plod, taking another 1000 years before the first year-round, permanently settled villages appeared on the coast at around 1700 ^{14}C yr B.P. (Widmer, 1988: 208, 214, 219). In Widmer's model, it was not until the Middle Woodland period that the humans finally settled in permanent locations along the coasts of south Florida. During the same range of time, the interior environments experienced their first substantial infiltration by seasonal foragers coming from the coast. But the interiors were never occupied year-round before the Middle Woodland period.

As is the case described above for northeastern Florida, an alternative model of Late Archaic/Early Woodland South Florida settlement has emerged under the recovery of new data. The identification of large shell rings at Horr's Island, Bonita, Hill Cottage, and the Ten Thousand Islands has led to the recognition that substantial Late Archaic populations lived along the southwest Florida coast between 5000 and 3800 ^{14}C yr B.P. (fig. 7.4; Russo, 1991a, 1994b, 2006). These populations settled in permanent villages, participated in mass-feasting ceremonies, and constructed large shell rings and earthen/shell burial mounds at locations within today's current coastal zone.

Rather than being an arid plain, the freshwater interior Everglades along the Shark River basin was actually flooded as early as 4700 cal B.P. Recent evidence of Late Archaic fish and turtle bone middens in association with shell tools from the coast has been found on scores of tree islands the dot the grassy wetlands (Russo, 2005; Schwadron, 2006a; Fradkin, 2007). These deposits either lack, or contain limited amounts of Late Archaic pottery, and are found below similar deposits of faunal remains that contain Woodland period pottery dating to as early as 2700 ^{14}C yr B.P. (Russo, 2005). The bone-midden deposits have been dated between 4700 and 4400 cal B.P. (Schwadron, 2006a and chap. 6, this volume) and indicate that interior south Florida consisted of

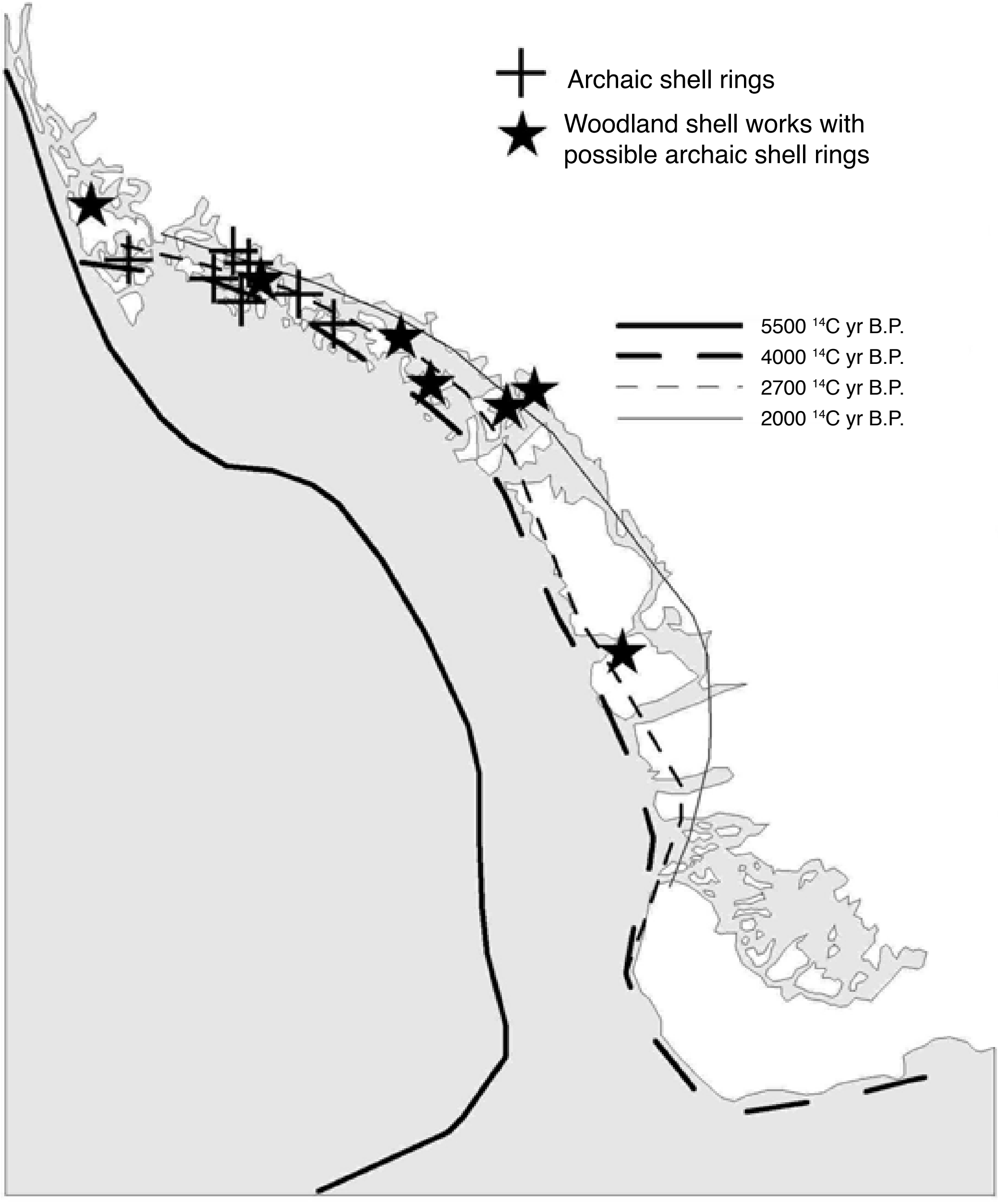


Fig. 7.3. Proposed shorelines of southwest Florida (after Widmer, 1988) with newly discovered shell rings (after Russo, 2006; Schwadron, chap. 6, this volume).

wet environments and inhabited tree island sites at the same time that shell rings and ceremonial mounds were being built along the coast, ca. 4700 to 3800 ^{14}C yr B.P. (Dickel, 1992; Russo, 1991a).

However, the interior Everglades do seem to have been abandoned during other times in the Late Archaic. Lying between the prepottery and pottery deposits is an unusual, thick layer of limestone or calcrete. One explanation for the presence of this stone is that the freshwater Everglades dried up and were abandoned by humans from the latter part of the Late Archaic into the Early Woodland (3800–2700 cal B.P.) as sea level dropped and increased the gradient and freshwater discharge from the Everglades. The limestone formations could have developed as caliche deposits. Dissolved bedrock limestone in groundwater below the midden rose through capillary actions under the subtropical sun, precipitating on ground surface and effectively capping the Archaic faunal deposits beneath a sheet of limestone. As water levels rose again, sometime around cal 2700 B.P., pottery-producing Early Woodland, Glades peoples returned to the tree islands to exploit the freshwater resources and deposited the remains of their catches upon the surface caliche that had buried the Late Archaic faunal deposits.

Alternative interpretations for the calcrete, however, have been forwarded. Schwadron (2006a and chap. 6, this volume) suggests, as one possible alternative, that water levels may have actually increased or were seasonally prolonged in the Everglades during the period ca. 3500 to 3100 cal B.P. based on local pollen samples, or for a longer period, 3800 to 2800 cal B.P., if nonlocal pollen records are considered. This wetter period may have resulted from fluctuations in El Niño intensity. Regardless of the ultimate cause, this model suggests that it was the increased wetness, rather than a lower sea level and draining of the Everglades, that resulted in the calcrete deposits on tree islands. Under this model, rather than a lower level, a higher level of water sufficient to flood the tree islands would have had to occur to account for the calcium carbonate layer. When the tops of tree islands are shallowly flooded, periphyton algal and bacterial communities draw

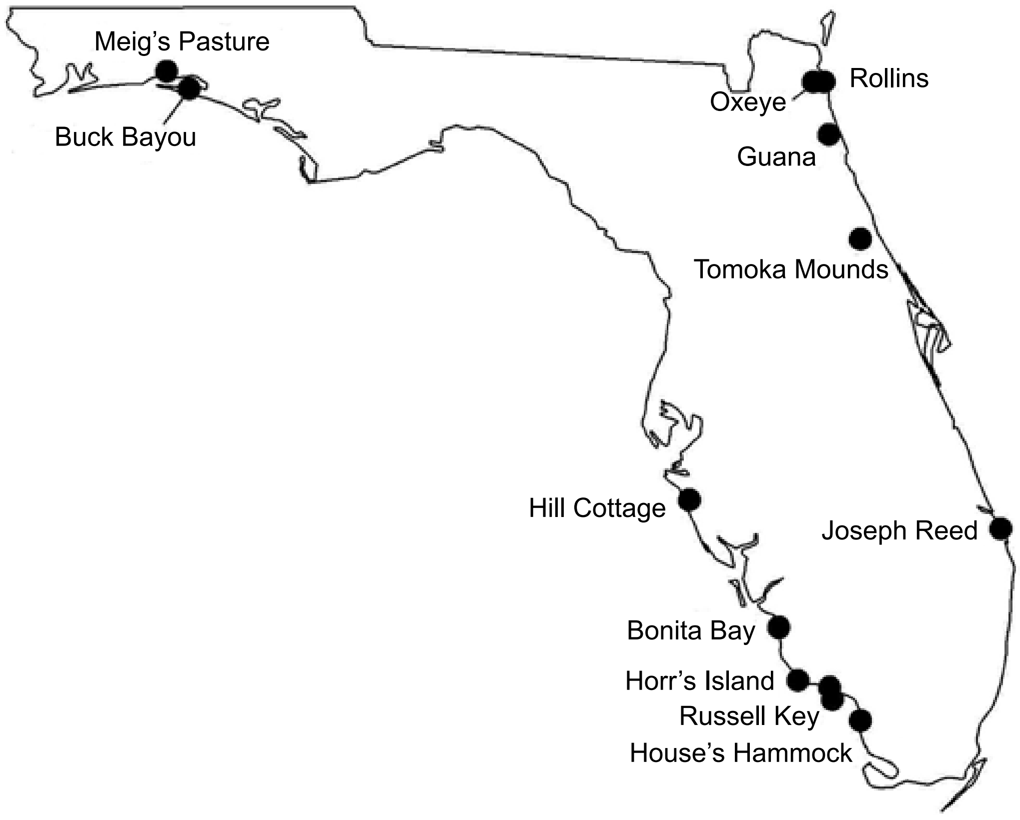


Fig. 7.4. Late Archaic (5000 to 3800 ^{14}C yr B.P.) shell rings and mounds in Florida.

calcium carbonate from the water and redeposit it subaqueously upon the benthic surfaces that are today, with lower water levels, the subaerial surfaces of tree islands. As water levels receded around 2700 cal B.P., the tree islands would have once again become at least seasonally dry and habitable, and coastal peoples could have returned, exploiting the same species evident in the Archaic deposits a thousand years earlier (Russo, 2005; Fradkin, 2007).

Schwadron and her colleagues do not suggest that changes in sea levels were needed to precipitate either the caliche or periphyton scenario, although they recognize the possibility. They do see the formation of caliche as requiring only prolonged or more seasonally intense drier conditions, and the deposition of calcium carbonate from periphyton as requiring only a "temporary climate shift to wetter conditions" to allow for a 5–15 cm flooding of the tree islands" (Graf et al., 2008). They also recognize that some paleoenvironmental data support the case for dry conditions while other data suggest wetter conditions. Thus, they do not identify which of the alternate models is most likely the cause of the calcium carbonate layer.

Whether from increased or decreased surficial freshwater, parts, if not all, of the interior Everglades seem to have become largely uninhabited from around 3800 to 2700 ^{14}C yr B.P. The abandonment of the Everglades at this time seems to have coincided with changes in human settlement along the adjacent coasts. On the southwest coast, shell ring construction and use may have come to a momentary halt near the beginning of this period, with terminal dates for Horr's Island at 4000 ^{14}C yr B.P.; Bonita at 3900 ^{14}C yr B.P.; and Hill Cottage at 3600 ^{14}C yr B.P. However, any regionwide hiatus in coastal ring construction was short lived. Within the same period, as well as following it, other shell rings appeared. At 250 m wide, the largest of south Florida rings, the Reed Shell Ring on the southeast coast was founded and occupied between 3500 and 2800 ^{14}C yr B.P. On the southwest coast (Schwadron, 2008 and chap. 6, this volume), the 220 m wide House Hammock shell ring was constructed ca. 3540–3300 cal B.P. And other very large, arc-shaped ridges that may or may not be rings are found, including those at Everglades City, Dismal Key, and Sandfly Key, some dating as early as 2800 cal B.P. and extending well into the second millennium A.D. (table 7.1; see also Schwadron, chap. 6, this volume). Numerous other shell rings of similar size and shape hiding deep in today's mangrove swamps have gone undated (Beriault et al., 2003; Russo, 2006; Schwadron, chap. 6, this volume). Based on their sizes, shapes, surface pottery types, and topographically lower positions than adjacent, more recent features, they are likely to be either Late Archaic or Early Woodland in age (Schwadron, chap. 6, this volume). As dates from these sites are obtained, it may or may not turn out that there was a hiatus in ring building or permanent settlement at or around 3800 cal B.P. coinciding with climatic change and/or sea level fluctuations. The data in hand, however, are sufficient to state that large-scale ring construction persisted through the period in question (3500–2500 cal B.P.) and well into the Early Woodland (Russo and Heide, 2004; Russo, 2006; Schwadron, chap. 6, this volume).

The propinquity of shell rings (or features suggestive of shell rings) to large, complex Middle Woodland shell work sites, such as those found at Key Marco, Dismal Key, Johnson Mound, and Fakahatchee Key, suggests that rings were the foundation and inspiration for the even more elaborated shell architecture that was to follow (Schwadron, chap. 6, this volume). The question, then, of "what happened to the Late Archaic" might best be answered in the Everglades—it evolved seamlessly into the Early and Middle Woodland as indicated by the continuation of its architectural traditions. Other traditions such as the construction of sand burial mounds, the extensive use of an elaborate shell tool technology, and a fisheries-based subsistence economy also followed into the Early Woodland with no discernible break from the Late Archaic.

Why do we see a different pattern in south Florida than we saw in northeast Florida? In south Florida less steeply graded coastline may have resulted in the continued presence of a wide estuarine zone even when sea level was lower or lowering. While locally specific estuaries would have dried up, others would arise or continue to be flooded under a sea stand that was 2 m lower. Thus, year-round access to fisheries, combined with an interior population moving to the coasts, facilitated the need to continue the occupation of the coast in permanent settlements even at a time when environmental changes may have more severely impacted other cultures in the Southeast. With new data on sea levels and

TABLE 7.1
Selected Archaic and Early Woodland Corrected Radiocarbon Dates from South Florida

Site	Count	Earliest cal B.P.	Latest cal B.P.		Reference
Horr’s Island Ring	13	4660	4015	2310*	Russo (1991: 423)
Horr’s Island Md A	8	4760	4140	3420*	Russo (1991: 423)
Horr’s Island Md B	5	6730	4230	4030*	Russo (1991: 423)
Horr’s Island Md C	2	4870	4860		Russo (1991: 424)
Horr’s Island Md D	1	4850			Russo (1991:424)
Bonita Ring	4	4530	3870		Dickel (1992: 161; Houck 1996: 31)
Hill Cottage Ring	5	4500	3625		Bullen & Bullen (1976: 13)
Reed Ring	4	3455	2850		Russo and Heide (2004 :113)
House’s Hammock	3	3540	3250		Schwadron, this volume
Mulberry Midden	2	3410	3400		Lee et al. (1993: 46)
Heineken Hammock	3	4530	3930		Lee et al. (1998: 232)
Mt. Elizabeth	1	3970			Janus (1998: 29)
8Cr112	1	4965**			Widmer (1974: 32)
Everglades City 7	4	2810	1410		Schwadron, this volume
Everglades City 9	4	3400	1890		Schwadron, this volume
Everglades City 10	3	3320	2520		Schwadron, this volume
Russell Key Ring	1	2190			Schwadron, this volume
Sandfly Key Ring(?)	3	2780	1530		Schwadron, this volume
Sandfly Key Mound	1	2685			Schwadron, this volume

* Intrusive burials and features.

** Based on charcoal.

All ages are from shell and have been corrected by adding 400 to 410 years if isotopic fractionation had not been originally undertaken; check cited reports for original measured (uncorrected) ages.

archaeological sites in hand, Widmer (2005: 80) has suggested that the period 3400 to 2800 ^{14}C yr B.P. was one of rapidly lowering sea levels resulting in unstable and unproductive estuaries and the general absence of cultural occupations along the south Florida coasts. However, large coastal shell rings for this time are known (Russo and Heide, 2002), suggesting that if some estuaries were drying up, others persisted or arose and the resources were sufficient to support permanent, large populations. In south Florida, the period 3500 to 2500 ^{14}C yr B.P. was one in which local populations were sufficiently organized to maintain the social organization and resources necessary to accommodate changes in estuarine resource locations and abundances of fish and shellfish.

Due to significant, but as yet poorly understood, climate changes, the entire human population of the interior Everglades had to abandon the regions between 3800 and 2700 cal B.P. I suggest that coastal communities took them in, or more likely, since older rings (e.g., Horr’s Island, Bonita Bay) do not seem to have been occupied during this period, the immigrants created their own, new permanent settlements. Rings dating between 3800 and 2100 ^{14}C yr B.P. lie low in today’s mangrove forests where they are subject to today’s daily tides. Considering that the central plazas of the rings were used as places of ceremony, oratory, and display, it is doubtful that such inhospitably drowned environments were present when the rings were built. Rather, the rings were placed vertically in these positions when the specific locations were dryer, i.e., during a time of lower seas. People of south Florida seemed to have been successful in adopting strategies to cope with environmental shifts that may have been occurring between 3500 and 2500 ^{14}C yr B.P., maintaining many of their cultural traditions of subsistence, economy, and ceremony in the process.

BIG BEND AND PANHANDLE

Around Tampa Bay, few large sites, and no shell rings, have been found that might suggest substantial village occupations during the Transitional period. The Canton Street site, an amorphous shell midden, is among the largest (ca. 150 × 750 m) and best studied of the sites for the period. The site's chronological position and function, however, are not well established (Bullen et al., 1978). It is known mostly for its artifacts related to the Transitional period, ca. 3000–2600 ^{14}C yr B.P., as opposed to its earlier, Late Archaic fiber-tempered component described only as "underlying or nearby" (Bullen et al., 1978: 3, 22). Since the "Transitional" period is the interest of this volume, it is important to note that the nearness or overlying of the "Transitional" and Late Archaic components is something of a puzzle. One might expect any "Transitional" occupations to have been located farther seaward if sea level was indeed lower during the Transition. One possible explanation may be found in local bathymetry. Nearby deep channels suggest that open water passages to the site may have persisted even during periods when sea levels were up to 2 m lower. Alternatively, the location of a large shell midden near present-day shorelines might be due its deposition during times other than that posited by the authors. That is, the artifacts indicate mostly Late Archaic and Early Woodland forms (e.g., Jaketown perforators, Archaic stemmed and Late Archaic point types, Deptford-like tetrapods, pinched and sherd-tempered pottery), periods of which many coastal sites are known in the area. If not for Bullen's (1959) formulation of the Transitional model to explain assemblages of apparent mixed-period artifacts at a few unusual sites, the Canton Street artifact assemblage might more efficiently be seen as Early Woodland occupations overlying Late Archaic ones. In either case, other than the possible presence at Canton Street, Transitional period sites are as rare in the Tampa Bay area as they are elsewhere in Florida.

Around Tampa Bay and to the north in the Big Bend of Florida, coastal Late Archaic sites are also rare, known most significantly from eroding shoreline or offshore shell middens (Bullen and Bullen, 1953; Lazarus, 1965; Milanich, 1994: 116). At the long-occupied Wacissa-Aucilla basin southeast of Tallahassee, the settlement record tells a story likely reflecting the greater regional picture. Along its submerged basin and up to 16 km (10 mi) offshore from the mouth of the Aucilla River, Early to Middle Archaic sites with coastal subsistence orientations, are found as much as 5 m below Gulf waters at the relict mouth of the river (Faught, 2004). Upriver onto the extant terrestrial portions of the basin 32 km (20 mi) inland, tools of the same periods are represented by quarry, chipping, and isolate-find sites. That is, the pattern of settlement for the Middle Archaic suggests adaptations that include both coastal and riverine exploitation strategies. Sites of the Late Archaic and Deptford periods also include upland, riverine settlements, but are missing larger, coastal-oriented sites (fig. 7.5; Memory et al., 2000; Kratt, 2005; Harrell, 2005). This suggests either that no coastal occupations for these periods occurred along the Aucilla shoreline estuaries during these times; or, more likely, that evidence for coastal occupations has been destroyed or submerged by changes in sea levels. Upstream, along the presently exposed river banks, sites are characterized by small freshwater shell middens and camps that have yielded coastal subsistence items suggesting frequent connections to the coast during Late Archaic and Early Woodland times (e.g., Kratt, 2005). The kinds (noncoastal camps; procurement stations, etc.) and distributions of these Late Archaic and Early Woodland sites suggest that we are seeing only a small part of the settlement picture for each of these periods. If larger, more permanent settlements existed, they have not been found on the present-day terrestrial landscape.

In contrast to the Late Archaic and Early Woodland archeological record there is a virtual absence of Transitional sites along the Aucilla. While sea levels during the Late Archaic and Early Woodland were sufficiently close to today's to reveal at least part of those eras patterns of settlement, sea stands may have been too low during the period 3500 to 2500 ^{14}C yr. B.P. to have most aspects of any coastal settlement pattern to have survived subsequent sea rise.

Further west in the panhandle along the Apalachicola, Late Archaic/Transitional sites with coastal subsistence orientations (i.e., shell middens) are remarkably few and small (White and Estabrook, 1994; White, 2003). Rather than oyster, the few shell middens that have been identified are typically *Rangia*, an estuarine species found in less saline conditions than oyster (read lower sea level). When found in coastal sites now located in high salinity estuaries, *Rangia* commonly serves the archaeologist as a proxy for sea level or other environmental causes for changes in salinity. White (2003: 75) has interpreted the presence of mostly relatively small *Rangia* and terrestrially oriented sites along the Apalachicola basin during the Late Archaic/Transitional periods to be the result of impermanent, mobile, small groups adapting to unpredictable and ever-changing environmental conditions including flooding and hurricanes. Although the coastal environment was rich enough to support large, permanent settlements, she argues that groups were kept small and settlements transitory in order to move when annual weather required it. Alternatively, of course, we may be seeing only part of the coastal record. We have to go west along the Florida panhandle to find the only two Late Archaic period coastal sites in northwest Florida the sizes and shapes suggestive of the large shell rings found in east and south Florida. Along the shores of Choctawhatchee Bay lie Meig's Pasture (ca. 4100–3000 ^{14}C yr B.P.) and the Buck Bayou Mound (no radiocarbon dates), both of which have been described as possible Late Archaic period shell rings or horseshoe-shaped accretional shell deposits despite the former lacking shell in many parts of the ring and the latter's appellation and more common interpretation as a mound (Curren et al., 1987; Thomas and Campbell, 1991; Thomas and Campbell, 1993: 530; Russo, 2006: 155–158). These two sites have been identified as simply Late Archaic or Elliotts Point, (ca. 4000–2400 ^{14}C yr B.P.) a Late Archaic/Transitional period culture distinct from contemporary Florida cultures by its material links to Poverty Point traditions. For those that support the Elliotts Point mode, the two relatively large (>100 m in diameter) sites are seen as being encircled by artifact scatters, camps, and hamlets, suggesting a central-place foraging organization, with the two possible coastal oriented shell rings being the central base camps (Thomas and Campbell, 1991, 1993: 518–542; Milanich, 1994: 98).

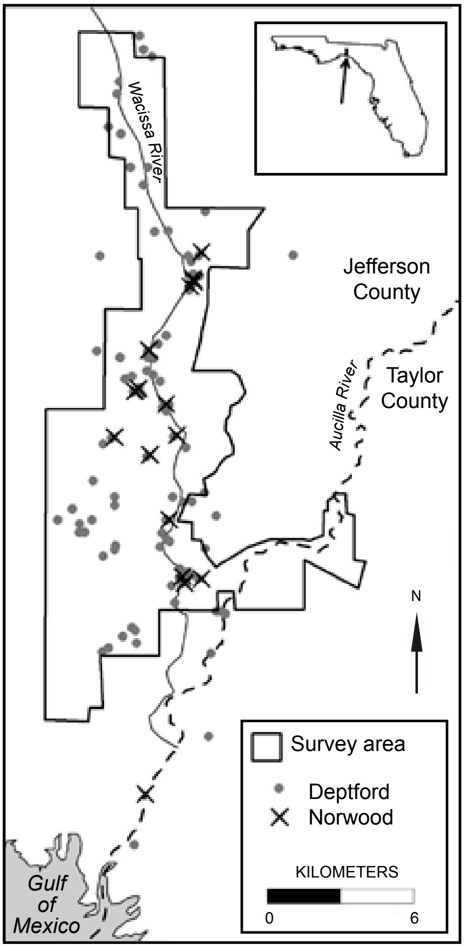


Fig. 7.5. Deptford and Norwood site locations in the Aucilla/Wacissa River basin of northwest Florida. (After Memory et al., 2000)

At first, this complex coastal settlement pattern seems to suggest that proximate coastal resources may have existed during our millennium in question, 3500 to 2500 B.P. However, at least half of the Elliotts Point sites do not exhibit any significant relation to coastal environments in the form of artifacts or ecofacts (Thomas and Campbell, 1993a: 524–529). In the same area, other coastal sites were abandoned at 3500 B.P., with the abandonment being attributed to unstable sea levels or climatic change (Saunders et al., 2009). This again raises the possibility that Late Archaic foragers may have followed receding seas and in the process left behind less productive, non-coastal environments. The numerous non-coastal sites may indeed be logistical camps. But the base camps may now lay underwater in former estuarine shorelines. As with the Aucilla/Wacissa area, the Choctawhatchee Bay sites my represent only a portion of the "Transitional" settlement pattern.

The earliest definitively recognized Woodland manifestations in the region date to the Deptford period (ca. 2500 to 1700 ^{14}C yr B.P.), just at the end of the millennium of concern. Deptford sites are typically found as components at the basal levels of Middle Woodland Swift Creek or Santa Rosa Swift Creek sites (e.g., Thomas and Campbell, 1993a: 553). As such, the sizes, shapes, and characteristics of coastal Deptford sites are typically underdescribed or assumed to mirror the sites types under which they lay. This may be one of the reasons that coastal Deptford sites have occasionally been seen as fairly large village/mound complexes with villages being ring shaped and with mounds reflecting participation in the Hopewell or earlier Yent ceremonial complexes (Sears, 1962; cf. Thomas and Campbell, 1993a: 558; Milanich, 1994; cf. Weisman, 1995). While Deptford shell middens and Deptford burial mounds are well known, such archetypes village/mound complexes are not. Mounds with Hopewell burial furniture have been found at Yent, Pierce, and Crystal River (Sears, 1962: Weisman, 1995). And possible ring middens with Deptford components have been found in the panhandle (Thomas and Campbell, 1993a: 554). But, with the possible exception of the multiple-component Crystal River site, the two site types, ring middens and mounds have not been found together (Weisman, 1995). Because no pure Deptford ring midden has ever been mapped or excavated, Swift Creek and Weeden Island rings have been used as a proxy for how Deptford villages must have looked and been used. There is a very real, and I would suggest, likely possibility that Deptford peoples along the Gulf coast did live in ring formations. But their absence on the terrestrial landscape suggests they may now lie offshore leaving open the question of coastal exploitation during a lowered sea.

A few types of Deptford sites other than rings have been called villages, and these consist of black earth middens that may or may not contain shell, pit features that may or may not contain shell, or a combination of both with separate shell refuse piles nearby (Thomas and Campbell, 1993a: 555). The Deptford shell-bearing components of most of these sites are rarely more than 15 to 20 m across (e.g., Memory et al., 2000; Harrell, 2005; Kratt, 2005). A few contain marine shell and other fishery resources sufficiently abundant to suggest the site's proximity to a readily accessible coastal environment. The largest and best studied of these coastal Deptford villages, the Hawkshaw site, seems to have consisted of 140 small pit features, about half of which contain subsistence deposits connecting the site to coastal exploitation. Considering that the site was occupied for as long as 260 years, on average, only four small features would have been deposited each year of occupation. Bense (1985: 168) recognizes restricted use of these kinds of sites and classifies them as seasonal encampments rather than villages (see also Thomas and Campbell, 1993a: 555–556 for a discussion of camps; cf. Harrell, 2005).

In the Choctawhatchee Bay area, Deptford settlement is seen as being rarer than in the previous Elliotts Point period in certain coastal areas, while more abundant in others (Thomas and Campbell, 1993a: 545). There, archaeologists have suggested that a break with Elliotts Point traditions occurred with fewer camps and more villages being found in their study area (two Elliotts Point versus five Deptford villages). Unfortunately, all but one of the Deptford villages are associated with multicomponent sites. Hence, the size and character of the Deptford component is not always apparent, whether the Early Woodland Deptford pattern of settlement differed that dramatically from its presumed predecessors in the region, the Elliotts Point culture remains somewhat problematic. Certainly, archaeologists have noted that settlement patterns in terms of distribution across ecotones are very similar between Elliotts Point and Deptford sites, with 35% of the Elliotts Point sites in the region being reoccupied by Deptford peoples, while other Deptford sites were established remarkably close to the Late Archaic settlement locales (see fig. 7.6; Thomas and Campbell, 1993a: 545). Unfortunately, the paucity of radiocarbon dates from both Elliotts Point and Deptford sites makes difficult any discussion of the arrival, distribution, and possible movements of people related to sea level changes. For example, it is not clear when most Elliotts Point sites were occupied. The hypothesized period of Elliott's Point spans 1,600 years (4000 to 2400 B.P.) and overlaps with the beginning of the subsequent Deptford (2500 to 1700 B.P.). Unit more dates from both periods are obtained, we will not know the level of coastal exploitation from 3500 to 2500 B.P. Without radiocarbon dates, following any possible movement of Elliotts Point settlements in relation to shoreline movements is difficult.

SUMMARY

The archaeology of the northeast, northwest, and south coasts of Florida has been described to assess the relative numbers, kinds, and distributions of sites between 3500 and 2500 ^{14}C yr B.P. These were compared to those that preceded and followed this period in order to assess possible effects of sea level changes may have had on settlement patterns. The data show that are fewer numbers, smaller sizes, and less coastal-oriented archaeological sites for this period. However, as archaeologists have waded into the wetlands and dived beneath Gulf waters, and as they have employed radiocarbon dates to assay shell middens when diagnostic artifacts were lacking, more coastal sites of the period have been discovered (e.g., Russo, 1991a, 2006; Russo et al., 1993; Faught, 2004; Schwadron, 2006a, chap. 6, this volume). Although settlement patterns seem to have changed in the three areas of Florida areas, coastal occupation continued to varying degrees.

Unfortunately, the coastal archeological record from 3500 and 2500 ^{14}C yr B.P. is so meager in most of Florida that our understanding of cultural responses to sea level or other possible climates changes is necessarily speculative. In northeast and northwest Florida, large coastal shell middens that have been radiocarbon dated between 3500 and 2500 ^{14}C yr B.P. are rare or nonexistent along most of today's estuaries. In south Florida, recent

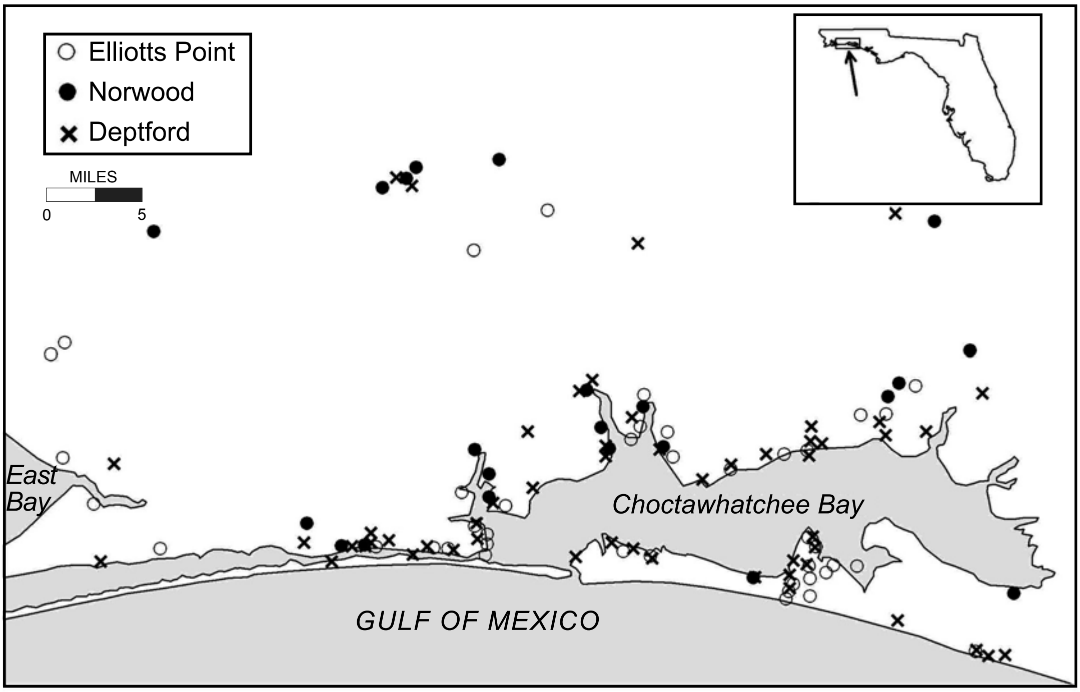


Fig. 7.6. Deptford, Norwood, and Elliotts Point sites in Choctawhatchee bay, northwest Florida. (After Thomas and Campbell, 1993)

investigations have identified large shell middens of the period, but smaller sites are virtually unknown (e.g., Russo and Heide, 2002; Schwadron, chap. 6, this volume). Of the few systematic surveys of Florida coasts that have been undertaken, only those that have investigated the lower levels of large multicomponent sites, those that have ventured into coastal marshes, and those that have gone beneath Gulf waters have successfully identified coastally oriented sites of the period, in addition to increasing our knowledge of the cultures immediately preceding and following it (e.g., Lazarus, 1965; Dunbar et al., 1991; Thomas and Campbell 1993; Memory et al. 2000; Russo and Heide 2002; Schwadron, chap. 6, this volume). Because of the logistical difficulties involved in investigating these sites, we do not always have a good idea of their sizes, shapes, or functional relationships to coastal environments. Thus, determining whether the people who occupied them were more or less marine oriented than those who preceded or followed them, or, by extension, whether estuaries were less abundant or less productive, remain difficult empirical problems.

Along the east coast above Canaveral, coastal sites of any size are virtually unknown for the period. In the Panhandle, there may be a few sites that date to the period that have been classified as Elliotts Point, Late Archaic, and/or Deptford, but most lack radiocarbon dates. Meig's Pasture (8Ok102) is the lone large shell bearing site classified with radiocarbon dates bordering 3500 ^{14}C yr B.P., but once fractionated, six of the seven shell dates hover around 4000, while the remaining comes in at 3440 ±60 B.P. (Curren 1987: 70–73; Thomas and Campbell, 1993: 506). On the other end of the millennial spectrum, out of 20 inventoried sites yielding 55 radiocarbon assays on and around Eglin AFB, one date on shell older than 2500 ^{14}C yr B.P. has been identified (1993b: 505–506). Obtained from a shell from a lower level stratum below dense shell midden, only one Deptford sherd from the 1 × 1 m excavation unit was recovered. The site, 8Ok126, is otherwise characterized by dense shell, abundant Deptford pottery and radiocarbon assays post-dating 2500 ^{14}C yr B.P. (and indicating dense estuarine shell exploitation by 2300^{14}C yr B.P.; Thomas and Campbell 1993a: 257). Among the regions examined, only south Florida has yielded a number of large shell midden sites dating between 3800 and 2500 ^{14}C yr B.P. The presence of these sites alone suggests that any large-scale climatic event that may have occurred, such as a dramatic change in sea level or rainfall patterns, was not universally catastrophic across the entire southeastern U.S. coastal zone. The question arises as to who and why some cultures may have thrived, or at least adapted to coastal changes, while other moved or died out in response to the changes.

Most Florida archaeologists recognize that sea level changes likely occurred during the period 3500 to 2500 ^{14}C yr B.P., or somewhere near it, and that these changes were linked to changes in human settlement (e.g., Goggin, 1952; Widmer, 1988; Thomas and Campbell, 1983; Milanich, 1994; Walker et al., 1994). Many sea level-cum-archaeology studies have been geared toward developing models for sea level stands and rates of rise and fall based on archaeological data, while others use sea level data from other disciplines to interpret changes in the archaeological record, particularly as they pertain to the appearance and apparent disappearances of large shell middens (e.g., Johnson and Stright, 1991; Suguio et al., 1992; Walker et al., 1994; Widmer, 2005). However, few of these have proffered particulars as to how those changes may have affected settlement patterns or cultural traditions of Elliotts Point, Transitional, or pre-Glades cultures.

With global warming in the news, sea level studies are de rigueur among science and management disciplines including archaeology, geology, geomorphology, oceanography, fisheries sciences, biology, agriculture, and environmental planning. The result has been numerous studies, predictions, and warnings as to what a rise in sea level may do to coastal landscapes. Typically these studies see a relative sea level rise as deleterious to existing beaches, marshes, estuaries, and adjacent terrestrial environments as wave actions destroys existing barrier islands, marshes are flooded, estuaries become more marine, and intrusion of saltwater destroys vegetation and infiltrates aquifers. While these dire forecasts are factually based and relative sea level rise may ultimately prove catastrophic to the infrastructure, economies, and ultimately, the social organization of modern cities, they do not necessarily speak directly to the prehistoric situations of the southeastern coasts. With relatively little infrastructural investment in settlements, prehistoric fishing cultures had more options to stay on the coast as sea levels rose or lowered. Under slowly changing conditions, groups needed only to move with the rise and fall of seas in order to keep pace with moving resources. Even if rises and falls were occasionally rapid over the last 4000 years, as some have postulated (Widmer, 2005), communities physically keeping up with transgressive and regressive coastlines may not have been a problem given the relatively small sizes of communities and millennia-long traditions of intracoastal communication, exploitation, and transport. Certainly, we have archaeological evidence that many cultures in the past undertook such movements to follow the retreating and advancing coasts, either horizontally or vertically (e.g., Lazarus, 1965; Stright, 1990; Walker et al., 1995).

Figuring out how cultures may have successfully (or unsuccessfully) accommodated unstable sea levels is difficult given the current lack of archeological data for the millennium and the plethora of conflicting sea level models. Because of minimal subsidence during this period for the Florida peninsula (Lazarus, 1965; Stright, 1990), eustatic models based wholly or partially on data obtained outside the region have been used to describe causes and results in settlement changes due to sea level instabilities (e.g., Fairbridge, 1984; Widmer, 2005). More recently, sea level models derived from local data (Balsillie and Donoghue, 2004) have been used to explain the location and character of coastal archaeological sites in Florida. Due to the geographically wide-ranging datasets and the variable proxies for sea level stands (e.g., estuarine muds and peats; beach ridge topography and sand grain sizes; shell middens and beach deposits; vertical distribution of archaeological sites), there is discordance among the modeled sea level curves (fig. 7.7).

One archaeological sea level study posits a stand below current sea levels for all of the period 2000 to 3000 ^{14}C yr B.P., while another places sea level 2 m higher for most of the same period (fig. 7.7: cf. Walker et al., 1994 and Widmer, 2005). Throw the various geological assessments of sea levels independent of archaeological data into the discussion and the reader gets either a rapidly rising, a rapidly falling, a stable but lower, or a stable and about the same as current levels sea level stand for the millennium in question (fig. 7: cf. Siddall et al., 2003; Fairbridge, 1984; Walker et al., 1994; Balsillie and Donoghue 2004, respectively).

Moving to the earlier millennium, 4000 to 3000 ^{14}C yr B.P., that partially covers the period of question, the archaeological interpretations of sea level stands diverge from the geological ones dramatically. Most geologically derived curves suggest lower stands from 2 to 8 m below current levels for the entire period, with some indicating relative stability and others rapid change. However, one archaeologically supported model for Florida and the greater Gulf suggests a stand up to 4 m higher than today for the greater part of the period, 3400 to 4300 ^{14}C yr B.P. (Widmer, 2005). If we go outside the region, eustatic sea stand models based in part on archaeological shell-midden data related to vertical and horizontal topographic positions contradict portions of the eustatic models used for Florida coasts (Suguio et al., 1992: fig. 7). In the end, I would suggest that the inclusion of sea level changes into models of archaeological settlement patterns in coastal Florida holds potential promise, but has received limited consideration, particularly along the Atlantic and panhandle shores. Significantly more sea level and settlement interaction has been applied to south Florida (Widmer 1988, 2005; Walker et al., 1995; Marquardt, chap. 14, and Schwadron, chap. 6, this volume).

Perhaps more than any other archaeologist working in Florida, Widmer (1988, 2005; see also Little, 2003) has argued that optimal conditions for human populations were directly associated with changes in sea levels. For the period 3400 to 2900 ^{14}C yr B.P., he argues, the sea level in Florida was suboptimal for coastal settlement, while from 2900 to 2000 ^{14}C yr B.P., it was optimal. In his model, optimal conditions are linked to three distinct points in the process of sea level fluctuations. At any of these points sea levels are seen as sufficient for the establishment of productive, stable estuaries from which cultures could exploit abundant resources. The abundance, in turn, could lead to increases in population, permanent settlements, and social organization sufficiently complex to handle the increased populations.

(1) Sea level stands mirror today's coastal configurations. Today's Florida coastlines are characterized by vast, productive estuaries, the necessary environments for nonagricultural societies to achieve large populations. The presence of large late prehistoric and historic Calusa shell midden and other coastally oriented site types on southern Florida's current coastline when sea levels were approximately as they are

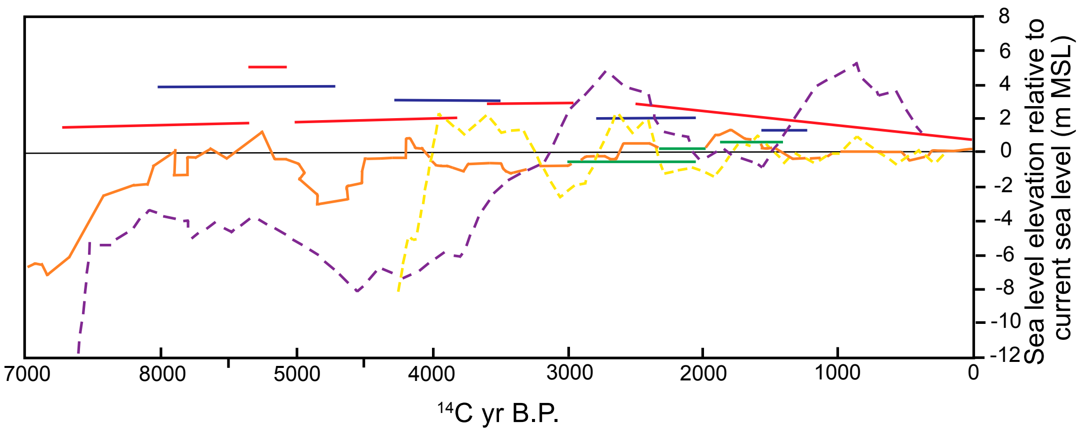


Fig. 7.7. Various sea level stands and curves, relative to current sea level, proposed for Florida and the western hemisphere. Legend: Purple line (Siddall et al, 2003; younger data set B); tan line (Balsillie and Donoghue, 2004); yellow line (Fairbridge, 1984); green line (Walker et al., 1995); blue line (Widmer, 2005), red line (Suguio et al., 1991).

today is seen as proof of their productivity.

(2) Higher still sea level stands are present. Widmer (2005: 81) argues that such stands are associated with increased rainfall brought on by warmer climates and that both climate changes resulted in more backwater wetlands and greater expanses of coastal marshes and swamps, the necessary environments for the establishment of bountiful shellfish and fisheries resources.

(3) Slow rises or falls in sea level are present. Widmer argues that high stands themselves were not necessarily the most productive stands. If sea level rises and falls were sufficiently slow to preclude the erosion of necessary coastal features such as barrier and mangrove islands that protected productive estuaries, then these periods could become optimal for human settlement (Widmer, 2005: 80).

Under Widmer's model, only three periods in the last 5000 years are seen as nonproductive in terms of estuarine development dependent on sea stands and rates of oscillations. These include 4700 to 4300 ^{14}C yr B.P., 3400 to 2800 ^{14}C yr B.P., and 2000 to 1600 ^{14}C yr B.P. (Widmer, 2005: 80, 83). At these times, either sea levels were rising or falling too fast or there were extremely low stands draining productive estuaries, both of which, Widmer suggests, would result in decreased fisheries and human populations that depended on them. One of these proposed nonproductive periods (3400 to 2800 ^{14}C yr B.P.), of course covers part of our period of question. Thus, Widmer's model provides some agreement to the idea that sea level was lower during at least part of the period. His evidence for lowered levels, in part, is the absence of large shell midden sites in south Florida between 3400 and 2800 ^{14}C yr B.P. In contrast, he posits that the period 4300 to 3400 ^{14}C yr B.P. represents a high stand producing extensive and productive estuaries across the southeastern U.S. as evidenced by the extensive "shell mound Archaic" cultures' large shell ring sites. He argues that these cultures successfully exploited the estuaries and, in the process, achieved levels of social complexity previously unknown in the region.

While his model of sea stands and the reflexive cultural responses have plenty of support (e.g., Marquardt 1992a; Walker et al. 1994; Little 2003), the devil is in the details. The critic is left to ponder the rise of large shell rings and ring complexes such as Oxeye, Horr's Island, and Hill Cottage whose entire use or initial construction occurred during the assumed nonproductive, low sea stand period 4700 to 4300 ^{14}C yr B.P. (Russo, 2006). At the very large Reed ring along the southeast Florida coast, dates of occupation (3455 to 2850^{14}C yr B.P.) also seem to match almost exactly those of Widmer's postulated nonproductive, and at times rapidly falling, low stand from 3400 to 2800 ^{14}C yr B.P.

(Russo and Heide, 2002; see also the calibrated dates for House's Hammock shell ring in the Ten Thousand Islands [Schwadron, 2006a: 33]).

All other dated ring sites in Florida (Horr's Island, Bonita, Hill Cottage; Guana and Rollins) were last occupied between 3600 and 4000 ^{14}C yr B.P., during the proposed high stand (Russo, 1991a, 2006). If slow and steady rises and falls around optimal sea levels were a cause for the expansion of populations and complex cultures during prehistoric high stands, they were clearly not a necessary or sufficient cause. Some peoples were able to cope with and thrive along the coast with rising, falling, and even lower levels of sea. Other societies seem to have collapsed in the middle of proposed optimal sea levels. The fact is that many cultures in Florida managed to deal with rises and falls in sea levels fairly effectively, while others did not. Along the Florida panhandle, it is unclear what happened between the Elliotts Point and other Late Archaic period coastal occupations and the Deptford. But the former seems to have followed a retreating sea offshore, while the latter moved inland one step ahead of a rising sea (Lazarus, 1965; Stright, 1990; Russo et al., 1993). Around 2500 ^{14}C yr B.P., Deptford peoples seem to have ended up at the last areas the Late Archaic folks left behind along the current coast. The distribution of Late Archaic and Deptford sites on the current terrestrial landscape northwest Florida so closely align with each other that they suggest that during lowered seas, cultures did not alter their subsistence and settlements strategies to any degree that significantly affected their abilities to repopulate the current coast when sea levels rose again (e.g., figs. 5 and 6).

In south Florida, from 5000 to 2000 ^{14}C yr B.P., the exploitation of coastal resources continued largely unabated by sea level fluctuations with large shell rings being constructed during all the various proposed stable high and low stands, as well as during the oscillations between (Dickel, 1992; Russo, 2006; Russo and Heide, 2002; Schwadron, 2006a, chap. 6, this volume). However, any comparisons of greater sizes or numbers of coastal sites as proxies for the productivity of high versus low seas are currently unattainable given the limitations of excavations, mapping, and radiocarbon dating, which have been confined to only a handful of the larger and longer-lived shell features. However, because we do know that some occupations occurred at large shell middens during proposed low stands as well as during rapid sea level oscillations (e.g., Horr's Island, Hill Cottage, House's Hammock, and Russell Key), we also know that cultures were not necessarily compelled to abandon sites when sea levels were on the move. These sites continued to be occupied, were occasionally revisited, or, in the case the Reed shell ring, were entirely constructed anew.

Currently, sea level curves and archaeologically derived models of high and low stands conflict with each other and with empirical archaeological data (fig. 7.7). As such, we can conclude that at least some sea level models must be wrong. The Russell Key shell ring (Schwadron, chap. 6, this volume), for example, has an upper 50 cm that dates between 2200 and 2000 cal B.P. subject to daily tidal inundations, and lower levels that now lie buried beneath at least 1 m mangrove marsh sediments and daily tides. This environmental setting suggests that when the construction of the ring began, a lower relative sea level must have been present. According to the Widmer (2005) model and the Fairbridge curve from which it was derived, however, the upper ring radiocarbon dates coincide with a sea stand that was 2 m higher than today (Widmer, 2005: 80). If true, the ring would have to have been constructed under water, or, alternatively, it was initially deposited when sea level was 2 m higher between 2600 and 2200 ^{14}C yr B.P., but also when it was rapidly plummeting some 4 m lower in the final 200 years of its use (Fairbridge, 1984: fig. 7).

Rapid lowering of sea level, of course, is precisely the condition under which exploitable shellfish resources are modeled to die out and human occupation to come to an end. The abundant midden oyster and other molluscs dating to periods of lower and rapidly lowering seas calls into question the state of the art of current models of sea level change and/or the precision of radiocarbon dates and, in the process challenges the assumptions that Florida populations would have been incapable of coping with moving shorelines.

Today, regional planners are preparing for a predicted rise in sea level due to global warming with one of two basic strategies: "hold the line" or retreat. Given the vast infrastructure that modern Floridians have invested in their coastal communities, by far, the "hold-theliners" are winning the day—replenishing shorelines, building bulwarks, replanting marshes. Faced with the same basic choices, but more limited technologies, large prehistoric Florida populations may have on occasion chosen a similar "hold the line" strategy manifest in the continued deposition of shell into the same or nearby middens as sea rapidly lowered or rose. Shellfish species that are proxies for lower seas have been observed as deposited at the same shell midden sites as shell proxies for higher sea levels (Walker et al., 1995: 216). Populations did not necessarily need to move if alternative strategies were available. If large-scale infrastructural commitments such as at Horr's Island existed, people may have been compelled to use alternative strategies to following the shoreline. These strategies likely included new social and political networks and alliances; use of intracoastal waterways to facilitate transportation of resources at increasingly greater distances; and even greatly transforming the environment, such as building in response to sea rise, building over the water as sea level rose, or building canals to facilitate water traffic (cf. Luer, 1998: 25, 33; Wheeler, 2005).

CONCLUSIONS

The Florida archaeological record does not support the idea that cultural exploitation of coastal resources disappeared during low and oscillating sea level stands. It does support the idea that different cultures coped with sea levels changes in different ways as sea levels fluctuated. In this too brief review of the literature on coastal occupation ca. 3500 to 2500 ^{14}C yr B.P., I have tried to follow the record of shell mounds, shell rings, and large shell middens as proxies for continued, unabated, and unabbreviated coastal exploitation strategies between the Late Archaic and Early Woodland, even when there may be no current record of their existence. My supposition was that if these large features appeared before and after the proposed low stand, then it is possible that cultures of the millennium in question continued to use the basic subsistence and social practices related to their construction during any lowered of seas despite the fact that we may not be able to observe that archeological record.

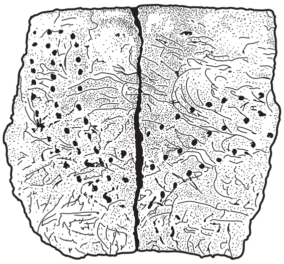
In south Florida, the use of shell rings and shell mounds is found before, after, and during the period in question This record is supports the idea that lifestyles continued similarly along the coast during the proposed low stand, and came out of it fairly intact in terms of subsistence strategies, settlement locations, and social organization. This is not to say that changes had not occurred in society in terms of their corporate rituals and architectures, but they took a while to appear. By the Middle Woodland period, far greater and more complex shell works lay adjacent to or had supplanted the earlier Archaic and Early Woodland shell rings (see Schwadron, chap. 6, this volume).

In northwest Florida, however, there is either no record or ambiguous records for these large shell features during this period. Moderately large mounded shell middens and possible rings of the Late Archaic before 3500 B.P. are found in some areas of northwest Florida, but only nonmounded shell middens reappear immediately after 2500 ^{14}C yr B.P. among Deptford sites. The in-between record, unfortunately, is sparse. A similar situation holds true for northeast Florida, where moderate as well as large Late Archaic shell mound and shell ring features are found. But only moderately sized shell middens and no shell rings have been found along the coast that date to around 2500 B.P. These data indicate that while Early Woodland people returned to the same or nearby coastal locations and exploited similar coastal resources as their Late Archaic predecessors, social and settlement traits had changed. Large public constructions such as shell rings were eschewed, and shell middens were generally smaller. The use of shell in large-scale public forums was to reappear again in both regions, but not widely until the Middle Woodland. In northwest Florida, Swift Creek and Santa Rosa–Swift Creek cultures would expand upon the tradition of mound construction and reintroduce the ring and its plaza as a forum for public ceremonies (Willey, 1949; Russo et al., 2009). In northeast Florida, a single Swift Creek ring and a number of burial mounds are known for the region whose corporate architecture is otherwise dominated by shell and sand mound constructions in the St. Johns I period. These features would receive further elaboration in the St. Johns II period, a time when the shell ring would also be reinvented (Ashley et al., 2007).

Thus, in both the northeast and northwest coasts of Florida, when the Early Woodland cultures reappear on today's coastlines, they do not seem to have carried on the same traditions as the Late Archaic coastal occupants. The local, massive pilings of shell that characterized many Late Archaic sites disappeared. Great quantities of shells continue to be found in early Woodland sites. But these shell collections are rarely conspicuously mounded. Ultimately Woodland cultures in both regions were to become ancestor venerators. Public traditions of feasting and display of food remains in large rings that characterized Late Archaic traditions were supplanted by community burial mound ceremonies. It is the mysterious and hidden record of the period 3500 to 2500 ^{14}C yr B.P. that seems to hold the answers as to why.

NOTES

1. These dates are more recent and some of the citations include dates expressed both as ^{14}C yr B.P. and cal B.P. The dates in Piatek (1994) were all processed on shell and are reported as ^{14}C yr B.P. Russo (2006) refers to ^{14}C yr B.P. chronologies. Russo et al. (2003), Saunders (2004b), and Saunders and Rolland (2005) each refer to cal B.P. determinations on shell.



CHAPTER 8

"WHAT HAPPENED TO THE SOUTHEASTERN ARCHAIC?" A PERSPECTIVE FROM ST. CATHERINES ISLAND

DAVID HURST THOMAS

This four-part paper begins by examining the unique resource structure of St. Catherines and the other composite barrier islands of the Georgia Bight. We then present a brief overview of St. Catherines Island archaeology, with a focus on key research questions, nature of fieldwork, and the current state of knowledge. We then focus on the available paleoenvironmental evidence for the terminal Archaic period along the Georgia coastline, and the human responses to those changes. The paper ends with a consideration of lingering questions and ongoing archaeological efforts directed at answering those questions.

GEORGIA'S UNIQUE (AND "FAKE") BARRIER ISLANDS

Nearly 2200 barrier islands lie along the margins of every continent on the globe (except Antarctica), protecting about 15% of the world's coastlines (Dolan et al., 1972; Schwartz, 1973; Hayes, 1979; Davis, 1985: 380; Clayton et al., 1992; Pilkey, 2003: 29; Davis and FitzGerald, 2004: 133).

Most of these barrier islands are beach ridges—long, linear wave-built barriers, punctuated by the occasional tidal inlet, and separated from the mainland by broad, shallow estuaries (Zeigler, 1959). Barrier islands are typically long, thin isolates that maintain a migratory equilibrium—moving back and forward, up and down—keeping pace with sea level, the variable sources of sand supply, wave energy, and storm overwash. Onshore winds blow huge quantities of aeolian sands across these beach-ridge barrier islands, and dune vegetation traps the sand necessary to stabilize the dune ridge. The thin, unconsolidated, and poorly developed soils generally foster stunted vegetation, which is subject to severe impacts from ocean winds, salt spray, and sometimes massive damage from tropical storms and hurricanes. Although maritime forest does sometimes grow on the backside of the larger beach-ridge barrier islands, terrestrial productivity is generally quite low and the resource patches are universally small. The typical barrier island, then, holds little terrestrial potential for the aboriginal forager; the mainland coastline provides much better access to the resource-rich estuaries, salt marshes, and swamps.

St. Catherines Island is one of 10 "composite" barrier islands that protect the modern Georgia coastline. The Georgia Sea Islands are unique accidents of sea level history, vastly different from the typical beach-ridge islands just described (Zeigler, 1959: 225–226). The "false," even "fake" barrier islands of the Georgia coastline are places where "things aren't what they seem to be" (Pilkey, 2003: 244–246).

The most ancient portion of the Georgia Sea Islands was left behind when the Pleistocene sea level peaked, then subsided. Sea level subsequently peaked again at the same level, creating a chain of paired barrier islands—an old one and a recent one—overlapped in exactly the same place. These large, "composite" islands protect enormous estuarine salt marshes, initially formed during the Pleistocene and reflooded during the Holocene sea level rise (Oertel, 1975; DePratter and Howard, 1977, 1980).

This accident of fluvial geomorphology

means that—unlike the long, narrow barriers that typify the Carolina or Texas coastlines—St. Catherines Island and the nine other composite islands of coastal Georgia are thus unique. The adjacent salt marshes and estuaries comprise one of world's richest environments—several times more productive than America's most fertile farmland (Johnson et al., 1974: 82)—with net production amounting to 2000 g/m^2/year (about 10 tons, dry weight) per acre of organics. Although the Georgia coastline is only 160 km long, it protects one-third of the salt marshes in eastern North America.

The mature maritime forest of the Georgia Sea Islands is a highly productive terrestrial counterpart to the rich littoral and marine resource base. Not only does the maritime forest produce abundant mast crops in the fall (critical to foragers and white-tailed deer populations alike), but artesian freshwater sources abound throughout the Pleistocene island core and the well-developed podsols and humate zones are admirably suitable to slash-and-burn methods of maize cultivation.

Because of the extraordinary confluence of sea levels past and present, Georgia's Sea Islands are one of the few places on the globe where these enormously productive ecosystems can be found in immediate proximity to one another, coexisting side by side as accident of maritime geomorphology (Clayton et al., 1992; Pilkey, 2003: 29; Davis and FitzGerald, 2004: 133). This potential is, of course, subject to environmental and climatic perturbations, particularly shifts in sea level (and its attendant impact on the salt marsh), coastal erosion, and catastrophic storm damage. We consider these impacts below.

AN ARCHAEOLOGY OF ST. CATHERINES ISLAND

Four overarching questions have long guided our research into the aboriginal lifeways of St. Catherines Island: (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")?

Four Decades of Fieldwork

The American Museum of Natural History has addressed these fundamental questions using a broad array of field and analytical techniques (summarized in Thomas, 2008a). We conducted a 20% probabilistic transect survey of St. Catherines Island, walking and probing for buried sites across a series of 31 east–west transects, each 100 m wide. We located 122 archaeological sites, which we tested with more than 400 1 × 1 m units. Because the transect sampling was heavily biased toward sites with marine shell, we also conducted a systematic shovel testing program and augmented these systematic surveys with a direct shoreline reconnaissance (mostly following the Late Holocene surfaces), recording roughly 84 additional shoreline sites. By plotting the distribution of these known-age sites across the Holocene beach ridges, we have developed a detailed sequence documenting the progradation and erosion of beach ridge complexes adjacent to tidal estuaries and oceanward shorelines on St. Catherines Island.

To establish temporal controls on the 1000+ test explorations and excavations, we have processed nearly 300 radiocarbon determinations for St. Catherines Island, including two dozen dates on "modern" molluscs (known-age specimens collected prior to atomic bomb contamination) to compute a "reservoir" correction factor specific to the estuaries around St. Catherines Island. One hundred and ten of these dates (from 31 distinct mortuary and midden sites) were directly associated with datable ceramic assemblages, which were classified according to Chester DePratter's (1979a, 1991) northern Georgia coast chronology. By comparing the results of typological classification with the radiocarbon evidence currently available from St. Catherines Island, we propose a slightly modified ceramic chronology for St. Catherines Island (table 8.1).

We analyzed the seasonal growth increments in modern hard clams (*Mercenaria mercenaria*) for a nine-year interval (beginning in 1975). *Mercenaria* suitable for seasonal analysis were recovered from nearly 85% (110 of 130) of the sites identified and sampled in the islandwide survey. We analyzed about 2000 individual hard clamshells recovered from these shell middens and, of these, 1771 individual specimens (or

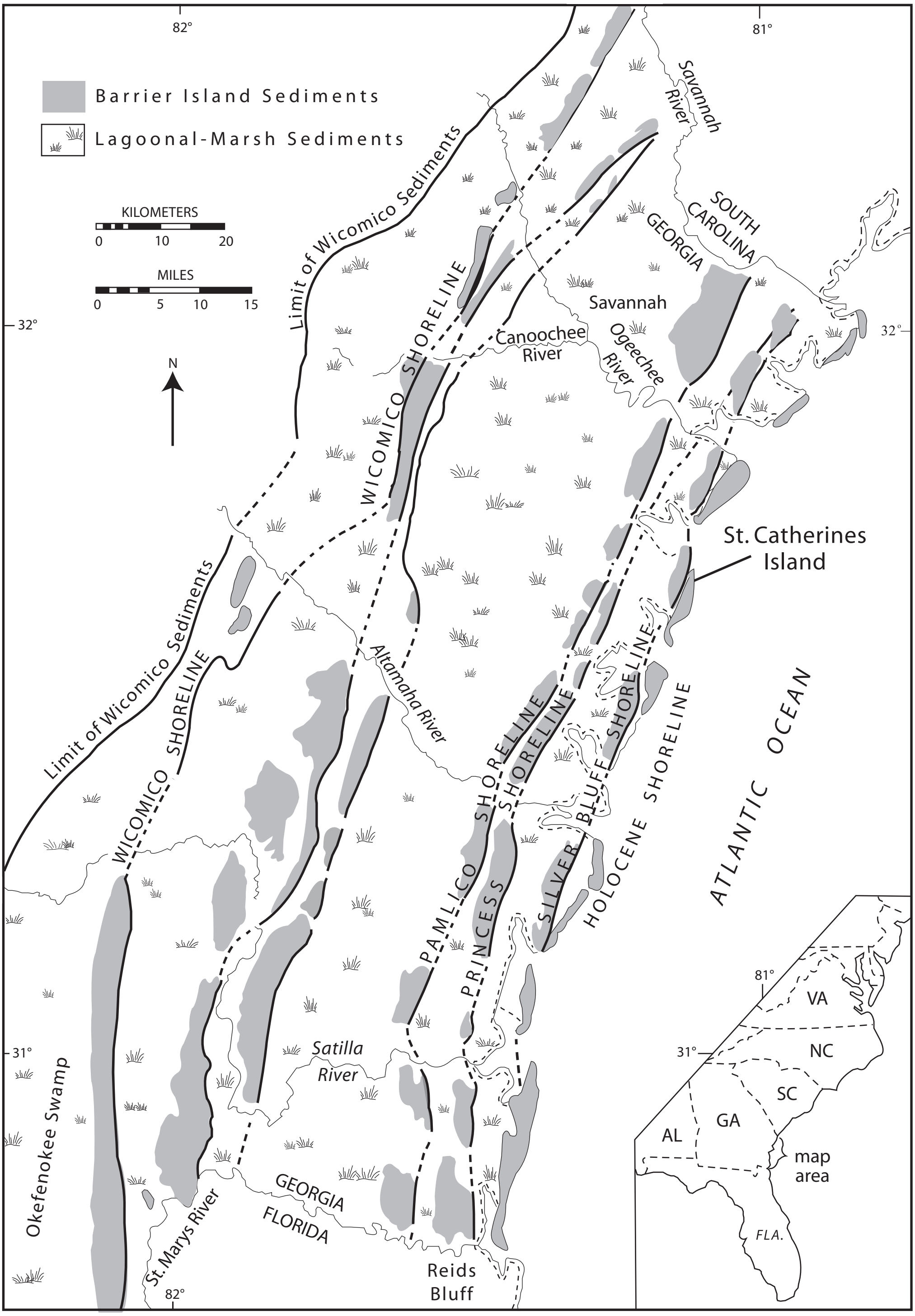


Fig. 8.1. Location of St. Catherines Island showing the Silver Bluff composite islands and five earlier Pleistocene shorelines. (After Hails and Hoyt, 1969)

TABLE 8.1

Comparison of the Northern Georgia Coast

(DePratter 1979a: table 30, as modified by DePratter 1991: table 1) and the St. Catherines Island chronologies (after Thomas, 2008a: table 15.3.)

Phases	Northern Georgia Coast	Northern Georgia Coast	St. Catherines Island
	chronology	chronology	chronology
	age (uncalibrated)	age (calibrated)	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.

fragments) provided usable growth increment estimates, enabling us to address seasonal patterns during the 5000 years of human history (O'Brien and Thomas, 2008). This study is reinforced by an oxygen isotope study of modern and ancient clams from St. Catherines Island (Andrus and Crowe, 2008).

The transect survey produced an extensive and diverse set of vertebrate faunal remains collected systematically from archaeological sites tested across the entire island. Elizabeth Reitz and her colleagues analyzed this vertebrate faunal assemblage, which contains at least 586 individuals represented by 14,970 vertebrate specimens (Reitz, 2008; Reitz and Duke, 2008).

An intensive program of bioarchaeology recovered the remains of more than 725 individuals from 18 archaeological sites on St. Catherines Island. More than 90% of these remains were analyzed by Clark Spencer Larsen and his colleagues, using a variety of microscopic, biomechanical, and stable isotopic techniques (Larsen, 1982, 1990, 2001; Schoeninger et al., 1990).

We have recently synthesized the archaeology of St. Catherines Island using a broad-based theoretical approach grounded in the general paradigm of human behavioral ecology, drawing upon three basic models (Thomas, 2008a: chaps. 7–10). The *diet-breadth (or prey choice) model* addressed the issue of which foods an efficient forager would harvest from all those available on St. Catherines Island. Diet-breadth models predict that foragers will optimize the time spent capturing prey, and employ the simplifying assumptions that all resources are randomly distributed (without patches) and that "capture/handling" and "search" times represent the sum total of all time spent foraging. We also apply the *patch choice model*, which, combined with the central limit theorem, predicts that foraging effort will correlate directly with efficiency rank order, meaning that foragers should spend more time working the higher-ranked patches and less time in patches with lower energetic potential. Finally, we likewise employ the *central place foraging* model to investigate the time/energy spent processing resources at temporary camps before transport to a residential base. For several years, we have also conducted a series of optimal foraging experiments on St. Catherines Island, specifically addressing procurement and return rates for key marine and terrestrial resources that would have been available to aboriginal foragers on St. Catherines Island.

Current Thinking

Several demographic and social trends emerge from this longitudinal examination of St. Catherines Island archaeology (Thomas, 2008a: chaps. 32–35):

- The biogeography of St. Catherines Island is such that foragers could systematically search and exploit resources in any patch on the island and return home each night. This conclusion is based on a strictly terrestrial modeling of effective foraging radius. Use of watercraft (which we think was extensive during all time periods) would have vastly extended the effective foraging radius, enabling foragers to return to their home base virtually at will.
- During the initial occupation of St. Catherines Island, Late Archaic foragers (3000 cal B.C.–1000 cal B.C.) established central place settlements exclusively on first-tier habitats located on the Pleistocene island core. As human population increased, so did the progressive utilization of fragmented, second-tier habitats, suggesting a significant intensification in provisioning strategies.
- A variety of proxy measures demonstrate that the aboriginal population of St. Catherines Island expanded exponentially from the earliest human footprint (about 3000 cal B.C.) to the abandonment of Mission Santa Catalina de Guale (in A.D. 1680).
- The diet-breadth model predicts that as human population densities increase, the availability of high-ranked prey species should decrease. This did not happen with white-tailed deer populations on St. Catherines Island, where venison remained a staple throughout the aboriginal period. There is a shift from larger fish (individuals weighing more than 1 kg) to smaller saltwater fish through time, but the reason for this change remains unclear. The adoption of maize cultivation after cal A.D. 1300 probably does not represent a broadening of diet breadth (because for millennia, St. Catherines islanders had exploited several shellfish taxa with return rates comparable to those for maize cultivation).
- Central place foraging theory predicts that aboriginal foragers should have positioned their residential bases to maximize the net returns, given the pursuit, handling, and transport costs of resources across different patches (effectively balancing out different fitness and foraging objectives of males and females). Specifically, primary *marshside* settlements were projected along the intersection of the two highest ranking patches, on the high ground fringing the maritime forest and the salt marsh. The probabilistic, islandwide archaeological survey demonstrates that the placement of more than 80% of the archaeological components (from all time periods) is fully consistent with the marshside settlement model derived from central place foraging theory.
- The common scenario of increasing sedentism through time probably does not hold for the 5000-year-old record on St. Catherines Island. Seasonality indicators, settlement pattern distributions, and intensification of occupation proxies indicate that St. Catherines islanders employed predominantly a collector mobility strategy of logistical movement from the Late Archaic until the Spanish *reduccíon* policy aggregated the aboriginal population at Mission Santa Catalina de Guale.
- Bioarchaeology documents the progressive decline in health and spread of infectious disease among aboriginal foragers and farmers over the past 2000 years.
- Mortuary evidence indicates that an egalitarian social network (involving leadership without inherited authority) was practiced during the Deptford–Wilmington periods (350 cal B.C.–cal A.D. 800) on St. Catherines Island.
- Mortuary evidence also demonstrates that after cal A.D. 800 (the onset of the St. Catherines period), leadership and social status were ranked in a despotic system of inherited asymmetry.
- Significant maize cultivation began during the subsequent Irene period (sometime after cal A.D. 1300 and prior to European contact in the 1560s).
- Human behavioral ecology suggests that

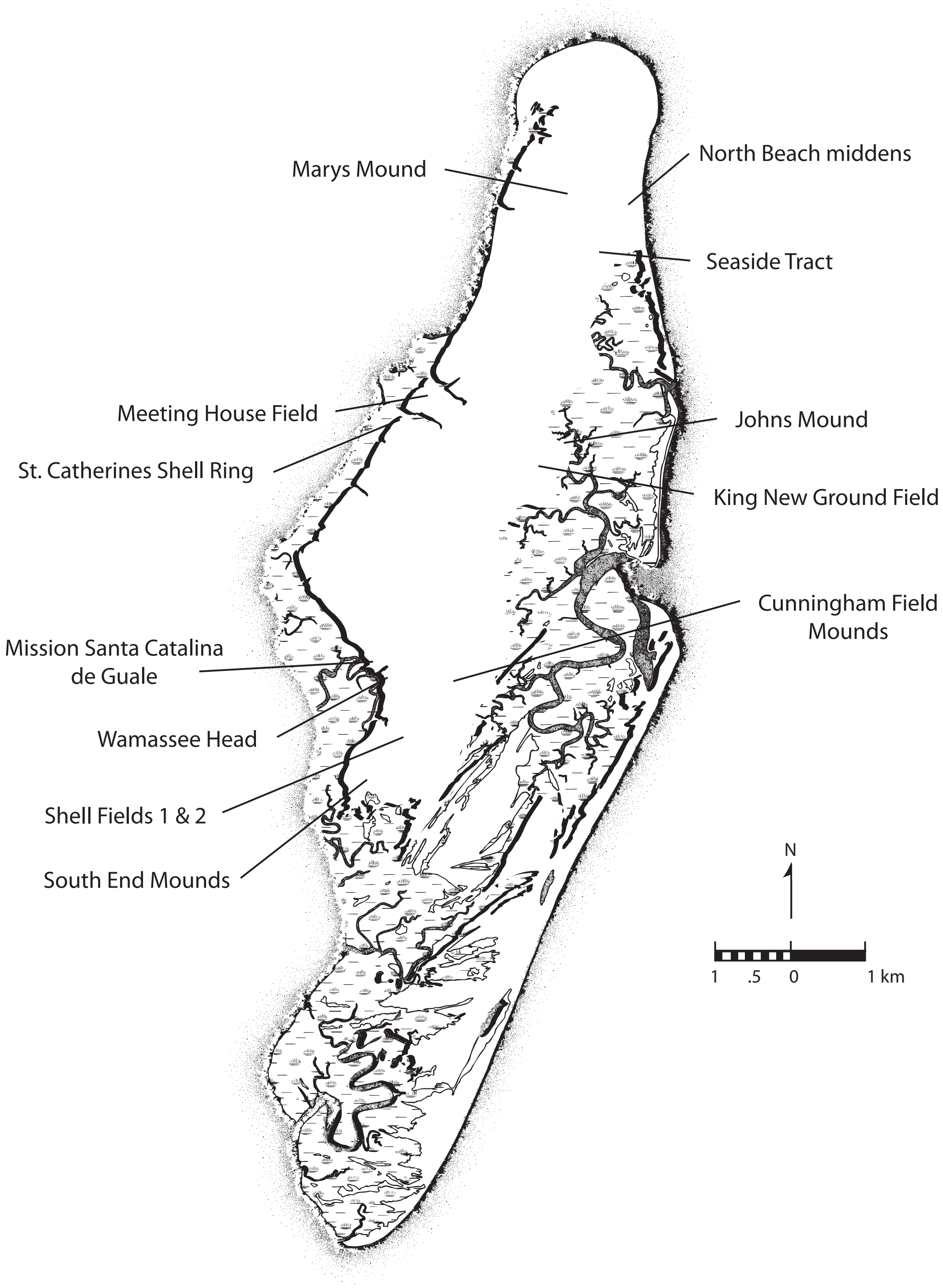


Fig. 8.2. Some important archaeological sites on St. Catherines Island, Georgia.

the optimal placement of central places should respond to the changing geography and geomorphology of St. Catherines Island. Over a five-millennium timespan, the shifting energetic cost–benefit considerations relative to the evolving geomorphic configuration of St. Catherines Island—not the introduction of maize-based cultivation—conditioned the distribution of archaeological sites during the Irene period (cal A.D. 1300–1580).

- Bioarchaeological evidence indicates that the ideological principle of ranked, inherited asymmetry predated significant maize cultivation on St. Catherines Island (which postdates cal A.D. 1300).

The archaeological and bioarchaeological evidence defines two critical transitions in the aboriginal lifeways on St. Catherines Island: The relatively abrupt shift from an egalitarian ethos to inherited asymmetry and an apparently rapid transition from forager to forager/farmer. It is clear that ranked social status developed prior to the adoption of significant maize cultivation on St. Catherines Island.

Against this general background, we turn to the specifics of the Third Caldwell Conference: *What happened to the southeastern Archaic?*

SHIFTING SEA LEVEL ON THE GEORGIA BIGHT

Sea level shifted considerably during the Holocene and these changes have defined the shape of the South Carolina/Georgia/Florida coastline. Due to the shallow inclination of the continental shelf—about a 2% gradient (meaning a change of 1 m of depth for every 20 km of distance; Miller, 1998: 43)—even relatively minor changes in sea level were accompanied by significant horizontal displacement of the shoreline. Such rapid changes can readily destabilize the coastal ecosystem.

With sea level rise averaging about 1 cm/year, the coastlines of the Early Holocene must have been remarkably unstable (Colquhoun et al., 1981; Davis, 1997: 157–158). About 5500 cal B.C. (7000 cal B.P.), the rate of rise slowed to about 3 mm/year; but due to the shape of the continental shelf, the shoreline at Sarasota (Florida), for instance, would still have moved about 300 m/century, a migration much too rapid for the formation of large and relatively stable barrier islands.

By about 3000 cal B.C., as the sea level rise along the Georgia Bight slowed and approached present levels, the coastal Georgia landscape must have looked quite similar to that of today (DePratter and Howard, 1977; Oertel, 1979; Colquhoun et al., 1980; Howard and Frey, 1980; Miller, 1998: 39; Booth et al., 1999a, 1999b). Gayes et al. (1992: 159, fig. 6) have determined that the Late Holocene highstand began with a transgressive, 2 m rise in sea levels between 3300 cal B.C. and 2300 cal B.C. (5300 and 4300 cal B.P.). This was followed by a regressive phase, during which sea levels fell 2 m from 2300 cal B.C. to cal 1600 B.C. (4300 cal B.P. to 3600 cal B.P.). The rate of both rising and falling sea level during this period was 50 cm/100 year (Gayes et al., 1992: 159; fig. 6). Since 1600 cal B.C. (3600 cal B.P.), sea levels have risen slowly and steadily at a rate of 10 cm/century (until the present). Figure 8.3 recapitulates this formulation upon which we will model the expectations for St. Catherines Island archaeology.

Under such relatively stable conditions, the combined forces of waves, tides, and longshore transport molded a complex mix of barrier islands, inlets, estuaries, and marshes that today define the South Carolina, Georgia, and Florida coastline. Stream gradients were reduced and stabilized, and the coastal biota was essentially modern, in a landscape considerably wetter than before (DePratter and Howard, 1980).

The presence of this offshore beach ridge system, some of it "welded" onto Pleistocene island cores, caused the barrier islands to grow seaward, typically assuming the characteristic butterfly, "double island" configuration still evident on Wassaw, Ossabaw, and St. Simons islands (see Thomas, 2008a: chap. 9). Behind the barrier islands, bays gradually filled, fostering the formation of the extensive salt marsh system, with its tidal creeks and estuaries.

Despite the relative stability in Late Holocene sea levels and associated landforms, some significant (if less pronounced) fluctuations were yet to come (Fairbridge, 1961a; DePratter and Howard, 1980: 33; Brooks et al., 1989: 96; Miller, 1998: 39)—and these changes had serious implications for foragers living on the "fake" barrier islands of the Georgia Bight.

THE LATE ARCHAIC–WOODLAND TRANSITION

During the Late Holocene transgression, the landscape available to the St. Catherines Island

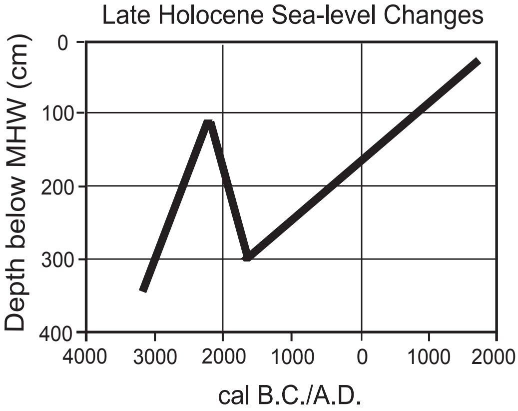


Fig. 8.3. Sea level fluctuations extrapolated from radiocarbon evidence obtained from Murrells Inlet along the northern coast of South Carolina. (After Gayes et al., 1992: fig. 6)

forager blossomed, with high-ranking marine patches developing in close proximity to longstanding terrestrial patches, thereby minimizing transport costs from centrally placed residential bases. But when the sea level dropped dramatically, as we believe it did, the estuarine oyster beds along the western margin of St. Catherines Island must have been heavily impacted. If patches of oyster beds survived at all, they did so at significantly diminished levels; any Late Archaic foragers exploiting this vastly reduced shellfishery would have created archaeological sites that are today either eroded away or buried beneath 2 m of more recently deposited salt marsh sediments.

These same fluctuating environmental constraints created a vastly different ecological setting on the oceanfront side of St. Catherines Island. A new barrier island formed offshore, protecting a vast, new saltwater marsh and providing foragers with an alternative source of salt marsh resources. The formation and subsequent disappearance of Guale Island and Guale Marsh likewise had a major impact on the behavior of St. Catherines Island foragers and the archaeological record they left behind.

The islandwide survey identified 10 archaeological components dating to the St. Simons period (3000 cal B.C.–1000 cal B.C.), all but 1 of them along the eastern Pleistocene core (Thomas, 2008a: table 30.2). From a landscape perspective, the probabilistic survey of St. Catherines Island documented a Late Archaic presence in 29 places. Since that time, we have also discovered the McQueen Shell Ring (fig. 8.4).

The reader is referred to chapter 3 (Sanger and Thomas, this volume) for a description of past and ongoing research at the two Late Archaic shell ring sites on St. Catherines Island: the St. Catherines Shell Ring (9Li321), and the McQueen Shell Ring (9Li1648). The present discussion attempts to place these preliminary results in a broader context relative to the objectives of the Third Caldwell Conference.

Fifteen archaeological components are known from the Refuge-Deptford period (1000 cal B.C.–cal A.D. 350) on St. Catherines Island, all but one of them along the eastern Pleistocene core (Thomas, 2008a: table 30.2). The probabilistic transect survey documented a Refuge-Deptford presence at 42 localities (Thomas, 2008a: fig. 29.3; tables 20.1 and 20.2).

GEOCHRONOLOGY

Modern St. Catherines Island formed shortly after 3000–2650 cal B.C. when sea level rose sufficiently to isolate the Pleistocene core from the mainland. By 2500 cal B.C., Guale Island protected the northeastern portion of St. Catherines Island, effectively buffering that shoreline and protecting a large interisland marshland extending along the Yellow Bank Scarp. The tidal creeks that meandered through Guale Marsh provided immediate access to this rich shellfishery and produced a mosaic of meander bends and levees along the creek beds (Rollins et al., 1990; Linsley, 1993: 72; see also Thomas, 2008a: chap. 3). During the St. Simons period, Guale Marsh extended southward to Middle Beach, as indicated by exposures of relic marsh muds between Seaside and McQueens inlets (West et al., 1990).

Vibracore samples from Cracker Tom Hammock included an oyster bed dating 1830–1530 cal B.C. (UGA-6442) and these marine conditions were soon followed by modern marsh and hammock communities and an increasing terrestrial environment (Booth, 1998: 90; Booth et al., 1999a, 1999b). The palynological record documents the progressive southward expansion of accretionary terrains “with a strong freshwater influence that even exceeds that of the present day” (Booth et al., 1999a: 85). We estimate that the maximum extent of progradation reached

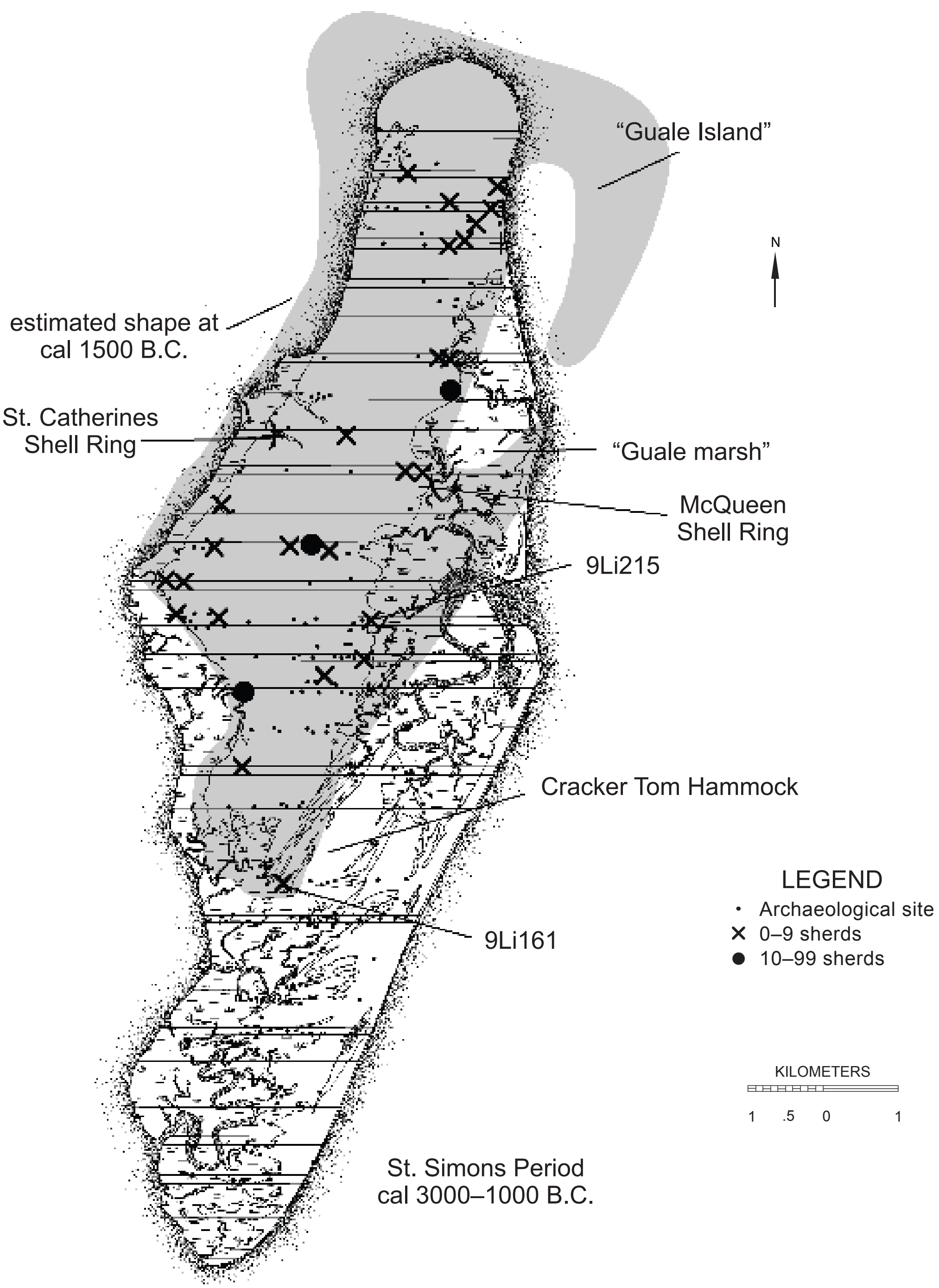


Fig. 8.4. The distribution of known St. Simons period sites on St. Catherines Island.

the western margin of Cracker Tom Hammock by 1500 cal B.C., near the end of the St. Simons period (Thomas, 2008a: figs. 29.2 and 29.8).

Sea level peaked, then began to drop during the first half of the St. Simons period (DePratter, 1975, 1977; DePratter and Howard, 1977, 1980, 1981; Brooks et al., 1986; Gayes et al., 1992; see also Thomas, 2008a: chap. 4, fig. 32.1). From a localized highstand at 2300 cal B.C. (roughly 130 cm below Mean High Water), sea level dropped about 2 m (at a rate of 50 cm/century). Such lowered sea level likely modified the sedimentary dynamics of the Georgia Sea Islands, affecting the back island marshes most dramatically (including the western margin of St. Catherines Island) by draining expanses of low marsh and causing some degree of downward erosion (incisement) of larger tidal creek channels. Some degree of progradation of Guale Island and seaward expanse of Guale Marsh might have occurred.[1]

During the Refuge-Deptford period, Guale Island survived along the northeastern margin of St. Catherines Island and additional beach ridges had accumulated along the southeastern shoreline, extending beyond the modern Cracker Tom Hammock and arching northward past the contemporary McQueens Inlet (Linsley, 1993: Thomas, 2008a: figs. 29.1, 32.3). Although still buffered from the Atlantic Ocean by Guale Island, Guale Marsh expanded markedly to the southwest, extending into McQueens Inlet and perhaps as far south as the Middle Settlement/Cemetery Road area. Numerous beach ridges also formed along the island's northern end, and, except for a remnant spur of island core to the northwest, the western shoreline approximated its modern configuration.

Beginning about 1600 cal B.C. and continuing throughout Refuge-Deptford times, sea level began rising slowly (at a rate of 10 cm/century), from a low-water mark of roughly 3 m below MHW. Marshland resources along the eastern margin of St. Catherines Island diminished (due to the eventual overtopping of Guale Island and disappearance of Guale Marsh), and estuarine marshlands reappeared along the entire western margin of the island.

The Radiocarbon Chronology

A quarter century of archaeological investigations on St. Catherines Island generated a database of 116 "cultural" radiocarbon dates (dubbed the "2005 Database" in Thomas, 2008a, chap. 16; fig. 8.5). The cumulative probabilities of these ^{14}C samples demonstrated a decidedly nonrandom distribution of the radiocarbon record across the 5000 years of aboriginal occupation. Whereas some time periods had distinctive peaks of multiple radiocarbon dates, other "gaps" denoted time spans for which ^{14}C dates were rare (or even absent, Thomas, 2008a: fig. 16.11). Since 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 (Thomas, 2008a: chap. 16). Specifically, "Gap A" denoted the obvious lack of St. Simons period radiocarbon dates (significantly below the 1σ level of the overall probabilistic distribution), with dates especially underrepresented at 2500 cal B.C. and 1500 cal B.C. Radiocarbon dates were also quite rare from the succeeding Refuge period (immediately post-1000 cal B.C.).

Despite the relatively large sample size, we were concerned about the sampling biases involved in the 2005 radiocarbon database. After deconstructing our motivation for selecting the specific samples to be processed as ^{14}C dates (in Thomas, 2008a: chap. 16), we isolated two major research strategies that had guided this selection: (1) defining chronostratigraphy during mortuary and midden excavations and (2) providing absolute chronological controls of the northern Georgia ceramic chronology. Because these two research strategies so heavily conditioned which samples we dated, all potential radiocarbon samples clearly did not share an equal probability of selection (a hallmark of unbiased, randomized sampling). Beyond these obvious sampling biases, we were also concerned about the stochastic distortions involved in the marine and terrestrial calibration curves because the very process of "calibrating" radiocarbon dates introduces its own peak-and-valley configuration (even within a continuous, uniformly sampled series of dates).

This is why, in 2006, we processed nearly five dozen additional radiocarbon determinations, which were individually targeted to "fill the gaps" evident in the radiocarbon record of St. Catherines Island (Thomas, 2008a: chap. 16, fig. 16.12). And specifically with reference to the current objectives of the Third Caldwell Conference, we addressed the peaks-and-gaps evidence in the distribution of ^{14}C determinations during the St. Simons interval (3000–1000 cal

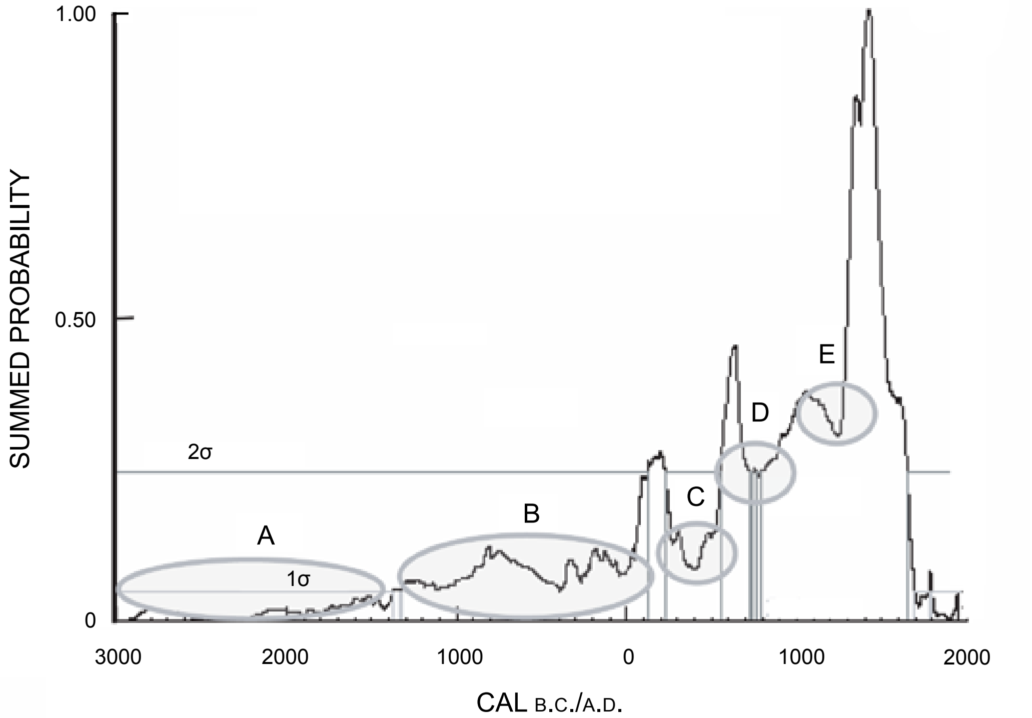


Fig. 8.5. The probability distribution of the 2005 dataset, with 116 radiocarbon dates from St. Catherines Island.

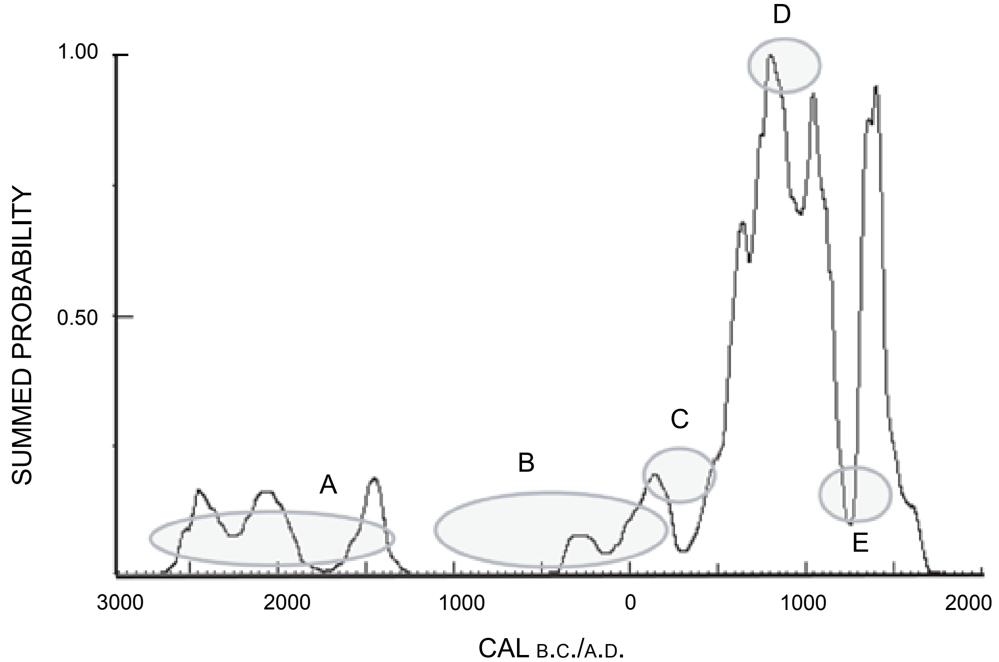


Fig. 8.6. The probability distribution of the 2006 dataset, with 49 additional dates from St. Catherines Island.

B.C.) and immediately thereafter.

Since the previous discussion was published (Thomas, 2008a: chap. 16), we processed several additional radiocarbon samples from both the St. Catherines and McQueen shell rings. Chapter 3 (Sanger and Thomas, this volume) summarizes and discusses all of the radiocarbon dates currently available from the St. Catherines and McQueen shell ring.[2]

The testing and retesting of radiocarbon dates from St. Catherines Island have produced some assurances and some surprises. The cumulative radiocarbon record for the St. Simons period shows several distinct trends:

- Significant quantities of shell midden accumulated on St. Catherines Island during the millennium following 2500 cal B.C.
- Very few marine shell radiocarbon dates (only eight of more than 150) from St. Catherines fall between 1350 cal B.C. and 120 cal B.C. Of these, only two marine dates (Beta-20822 and Beta-21406) derive from primary midden contexts; the remaining six marine shell dates come from mortuary features, which are apparently secondary deposits and perhaps reflect long-distance transport.
- With respect to both the late St. Simons and early Refuge periods, roughly two-thirds of the ^{14}C dates produce age estimates significantly later than the apparently associated Late Archaic ceramic assemblages.
- Conversely, none of the radiocarbon dates associated with later ceramic periods produced ^{14}C dates from the late St. Simons/early Refuge-Deptford periods.

Thus, despite concerted efforts to fill the Late Archaic gap in ^{14}C dates, we can only consistently generate radiocarbon determinations that span the first two-thirds of the St. Simons interval (ca. 2500 cal B.C.–1350 cal B.C.), and part of this distribution is quite spotty and uneven (esp. 1900 cal B.C.–1530 cal B.C.). During the 1000-year-long interval beginning about 1350 cal B.C., marine radiocarbon dates are conspicuously lacking from any contexts on St. Catherines Island (fig. 8.7).

Conversely, many of the marine shell samples *apparently* associated with St. Simons and early Refuge-Deptford period ceramics actually produce much later ^{14}C age estimates. This systematic error seems to reflect the general lack of shell deposits dating to the time span 1350 cal B.C.–200 cal B.C. (despite the presence of fiber-tempered and Refuge-Deptford period ceramics).

This hiatus in shell midden deposition is perhaps the major archaeological anomaly identified during our three decades of archaeological fieldwork on St. Catherines Island. Figure 8.7 plots the pooled probability distribution for all of the marine ^{14}C dates available for the St. Simons period on St. Catherines Island against the contemporary sea level changes (per the projections in Thomas, 2008a: chap. 4). The distinctive dating cluster during the early St. Simons period (ca. 3000 cal B.C.–2000 cal B.C.) defines a period of rising sea level, peaking at about 2300 cal B.C., then dropping at a rate of 50 cm/century. This early St. Simons dating cluster consists almost entirely of ^{14}C dates from the western marshside, six from the St. Catherine Shell Ring (9Li231) and the other from 9Li137 (2400 cal B.C.–1020 cal B.C.).

Between 2000 cal B.C. and 1500 cal B.C., sea level change reverses and so does the frequency distribution of radiocarbon dates on marine shell. We think that the estuarine marsh significantly retreats (and perhaps disappears entirely) during this period and this is why Late Archaic sites dating to this interval are absent along the western margin of St. Catherines. Significantly, each of the remaining six ^{14}C dates (Thomas, 2008a: fig. 32.1) from the Late Archaic period dating post-1500 cal B.C. derived from archaeological sites along the eastern margin of St. Catherines Island. This important paleoenvironmental shift has clear-cut consequences for the human settlement of the St. Simons period.

The probability distribution of the 116 radiocarbon dates in the 2005 dataset also contained a distinctive valley (Gap B) evident during the Refuge–Early Deptford period (1000 cal B.C.–200 cal B.C.; Thomas, 2008a: chap. 16). Because the 2005 dataset lacked shell midden dates during the Refuge and early Deptford periods, we submitted 10 additional ^{14}C samples to explore the nature of this gap (Thomas, 2008a: chap. 16). Three of these samples did indeed fall within the expected middle and late Deptford period (100 cal B.C.–cal A.D. 300) and one radiocarbon date (Beta-215818), unassociated with diagnostic ceramics, dated to 400–80 cal B.C. But the remaining radiocarbon samples processed in 2006 derive from significantly later time periods.

In other words, despite our concerted efforts, *The Refuge–Early Deptford period (Gap B: 1000 cal B.C.–200 cal B.C.)* remains a significant hiatus in the cultural radiocarbon record of St. Catherines

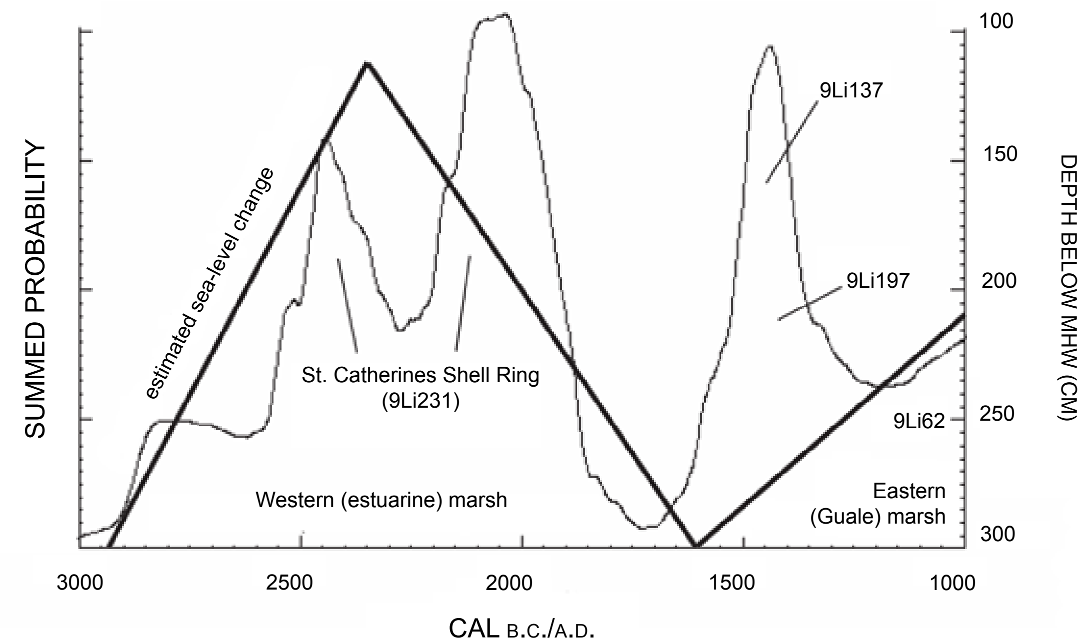


Fig. 8.7. The cumulative probability profile of marine radiocarbon samples available from the Late Archaic (St. Simons) period on St. Catherines Island, projected against estimated sea level changes for the same time period.

Island. Except for the samples from 9Li228, all of the dated marine shells that were apparently associated with Refuge–Early Deptford period sherds actually accumulated much later. This systematic bias reflects the scarcity of Refuge- and Early Deptford–age shell deposits (even in the presence of Refuge-Deptford period ceramics) and reinforces the impact of changing sea level on the marine resources surrounding St. Catherines Island.

This important trend is illustrated in figure 8.8, which explores the probability distribution of the 29 available ^{14}C determinations on marine shell from the Refuge-Deptford period (1000 cal B.C.–cal A.D. 350). As discussed above, changing sea level shifted the position of marshlands surrounding St. Catherines Island during the preceding St. Simons phase. The initial human settlement began along the western (estuarine) Walburg Scarp, but after sea level dropped more than 3 m, the estuarine marshland disappeared and the St. Simons settlement pattern shifted eastward to the margins of Guale Marsh.

This trend continues into the Refuge and subsequent Deptford period (fig. 8.8). During the Refuge period (1000 cal B.C.–350 cal B.C.), sea level rises gradually, but ^{14}C dates are entirely absent during this interval (apparently reflecting the scarcity of Refuge-age marshlands, at least along the estuarine margin of St. Catherines Island). The only Refuge period radiocarbon dates on St. Catherines Island derive from mortuary contexts.

LATE ARCHAIC AND EARLY WOODLAND LANDSCAPES

We employed central place foraging theory to estimate settlement positioning on St. Catherines Island. All else being equal, we expect that St. Catherines Island foragers should have situated their residential bases to maximize the net central place foraging returns with respect to the pursuit, handling, and transport costs from different patches.

Combined with prey-choice and patch-choice models, central place foraging theory suggests that—regardless of changes in diet breadth—the estuarine and inland salt marshes should be the highest ranking patch type available on St. Catherines Island, followed closely by the maritime forest (both patches far outstripping the sandy beach and the ocean front patch types). As argued elsewhere (Thomas, 2008a: chap. 11), aboriginal residential bases should be positioned to maximize the average central place foraging returns (relative to the costs associated with pursuit, handling, and transport costs). Despite potentially conflicting goals between male and female foragers, we hypothesized that foraging populations should select central place locations that maximize the highest combined rate that both men and women can return to everyone living there (Zeanah, 2004: 20–21; Kennett, 2005).

Central place foraging theory projects that *marshside settlements* should be sited in optimal places along the intersection of the two highest-ranking patch types—specifically positioned along the stabilized dune remnants that fringe the maritime forest, immediately adjacent to the salt marshes and the tidal streams that drain them. So situated, marshside settlements offer ready access to the highest ranking marine and terrestrial patch types, each of which supports multiple suites of high-ranking plant and animal food resources (figs. 8.9 and 8.10).

In addition to the estuary along its western margin, which characterizes all the barrier islands of the Georgia shoreline, St. Catherines Island hosts a second major salt marsh system along the seaward shoreline. McQueen salt marsh, which today covers approximately 13.5 km^2, is protected from high-velocity tidal surges by a series of prograding sand spits, shoals, hammocks, washover fans, and aeolian dunes. One cannot overestimate the importance of the McQueen salt marsh (and its prehistoric precursor, Guale Marsh, further north) to the aboriginal forager. More than 80% of the

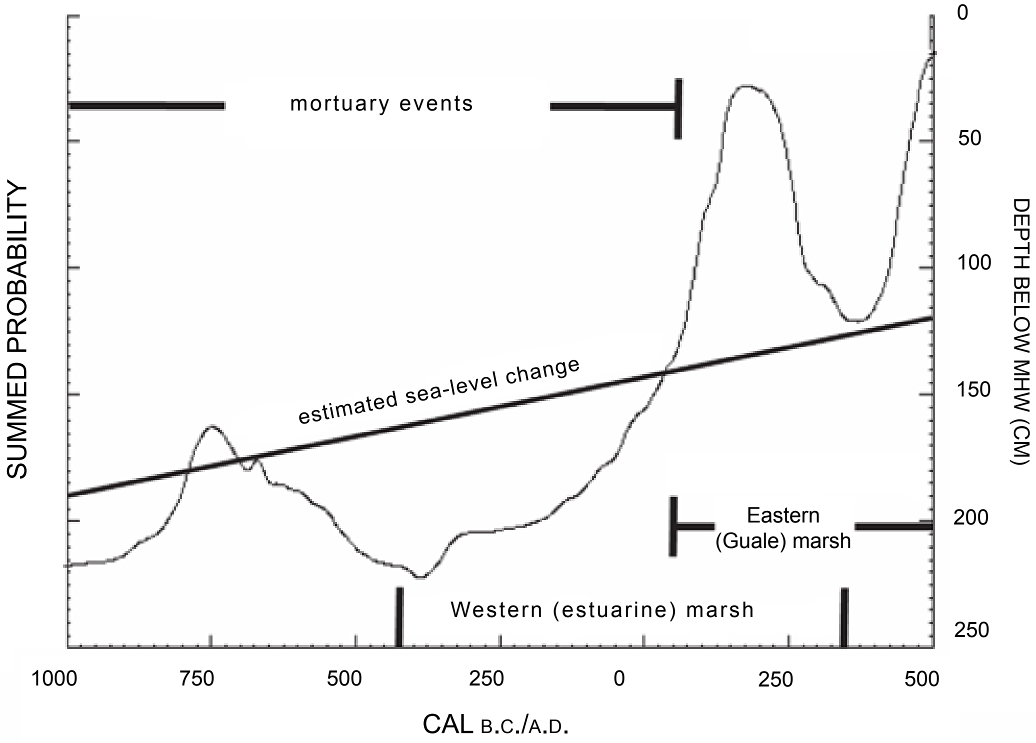


Fig. 8.8. The cumulative probability profile of marine radiocarbon samples ($N = 29$) available for Refuge-Deptford contexts on St. Catherines Island, compared with estimated sea level changes and duration of contemporary mortuary events.

maritime forest edge on St. Catherines Island fronts directly on the margin of a significant salt marsh—effectively doubling the number of optimally positioned central places (fig. 8.9).

These optimally positioned marshside settlements define parallel bands of probability that run along the edge between the highest ranking patch types, projecting most probable locations for each optimally positioned central place. All else being equal, marshside settlements should produce the highest central place foraging rates because they maximize access to the two highest ranking patch types. Further, the variances associated with marshside settlements should be asymmetrical—steeper toward the scarp defining the salt marsh/maritime patch margin, then trailing off within the terrestrial habitats. The scarp between the salt marsh and the maritime high ground is defined by the upper reach of the spring tides, effectively creating an abrupt, one-way barrier that prohibits potential settlements situated closer to the marsh; central places located in more inland patches of maritime forest are not conditioned by such intertidal barriers.

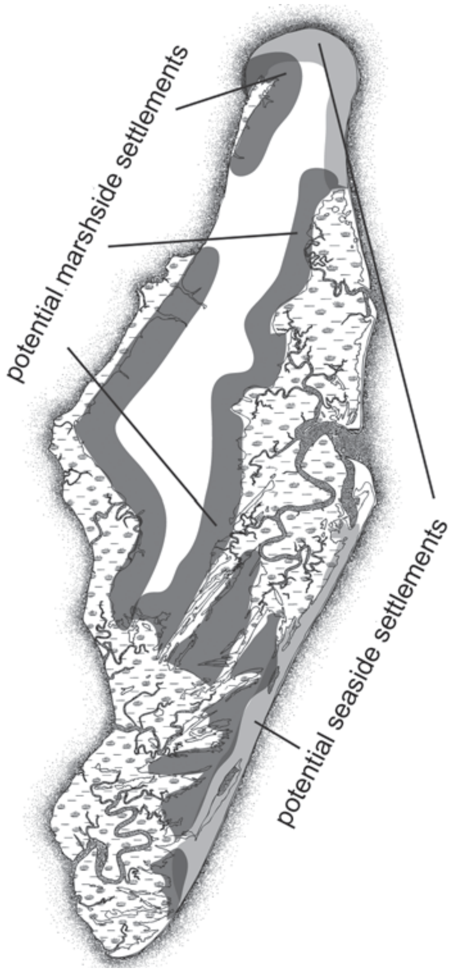


Fig. 8.9. Projected potential distributions of marshside settlements (central places with direct access to the three highest ranking patch types—the salt marsh, the maritime forest, and the offshore) and seaside settlements on St. Catherines Island.

Western Marshside Settlements: The most conspicuous marshside settlement dating to the Late Archaic period is the St. Catherines Shell Ring (9Li231), the oldest known human presence on St. Catherines Island. Working in consultation with Chester DePratter, we located and tested 9Li231 during the islandwide probabilistic survey. Subsequent test pits produced only undecorated fiber-tempered ceramics and the two ^{14}C dates falling into the early St. Simons period. The American Museum returned to the St. Catherines Shell Ring in 2006 to initiate long-term archaeological investigations; this follow-up mapping and excavation disclosed that 9Li231 is a complete (and perfectly circular) shell ring.

The St. Catherines Shell Ring is similar to many other Late Archaic sites known along the Georgia Bight (esp. Waring and Larson, 1968; Marrinan, 1975; DePratter, 1975; Russo, 1996a; Sassaman and Ledbetter, 1996; Thompson et al., 2004; Thompson, 2006). DePratter and Howard (1980: fig. 15) suggest that whereas shell rings may have existed on both side of the barrier islands in coastal Georgia, the surviving shell rings tend to occur exclusively on the estuarine side of Pleistocene barrier islands.

The stratigraphy of the St. Catherines Shell Ring is complex and not fully understood at present. We have already presented the 35 radiocarbon dates currently available from the St. Catherines Shell Ring (Sanger and Thomas, this volume, table 3.1). Based strictly on marine shell dates ($N = 13$), the 2σ limits are 2860 cal B.C.–1910 cal B.C. (1σ limits: 2560–2030 cal B.C.). The five charcoal dates provide comparable age estimates: 2860 cal B.C.–2140 cal B.C. (2σ limits) and 2470 cal B.C.–2210 cal B.C. (1σ limits).[3] The

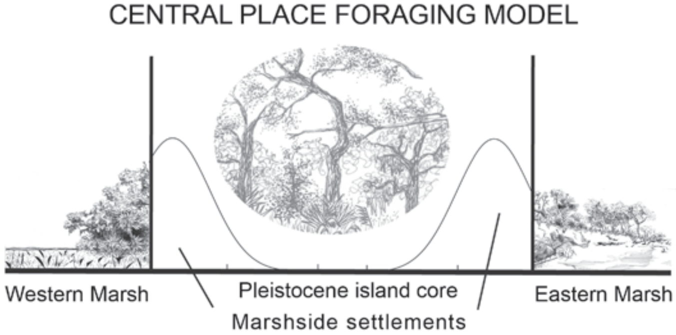


Fig. 8.10. The Central Place Foraging Model hypothesizes that Marshside Settlements should be distributed, in approximately normal fashion, within the mature maritime forest, but bordering the eastern and western marshlands of St. Catherines Island.

pooled age estimates for the St. Catherines Shell Ring are 2860 cal B.C.–1940 cal B.C. (1σ limits) and 2560 cal B.C.–2060 cal B.C. (1σ limits).

When the St. Catherines Shell Ring was initially occupied, sea level was apparently rising at a rate of roughly 50 cm/century (per above discussion). The carbonate-rich Pleistocene core of St. Catherines Island had long fronted the open Atlantic Ocean, anchoring high foredunes that prevented overwashing and landward migration (Hayes, 1994). As the sea continued to rise, saltwater flooded previously freshwater lagoons as the intertidal zone shifted inland, creating new estuarine tidal flats, marshes, and back-barrier bays, reflecting the tidal range and the tide/wage energy balance of the Georgia Embayment (Crusoe and DePratter, 1976; Bahr and Lanier, 1981; Davis and Hayes, 1984; Davis, 1997: 158). The juxtaposition of the high-ranking resources of the Pleistocene core (especially the mast crop and newly isolated white-tailed deer herds) and the equally high-ranking saltwater marsh provided human foragers with an extraordinarily diverse and closely spaced set of marine and terrestrial patches.

Then as now, the St. Catherines Shell Ring was perched along the westernmost (estuarine) margin of the Walburg Scarp (Thomas, 2008a: fig. 32.2). The midden is comprised primarily of a dense, roundish kind of oysters (unusual in archaeological or modern oyster shells on St. Catherines Island), the occasional *Mercenaria*, and periwinkles in surprising abundance. Bone preservation is excellent, and vertebrate remains (especially fish bones) are common. The positioning of the St. Catherines Shell Ring, only 30 m from the modern marsh edge, is entirely consistent with central place foraging projections.

The Late Holocene transgression likely peaked roughly 2300 cal B.C., when sea level stood approximately 1.25 m below contemporary Mean High Water. Then during a span of only 7 centuries, sea level apparently dropped about 2 m. This was a dramatic turn of events for Late Archaic foragers of St. Catherines Island because the saltwater marshland along the estuarine (western) side of the island must have been dramatically reduced, if not eliminated altogether. If marsh remnants did survive in the estuary, associated human settlements might be expected to pursue the lower reaches of the dwindling saltmarsh resources. If so, then most of the archaeological evidence for marshland exploitation along the western margin of St. Catherines Island between 2300 cal B.C. and 1600 cal B.C. is likely submerged beneath a meter or more of marsh sediments that accumulated later (as the sea rose to approach modern levels).

Present evidence indicates that St. Catherines Shell Ring was abandoned ca. 2180–1890 cal B.C., coincident with the disappearance of the western (estuarine) marshlands. Elsewhere, we tested the distribution of St. Simons period components and landscape manifestations against the expected distribution based on the central place foraging model (Thomas, 2008a: chap. 30, esp. fig. 30.45). We found that Late Archaic settlements average 134 ± 144 m from the western marsh margin, a distribution consistent with the log normal patterning projected from central place theory.

Eastern Marshside Settlements: We also hypothesized that a rather different scenario played out along the seaside (eastern) margin of St. Catherines Island (Thomas, 2008a: esp. chap. 30). The generally rising sea level during early Holocene triggered a rapid westward transgression of offshore barrier islands, eventually docking these newly formed beach ridges to the relic late Pleistocene landscape by 3000 cal B.C. or so, when the offshore Guale Island formed along the northeastern margin of St. Catherines Island. This new barrier effectively buffered the ocean front, and an extensive, interisland marsh (Guale Marsh) evolved as the sea level rose. Guale Island would eventually be overtopped by still-rising Late Holocene sea levels, but during its short-lived existence, it must have provided a refuge salt marsh habitat along the eastern shoreline of St. Catherines to those foragers abandoning the dwindling estuarine salt marshes along the western island scarps.

Figure 8.4 plots the distribution of Late Archaic settlements along the eastern scarps of St. Catherines Island. The St. Simons presence clusters along the northeastern end of the island core, centered on the high ground surrounding Guale Marsh. Today, nearly all of these northern St. Simons occupations are situated at an elevation of roughly 6 m above sea level, located on well-drained Echaw-Foxworth-Centenary soils. These were inland sites during the St. Simons period, located on relatively high ground, but still within 1 km of the Guale Marsh margin.

The nine eastern marshside components average 292 ± 303 m from the marsh edge, placement consistent with the normal and lognormal projections from central place theory (Thomas, 2008a: figs. 30.43 and 30.44). With few exceptions, then, the archaeological record of the St. Simons phase on St. Catherines Island is fully consistent with the marshside settlement model derived from central place foraging theory.

Such was the situation when described in *Native American Landscapes of St. Catherines Island* (Thomas, 2008a). While this volume was in press, late in 2007, Mr. Royce Hayes, Superintendent of St. Catherines Island, discovered the McQueen Shell Ring (9Li1648), what appeared to be an impressive Late Archaic shell ring located on the King New Ground Scarp of St. Catherines Island.

After field investigation in the spring of 2008a confirmed the circular configuration, we have tested several places in the McQueen Shell Ring. To date, 15 dates currently available from the McQueen Shell Ring have been derived from three different contexts: shell deposits that comprise the ring itself, features found within the interior of the ring, and later (post-Late Archaic) features encountered at the ring (Sanger and Thomas, chap. 3, this volume, table 3.2). Setting aside one extremely old date, we conclude that the earliest portions of the ring were constructed 2300–2120 cal B.C., with a second construction stage about 2130–1950 cal B.C. We are currently unsure whether this division between earlier and later construction is an accurate representation or an artificial construction caused by the errors inherent in radiometric dating. At this writing, we are conducting more intensive archaeological excavations at the McQueen Shell Ring.

Lacustrine Settlements: Despite the excellent fit between the empirically observed aboriginal settlement pattern and expectations from human behavioral ecology, the deviations are notable and significant.

Three Late Archaic components (9Li247, 9Li248, and 9Li249) were positioned along the midline of St. Catherines Island and distinctly separated from the marshside settlements of the eastern and western shorelines. Each buried component went undetected during the initial part of the systematic transect survey due to the absence of marine shell. Situated along the margin of the Rutledge soil type that dominates the central depression of the Pleistocene core, these archaeological sites were discovered only during the follow-up systematic shovel-testing program that completed the islandwide survey (see Thomas, 2008a: chap. 20). The ceramic assemblage from each component is almost exclusively fiber-tempered pottery.

These lacustrine settlements comprise the most significant deviation from central place foraging expectations, which posited that the major settlements should occur at the interface of saltwater marsh and the maritime forest, the two highest-ranking resource patches. During St. Simons times, the poorly drained central depression hosted numerous freshwater ponds, which survived into the antebellum period (prior to the lowering of the artesian water table a century ago; Thomas, 2008a: chap. 5). These

Late Archaic components suggest a lacustrine adaptation that flanked the central freshwater ponds, likely exploiting freshwater resources such as turtles, migratory waterfowl, bulrush and cattails, and perhaps even freshwater fish. Given the relatively coarse-grained sampling fraction employed during our shovel-testing program, it is likely that numerous buried, nonshell St. Simons era sites remain to be discovered in this inland setting.

The Pleistocene Swale (or "central depression") of St. Catherines Island is a discontinuous, but largely linear, low-lying zone characterized by poorly drained Rutledge soils that developed in the shallow depressions and bays of the former central freshwater meadow. The Pleistocene Swale could support a number of subsistence activities including lacustrine hunting, harvesting of lacustrine wild plants, and (post-cal A.D. 1000) plant-and-harvest maize cultivation (a strategy for utilizing the low-lying slough areas characterized by Rutledge soils; previously lumped with swidden maize cultivation, which is better suited for the Pleistocene dune habitats).

Although adequate postencounter rate estimates are not available, diet-breadth modeling indicates that after the (temporary) disappearance of estuarine marshland resources (during a time of lowered sea levels), the lacustrine hunt type might have become the second highest-ranking patch (after the maritime forest). This scenario suggests that the interface running along the margins of the Rutledge soils could potentially become the highest-ranking central place.

Archaeological samples generated during the islandwide transect survey are inadequate for assessing the efficacy of Pleistocene swale habitats that potentially host a distinctive lacustrine settlements. This possibility suggests an important new horizon for archaeological research on St. Catherines Island, involving an inland shoreline survey (basically walking the interface between the Rutledge/Echaw-Foxworth-Centenary soil series—similar to the way we surveyed the marsh margins along the Late Holocene beach ridges). This survey should rely heavily on systematic shovel testing (because marine shell is sometimes absent at such sites, particularly those utilized during Late Archaic and Refuge time periods). Such a survey strategy should determine, for instance, whether the site clusters of 9Li247, 9Li248, and 9Li249 are anomalous or represent a previously undetected lacustrine settlement type.

Marshside settlements reappeared along the western (estuarine) margin of St. Catherines Island during the onset of the Deptford period (at 350 cal B.C.), as documented by a cluster of eight ^{14}C dates (from five sites). Although these settlements overlap temporally with the mortuary activities at the McLeod and Seaside mounds, no eastern (Guale) marshside settlements can be documented between 1050 cal B.C. and cal A.D. 50—such deposits are now submerged or, more likely, eroded away entirely with the disappearance of Guale Island.

This temporal pattern reverses during the mid-Deptford period, as the marshside settlement pattern on St. Catherines Island shifted abruptly eastward, with western marshside settlements disappearing once again. A cluster of one dozen radiocarbon dates (from eight different archaeological sites) defines this reoccupation of the eastern marshside settlements, after an apparent hiatus of a millennium. Perhaps the Guale/McQueen marshland disappeared (or was not exploited), or perhaps the Refuge–early Deptford age marshside sites were entirely flooded or eroded away with the overtopping and eventual destruction of Guale Island (and whatever archaeological sites existed there).

SEASONALITY

The evidence for seasonality during the St. Simons period on St. Catherines Island is decidedly limited when compared to data available for later time periods. Seasonality estimates are available for only two St. Simons period sites (Thomas, 2008a: chap. 20, fig. 30.2, and table 30.4). The extraordinarily large vertebrate faunal sample contained shark and sea catfish, taxa indicative of occupation sometime between April and October. Reitz (2008a) hypothesizes—strictly on the basis of vertebrate faunal remains recovered in the islandwide survey—that year-round occupation of St. Catherines Island began during the St. Simons period.

Incremental analysis of *Mercenaria* recovered from the St. Catherines Shell Ring demonstrates that clams were collected during the winter and early spring, in roughly equal proportions. *Mercenaria* at Seaside Field (9Li252) were collected in the winter, early spring, and summer/fall.

Both vertebrate and invertebrate assemblages thus suggest a four-season presence at the St.

Catherines Shell Ring, but we caution that this evidence does not necessarily mandate a full-time, permanent, sedentary occupation of any particular site (although we suspect this to be the case). The most conservative reading of the available evidence suggests that during the St. Simons period, St. Catherines Island seems to have provided a sufficiently rich resource base to support year-round presence, should the Late Archaic people have elected to remain there.

Seasonality estimates are available from nine Refuge-Deptford occupations (fig. 8.11). Diagnostics are rather evenly distributed across all four seasons, with fall slightly underrepresented at 17.9% (Thomas, 2008a: table 30.4). Four components (at 9Li172, 9Li173, 9Li15, and 9Li49) are four-season occupations. From an islandwide perspective, it is clear that numerous Refuge-Deptford occupations were year-round.

Figure 8.12 plots the distribution of 23 radiocarbon dates derived from mortuary contexts spanning 2000 cal B.C.– cal A.D. 500. Three distinct clusters emerge from these during the Refuge-Deptford periods, each reflecting a flurry of mortuary activity that took place simultaneously across St. Catherines Island.

MID-REFUGE CLUSTER (1200–400 cal B.C.): A cluster of 12 radiocarbon dates (from seven mortuary sites) defines the Refuge cluster (Thomas, 2008a: chap. 32). Although the Cunningham and Seaside mound groups are nearly 5 km apart, the ^{14}C evidence demonstrates a remarkable contemporaneity in construction stages. Roughly half (6 of 11) of the Refuge period ^{14}C determinations derive from marine shells, and the rest were processed on charcoal samples in burned primary humus. Several conclusions emerge regarding the Refuge period cluster (fig. 8.12):

- Although the Refuge period spans about 650 years, virtually all of the demonstrable mortuary activities transpired during a very brief interval (600–750 cal B.C.).
- Occupational middens are virtually absent during the Refuge period, and none are contemporary with the mortuary activity. Due to depressed sea level, only two midden dates are known from this interval.
- Deliberate mortuary activity can be demonstrated only at Cunningham Mound C, where a human cremation was buried in a premound pit during the preceding St. Simons period. All remaining activities recorded at the "mortuary" sites during this interval involve features that might (or might not) be directly related to mortuary ritual.
- No mound building can be documented on St. Catherines Island prior to 350 cal B.C.

Twenty-two radiocarbon dates are available from mortuary contexts during the Refuge-Deptford interval on St. Catherines Island. Although this temporal period spans more than 13 centuries, the radiocarbon evidence defines three tightly circumscribed clusters: 600–750 cal B.C., 120–360 cal B.C., and cal A.D. 100–300.

EARLY DEPTFORD CLUSTER (360 cal B.C.–120 cal B.C.): After a notable gap in the radiocarbon record (toward the end of the Refuge period), the earliest Deptford period is marked by a slightly bimodal distribution of five statistically identical ^{14}C dates from five different mounds, clustering between 120 and 360 cal B.C. (Thomas, 2008a: fig. 32.5). The early Deptford period ^{14}C cluster suggests that:

- Statistically simultaneous burning and marine shell harvesting took place throughout the various mortuary contexts within the Cunningham Mound group.
- Numerous contemporary midden dates are available from sites along the western margin of St. Catherines Island, responding to rising sea level during the early Deptford period.
- Nothing in the available radiocarbon evidence suggests that actual mound building had commenced anywhere on St. Catherines Island by 360–120 cal B.C. (early Deptford period). During this interval, marine shells that would eventually be incorporated into the central pit at McLeod Mound were being harvested (probably in December or January). The premound surface was burned (and sometimes nonmortuary features excavated) at four additional places where mounds would eventually stand.

LATE DEPTFORD CLUSTER (cal A.D. 80–230): Following a hiatus of perhaps 2 or 3 centuries, there is a cluster of five ^{14}C dates derived from four mounds in the Cunningham group (Thomas, 2008a: fig. 32.5 and 32.7). These dates are statistically the same (at 95%) and yield a pooled age of cal A.D. 80–230.

The only demonstrable mortuary activity during the late Deptford period (cal A.D. 80–230) is the log-lined central pit excavated at Cunningham Mound A (no bones were found inside this feature). We cannot establish conclusively (1) whether the additional premound activities dur-

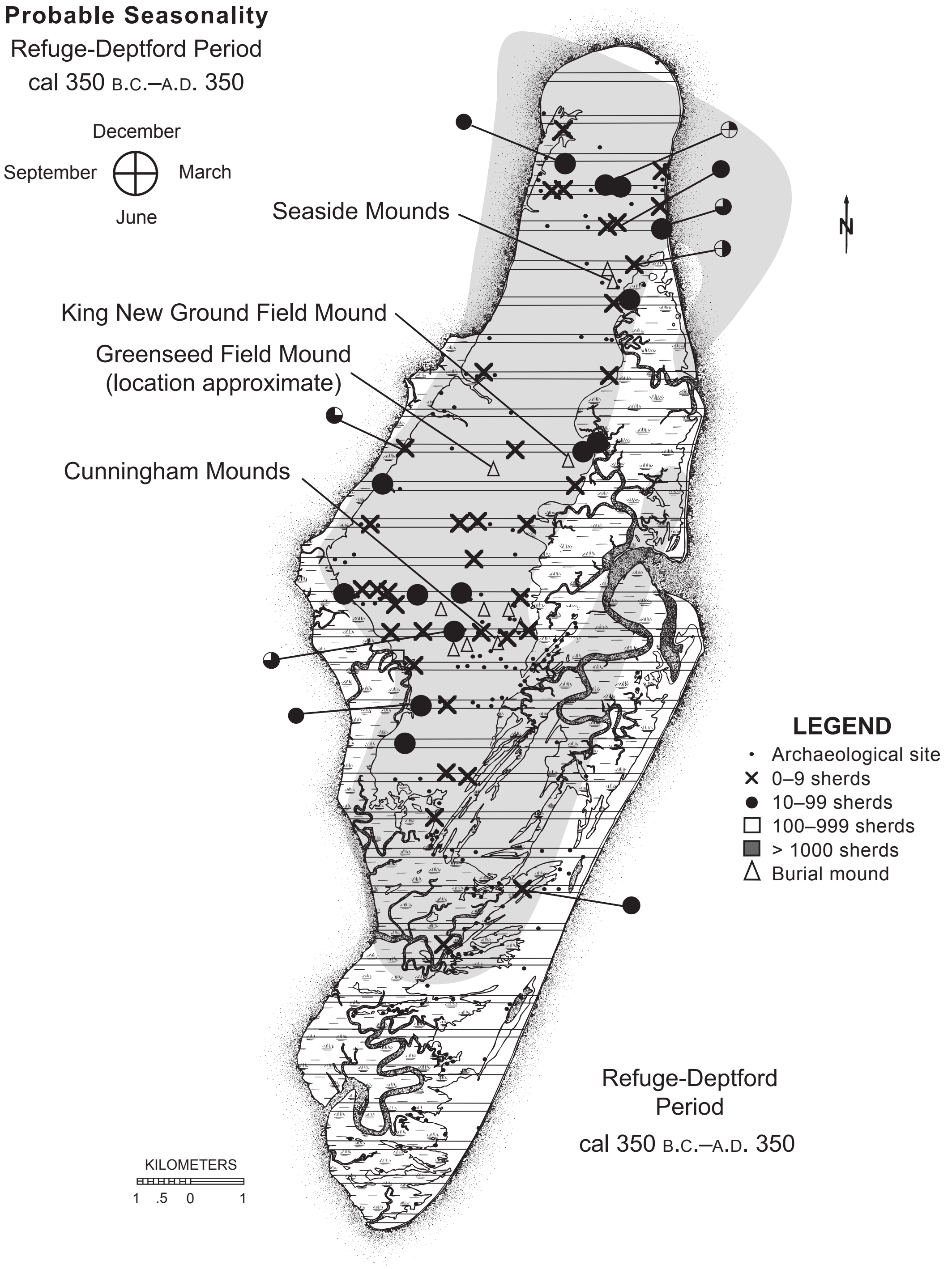


Fig. 8.11. Seasonal distribution of archaeological components during the Refuge-Deptford interval on St. Catherines Island.

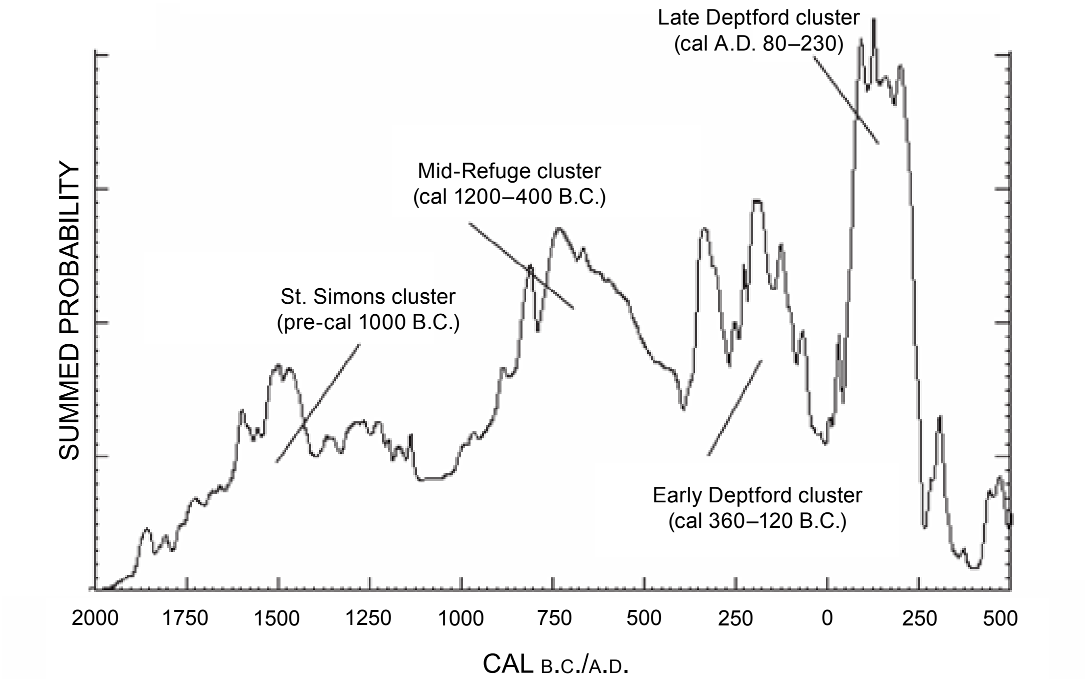


Fig. 8.12. The cumulative probability profile for mound construction based on the radiocarbon dates available (*N* = 23) for the interval cal 2000 B.C.–A.D. 500 on St. Catherines Island.

ing this interval involved mortuary rituals, or (2) the sand mounds were erected over these premound surfaces (although this possibility seems likely in several cases, including Seaside mounds I and II, South New Ground Mound, and Cunningham mounds A, B, and C).

Numerous radiocarbon determinations also derive from several late Deptford shell middens, many of which are located in the general vicinity of the Cunningham Mound group.

Mortuary Activities

No mortuary facilities or human remains of any kind have been encountered from the Late Archaic period on St. Catherines Island.

The mortuary evidence for the Refuge-Deptford period (restricted to the interval 1000 cal B.C.–A.D. 800) is entirely consistent with that expected for societies allocating social status according to egalitarian principles (Thomas and Larsen, 1979; see also Thomas, 2008a: chap. 33). Setting aside gender differences, this was a society in which people were born with equal rights and standing. Social status was accrued in direct proportion to life accomplishments. Infants and juveniles have relatively little time or opportunity in which to acquire such status.

No truly elaborate burial facilities are known from this period, and when grave goods were present, there was no particular trend for association with either male or female burials. Moreover, despite the number of mounds that have doubtless been destroyed over the past two millennia, mound burial was apparently reserved for a fraction of the total population, thereby implying a considerable degree of status differentiation. Clearly, those few set aside for special mortuary treatment—and the five female burials from the Central Tomb at McLeod Mound come to mind here—were people of high social status that had accrued during their lifetimes (hence the exclusion of infants, young children, and most preadults).

In such a system of *achieved asymmetry*, prestige was still grounded in real-world achievement, but there were socially sanctioned ways to cash in (Marcus and Flannery, 1996: 239). Some villages inevitably grew larger than others, in part because the highest ranking habitats were the first occupied, and also due to the efforts of self-selected leaders who worked harder, accumulated more wealth, excelled at raiding and warfare, engaged in more long-distance exchange of prestige items, and hosted social events that attracted more followers. Better foragers working in top-tier habitats could afford, say, to invest in the construction of a new fish weir, a new council house, support multiple spouses, present better bride gifts, and provide a better dowry to a daughter. This enlightened self-interest must have attracted the envy and ire of less successful neighbors. But with achieved asymmetry, their leadership and authority died with them.

SOME IMPORTANT AND LINGERING QUESTIONS

We have documented the transition from St. Catherines islanders building shell rings during the Late Archaic period to St. Catherines islanders building burial mounds during the Refuge-Deptford period. While there do seem to be clear-cut and significant environmental factors that trigger this transition, several lingering questions remain.

What's Up with the Shell Rings?

We are currently exploring the archaeology of the two most significant Late Archaic sites on the island, the St. Catherines and McQueen shell rings (see Sanger and Thomas, chap. 3, this volume). Considerable speculation exists about the construction and use of shell rings in the American Southeast, and several investigators have discussed their implications regarding social inequality (DePratter, 1979b; Trinkley, 1985; Russo, 1994a, 1996a, 2004a, 2004b, 2006; Anderson, 2002; Sassaman, 2004; R. Saunders, 2004b). Whereas some investigators suggest that the rings resulted from deposition of refuse shell adjacent to habitation structures (e.g., Waring and Larson, 1968; Trinkley, 1980; Thompson et al., 2004; Thompson, 2006), others have suggested that the shell rings accumulated as the result of periodic feasting (e.g., Russo, 1991b, 2004a, 2004b).

Ongoing, large-scale excavations at both shell rings on St. Catherines Island are attempting to define the chronology, microstratigaphy, seasonality, and function of these extraordinary sites, seeking the complex beginnings of ritual activity and sacred spaces that pervaded the subsequent aboriginal occupation on the island.

Testing and Refining the Sea Level Hypothesis

During the Late Holocene transgression, the landscape available to St. Catherines Island foragers blossomed, with high-ranking marine patches developing in close proximity to long-standing terrestrial patches, thereby minimizing transport costs from centrally placed residential bases. But when the sea level dropped dramatically, as we believe it did, the estuarine oyster beds along the western margin of St. Catherines Island must have been heavily impacted. If patches of oyster beds survived at all, they did so at significantly diminished levels; any Late Archaic foragers exploiting this vastly reduced shellfishery would have created archaeological sites that are today either eroded away or buried beneath 2 m of more recently deposited saltmarsh sediments.

These same fluctuating environmental constraints created a vastly different ecological setting on the oceanfront side of St. Catherines Island. A new barrier island formed offshore, protecting a vast, new saltwater marsh and providing foragers with an alternative source of salt-marsh resources. The formation and subsequent disappearance of Guale Island and Guale Marsh likewise had a major impact on the behavior of St. Catherines Island foragers and the archaeological record they left behind.

Drawing upon the seminal work of DePratter and Howard (1980, 1981), Brooks et al. (1989), Colquhoun et al. (1980), and Gayes et al. (1992), we have offered several hypotheses regarding the influence of Late Holocene sea level changes on the archaeological record of St. Catherines Island. But because the fundamental geomorphological baseline needs further testing and refinement; we are currently exploring multiple geoarchaeological avenues for doing just this.

Understanding Lacustrine Adaptations

We have already noted the high degree to which the empirically observed aboriginal settlement pattern corresponds to theoretical expectations from central place foraging theory. But the fit is not perfect, and several indications in the available archaeological record suggest the importance of investigating the possibilities of significant freshwater, lacustrine adaptations in more detail.

Because sea level provides the hydrological base level for both surface and groundwater, this eustatic lowering of sea level exerted a great influence on the freshwater hydrological regimen of the Georgia Bight (Colquhoun et al., 1981; Brooks et al., 1989: 91). Whereas numerous freshwater wetlands survive on the Lower Coastal Plain of the southeastern United States—the best-known examples including the Everglades and Big Cypress Swamp in Florida, Georgia's Okefenokee Swamp in Georgia, and the Dismal Swamp (Virginia)—Brooks et al. (1989: 91) suggest that prior to the Early/Middle Holocene, most of these present wetlands and lakes were dry.

The hydrological threshold for peat formation was surpassed about 3700 cal B.C. (5000 cal B.P.), suggesting a contemporaneous local rise in relative sea level to within 3.5 m or so of the present elevation (Brooks et al., 1989: 91, fig. 5.1). After this time, sea level change primarily influenced wetland-estuarine development and biotic shifts in climax forest communities, documenting a change from drier to wetter conditions. This was a time of tremendous increase in the number and area of peat-depositing wetlands of the lower coastal plain, and low moor (marsh or swamp) peat formation. "Thus, the direct influence of sea level as a base-level control acting upon the freshwater hydrologic regime in lowland, coastal areas appears to be considerable" (Brooks et al., 1989: 92).

The cluster of three St. Simons period components found near the midline of St. Catherines Island is important because each of these sites lacked marine shell of any kind and were detected only through the systematic shovel-testing program conducted as part of the islandwide transect survey (Thomas, 2008a: chap. 30). All three St. Simons components lie along the margin of the Rutledge soil type that dominates the central north-south swale of the Pleistocene core. This poorly drained area of lowered elevation was doubtless flooded by freshwater ponds before the artesian water table was lowered a century ago.

Comparable lacustrine settlements are also evident during the subsequent Refuge-Deptford period. Each of these small sites is situated along the margins of the central freshwater marsh. Although marine shell was often entirely absent, whenever *Mercenaria* valves were recovered, incremental analysis suggests that the sites were occupied mostly during the wintertime. This lacustrine pattern continued through the Wilmington and St. Catherines periods, with relatively small and mostly wintertime occupations situated near the central freshwater swamp. But this pattern virtually disappeared during the late prehistoric period, with only a single Irene period site found in lacustrine context.

Archaeological samples generated during the islandwide transect survey are inadequate for assessing the efficacy of such a Pleistocene swale habitat to host a distinctive lacustrine settlement type. This opens an important new possibility for archaeological research on St. Catherines Island, namely an inland shoreline survey—basically walking the interface between the Rutlege/Echaw-Foxworth-Centenary soil series, much as we walked out the marsh margins of the Late Holocene beach ridges. Such a survey should rely on systematic shovel testing (because marine shell is sometimes absent at such sites, particularly those utilized during Late Archaic and Refuge time periods).

What Happened to White-Tailed Deer along the Georgia Bight?

Modern white-tailed deer living on the Sea Islands are considerably smaller than the mainland counterparts, and their biomass varied significantly through time (Purdue and Reitz, 1993; Thomas, 2008a: chap. 8). At approximately 1600 cal B.C.—perhaps a millennium after St. Catherines Island had separated from the mainland landscape—the mean adult body weight of Sea Island deer is estimated to have been 72.5 kg (slightly larger than their mainland counterparts). But thereafter, the biomass of island deer populations shrank markedly, reaching an adult body size of only 37 kg for contemporary white-tailed deer populations in the Sea Islands. Quite literally, then, St. Simons period hunters were stalking deer twice the size of those hunted at Mission Santa Catalina de Guale.

The longer the St. Catherines Island deer population was isolated from the mainland population, the smaller the individual deer became. Why did the white-tailed deer population of the Sea Islands shrink so rapidly? Post-Pleistocene climatic change may have been a factor here, since mainland deer were becoming somewhat smaller during this interval (Purdue, 1980; Purdue and Reitz, 1993), and the newly isolated Sea Island deer populations faced a significant change in dietary composition. Although white-tailed deer probably foraged across all available island habitats (including the maritime forest, the dune fields, and even the island edge into the salt marsh), this was clearly a population under stress. Late Holocene marine transgressions had fragmented the coastal landscape into the small-scale patchy habitats that characterize the contemporary Sea Islands, and Late Archaic foragers likely imposed significant hunting pressure on the local, newly isolated island deer populations.

Elsewhere (Thomas, 2008a: chap. 31), we have explored the archaeological record of white-tailed deer exploitation on the barrier islands and mainland along the Georgia Bight—from Santa Elena (South Carolina), through the barrier island and mainland sites along the Georgia coast, southward to St. Augustine (long-term capital of La Florida). Two important findings emerged.

- For all time periods, and regardless of recovery methods or indices (NISP, MNI, or Biomass) employed, white-tailed deer exploitation was much more intensive on the Georgia Sea Islands than in nearby mainland sites.
- For all time periods, exploitation of white-tailed deer was most intensive on St. Catherines and Ossabaw islands, but less important on barrier islands to the north and especially to the south. To a lesser degree, a parallel exists in archaeological sites on the adjacent mainland, although white-tailed deer exploitation was always more important on the barrier islands.

Both findings are intriguing and suggest a paradox: The diet-breadth model predicts that white-tailed deer, one of the highest ranking resources available to aboriginal foragers in Georgia's Sea Islands, should have always been taken upon encounter. The archaeological record from St. Catherines Island northward is fully consistent with this projection: white-tailed deer are present and they are intensively exploited through time. But, on the other hand, the zooarchaeological evidence (mostly from St. Catherines Island) fails to demonstrate a significant depression in white-tailed deer population (as also projected by the diet-breadth model).

The prey-choice model predicts that (1) Late Archaic hunters should have pursued white-tailed deer whenever encountered and (2) through time, this high-ranking resource should have been differentially depleted. Significantly, the newly arrived Late Archaic peoples on St. Catherines Island encountered a white-tailed deer population at risk. With an average adult size >70 kg, these white-tailed deer were adapted to the expansive southern forests that covered the coastal plain, from the Fall Line, to the frequently flooded bottomlands, to the Atlantic shoreline. The Late Holocene marine transgression, however, fragmented the coastal landscape into the small-scale patchy habitats that characterize the contemporary Sea Islands.

The Late Archaic human presence likely posed considerable threat to local island deer populations, which were already under stress due to extreme habitat fragmentation. In addition, the shift from density-dependent to density-independent population regulators likely took place shortly after the Sea Islands became isolated from the mainland landscape—at precisely the time that human foragers first populated the barrier islands.

The timing and mechanisms of island isolation are ill defined at present, but we do know that significant changes in sea level took place during the Late Holocene period along the Georgia coast. The degree to which St. Catherines and the other barrier islands were reconnected to the mainland during this regressive interval is unclear; but if this Late Holocene "reconnection" actually occurred, it would have had marked implications for terrestrial fauna living on the nascent Sea Islands—especially white-tailed deer. Regardless of the sea level changes involved, the newly isolated deer populations of the barrier islands likely faced the dual pressures of habitat fragmentation and intensified human predation *before* a genetic response had moved away from long-standing mainland patterns of reproductivity toward island dwarfism.

The threat to barrier island deer populations was further magnified by the nature of Late Archaic subsistence and settlement patterns along the Georgia coastline. Currently available data are insufficient to support a meaningful estimate of Late Archaic population levels along the Georgia Bight, and simple tabulation of available site records for the area could provide very misleading results without systematic investigations of the sites in question.

But previously, we have suggested that the Late Archaic human presence seems relatively low along the northern Georgia coastline, that is, in the vicinity of St. Catherines, Ossabaw, and Skidaway Islands, precisely those areas where white-tailed deer exploitation appears to be important during the subsequent aboriginal occupation (Thomas, 2008a: table 31.4). We hypothesized that deer populations survived a relatively sparse and perhaps discontinuous St. Simons period occupation of these composite barrier islands along the northern Georgia coastline. The newly isolated white-tailed deer populations were ill adapted to barrier island life due to habitat fragmentation caused by marine transgression. If white-tailed deer populations were subjected to less intensive hunting pressure (as along the southern Georgia and southeastern Florida coastline), then perhaps these deer populations adapted and survived for millennia by downsizing, both in terms of nutrition and also genetics. There is some evidence, in fact, that some degree of selective hunting pressure actually increased the long-term survivability of white-tailed deer herds. In recent times, deer densities in the Sea Islands may have far surpassed those in mainland habitats; this suggests that, given a chance to adapt to the newly fragmented barrier island habitats, the surviving deer populations could withstand a significant and sustained harvest.

We previously further hypothesized that a different scenario may have played out along the southern Georgia/northern Florida coastline. When it comes to island deer populations, local extinction can be forever. Although some immigration from neighboring islands and the mainland can never be totally ruled out—white-tailed deer have been occasionally spotted swimming the estuarine waters—the odds of deer reestablishing a breeding population on an isolated barrier island seems remote (barring, of course, human intervention, which has happened numerous times in the Sea Islands over the last century).

It seems more likely that local, island-level variability in herd dynamics, boom and bust cycles, episodes of human overpopulation, times of island abandonment, natural disasters (including droughts and hurricanes), local extinctions, and, on occasion, recolonization of white-tailed deer populations from neighboring islands or the mainland are involved.

This scenario reflects the sentiment, expressed at least back to Larson's (1958) synthesis, that the long-term history of the Georgia Sea Islands involves an extraordinary complexity and island-specific variability. In discussing his own research on St. Catherines Island, Caldwell (1971) posited that "no single cultural sequence will hold for the entire Georgia coast, and I suspect that we already need a separate sequence for the regions adjacent to each major estuary."

We agree completely. Each Sea Island has a unique geomorphic and biogeographic history. Specifically with respect to terrestrial hunting, we hypothesize that white-tailed deer populations on each barrier island have distinctive and (perhaps) unique trajectories, reflecting the quality and distribution of local habitats and the intensity of human hunting pressure through time. We emphasize the importance of human predation during the St. Simons period, shortly after the island's white-tailed deer populations became isolated from the mainland, but before selective pressures could produce the smaller, more adaptive phenotypes necessary to survive in the narrow and restrictive barrier island habitats. We are hypothesizing, in effect, that the hunting pressure exerted on early island deer populations is directly proportional to the duration and intensity of Late Archaic occupations on each island.

SUMMARY

Modern St. Catherines Island was formed about 3000 cal B.C., when sea level rose sufficiently to isolate the Pleistocene core from the mainland. Perhaps as early as 2500 cal B.C., Guale Island had developed along the northeastern margin of St. Catherines Island, effectively buffering the Pleistocene and protecting a large interisland marshland along the Yellow Bank Scarp. This meant that, in addition to the extensive estuary along its western margin (which characterizes all the barrier islands of the Georgia shoreline), St. Catherines Island hosted a second major salt marsh system on the seaward side. The meandering tidal creeks of Guale Marsh provided immediate access to this rich shellfishery and produced a mosaic of meander bends and levees along the creek beds (Rollins et al., 1990; Linsley, 1993: 72; Thomas, 2008a: chap. 3). More than 80% of the maritime forest edge on St. Catherines Island fronts directly on the margin of a significant salt marsh—effectively doubling the number of optimally positioned central places. Current exposures of relic marsh muds demonstrate that during the St. Simons period, Guale Marsh extended southward to Middle Beach (West et al., 1990).

For the aboriginal St. Catherines islander, the unique accidents of sea level history translated directly into a mosaic of closely spaced, seasonally diverse, and extraordinarily productive resource patches. Within an effective foraging radius of less than 10 km, aboriginal foragers could exploit massive tracts of prime maritime forest, almost endless salt marsh flats, the deep waters of St. Catherines and/or Sapelo sounds, the seaside shorefront, and the gradually sloping continental shelf of the Atlantic Ocean. St. Catherines Island foragers could readily pursue a strategy of logistic procurement and low residential mobility whenever they elected to do so.

This is exactly what happened at the St. Catherines and McQueen shell rings, the oldest known human presence on St. Catherines Island. Both rings were initially occupied about 2900 cal B.C.–2500 cal B.C. during a time of rising sea level. Then as now, both shell rings were perched along scarp margins of St. Catherines Island, where the immediate juxtaposition of the high-ranking resources of the Pleistocene core (especially the mast crop and newly isolated white-tailed deer herds) and the even higher ranking saltwater marsh provided human foragers with an extraordinarily diverse and closely spaced set of marine and terrestrial patches.

The Late Holocene transgression apparently peaked about 2300 cal B.C. (Thomas, 2008a: fig. 32.1), and then, over the next seven centuries, sea level dropped about 2 m. This was a dramatic turn of events for St. Catherines islanders because the saltwater marshland along the estuarine side of the island must have been significantly reduced (if not eliminated altogether). The St. Catherines and McQueen shell rings were soon abandoned (ca. 2180–1890 cal B.C.) and apparently never reoccupied.

Several (nonring) St. Simons–age settlements clustered along the eastern scarps of St. Catherines Island, situated on the high ground within 1 km of the Guale Marsh margin. Placement of these marshside occupations is entirely consistent with projections from central place foraging theory. But the islandwide archaeological survey also documented a number of Late Archaic components flanking the freshwater ponds and swamps that once defined the midline of St. Catherines Island. These lacustrine settlements likely exploited freshwater resources such as turtles, migratory waterfowl, bulrush and cattails, and freshwater fish. Because we underestimated the importance of the lacustrine resources (particularly when the western marshland went away due to lowered sea level), these inland settlements were not anticipated in our central place foraging models (Thomas, 2008a: chaps. 7–11).

About 1600 cal B.C., sea level began rising again (at a rate of 10 cm/century) from a low-water mark of roughly 3 m below MHW to the present level. On St. Catherines Island, this meant that foragers of the late St. Simons and early Refuge-Deptford periods likely witnessed (1) a progressive deterioration (and southward migration) of saltwater marsh resources along the eastern margin of St. Catherines Island (due to the overtopping of Guale Island and disappearance of Guale Marsh) and (2) a resurgence of estuarine marshlands along the western island scarp.

The first St. Catherines islanders established a subsistence pattern that persisted for millennia, harvesting a broad range of vertebrate and invertebrate marine resources from the nearby estuarine and marine waters (including fish, clams, oysters, crabs, and shrimp). St. Simons period foragers also hunted deer and likely collected a range of terrestrial food sources including hickory nuts and acorns, berries, and edible roots and tubers. Within the limits and biases of the seasonality estimators employed to date, it is clear that during the interval 1000 cal B.C. through about cal A.D. 800, a large proportion of the archaeological sites were used during all seasons of the year. Population densities were probably quite low during the Late Archaic period, and we believe that the first St. Catherines islanders were organized into egalitarian, tribal-level societies probably living in economically self-sufficient, virtually sedentary, and politically autonomous villages (Sahlins, 1968: 15–16; Carneiro, 2002: 35; Anderson, 2002: 246).

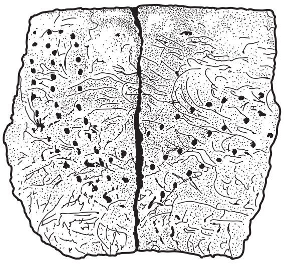
The mortuary evidence for the Refuge-Deptford period (1000 cal B.C.–cal A.D. 800) is consistent with that expected for societies allocating social status according to egalitarian principles. This was a society in which people were born with equal rights and standing. Social status was accrued in direct proportion to life accomplishments. In such a system of *achieved asymmetry*, prestige was grounded in real-world achievement rather than status inherited at birth.

NOTES

1. Crusoe and DePratter (1976: 2) suggested that large oyster beds did not develop behind the barrier islands of coastal Georgia until the rising sea level flooded the previously freshwater lagoons, sometime between 3700 cal B.C. and 2100 cal B.C. (5000 and 4000 cal B.P.). The oldest recognizable shorelines date to 2800 cal B.C.–1700 cal B.C. (4500–3700 cal B.P.) and St. Simons ceramics are typically associated with these surfaces. Particularly notable are the numerous Late Archaic shell rings that characterize the Georgia Bight (Waring and Larsen, 1968; DePratter, 1975; Marrinan, 1975; Russo, 1996a; Sassaman and Ledbetter, 1996**).** The basal strata of the St. Simons period shell rings can lie as much as 1 m below the present marsh surface (Waring, 1968a, 1968c; DePratter, 1975; Marrinan, 1975), suggesting that when they were occupied, sea level must have been (at least) 1 to 2 m below the present level. Speaking specifically of the Georgia coast, DePratter and Howard (1980: fig. 15) suggest that shell rings existed on both sides of the barrier islands; the surviving shell rings tend to occur on the estuarine side of Pleistocene barrier islands, but those on the seaward side have likely eroded away altogether.

2. A note of caution is required here about the radiocarbon dates recently processed from the St. Catherines Shell Ring. In all, 35 dates were processed, 14 of these on bulk carbonate samples from features located inside the St. Catherines ring. These dates tend to be younger than the dates obtained from the ring portion of the site, and to determine whether systematic bias existed within the bulk dates, we processed several sets of dates pairing humate samples with charcoal and/or shell recovered from the same provenience. Although the humate dates varies somewhat, all were younger (some were considerably younger) than the shell/charcoal paired dates. Although we are still studying the matter, we have concluded that the bulk carbonate samples are subject to considerable in situ leaching, creating a systematic underestimation of actual age. For this reason, we have excluded all bulk carbonate dates (table 8.2) from the present discussion.

3. As noted by Sanger and Thomas (chap. 3, this volume), the bulk carbonate dates are problematic and not employed here.



CHAPTER 9

LEAVING THE RINGS: SHELL RING ABANDONMENT AND THE END OF THE LATE ARCHAIC

MATTHEW C. SANGER

Shell rings dating to the Late Archaic (3000–1000 cal B.C.) are found throughout the coastal regions of South Carolina, Georgia, Florida, and Mississippi. The more than 50 documented shell rings occur in a variety of shapes and sizes but are differentiated from normal shell middens by having a large shell-free interior that is circumscribed by mounded shell deposits. These shell deposits do not always fully encircle the shell-free interior, especially in the shell rings found in Florida, making the deposit more of a C or U shape rather than a circle.

While thoughtful and compelling research has been employed in describing the creation and maintenance of shell rings, very little has been said about the abandonment[1] of these sites. Generally, abandonment is either implicitly or explicitly described as being part of the overall population movement away from the coast during the end of the Late Archaic. As such, the demise of shell rings is homogenized into a larger societal transition that largely robs the rings of their individual histories.

This paper provides a first step in an attempt to reinvest shell rings with their own histories by detailing the abandonment sequence of the shell rings, specifically in regards to the overall decline in sites along the coast during the Late Archaic—Early Woodland transition. This is not to say that overall population changes during the Late Archaic and shell ring abandonment are not interrelated. Rather, neither are monolithic and it is the variation both within and between the two that deserves the attention of the archaeological community.

METHODOLOGY: THE AVAILABLE RADIOCARBON RECORD AND ASSOCIATED RESERVOIR CORRECTIONS

This paper presents radiocarbon data from published reports[2] as well as new data from two shell rings on St Catherines Island, Georgia (see Sanger and Thomas, chap. 3, this volume). Dates have been selectively taken from the available literature in an attempt to date the "final" occupation on each of these rings. Finding *the* last date on any site is of course a quixotic task, and those given in this paper are not presented as the absolute last occupation of the site. Instead, they—like all attempts at dating—are best estimates. To further refine estimates, dates with large deviations will not be used in this study.

One important methodological note is the use of marine reservoir corrections. The vast majority of the radiocarbon records from coastal sites are drawn from marine shells. Utilizing shell, rather than terrestrial, carbon samples is the standard along much of the southeastern coast. As Thomas writes, "shell samples tend to provide more reliable results than charcoal samples" (2008a: 346) largely because they have fewer contaminants, are less likely to shift within middens, are relatively ubiquitous, and are often larger samples that permit more affordable dating options. Although utilizing shell samples does have its benefits, one potential drawback is the need to correct the raw radiocarbon results. While one of the corrections, the fractionation effect, is relatively well understood, the need to correct for localized reservoir effects is still largely ignored or poorly utilized.

Reservoir effects are caused by the incorporation of older carbonates into living organisms. Within aquatic environments, older carbonates are made available through a variety of means including upwelling of deeper ocean waters, capture of older mineral carbonates by river in-cutting, and through the effects of bayou, bay, and estuary carbonate capture (Broecker and Olson, 1961). These effects are often localized and are currently understudied along the Atlantic coast of North America. As of December 2009, there were only two points on the coastline between New Jersey and Florida that had their local reservoir effect reported at the most often utilized website for local reservoir effects (http://calib.qub.ac.uk). The two points, found at Atlantic City (N.J.) and The Rocks (Florida) have significantly different reservoir effects. While the New Jersey samples have a correction of 170 ± 50 years, the Florida correction is 33 ± 16 years. Researchers between these two locales often do not apply either reservoir correction because they are so distant from their study area and therefore do not apply any corrections beyond those needed to correct for the fractionation effect[3].

In an attempt to refine the local reservoir effect for the coast of Georgia and surrounding environs, Thomas conducted a series of tests to determine the reservoir effect at St. Catherines Island. By matching shells of known dates to their radiocarbon age (after correcting for fractionation), he was able to determine a local reservoir effect of –134 ± 26 years for St. Catherines Island (Thomas, 2008a: 357).

Obviously, there is variability in reservoir corrections based on geography. With only three reservoir corrections it is difficult to determine whether there are large areas that all share the same corrections, or if the coast is more heterogeneous. To facilitate this paper I will follow convention and apply various corrections based on geography with the St. Catherines correction being limited to the Carolina, Georgia, and north eastern Florida coast while the CALIB Florida correction will be used on sites from central, southern, and Gulf Coast Florida. I will highlight instances where the various applications of different corrections would significantly affect the results.

Data

As discussed elsewhere (Sanger and Thomas, chap. 3, this volume), there are two Late Archaic shell rings on St. Catherines Island—the St. Catherines Shell Ring (9Li231) and the McQueen Shell Ring (9Li1648). The latest dates from both St. Catherines and McQueen rings were processed on marine shell samples. While the most recent date from St. Catherines Shell Ring is in correct stratigraphical order, the latest date from McQueen Shell Ring is out of sequence. Three shell dates have been run from McQueen and they occur in reverse order, with the oldest date on the top and the youngest date on the bottom, with a middle date in between the two. The three dates are all very similar, and may suggest an extremely quick deposition at the site. However, the possibility of intermixing cannot be discounted and should be kept in mind when using the date.

Based on these dates, the two rings on St. Catherines Island appear to have been abandoned at the same time. The latest dates from both rings (McQueen: Beta-238325 and St. Catherines: Beta-215822) are statistically identical at a 95% confidence level (t = 0.54; χ^2 = 3.84; df = 1), which suggests that the two sites were abandoned within a few years of each other (if not simultaneously). Pooling the two dates suggests that the abandonment occurred 2120–1810 cal B.C. Not only were both shell rings abandoned, but based on all of the available radiocarbon data, the entire island appears to have been depopulated at this time and not repopulated for 300–500 years (Thomas, 2008a: 461).

The repopulation is limited to a few sites on the eastern edge of the island. These sites are made up of small shell scatters with associated Late Archaic ceramics and a few pieces of lithic debitage. No additional shell rings were constructed, nor is there any evidence of the existing shell rings being utilized after their abandonment.

Beyond St. Catherines Island

Of the more than 50 possible rings that have been recognized throughout the Southeast, 32 have published radiocarbon dates associated with them (Russo, 2006, Sanger and Thomas, chap. 3, this volume). Having already presented the data from two of those sites, we now look at the dates from the other shell rings.

Not all of these dates are useful to the discussion about how and when the rings were abandoned. Most of them date the initial creation of the rings, the massive buildup of the shell deposit, or later features found within the site. Instead

Fig. 9.1. Reservoir corrections employed in this chapter.

of using these samples, the dates presented in this paper will be pulled from latest Late Archaic contexts. Several of the rings have dates associated with later reuse of the sites, often hundreds or thousands of years after the site was initially abandoned. While these dates suggest an interesting reuse of the landscape by later peoples, they are not pertinent to this study. Likewise, dates with extremely large standard deviations are not useful in dating the site abandonment discussed in this paper.

In an attempt to organize the data, the dates from each shell ring will first be presented according to geography. Starting in the north, dates from shell rings in South Carolina will be presented first, followed by Georgia, and continuing into Florida and Mississippi.

There are 14 rings in South Carolina that have associated radiocarbon dates (see fig. 9.2)[4]. These rings include: Sea Pines (Calmes, 1967, Trinkley, 1980), Skull Creek Large (Calmes, 1967), Skull Creek Small (Calmes, 1967), Barrows (Russo, 2006), Patent (Russo, 2006), Coosaw River 1, 2, and 3 (Heide and Russo, 2003), Lighthouse Point (Trinkley, 1980), Auld (Hemmings, 1970d), Fig Island 1, 2, and 3 (Saunders and Russo, 2002), and Sewee Shell Ring (Hemmings, 1970d: Russo and Heide, 2003). Dates from seven of these rings are not applicable to this paper. The dates from Auld, Coosaw 1 and 3, Patent, Small Skull Creek, Barrows, and Lighthouse Point are either from the base of the shell deposition and are therefore more applicable for dating the initial creation of the rings or are from an unknown context.

Of the remaining eight South Carolina shell rings, radiocarbon dates from four appear to be from locations that securely date the last usage of the site: Sewee[5], Sea Pines, Large Skull Creek, and Fig Island 1 (table 9.1).

The remaining three rings (Coosaw 2, Fig Island 2 and 3) have dates that will be used in this paper, but with reservations. At Coosaw 2 the dates from the top and bottom of the deposit are

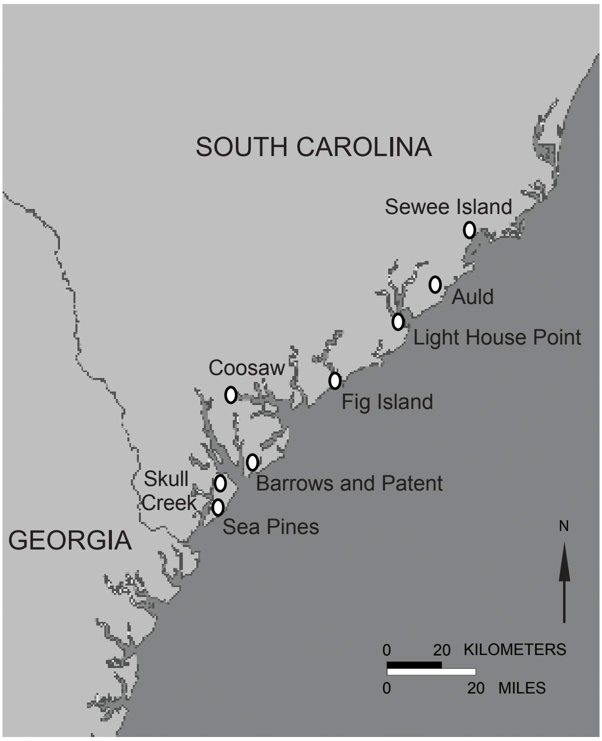


Fig. 9.2. Shell ring sites in South Carolina.

TABLE 9.1
Radiocarbon Dates on Shell Ring Sites in South Carolina

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age B.P. calibrated[a] (±1σ)	Reference
Coosaw River Shell Ring 2						
GX-29527	EU2 Top, 25–30 cmbs	*Crassostrea*	-1.8	3230 ± 70	3610 (1830–1620 B.C.)	Heide and Russo (2003)
Fig Island Shell Ring 1						
Wk-10103	TU2 Top	*Crassostrea*	-0.9	3420 ± 50	3820 (2080–1910 B.C.)	Saunders (2002)
Fig Island Shell Ring 2						
Wk-10102	St 4, 30 cmbs	*Crassostrea*	-0.3	3600 ± 60	4010 (2360–2170 B.C.)	Saunders (2002)
Fig Island Shell Ring 3						
Wk-9747	TU2, Base Feature 1	*Crassostrea*	-0.8	3590 ± 50	3990 (2320–2140 B.C.)	Saunders (2002)
Patent						
Beta-213397	Base of Shell, NE – 30–40	*Crassostrea*	-1.5	3280 ± 80	3660 (1890–1680 B.C.)	Russo (2006)
Sea Pines						
I-2847	0-6" below surface	*Strombus*	0	3110 ± 110	3520 (1750–1470 B.C.)	Calmes (1968)
Sewee Shell Ring						
GX-2279	NE Quad C-1 2" below surface	*Crassostrea*	0	3300 ± 110	3670 (1950–1660 B.C.)	Trinkley (1980)
Skull Creek Shell Ring, Large						
I-2849	27" below surface	*Crassostrea*	0	3210 ± 110	3530 (1760–1480 B.C.)	Calmes (1968)

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

almost the same, but the date in between the two is significantly older (Russo and Heide, 2003: 31). This mixing of stratigraphic order within shell rings occurs at several sites and may suggest that the deposition of the shell at these sites may be more complex than currently theorized.

The two dates from Fig Island 2 and 3 are likely very close to the final occupation of both rings (Saunders, 2002: 114; Russo and Heide, 2003: 15). A small amount of concern is justified because they are not described as being from the uppermost levels of the shell deposit, but the Fig Island 2 sample is from only 30 cm below surface and the Fig Island 3 is from the base of a late feature. These dates will be utilized with these limitations in mind.

In Georgia, there are eight rings with associated radiocarbon dates (see fig. 9.3): Cannon's Point (Marrinan, 1975), West Ring (Marrinan, 1975), Sapelo 1, 2, and 3 (Waring and Larson, 1968; Thompson, 2006), A. Bush Krick (Brandau and Noakes, 1972), St. Catherines Shell Ring (Sanger and Thomas, chap. 3, this volume), and McQueen Shell Ring (Sanger and Thomas, chap. 3, this volume). Only two of these rings, Sapelo 2 and A. Busch Krick, do not have a date applicable to this paper. The date from Sapelo 2 is from a questionable locale that is likely too deep to be considered the latest occupation of the site (Thompson, 2006), while both of the dates from A. Busch Krick are from very deep contexts (Brandau and Noakes, 1972).

The samples from Sapelo 1 and 3 were processed on terrestrial samples (Thompson, 2006: 183). The Sapelo 1 dates are from a sooted sherd, while the Sapelo 3 date is from a piece of charcoal. While both dates will be used in this paper, comparison between terrestrial and marine radiocarbon dates can be risky, as each is affected by different factors.

Eight rings in Florida have associated radiocarbon dates (see fig. 9.4): Rollins (Russo and Saunders, 1999; Saunders, 2004), Bonita Bay (Hughes, 1996, 1998), Reed (Russo, 2004;

Russo and Heide, 2002, 2004), Meig's Pasture (Thomas and Campbell, 1991), Guana (Russo et al., 2002; Saunders and Rolland, 2006), Oxeye (Russo, 2004b; Russo and Saunders, 1999), Horr's Island (Russo, 1991a, 1994b), and Hill Cottage (Bullen and Bullen, 1976). All of these sites, with the exceptions of Bonita Bay and Hill Cottage, have very secure dates that are from near the top of the shell deposit (table 9.3).

While Bonita Bay does have a date from the top of the shell deposit, it is roughly 300 years older than a date found a meter below it (Russo, 2006: 169). It is possible that the dates from the top and bottom of Bonita Bay are actually the same since they do barely cross at a 2σ level but rather than attempt to use these potentially disturbed dates we will ignore Bonita Bay within this paper.

The Hill Cottage date was pulled from a section of the shell deposit that is between 0.6 and 0.75 m (2 and 2.5 ft) below the surface (Bullen and Bullen, 1976: 13). Some concern is justified when using this date because there is another date found in the level above it that is older. However, the two are within 2σ of each other—although this is partially a product of the large deviations associated with these dates, another concern when using the data from Hill Cottage. The data from Hill Cottage will be used within this paper, being mindful of these shortcomings.

Two shell rings have been dated in Mississippi: Cedarland and Clairborne (Gagliano and Webb, 1970). Unfortunately, the dates from these rings have such large standard deviations that they are impossible to use in this paper.

In total, this paper will be utilizing dates from 20 shell rings found in South Carolina, Georgia, and Florida (tables 9.1–3). In the following section the data from each of these rings will be given in chronological order with the earliest abandonment presented first.

Chronological Ordering of Ring Abandonment

In order to place each ring in chronological order, it is necessary to correct and calibrate each date. As mentioned earlier in the paper, the issue regarding differential reservoir corrections for different locales is as yet unresolved. Within this paper I will use the St. Catherines correction for rings from Georgia, South Carolina, and northeastern Florida while the CALIB-Florida correction will be used for the rest of Florida. On occasion I will point out the differences in temporal placement based on which correction was used.

Currently, the oldest shell ring found in the American Southeast is the Oxeye Shell Ring (Russo and Saunders, 1999; Russo, 2004b). Oxeye appears to have been initially utilized by 3000 cal b.c. The site was then abandoned between 2780 and 2400 cal b.c. (2σ; WK7437). The site appears to have been constructed before the local introduction of pottery. While the site predates pottery, numerous pieces of baked clay items were recovered (Russo, 2006). Most of the site is currently buried under 0.5–1 m of marsh, suggesting that sea levels have increased since the site was in use (Russo and Saunders, 1999). Likely there are other rings that date to the same time period as Oxeye, but are currently underwater because of higher sea levels (Russo and Saunders, 1999, Russo, chap. 7, this volume).

After Oxeye there is a wave of abandonments with dates that cluster around 2280 cal b.c. This wave includes two rings from St. Simons Island (Cannon's Point and the West Ring; see table 9.2), and the Fig Island 2 and 3 shell rings (see table 9.3). If the St. Catherines Correction is used, the Hill Cottage and Horr's Island abandonment align with the dates from Cannon's Point, West Ring, and Fig Island 2 and 3. If the St. Catherines Island reservoir correction is applied to all of the potential early abandonment sites (Cannon's Point, West Ring, Fig Island 2 and 3, Hill Cottage, and Horr's Island), the dates are statistically identical (t = 0.768; χ^2 = 11.1; df = 5) and create a pooled mean of 2420–2140 cal b.c. (2σ). Alternatively, if the dates from Hill Cottage and Horr's Island are corrected using the Calib Correction (2008) then these dates are not statistically uniform with the rest of this first wave of abandonment and instead fall in line with the second wave discussed below.

If Horr's Island and Hill Cottage are not considered part of this first wave of abandonment then the similarity in dates between the remaining samples becomes even stronger (t = 0.72; χ^2 = 7.81; df = 3) and results in a pooled mean of 2420–2130 cal b.c. (2σ).

A second wave of abandonment clusters at 2030 cal b.c and includes Fig Island 1, the two rings from St. Catherines Island (St. Catherines and McQueen), and Sapelo 1 and 3 (see table 9.2). As noted above, if the dates from Horr's Island and Hill Cottage are corrected using the

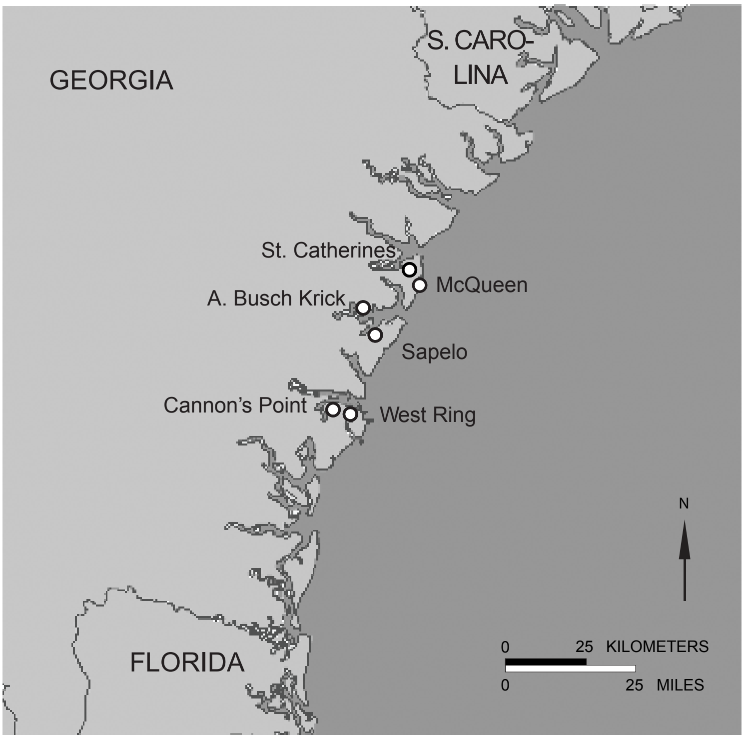


Fig. 9.3. Shell ring sites in Georgia.

TABLE 9.2
Radiocarbon Dates on Shell Ring Sites in Georgia

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (±1σ)	Reference
Cannon's Point						
UM-521	18N, 3E, last occupation	*Crassostrea*	0	3680 ± 90	4090 B.P. (2480–2220 B.C.)	Marrinan (1975)
McQueen Shell Ring						
Beta-238325	AMNH 696	shell	-3.2	3420 ± 50	3780 B.P. (2030–1870 B.C.)	Sanger and Thomas (this volume)
Sapelo Island Ring 1						
UGA-15084	Unit 1 Lev 2 – 10–20	sooted sherd	-17.04	3480 ± 50	3610 B.P. (2030–1900 B.C.)	Thompson (2006)
Sapelo Island Ring 3						
UGA-15082	Unit 9, level 4	charcoal	-27.52	3600 ± 50	3560 B.P. (2010–1820 B.C.)	Thompson (2006)
St. Catherines Shell Ring						
Beta-215822	N784 E801	shell	-2.6	3430 ± 60	3800 B.P. (2060–1880 B.C.)	Sanger and Thomas (this volume)
West Ring						
UM-523	Last occupation	*Crassostrea*	0	3610 ± 110	4020 B.P. (2440–2120 B.C.)	Marrinan (1975)

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

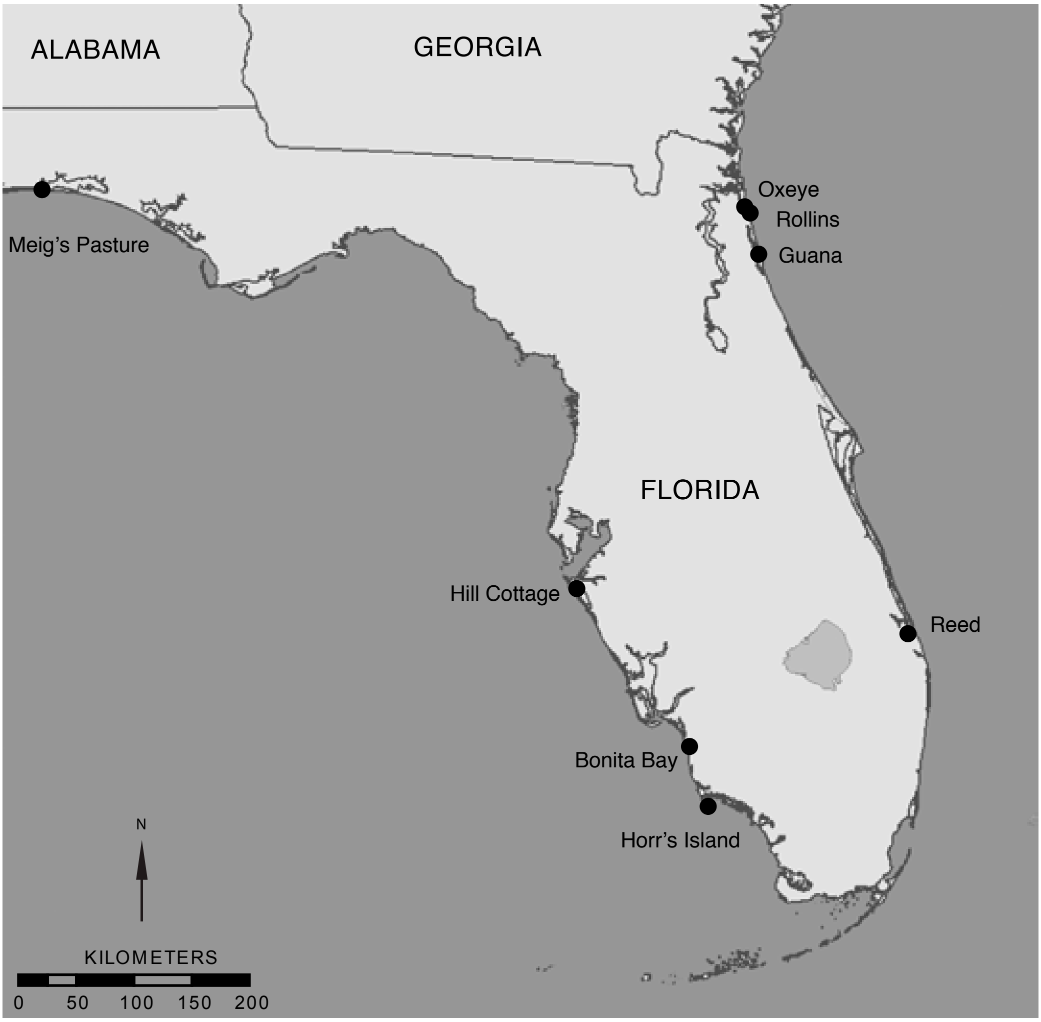


Fig. 9.4. Shell ring sites in Florida.

most recent Calib correction, they line up with this second wave of abandonment. The statistical tool available on Calib 5.0.1 performs very poorly when it is used to test significance between marine and nonmarine dates. While the two nonmarine dates from Sapelo obviously overlap with the other samples from this group, the Calib program does not recognize a statistical significance. If these two samples are removed, then the other five dates are statistically the same ($t = 9.14$; $\chi^2 = 9.49$; df = 4), resulting in a pooled mean of 2160–1910 cal B.C (2σ). If the Hill Cottage and Horr's Island samples are corrected using the St. Catherines Correction and shift out of this group, the remaining samples are statistically identical ($t = 0.193$; $\chi^2 = 5.9$; df = 2) and create a mean pool of 2120–1850 cal B.C (2σ).

A third wave of abandonment dates clusters around cal 1720 cal B.C. and includes Sewee, Coosaw 2, Large Skull Creek, Sea Pines, Meig's Pasture, Rollins, and Guana (see table 9.3). This cluster remains intact despite the use of different corrections but is tighter when the St. Catherines Island correction is used on all of the samples.

TABLE 9.3

Radiocarbon Dates on Shell Ring Sites in Florida

Code/Lab No.	Provenience	Material	$^{13}C/^{12}C$	Adjusted age B.P.	Radiocarbon age calibrated[a] (±1σ)	Reference
Bonita Bay						
Beta-90530	Unit 546-47 E550 100–110	marine shell	0	3460 ± 70	3870 B.P. (1930–1740 B.C)	Houck, 1996
Guana Shell Ring						
Beta-165598	380N 400E	*Crassostrea*	-2.2	31200 ± 60	3490 B.P. (1460–1310 B.C.)	Saunders and Rolland, 2006
Hill Cottage Midden						
G-596	1ft	*Crassostrea*	n/a	3350 ± 120	4040 B.P. (2460–2130 B.C. St. Catherines Correction 2240–1900 B.C. Florida Correction)	Bullen and Bullen, 1976
Horrs Island Shell Ring						
Beta-1273	Test 7, Stratum B	*Crassostrea*	0	3620 ± 80	4020 B.P. (2390–2160 B.C. St. Catherines Correction 2140–1920 B.C. Florida Correction)	Russo, 1991a
Meig's Pasture						
Dicarb 3295 A	Zone 2	marine shell	0	3220 ± 50	3630 B.P. (1610–1470 B.C.)	Thomas and Campbell, 1993
Oxeye						
WK7437	EU 5 m 10–15 cmbs	marine shell	0	3990 ± 60	4400 B.P. (2640–2460 B.C.)	Russo and Heide, 2000
Reed Shell Ring						
GX-26119	EU 4, 0–20 cmbs	*Crassostrea*	-0.7	2880 ± 80	3280 B.P.(1240–1010 B.C.)	Russo and Heide, 2000
Rollins Ring						
WK7438	Trench 1 Unit 1 Fea. 1 35 cmbs	*Crassostrea*	0	3230 ± 60	3600 B.P.(1620–1450 B.C.)	Russo and Heide, 2000

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

These seven dates are statistically identical (t = 4.77; χ^2 = 12.6; df = 6) and create a pooled mean date range of 1830–1570 cal B.C. (2σ).

After the third wave at 1720 cal B.C., all of the shell rings in the American Southeast, outside of Florida, were abandoned. However, this was not the end of the Late Archaic as the smaller non–shell ring sites continued until roughly 1000 cal B.C. Also, while there are no shell rings post dating 1720 cal B.C. in Georgia or South Carolina there is a single Late Archaic shell ring (Reed Shell Ring) and later woodland rings in Florida (Russo and Heide, 2002, 2004; Russo, 2004b, Russo, chap. 7, this volume; Schwadron, chap. 6, this volume).

Based on the dates from each of these rings, it is clear that the abandonment of the shell rings was not a single occurrence across the Southeast. Instead, all but two rings, Oxeye and Reed, were abandoned over an 800–1000-year span of time. The question is, what caused the abandonment? Environmental changes are often cited as causing the demise of the Late Archaic in the Southeast (Kidder, 2006; R. Saunders, chap. 5, and Schwadron, chap. 6, this volume). While environmental changes might be the cause of the overall end of the Late Archaic, can they be blamed for the end of the shell rings? What environmental factors could act in such a way as to drive out a ring on St. Simons Island but allow rings to flourish on St. Catherines and Sapelo islands? The following section will attempt to make sense of the data and suggest a possible cause of the abandonment of shell rings throughout the Southeast.

DISCUSSION: UNRAVELING THE RADIOCARBON RECORD AND THE PLACE OF SEA LEVEL RISE IN THE ABANDONMENT OF SHELL RINGS

It is beyond the scope of this paper to outline all of the possible factors that could have caused the abandonment of the shell rings. The list of possible causes is extensive and the available data are still in a state of flux. One potential cause of shell ring abandonment, and the shift away from the coast during the Late Archaic, that has been suggested by numerous other researchers (Russo, chap. 7, this volume; Thomas, 2008a; chap.8, this volume; Thompson and Turck, 2008; Thompson, chap. 10, this volume) is sea level rise. Sea level rise has often been associated with coastal landscape usage (Cannon, 2000). While there are several competing theories regarding sea level fluctuations during the Late Archaic (DePratter and Howard, 1977; Pirazzoli, 1991; Edwards et al., 1993; Bard et al., 1996; Gehrels, 1999; Morton et al., 2000; Tornqvist et al., 2004), I will be utilizing the study conducted by Gayes et al. (1992) as a basis. By using foraminiferal zonation and tightly clustered vibracores, Gayes et al. produced a sea level model that stretches back to the Late Holocene. In simplistic terms, Gayes et al. (1992) determined that there was a general increase in sea levels between 3300 and 2300 cal B.C. This period of rising sea levels was followed by a dramatic decline between 2300and 1600 cal B.C. during which sea levels fell by close to 2 m. After 1600 cal B.C. sea levels gradually rose until they reached modern levels. The timing of the sea level variations described by Gayes et al. (1992) corresponds to the timing of abandonment of many of the shell rings in South Carolina, Georgia, and Florida.

Implicit in any theory relating sea level drops and settlement patterning is that large portions of the archaeological record are likely underwater and no longer visible. As many researchers have suggested (Russo, chap. 7, this volume), we are working with an incomplete dataset in terms of site distribution during the Late Archaic. Current research into finding inundated prehistoric sites will likely revolutionize our settlement theories as sites are discovered and tested. Unfortunately, the current state of affairs in terms of prehistoric underwater archaeology along the southeastern coast is limited and we are forced to only consider our terrestrial dataset.

Before presenting the available data on the correlation between ring elevation and the timing of ring abandonment, a cautionary note must be made. Elevation data will be given that describe the current, preexcavation, ground level of shell rings. All of the shell rings are located in accretionary environments and it is almost certain that the current ground level is higher than the Late Archaic surface. Unfortunately, for most of the rings it is impossible to deduce the ground level during the Late Archaic from the available published reports. For the sake of this paper, we will have to assume that any difference in soil accumulation between the sites is not great enough to nullify our findings. Much of the elevation data given in this paper are admittedly rough, but the conclusions drawn from the data do not require fine-grained information.

The first ring that was abandoned (that we know of) is also the lowest in elevation. While portions of Oxeye are still visible above the surface of the marsh, a large portion of it is buried by up to 1 m of sediment (Russo and Saunders, 1999; Russo, 2004). Obviously, when the ring was constructed sea levels had to be lower than they are today. According to the model presented by Gayes et al. (1992) sea levels began to rise at 3300 cal B.C. If Oxeye was originally constructed along a marsh edge around 3000 cal B.C. as the radiocarbon record suggests (Russo, 2006: 168), then the slowly rising sea levels may have overtopped the site around 2700 cal B.C., thereby forcing the abandonment of the site.

While Oxeye was apparently a single abandonment (although the discovery of other fully submerged rings may disprove this) the rest of the rings, with the exception of Reed, were abandoned in three waves at 2280, 2030, and 1720 cal B.C.

First Wave (2280 cal B.C.): Rising Sea Levels and Ring Inundation

The first wave of abandonment at 2280 cal B.C. includes Cannon's Point, West Ring, Fig Island

2 and 3,and possibly Hill Cottage and Horr's Island. The timing of abandonment of these rings correlates with Gayes et al.'s (1992) prehistoric sea level high stand. Many of these rings are located at relatively low elevations—suggesting that they are susceptible to flooding by high sea levels. The concurrence between a relatively low elevational profile, a sea level high stand, and the abandonment of the rings strongly suggests a causal correlation in which rising sea levels flooded many of these rings and forced their residents to abandon the sites. This is a relatively simplistic analysis that is complicated when we look closer at the individual circumstances of each of these rings.

Currently, Cannon's Point and Fig Island 2 and 3 are periodically overtopped, especially during high tide. While working at Cannon's Point, Rochelle Marrinan commented that "At periods of high tide, the marsh ring [Cannon's Point] is completely surrounded by water and the center is inundated" (Marrinan, 1975: 23).

While Cannon's Point is located at a very low elevation, the other ring on St. Simons Island, West Ring, is at a higher elevation and appears to defy our model of relation between shell ring elevation and timing of ring abandonment. The West Ring was abandoned at the same time as Cannon's Point, but the West Ring is described as being "located some 85 meters southwest

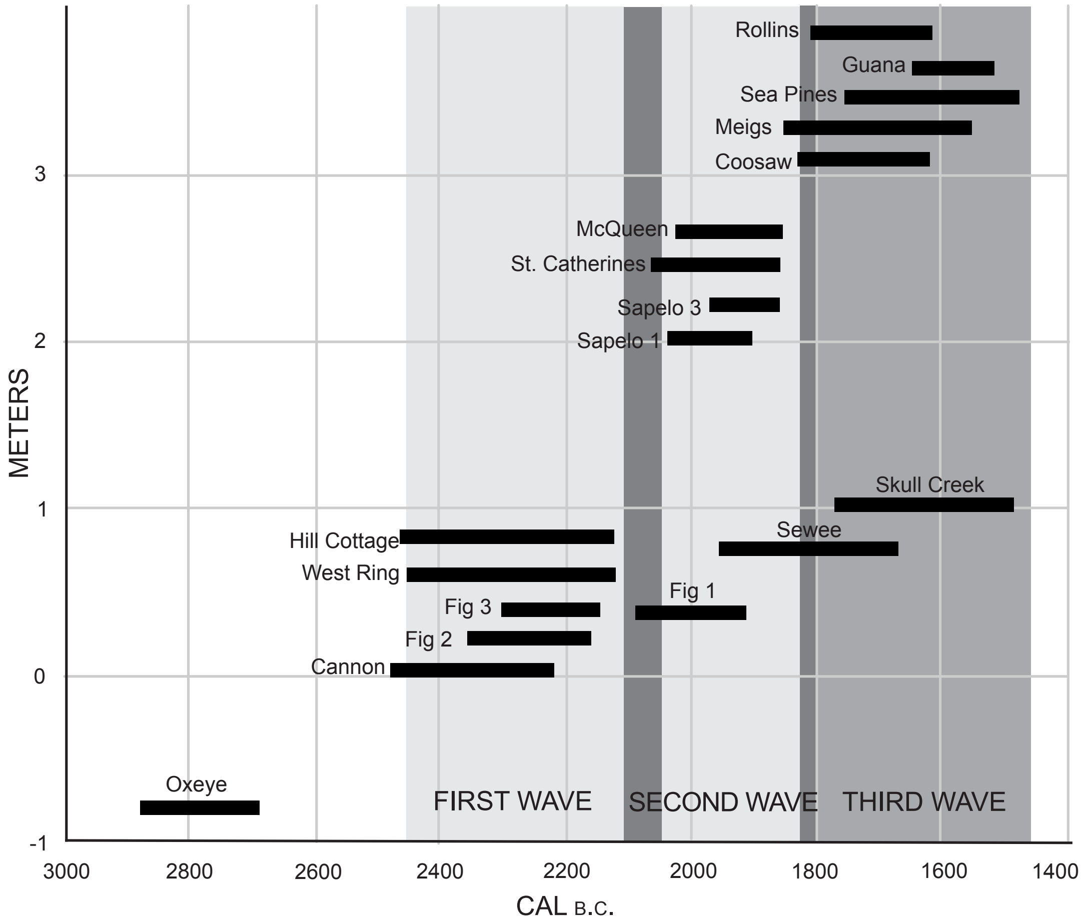


Fig. 9.5. Relationship between elevation and age in selected shell ring sites.

of the marsh ring on high ground" (Marrinan, 1975: 22).

Considering that the West Ring is quite a bit higher in elevation than Cannon's Point, it seems unlikely that it was directly impacted by sea level change. Instead, its abandonment may be more related to the sociopolitical impact of the abandonment of the larger Cannon's Point shell ring. Relations between rings are poorly understood, but it is possible that they were so interrelated that the abandonment of one could have a cascade effect on other nearby rings, causing them to collapse even if they are not directly impacted by the environmental change.

Along with the two rings from St. Simons Island, two of the rings from Fig Island (numbers 2 and 3), were part of the first wave of abandonment at 2280 cal B.C. Based on aerial images, the Fig Island rings (1, 2, and 3) are surrounded and filled with marsh rather than dry ground and are occasionally filled with water. While Fig Island 2 and 3 were abandoned at the same time (around 2300 cal B.C.), Fig Island 1 continued to be occupied for another 300 years.

Fig Island 1 is at the same elevation as Fig Island 2 and 3, however it is very different from the other two rings in that its shell deposit rises close to 6 m above the marsh while Fig Island 2 and 3 are both only a little more than 1 m in height (Saunders, 2002; Russo and Heide, 2003). Fig Island 1 is also very different from most other rings—especially those found in South Carolina and Georgia—in that it is made up of numerous ringlets and a mound attached to the ring by a raised "walkway" of shell. The deepest date available from Fig Island 1 is 1 m below the surface and it is statistically the same as its uppermost date ($t = 0.439$; $\chi^2 = 3.84$; $df = 1$), which suggests a rapid deposition of shell. Both dates postdate the abandonment of Fig Island 2 and 3. It seems possible that as sea levels rose and Fig Island 2 and 3 were inundated, the surrounding population became focused on increasing the height of Fig Island 1 and purposefully created a large, vertical deposit that was above the increased sea level. Saunders noted that the shell deposits at the highest portions of Fig Island 1 appear to be originally deposited elsewhere and only later brought to the top of the ring (Saunders, 2002). This purposeful piling of shell is different from the gradual accumulation described at Fig Island 2 and 3, and would have been a logical method of quickly building up the height of Fig Island 1.

The later dates from Fig Island 1 along with the mining and redeposition of shell from other locales may be directly related to sea level rise as the Late Archaic inhabitants attempted to create a living surface above the inundated marsh floor. If this model is correct, then it provides an interesting counter to the abandonment of St. Simons Island where the West Ring may have been abandoned because of sociopolitical reasons rather than being directly affected by sea level changes. What allowed the population at Fig Island to continue their presence at one of their rings—despite the challenges associated with environmental change—while the peoples utilizing the West Ring and Cannon's Point were unable to cope and decided to abandon their rings? Although this question is outside the scope of this paper—it does show that the cultural effects of environmental change are dynamic and often based on historical underpinnings and societal capabilities that can vary widely between sites.

The Hill Cottage shell ring has a very similar elevation profile as Cannon's Point and the Fig Island rings. Currently, the ring is at sea level (Russo, personal commun., 2008). Because the temporal placement of Hill Cottage is somewhat dependent upon the reservoir correction used, it is difficult to bring this site into the overall discussion of ring abandonment. That being said, and being mindful that further work in creating a detailed reservoir correction for more of the eastern coast is needed, I suggest that based on its similar elevation, Hill Cottage was vacated during this first wave of abandonment.

The same cannot be said about Horr's Island. Horr's Island is a unique shell ring in that its lowest elevation is roughly 10 m above sea level (Russo, personal commun., 2008). Obviously, Horr's Island is substantially different from any other ring discussed in this paper and its abandonment cannot be explained through sea level fluctuations.

Second Wave (2030 cal B.C.): Sea Level Drop and Rings Left Dry

The second wave of abandonment includes Fig Island 1, St. Catherines, McQueen, and Sapelo 1 and 3. Again, many of these sites share a common elevation profile, which may relate to the timing of their abandonment.

While the abandonment of Fig Island 2 and 3 may have been caused by sea level rise, it appears that Fig Island 1 was left because of a drop in sea levels. Environmental models suggest that sea levels began to drop around 2300 cal B.C. (Gayes et al., 1992). By the time Fig Island 1 was abandoned (1900 cal B.C.), sea levels would have been close to 3 m below current levels. This drop in sea level would have decimated the available marsh and marine resources that were the nutritional backbone of the Fig Island shell rings.

It is this drop in sea level that may be the cause of the second wave of abandonment that claimed not only Fig Island 1 but also St. Catherines Shell Ring, McQueen, and Sapelo 1 and 3. All four rings have a similar elevation profile. McQueen is 2.5 m above sea level while the St. Catherines Island Ring is 2 m. Both Sapelo 1 and 3 are also 2 m above sea level (Thompson, personal commun., 2008). These rings appear to be vacated for the same reasons that Fig Island 1 was abandoned—with a sea level drop the coast and marsh lines moved farther away from the sites until the rings were on high ground and distant from their traditional nutritional resources.

THIRD WAVE (1720 CAL B.C.): HIGHER ELEVATION RINGS AND PROBLEMS WITH THE SEA LEVEL HYPOTHESIS

The third wave of abandonment occurs at cal 1720 cal B.C. and includes Sewee, Patent, Coosaw 2, Large Skull Creek, Sea Pines, Meig's Pasture, Rollins, and Guana. These rings are difficult to relate to current theories regarding sea level change. In general, the rings are found at relatively high elevations, which would suggest that they would benefit from an increased sea level. Based on the Gayes et al. (1992) model however, many of these rings were established and utilized during periods of low sea levels. The timing of the establishment, utilization, and abandonment of these rings challenges our model. It is also possible that there are important local environmental factors at work on each of these sites that we do not currently understand. Up to this point it has been assumed that sea level change would have a uniform effect throughout the coastal zone. This does not have to be the case. Various local conditions such as continental shelf slope, beach topography, and underlying geology could have a potential effect on localized ramifications of sea level change. Likewise, we have assumed that the current topography of each of the sites is largely untouched since the Late Archaic. Again, this does not have to be the case since subsurface deflation, secondary depositional episodes, and other occurrences could create a dramatic change in topography over the last 4000 years. With that being said, the cause of this last wave of abandonment is unknown and may not even be environmental. Our current sea level model does not adequately explain this series of abandonments, nor does it explain how these sites could exist during time periods in which sea levels were thought to be substantially lower than they are today. It is possible that the Gayes et al. (1992) sea level model is incorrect and that there is no substantial drop in sea levels at this time.

Two of the rings that are abandoned during this last wave, Sea Pines and Skull Creek, are located on Hilton Head Island. While Sea Pines is located close to the interior of the island and at a relatively high altitude (according to a map published by Trinkley [1980a: 39] the Sea Pines Ring is at roughly 3.3 m elevation), Skull Creek is on the marsh edge close to sea level. In a manner similar to the hypothesized cascade effect that caused the abandonment of both the West Ring and Cannon's Point on St. Simons, it is also possible that there was a buttressing effect between Sea Pines and Skull Creek. Based on their very different locales, it seems likely that they would be affected very differently by sea level fluctuations. Perhaps this variation between the two permitted a measure of flexibility allowing the two rings to continue to prosper despite the changing environment.

The Sewee Ring is the only other ring, besides Skull Creek, that is located at a low elevation. William Edwards writes "as exceptionally high tide caused most of the flat area to be covered by several inches of water, which also extended across the gap in the mound's shell ring and filled most of the circular area within" (1965: 6). While there does appear to be a strong correlation between higher elevations and later abandonment at shell rings, evidence from Sewee Ring suggests that this may not always be the case.

Four of the remaining rings are all located in Florida and at relatively high elevations. The Guana Shell Ring is over 3 m above sea level (Russo, 2002: 7), while the Rollins Ring occurs at the highest elevation of any ring, roughly 4 m above sea level (Saunders, 2004). Meig's Pasture is not only constructed on high ground (3.3 m elevation), but it is also almost 800 m away from the shore line (Little, 2003). Based on the elevation of their datum, which appears roughly equal to the general ground surface surrounding the rings, the elevation of the Coosaw Rings is 3 m (Heide and Russo, 2003). Russo (chap. 9, this volume) has suggested that shell ring usage continued much later in Florida and that lowered sea level may have actually promoted settlement in the southern portion of the state. He also suggests that there may have been a movement of shell ring makers from Georgia and South Carolina into Florida around the end of the Late Archaic and that their presence and ideas are responsible for the continued usage of shell rings in Florida.

CONCLUSIONS

Based on the available radiocarbon record, it is clear that shell ring abandonment was not a uniform event. Over a period of 800–1000 years, a series of three waves of abandonment occurred. This paper suggests that the underlying cause of the abandonment of some of the shell rings may be tied to sea level change, as rings either became submerged or left on high ground far from the marsh line. The current models of sea level change do not account for the final wave of shell ring abandonments, however, suggesting that the situation is more complicated than would first appear. Even while associating shell ring abandonment with sea level changes, I have attempted to highlight the possible variability in response by the affected communities. While environmental change may add stress to a community and its landscape usage, it is the actions and decisions of those communities that account for changes and continuity of practices. This allows varied responses to similar environmental stresses both within and between communities. This varied response to environmental stress can offer clues about group cohesion, societal structure, and landscape usage.

While the data presented have largely addressed the question of how and when the abandonment of shell rings occurred, this record has little to do with how this abandonment relates to the overall transition between the Late Archaic and the Early Woodland. This is largely because the connection between the transition and the abandonment appears tenuous. While both of the shell rings on St. Catherines Island were abandoned by 1800 cal B.C., this was not the end of the Late Archaic on the island. After a 300–500-year hiatus, the northeast corner of the island was reoccupied by a population that could be defined as Late Archaic based on their pottery type. Based on the simplicity of the site structure, it would appear that this later reoccupation was not as intense or complex as when the shell rings were being utilized. Perhaps we could say, based on the apparent drop in complexity and population, that the Late Archaic was over when the shell rings were abandoned and that this secondary occupation occupies a gray zone between Late Archaic and Early Woodland. Certainly, the population that reoccupied the island was no longer in the business of building shell rings, which strongly suggests a shift in cultural mores. Is a change in complexity, population size, and cultural mores enough to suggest that the shift between the Late Archaic and Early Woodland had occurred on St. Catherines Island during the hiatus between the two occupations? Or do the material similarities in pottery types overrule these other changes and demand that we continue to call both populations Late Archaic? Defining culture groups, temporal phases, and material typologies is always a messy affair that at some point becomes subjective even while being drawn from empirical evidence. The continuation of material culture—especially pottery—occurs throughout the Southeast, even after the abandonment of shell rings and a suggested drop in complexity. This continuation further complicates the manner in which we define the end of the Late Archaic.

Further research into the abandonment of shell rings and their relation to the end of the Late Archaic should continue as more rings are discovered and tested and further work is conducted on already published sites. Too often the first, and often only, goal for radiocarbon testing is to determine when shell rings were initially occupied. While this is an important goal and should be continued, samples from the latest deposits on the ring should also be tested. Only with a more robust radiocarbon record can we revisit the issue of shell ring abandonment with hopes of reaching more definitive hypotheses than the ones given in this paper.

It is also important to excavate, date, and publish findings from nonshell ring Late Archaic sites from the coastal zones. The emphasis on shell ring studies has provided a lopsided point of view on the Late Archaic landscape. The relation between shell rings and nonshell ring sites is poorly understood and one of the primary hindrances in Late Archaic studies along the southeastern coast. One aspect that is certainly hindered is the current attempt to describe the end of the Late Archaic. As highlighted by the St. Catherines Island example, the end of shell rings may not mean the end of Late Archaic sites. Variations in the local response to the abandonment of shell rings would be an intriguing study—but requires new research on nonshell ring sites as well as publication of existing data.

NOTES

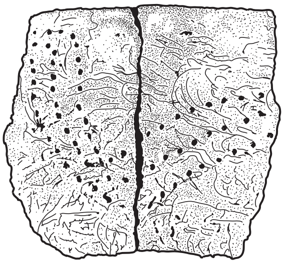
1. The term "abandonment" is often viewed as negative within descendent communities, as it suggests a release of ownership of a site (Colwell-Chanthaphonh and Ferguson, 2006). Within this paper, I use abandonment to mean that the sites appear to no longer be used as often or with the same intensity as they were previously. Many shell rings do show signs of being reused and were likely important parts of the landscape for the descendants of the ring builders even if the usage of the site declined or drastically changed.

2. Much of the early work conducted at Late Archaic shell rings is only available in the "grey" literature of CRM reports, master's degree theses, and unpublished site reports. Mike Russo created an invaluable resource for anyone interested in shell rings when he published all of the available shell ring data in *Archaic Shell Rings of the Southeast U.S.* (2006). This paper is largely based on Russo's work.

3. Rebecca Saunders has also utilized a reservoir effect of –5 ± –20 when analyzing the Rollins Shell Ring based on a personal communication with Darden Hood (Saunders, 2004: 253).

4. Dates from Spanish Mount are not included in this paper because this site may not be a Late Archaic shell ring.

5. Mike Russo has pointed out that there might be a problem with the sample from Sewee. He notes, "The first radiocarbon date obtained from the site was reported as having come from charcoal (Anderson and Logan, 1981: 54, see also Gardner, 1992: 49; Trinkley, 1980b: 14). The actual lab sheet, however, identified the assayed carbon as having come from an oyster shell." (2006: 61). Russo therefore applied the correction for marine samples to the date which brought "it more in line with new dates obtained from the site." (Russo, 2006: 61). I have followed Russo's lead and have analyzed this sample as a marine date.



CHAPTER 10

THE RHYTHMS OF SPACE-TIME AND THE MAKING OF MONUMENTS AND PLACES DURING THE ARCHAIC

Victor D. Thompson

> "It is often possible in archeological studies to reason and to draw inferences from various kinds of patternings and discontinuities seen in cultural sequences and in areal distributions. The assumption is often made, if seldom stated, that such patterns were brought about by particular events or continuing processes. Surely not all prehistory is resurrected this way, but a prime purpose of this study will be to see to what extent we might infer events and processes from patterns and discontinuities deliberately looked for."
> —Joseph R. Caldwell (1958: 1)

In the later part of the 20th century, Brown and Vierra (1983: 165) posed the question: "What Happened in the Middle Archaic?" Based on their work at Koster and other sites around the midcontinent, they recognized that many of the subsistence and settlement characteristics (e.g., multiseason base camps, permanent habitations, multiregional exchange networks, etc.) defined for the Late Archaic clearly had antecedents and were in place by at least 5000 ^{14}C yr B.P. (Brown and Vierra, 1983: 165). This work, along with other notable projects such as Watson and Marquardt's Shell Mound Archaic Project (SMAP) along the Green River of Kentucky (e.g., Marquardt and Watson, 1983, 2005b; Marquardt 1985; Crothers, 1999) and Jefferies and Butler's (1982) work in Illinois at Carrier Mills, was part of a growing recognition that hunter-gatherers worldwide exhibited aspects of complexity far earlier than was previously imagined (Price and Brown, 1985).[1]

The studies mentioned above spawned a host of additional research related to the complexity of Archaic groups. Indeed, archaeologists now recognize that some of the earliest mound building cultures in the Americas thrived in the lower Mississippi River Valley and along the coasts of the Southeast (e.g., Gibson, 1994d; Russo, 1994a, 1994b, 2004b; Kidder, 2002a; J. Saunders, 2004a; R. Saunders, 2004b; Sassaman, 2004; R. Saunders et al., 2005; Thompson, 2007). Most recently, this work has culminated in Gibson and Carr's (2004) edited volume in which authors take on the explicit meaning of southeastern Archaic complexity in terms of power and social relations.

As a result of this research, David Anderson poses at least one possible answer to Brown and Vierra's question. That is, segmentary societies (see Parkinson, 2002), otherwise known as tribes, emerged during the Archaic (Anderson, 2002: 269, see also 2004). To make this argument, Anderson draws on a whole host of archaeological examples from across the Southeast. One key point that should be noted in this analysis is that such tribal formations emerged against a regional background of band-level societies (Anderson, 2002: 248). This illustrates that these tribal formations occurred across the Southeast at varying temporal and spatial scales. Despite this, by the Late Archaic, a large portion of the region exhibited characteristics and/or traditions (e.g., mound-building, defined burial areas, interregional trade, etc.) associated with tribal formations. Interestingly, many of these characteristics would decline and would not become widespread again until the Middle Woodland Period. Thus, continuing on a theme, the editors of this volume ask: "What happened to the Late Archaic?"

Key to addressing the question of what happened to the Late Archaic is an understanding of the cultural variability at multiple temporal and spatial scales that existed during these periods. One of the foremost lines of evidence that Anderson uses in his analysis are specific archaeological sites that seem to have emerged as enduring features on the landscape during the Archaic. These are sites well known to archaeologists and include the early mound-building cultures of the lower Mississippi River Valley (e.g., Gibson, 1994d; Kidder, 2002a; R. Saunders et al., 2005), the shell rings of the southern coasts (Russo, 1994b, 2004b; R. Saunders, 2004a, 2004b; Thompson et al., 2004; Thompson, 2007), and the interior riverine shell and earthen midden/mounds (Milner and Jefferies, 1998; Marquardt and Watson, 2005b; Jefferies et al., 2005, 2007).

Often in regional syntheses the shell midden/mounds of the interior south and the shell rings and mounds of the coasts are often lumped together under the general rubric of the Shell Mound Archaic or more generally Archaic complexity (Neusius and Gross, 2007: 466; see also Sassaman, 2004a: 255). This, unfortunately, obscures many of the differences among these sites. Anderson (2002, 2004) makes a compelling argument for the emergence of segmentary societies; however, an important point in this analysis is that very different traditions (e.g., monument constructions, burials, etc.) evoke similar social formations (e.g., tribes). The purpose of this paper is to explore this variability in terms of the process and timing of these enduring sites and how we perceive them in a macroregional perspective, rather than focusing on trajectories of neoevolutionary types. In doing this, I will emphasize the differences rather than the similarities among these sites. This is an important point of departure in determining exactly what occurred at the end of the Late Archaic. In order to do this I use the framework of time perspectivism (Bailey, 2007) and the idea of persistent place (Schlanger, 1992).

TIME PERSPECTIVISM AND PERSISTENT PLACES

The foundational idea from time perspectivism that informs this analysis is that different cultural traditions may be resolved by looking at different temporal scales of analysis (e.g., short- and long-term processes and spans; Bailey, 1983, 2007). Bailey (2007) uses the idea of palimpsest to provide a methodological link from the archaeological record to ideas of time. In his article he elaborates on several different types of palimpsests; however, I am concerned with only spatial and cumulative palimpsests in this paper. Spatial palimpsests refer to depositional episodes that are spatially distinct, but the temporal relationships between them are difficult to establish (Bailey, 2007: 205–207). Cumulative palimpsests have depositional episodes superimposed on each other that are so mixed and reworked that separating them is difficult or impossible (Bailey, 2007: 204).

The second and related concept in this analysis is the idea of persistent place. Schlanger (1992: 97) defines persistent places as "places that were repeatedly used during long-term occupations of regions." Additionally, "they represent the conjunction of particular human behaviors on a particular landscape" (Schlanger, 1992: 97). Therefore, as defined by Schlanger (1992: 97), such places may have one or more of the following characteristics:

- Their formal (e.g., environmental/economic resource) characteristics make it appealing/amenable/suitable for specific behaviors or practices.
- Their features (both natural and cultural) work to promote reoccupations.
- Their creation occurs over an extended period and is the result of occupation and revisitation; however, such (re)occupation is "independent of cultural features but is dependent on the presence of cultural materials" (Schlanger, 1992: 97).

Clearly, the Archaic sites discussed above all have certain characteristics of persistent places, be they in the form of monumental circular works of shell and earth or places of repeated reoccupation and burial.

In what follows I examine the rhythms, in both time and space, for the specific practices that created these enduring sites during the Archaic period. Given the limitations of space (in this paper), I cannot review all the relevant data that bear on this topic. Instead, I concentrate on three specific areas for comparison. These are the lower Mississippi River Valley, the Green River area of Kentucky, and the shell rings of the Atlantic coast Georgia Bight (fig. 10.1). In doing this I will illustrate three specific points. First, while often lumped together under a general rubric of Archaic complexity, these traditions actually represent very different timing or rhythms of creation. Second, while many of these sites served to focus reuse and reoccupation, the durational nature of these traditions are different and site function and meaning are not uniform in time and space. Finally, by taking a macroregional view, I show that, despite the different rhythms represented by these sites, many of these traditions cease at the end of the Late Archaic in multiple regions and that no analogous traditions emerge during the Early Woodland in these areas. I hypothesize that one of the reasons for this is partly climatic shifts that caused a disruption of the socioecological systems established during the Archaic Period. And, while these areas experienced collapse in terms of these practices, other areas continued practices that had been established centuries before.

The Green River

The Green River region of western Kentucky is one of the most intensively studied areas of Archaic hunter-gatherers in eastern North America (e.g., Webb and Haag, 1939, 1940, 1947; Webb, 1950; Rolingson, 1967; Marquardt and Watson, 1983; Milner and Jefferies, 1998; Jefferies et al., 2002, 2005; Crothers and Bernbeck, 2004). While much of this research focuses on the river edge shell middens, a few projects examine bluff top earthen middens (e.g., Jefferies et al., 2007). The key differences between these sites and the river edge sites are the amount of shell and their geographic proximity to the river. Despite these differences, it appears that many of the same behaviors, rituals, and traditions were practiced by Archaic peoples at these sites. Practices such as burial of the dead and associated rituals, as well as more mundane practices such as tool maintenance and production, represent some of the more common activities inferred by archaeologists based on artifact assemblages and uses of space at these sites (e.g., Milner and Jefferies, 1998; Crothers and Bernbeck, 2004).

There are several conflicting interpretations regarding the Green River sites. Researchers like Milner and Jefferies (1998: 130) see them as part of an annual subsistence cycle and argue that they represent a trend toward increasing sedentism, rather than formal monuments or cemeteries. Others, particularly Claassen (1991, 1992, 1996; see also Sassaman, 1993a), see them as intentional burial mounds and sites where aggregate groups came together for feasting and ritual. Finally, Crothers and Bernbeck (2004) view these sites as part of a "foraging mode of production"

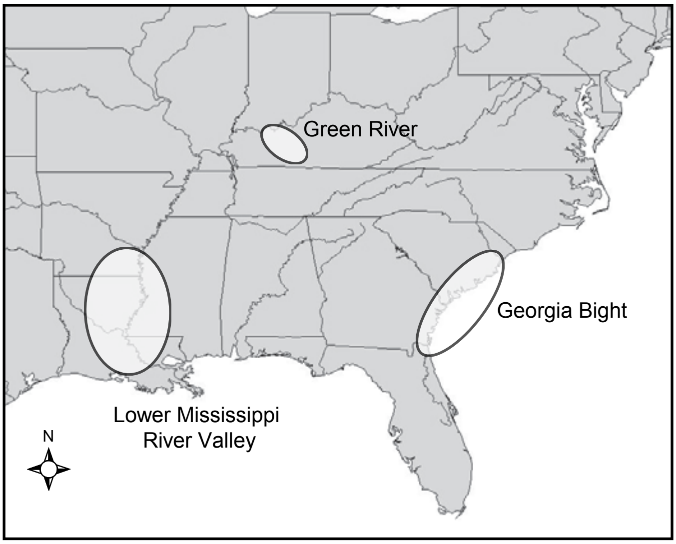


Fig. 10.1. Map of the southeastern United States showing regions discussed in the text.

and emphasize the relatively high degree of mobility in this model as compared to the others (e.g., Milner and Jefferies, 1998; Jefferies et al., 2005). While each of these models has merit, it is not the purpose of this paper to empirically evaluate them vis-à-vis the archaeological record. Instead, I offer an alternative way to think about these sites derived from the concept of persistent place. Such a perspective allows for the functions of sites to change or alternate on short- and long-term time scales (see Thompson, 2007, for a similar proposition regarding shell rings).

The Green River sites fit well with Schlanger's ideas regarding persistent places. First, the formal features around these sites, namely the riffle runs that provided shellfish habitats (see Morey and Crothers, 1998), make them suitable areas to return to again and again for shellfish production and consumption. Second, many of these sites contain hundreds of burials (e.g., Ward [Herrmann, 2002; Jefferies et al., 2007;]; Read [Webb, 1950; Milner and Jefferies, 1998; Herrmann, 2002]; Indian Knoll [Powell, 1996; Haskins and Herrmann, 1996; Herrmann, 2002]), which would serve as a cultural impetus to focus and encourage revisitation and (re)occupation. Finally, the fact that these sites contain several meters of deposits and are associated with artifact assemblages and radiocarbon dates (see Claassen, 1996; Marquardt and Watson, 2005b; Herrmann, 2007, for dates) that span both the Middle and Late Archaic suggests that the creation of these sites occurred over an extended period of time.

At the intrasite level, the Green River sites represent spatial and cumulative palimpsests. Take for an example the Ward site (fig. 10.2). At Ward, like many of the Green River sites, the 433 burials span different ages. Four calibrated radiometric dates at Ward span a 2200-year period (ca. 6700 to 4500 cal B.P.; Herrmann, 2002: 55, 2007: 84). Thus, Ward represents a spatial palimpsest because we only have a general idea of the temporal relationships among burials. At a broader scale, radiocarbon dates from a series of burials from Ward, Indian Knoll, and Barrett suggest that use of these sites spans a temporal range that encompasses much of the late Middle and Late Archaic (see Herrmann, 2007). Furthermore, each of these sites represents a cumulative palimpsest as many of the features, shell deposits, burials, pits, postmolds, and artifact concentrations overlap or intrude upon one another, further complicating temporal associations (see discussion by Crothers and Bernbeck, 2004).

Given the above discussion, archaeologists may question how valid our statements are regarding the temporality of these sites. However, if we accept that the archaeological record is by its very nature a palimpsest (see Binford, 1981; cf. Schiffer, 1985 and also Murray, 1999), we can begin to make statements regarding the long- and short-term processes that worked to create palimpsests, thus allowing for a comparison of the different rhythms of the creation of sites across regions (e.g., the Green River, lower Mississippi River Valley, and Atlantic coast). For the Green River region, one useful way to access the long- and short-term processes that created these sites is to examine the temporality of the burials themselves. In order to do this, I draw on Littleton and Allen's (2007) concepts and measures of time for hunter-gatherer burials in southeastern Australia.

Littleton and Allen (2007: 284; see also Carr, 1995) put forth the idea that burials represent both a point in time and a set of long-term behaviors and traditions. I have modified their concepts and measurement of time for Green River sites so that burials, as well as more mundane activities, may be accounted for at these places (table 10.1). The concepts and measures of time in table 10.1 are based largely on the nature of the site structure as well as the long temporal span of the burials and associated radiocarbon dates—from burial and nonburial contexts. Given that these practices represent both short- and long-term processes, I argue that Green River sites may best be thought of as a long-term amalgam of varying-scale, short-term, disjunctive events at specific places on the landscape. Thus, instead of assigning a functional category to them, such as intentional construction of large-scale monuments of the kind proposed by Claassen, I argue that these sites are better thought of as resulting from varying combinations of groups and events (see also Milner and Jefferies, 1998; Crothers, 1999). The final point, however, is that these sites are the end product of long-term use in deep time. The importance of this point will be illustrated in my discussion and comparison of other regions, whose traditions operate on a distinctly different time scale.

Georgia Bight Atlantic Coast Shell Rings

In many ways, the issues surrounding coastal shell rings mirror the Green River sites. Some researchers suggest that, like the

Green River sites, shell rings are intentional monuments formed by aggregating bands of hunter-gatherers in the context of grand feasting events (R. Saunders, 2004a, 2004b; cf. Claassen, 1992). Others suggest that shell rings represent household middens that gradually form circular arrangements as trash accumulates (DePratter, 1976; Trinkley, 1985). Russo (2004b) suggests that both processes worked to create shell rings. Building on this idea and drawing on Bradley (1998, 2003), I argue that the dominant process (i.e., feasting/intentionality or quotidian meals/unintentional accumulation) may shift through the life history of a shell ring (Thompson, 2007).

TABLE 10.1
Hypothesized Concepts and Measures of Time for the Three Regions (Adapted from Littleton and Allen 2007: Table 1)

Concepts and measures of time for the Green River sites		
	Process	Span
Short-term	burial event	ca. <1 week
	burial event and concomitant feasting and ritual preparation	ca. <1 year
	burial in relation to seasonal use of resources	< 1 generation (ca. 25 years)
	burial relative to the life cycle of an individual	1 generation
	collection of shellfish, nuts, or other resource	seasonal, cyclic
	aggregation for mate & information exchange	< 1 year
Long-term	intrusive burials	1 generation +
	burials in relation to landscape features (e.g., riffle runs)	1 generation +
	burials in relation to each other	simultaneous to 2000+ years
	shifts in burial rituals (e.g., flexed, cremation, etc.)	simultaneous to 2000+ years
	creation of burial mounded/middens	1 generation to 2000+ years
	creation of burial mounded/midden landscape	multiple generations
Concepts and measures of time for coastal shell rings		
	Process	Span
Short-term	depositional event	ca. < 1 week
	mounding event	ca. < 1 week
	feasting and ritual preparation	ca. < 1 year
	gradual accumulation of household middens	ca. multiple seasons
	collection of shellfish, nuts, or other resource	Seasonal, cyclic
	aggregation for mate & information exchange	< 1 year
Long-term	creation of multiple ring complex	1 generation +
	creation of mounded/middens	1 generation to 500+ years
	creation of shell ring/ midden landscape	multiple generations to 500+ years
Concepts and measures of time for Archaic mounds of the LMRV		
	Process	Span
Short-term	depositional event	ca. < 1 week
	mounding event	ca. < 1 week
	feasting and ritual preparation	ca. < 1 year
	aggregation for mate & information exchange	< 1 year
Long-term	creation of multiple mound complex	1 generation +
	reuse and reoccupation	1 generation +
	creation of a mounded landscape	multiple generations to 1000+ years

Therefore, not all shell rings are the result of the same formation processes. Indeed, some shell rings sites may have been primarily the result of habitation, while others formed solely as a result of large-scale ceremonies. I recognize the fact that individuals' ceremonial and daily lives are not necessarily separate entities à la Bradley (2003); however, this distinction is used as a heuristic in order to discuss the primary behavior/tradition/practice that worked to create the archaeological record. Clearly, there are many parallels in the ways in which archaeologists think about the Green River sites and coastal shell rings.

I argue that many shell ring sites, like the Green River sites, may be thought of as persistent places. They are often found in favorable locations, like the mainland side of Pleistocene islands along the Atlantic coast (cf. Thomas, 2008a; see also chap. 8, this volume; Sanger, chap. 9, this volume), which afforded access to rich estuarine resources and protection from storms. Thus, the formal location of shell rings often served to focus occupations in these areas. Second, the formal deposition of shell in a circular arrangement and the creation of plazas would have drawn people to these places on the landscape—especially if, as R. Saunders (2004a, 2004b; cf. Thompson et al., 2008) believes, these are aggregation sites. On a related note, many shell ring sites in Georgia and South Carolina have multiple rings associated with a single location on the landscape (see fig. 10.2). If these additional rings represent subsequent occupations of the same location or, alternatively, additional groups fusing with a founding group, then this would also fit with the idea of persistent place.

While there are many similarities between the Green River sites and the Georgia Bight shell rings, I suggest that they represent very different temporal rhythms. What I mean by this is that the processes and behaviors that worked to create shell rings occurred at a much faster tempo than the processes at the Green River sites (see table 10.1), even though, as I have pointed out, the archaeological context (sensu Schiffer, 1983) looks similar in terms of layering and artifact density.

Unlike Green River sites, shell rings contain no formal burials (Russo, 2006). While human bone is present in the rings, these remains are few, fragmented, and dispersed throughout, suggesting something other than intentional burial (cf. Claassen, 1992). As a result, human interments and associated radiocarbon dates are of little use in evaluating the temporality of these sites. Therefore, I turn to the deposition of shell itself, its spatial arrangement, and associated radiocarbon dates to assess the temporality of these sites.

In contrast to the Green River sites where use and occupation of an individual site can span over 2100 years of the Archaic Period, the temporal occupations of coastal shell rings, especially along the Atlantic coast, indicate a much shorter time frame. Based on the associated radiocarbon dates, it appears that most of these sites were occupied for about 500 years or less (see R. Saunders, 2002: table 10.2 for radiocarbon dates). Even this estimate may be too long. At some sites, like the Sapelo Island shell ring complex, the occupation could be interpreted as being relatively short, on the order of 200 to 300 years, possibly less. Regardless, the temporal rhythm appears to be significantly faster at coastal shell rings than in the Green River area.

Like the Green River sites, coastal shell rings represent both spatial and cumulative palimpsests. However, the complexity of these palimpsests differs between these two regions. Unlike the Green River sites where burials, pits, and features overlap and grade into one another, among coastal sites the shell rings are usually more spatially distinct. Furthermore, at the site level, if there is more than one ring at a site these rarely overlap. However, see the Scull Creek Ring in South Carolina for an exception to this observation (Calmes, 1967). This is not to say that the temporal association among multiple rings at a given site is clear. Indeed, multiple rings most likely represent many different temporal associations. However, where archaeologists have conducted extensive research, it appears, based on radiocarbon dates and connecting architectural features like those found at Fig Island, that multiple rings were utilized contemporaneously at least at one point during the life histories of these sites (e.g., Russo, 2002; R. Saunders, 2002; Thompson, 2007).

Shell rings, of course, also represent cumulative palimpsests. Indeed, the disentanglement of various strata, and the timing of large shell deposits, figures prominently in discussions regarding shell rings as gradually accumulating middens or intentional feasting monuments. Russo and Heide (2003: 43) argue that feasting deposits should indicate relatively rapid accumulation, whereas slow, gradual accumulation

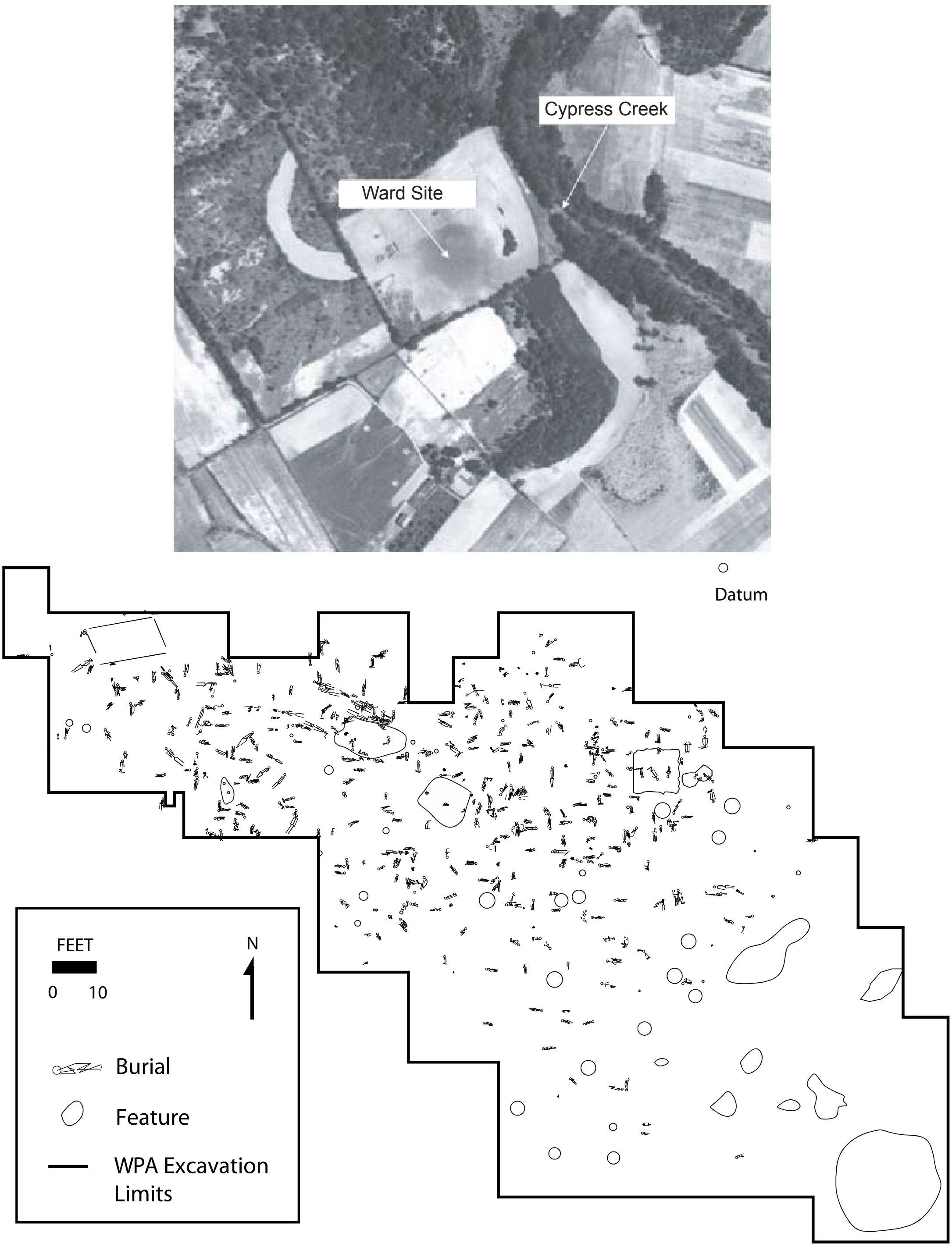


Fig. 10.2. Aerial photo and site map showing the complex overlap of features and burials at the Ward site in the Green River region (modified from Jeffries et al, 2007). Aerial photo from 1936 aerial survey Paducah Reservoir Engineering Service Division, TVA, Knoxville, TN, sheet no. 2.121-9.

of refuse would be the result of daily habitation (e.g., Marrinan, 1975; DePratter, 1979b; Trinkley, 1985). The key, of course, is determining the timing of a shell depositional event. Many have taken the large, undifferentiated shell deposits found in rings and also in Green River shell mounds as evidence of rapid accumulation and thus intentional monument construction. Recent work by Thompson and Andrus (2010; see also Thompson, 2006; Thompson and Andrus, 2006, 2007) calls this assumption into question. In that study, Thompson and Andrus (2010) sampled clams and oysters from large shell layers from the three shell rings at the Sapelo Island shell ring complex. In total, over 50 samples were subjected to O^{18} isotopic analysis to determine season of death and thus season of deposition for the shell layer. These results indicated that for two of the rings (ring II and ring III) the deposits sampled accumulated over multiple seasons, indicating a gradually accumulating midden. However, samples from the large upper layer of ring I, the largest of the three shell rings, indicate accumulation in predominantly one season (winter), thus suggesting a more rapid rate of deposition. Therefore, one cannot assume or judge based on stratigraphy alone the rapidity of deposition. These results also indicate that at least some portion of the population occupied the site throughout the year, as all four seasons are represented in the isotope data (Thompson and Andrus, 2006, 2007, 2010; Thompson, 2006). This is consistent with Russo's (1998; see also Thomas, 2008a, for the St. Catherines Shell Ring) study of season of occupation for the Horr's Island shell ring. Thus, the varying-scale activities that work to form shell rings over time (see table 10.1) exhibit different rhythms with tempos that increase and slow down depending on the concomitant activity.

The coastal shell rings appear to have accumulated over a much shorter time than Green River sites at the site level as well as at the regional scale. The more regular intrasite spatial patterning (e.g., multiple ring sites as well as clean plazas) and season of occupation indicators indicate that they were utilized on a more continuous basis than the Green River sites. Thus, we may think of coastal shell rings as the result of varying-scale long- and short-term contiguous events. Additionally, the creation of shell rings along the Atlantic coast landscape evidences a relatively short time compared to the Green River region, as most of the associated radiocarbon dates on the Atlantic coast cluster within a 500-year time frame. Let us now turn to our final area of comparison, the lower Mississippi River valley.

Earthen Monuments of the Lower Mississippi River Valley

The lower Mississippi River Valley Archaic mounds represent a departure from the two regions just considered. Unlike the Green River and coastal shell rings, there is no debate on whether these sites represent monuments. Mound-building here has a long history dating back to the late Middle Archaic (Saunders et al., 2001). Many of these mound centers replicate one another in their spatial layout (Clark, 2004; Sassaman and Heckenberger, 2004a, 2004b; cf. Crothers, 2004; Sassaman, 2005). However, there are some divergences that call into question how regular and structured these commonalities are among the mound centers (see Vogel, 2006, for a critique of the Toltec module that applies to the analyses of Archaic mound grammar). Despite this, these Middle and Late Archaic mounds represent one of the longest traditions of mound-building in eastern North America (Russo, 1996a: 285; Sassaman, 2004a: 259). This institution of hunter-gatherer mound-building culminates and ends abruptly with the collapse of Poverty Point and its associated sites (Kidder, 2006).

We, perhaps, know less about the Mississippi Valley Archaic mounds than about the other two areas. However, the available evidence suggests that these sites were the focal point of Archaic ritual and ceremony (J. Saunders, 2004; J. Saunders et al., 2005). Like the Green River and coastal shell rings, these sites are often found adjacent to wetlands (J. Saunders et al. 2005: 633), thus meeting our first criterion for a persistent place. However, unlike coastal shell rings, only one site (Watson Brake) has marginal evidence for year-round occupation; most appear to have been occupied seasonally (J. Saunders, 2004: 147, 160; see also chap. 12, this volume). Watson Brake represents the best studied of these centers. J. Saunders and colleagues (2005) found that the site's circular earthwork mounds exhibited multiple construction sequences; they sometimes observed buried "A" soil horizons indicating a short hiatus (< 200 years) between construction episodes (J. Saunders et al., 2005:

648). It seems reasonable that the mounds themselves, independent of the original builders, served to focus reoccupation and reuse of these places. These points, along with the recognition that mound construction at single sites and their use across the landscape span over 1000 years, strongly suggest viewing them as persistent places (table 10.1).

The tradition of mound-building in the lower Mississippi Valley had a "brief" hiatus (1000 years) between early mound centers like Watson Brake and Hedgepeth and the tradition that arose during the Poverty Point era (ca. 3400–2800 cal B.P.; Gibson, 1996c: 44; Sassaman 2004a: 259; see Kidder, 2006: 221 for a possible climatic event associated with this hiatus). Despite this hiatus, earlier mound sites may have served as a guide to later mound-builders. Evidence to this effect is the fact that some of the mounds at Poverty Point itself were constructed during the late Middle Archaic. J. Saunders et al.'s (2001) assessment of the Lower Jackson mound suggests that it is a late Middle Archaic construction. Prior to the determination of its age, researchers considered this mound part of the Poverty Point complex and an intentional component of the site (Webb, 1982; Gibson, 1996b, 1998b, J. Saunders et al., 2001; Clark, 2004). Thus, it appears that places continued to be meaning-laden for centuries after the collective action of construction and reuse.

Above, I alluded to some of the ways in which these sites and their relationships to one another represent both cumulative and spatial palimpsests. Like the shell rings of the Atlantic, few human remains have been recovered from Middle and Late Archaic lower Mississippi valley mounds (J. Saunders, 2004). However, unlike shell rings, mound stages are discernible in profile (J. Saunders et al., 2005). As previously stated, evidence suggests that stages were punctuated events and that some time elapsed between mounding events. What is uncertain is the extent to which the mounds at individual sites were contemporaneous, like the ones that complete the circular arrangement at Watson Break (see Crothers, 2004). However, Gibson's (1987: 19–22; see also Clark, 2004; Sassaman and Heckenberger, 2004b) proposal that these sites were organized to follow a specific site plan suggests that the mounds were constructed contemporaneously. Thus, it seems that these mound sites may be tentatively thought of as an amalgam of several disjunctive short-term construction and occupation events. In contrast, the later Poverty Point site and landscape suggest a different rhythm.

Unlike the late Middle Archaic mounds, the Poverty Point site suggests a much faster temporal rhythm. The site covers 3 km^2 and contains over 750,000 m^3 of mounded earth (Kidder, 2006: 195). Specific examples of the rapidity of monument construction include Kidder et al.'s (2004: 111) examination of mounds B and E at Poverty Point, which indicates that construction stages occurred quickly as single events. While Poverty Point peoples did incorporate older features (i.e., Lower Jackson mound), it appears that the expansion and occupation occurred very quickly at the site, on the order of around 400 years (ca. 3730–3350 cal B.P. [Gibson, 1998a: 319] see also Kidder, 2006). In addition, unlike the late Middle Archaic mounds of the lower Mississippi River Valley (see J. Saunders, 2004), Poverty Point did appear to support at least some sort of full-time resident population (Gibson, 1987; Kidder, 1991; Carr and Stewart, 2004: 143; cf. Jackson, 1991a). Thus, the later Poverty Point site temporal rhythm appears to include contiguous short-term and long-term events.

COLLAPSING PERSISTENT PLACES: A MACROREGIONAL PERSPECTIVE

Recently, archaeologists have been emphasizing the role of macroregional analysis in discerning large-scale patterns. Much of this research stems from Mesoamerican contexts (e.g., Feinman, 1999; Kowalewski, 2004). Chamblee (2006: 20) succinctly sums up this approach by defining macroregional analysis as "looking for patterns of change across multiple regions by balancing the competing analytical goals of 'retain[ing] variation as long as possible' while simplifying and reducing variation to a 'concept' (Kowalewski, 2004), such as market exchange, elite interaction, or warfare." Chamblee also points out that a macroregional perspective that incorporates multiple temporal scales allows for a more balanced view of environmental factors and a way to avoid the deficiencies of neoevolutionary theory (2006: 19–21).

In the above analysis, I use the concept of persistent place to examine change across different regions of the southeastern United

States. I compared three distinct regions, the Atlantic coast Georgia Bight, the lower Mississippi River valley, and the Green River, in terms of the timing of traditions and events at sites that created enduring features on the Middle and Late Archaic landscape. In doing so, I explicitly avoided tracing the ebb and flow of social institutions vis-à-vis neoevolutionary typology. What emerges from this analysis is a view that suggests considerable variability in the timing of creation, occupation, and tradition in these different regions. Each of these regions represents a different scalar rhythm. From the site level to landscape, the timing of creation and the view of time that people had in these regions varied.

While the timing of these various traditions at work in each of the regions varied, they all came to an end at *roughly* the same time—the end of the Late Archaic. Mound-building at Poverty Point ceased ca. 3100–3000 cal B.P. (Saunders and Allen, 2003; Kidder, 2006: 196). Occupation of most of the great shell rings on the Atlantic coast ceased before ca. 3100 cal B.P. (Russo and Heide, 2001; Russo, 2004b; Thompson, 2006). Finally, by ca. 3400 cal B.P., the Green River region's shell and earthen sites ceased to be utilized with no appreciable occupation until the Mississippian period (Marquardt and Watson, 2005b: 631–632). No readily analogous traditions emerged during the Early Woodland period in these areas (see Marquardt and Watson, 2005b; Kidder, 2006; Thomas, 2008a; Thompson and Turck, 2009; Sanger, chap. 9, this volume). In each area there is either a radiocarbon gap or evidence of depopulation based on diagnostic artifacts (Elliott and Sassaman, 1995; Jefferies et al., 2002; Marquardt and Watson, 2005b; Kidder, 2006; Thompson and Turck, 2009). The implication of the collapse of these persistent places, coupled with the idea that they all represent different temporal rhythms, suggests a systemic casual relationship, as I outline above.

I offer the hypothesis that one factor in the collapse of persistent places in these areas may be a disruption of the coupled socioecological systems that emerged during the mid-Holocene that were predicated on the exploitation of wetland resources (Brown, 1985; Marquardt and Watson, 2005b; Anderson et al., 2007a) as well as long-distance exchange networks (Kidder, 1991; Sassaman, 1993a; Bense, 1994; Jefferies, 1997, 2004a; Gibson, 2001). Data from several areas along the coasts and in the interior suggest major climatic shifts during the Late Archaic–Early Woodland transition (Gunn, 1997: 146; Anderson, 2001; Little, 2003; Kidder, 2006; Thompson and Turck, 2009). We do, however, see to some degree some time lag in the collapse of persistent places. That is, while the practice of creating these places are all coming to an end during the Late Archaic, the decline points are separated sometimes by a century or possibly more. If climate were, indeed, a factor in the changing practices, then we would fully expect such a pattern. Even if climate is affecting the environment and resource base similarly across large portions of the macroregion, communities and microregions will react and deal with these changes differentially. Some of the shorter-term traditions (feasting, aggregations) may survive, but longer-term practices may be in danger of disappearing from the landscape (see table 10.1).

Recent high-resolution climate data point to large-scale atmospheric-oceanic system changes between ca. 3000 and 2600 cal B.P. Kidder (2006: 212–216) summarizes this work for eastern North America. A few of the consequences of this global change were cooler temperatures and increased precipitation, which may be linked to increased storm frequencies. For the lower Mississippi Valley, Kidder (2006) argues that massive flooding in the Mississippi River basin engendered considerable landscape change and, concomitantly, the abandonment of many parts of the basin. These changes may have been the root factor in cultural transformations during this period. That is, the collapse of mound-building in the Mississippi basin.

Along the Atlantic coast, numerous studies indicate a shift in sea levels at the Late Archaic–Early Woodland transition (DePratter and Howard, 1980; Colquhoun and Brooks, 1986; Colquhoun et al., 1981; Gayes et al., 1992). While there are incongruities between these various curves, most show a significant drop in sea level during the terminal Late Archaic or during the Early Woodland (Thompson and Turck, 2009: fig. 9). Thompson and Turck (2009), using site file data, argue that there is a dramatic decrease in Early Woodland settlement for the Georgia coastal zone. Indeed, Elliott and Sassaman (1995; see also Gunn, 1997: 146) suggest a possible collapse of Archaic social systems along the coast. Further, Early Woodland settlements seem to shift toward the inland, occupying locations on the landscape that were not utilized by Archaic peoples. Finally, Elliott and Sassaman (1995) also recognized an almost complete abandonment of intensively settled sites along the barrier islands, except for those areas located in deltaic environments (Thompson and Turck, 2009; see also Thomas, 2008a, for an example from St. Catherines Island). Thompson and Turck (2009) argue that this shift in settlement/subsistence patterns is linked to the lowering of sea levels and thus resulted in a disruption of the estuarine resource base (e.g., changes in salinity and fish and shellfish distributions) that supported the populations occupying these large, intensively utilized locales.

Unlike the Georgia Bight and the Mississippi Basin, there is currently no direct paleoenvironmental data in the Green River region that suggest a major disruption for the Late Archaic–Early Woodland transition. However, the cooler and wetter conditions indicated for the Mississippi basin may be characteristic of a considerable area of the Eastern Woodlands and may have played a direct role in the shifts in settlement and subsistence noted by archaeologies in the Middle Green River (Marquardt and Watson, 2005b: 639). Fiedel (2001) for the Northeast and Emerson and Fortier (1986) for the Midwest make similar arguments for the decline in Early Woodland populations and settlement change. The fluctuation in sea levels and changes in precipitation and cooler temperatures appear to be linked to larger scale climatic forcing mechanisms such as solar variability (Anderson et al., 2007a: 7–8; see also Gunn, 1997; Fiedel, 2001; Anderson, 2001; Little, 2003; Kidder, 2006) and thus would have represented a major disruption of established socioecological systems across much of the eastern U.S.

Coincident with the abandonment or shifts in use to minor portions of the population of these persistent places was the collapse of long-distance exchange networks. The disintegration of such institutions would have necessitated alternatives for information exchange and mate selection. One way in which groups may meet such needs is by increasing mobility (Whallon, 2006). To be certain, in most of these areas people were mobile; however, what I suggest here is that by focusing on and creating persistent places, the mobility of these groups during the Late Archaic was to some degree constrained. In contrast, the discontinuance of the importance of these places on the landscape allowed for higher degrees of mobility.

On a final note, it should be recognized that the Archaic groups in adjacent regions probably continued to practice highly mobile lifestyles of the kind we associate with band-level societies (Anderson et al., 2007a: 471; Crothers 2008). These people chose not to participate, or minimally interact, in the tribal networks hypothesized by Anderson (2002, 2004). And, what happened to these people at the end of the Archaic? The answer to this is maybe nothing much at all. I argue elsewhere (Thompson and Turck, 2009) that such high mobility is highly resilient to environmental disruptions. Therefore, these groups were already practicing a highly resilient and flexible strategy that facilitated production and reproduction.

WHAT HAPPENED *TO THESE* LATE ARCHAIC GROUPS?

To return again to Anderson's (2002, 2004) idea that segmentary societies emerged during the Archaic, it appears that, if indeed these social institutions surfaced in certain areas at this time, they collapsed shortly thereafter. Anderson's (2002) identification is key in my analysis of what happened to the Archaic; however, one may rightly question whether the collapse of these institutions is simply a result of tribal cycling (e.g., Parkinson, 2002). For the regions discussed in this paper, I argue that when we take into account a broader perspective, then the archaeological record indicates a pattern that is too complex to be accounted for by cycling alone.

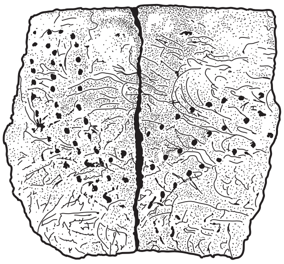
To recap, I argue that the large, enduring sites such as the mounds of the Mississippi basin, the shell rings of the Atlantic, and the shell-bearing sites of the Green River may be thought of as persistent places on the Archaic landscape. Using ideas from time perspectivism, I suggest that each of these regions and sites represents very different temporal rhythms of creation. By taking a macroregional approach to the creation of persistent places, I argue that we are better able to understand how environmental changes interact with broad-scale culture dynamics (see Kowalewski, 1995; Anderson et al., 2007a). Here, I suggest that what happened to some Archaic groups was really the collapse of these persistent places and their associated interaction networks. This, I suggest, was, in part, a response to climatic disruptions experienced by these socioecological systems based on aquatic resources, regional exchange, and facilitated by ritual, ceremony, and information and mate exchange that took place at specific locations on the landscape. As a way of mediating these changes, some Early Woodland groups, specifically during the time frame ca. 3000 to 2500 cal B.P., turned to a more mobile lifestyle that facilitated the expansion of information flow and social networks.

In many areas across eastern North America during the Early Woodland, we do not observe anything approximating the scale of practices and intensive commitment to specific locations on the landscape that we see for the Archaic Period. There are, of course, areas such as Middle Ohio valley and Pickwick Basin in Tennessee (Webb and DeJarnette, 1948) that contradict the patterns observed in the examples that I provide in this paper (e.g., Clay, 1986, 1987, 1998, 2002; Anderson and Mainfort, 2002b). Why did short- and long-term practices that work to create persistent places develop and/or persist in these areas? Why also was it not until the Middle Woodland that we see such practices of mound-building and large-scale exotic trade networks in *multiple* regions across the Southeast rise again (e.g., Brose and Greber, 1979; Carr and Case, 2005; Charles and Buikstra, 2006)?

I offer, in this paper, as a departure point to understand the complex interaction of cultural traditions and the environment, a perspective that emphasizes an examination of temporal rhythms (both in terms of short- and long-term scales) at a local, regional, and macroregional scale. In an age when climate change is a factor affecting both short- (e.g., household recycling) and long-term practices (carbon budgets) of modern society, it should come as no surprise that such forces impacted practices in the past. I am not arguing here that people were reacting to climate change, but rather doing what they probably have always done. That is, making decisions and carrying out actions regarding mobility, feasting, burial, ritual, and the like based on cultural traditions interwoven with knowledge of the changing local environment at short-term temporal scales. As we know for modern society, environmental and economic change presents challenges to local communities, each of which will deal with it in different ways. Some of these groups will successfully negotiate environmental change, thus giving the appearance of long-term stability. Others, however, will require a complete or fundamental reorganization of cultural practices at short-term time scales that will eventually change longer-term temporal patterns. How this reorganization happens and its ensuing consequences may be one of the most interesting questions in the study of past societies. It is often at these flashpoints that novel and unexpected traditions arise.

NOTES

1. Chris Moore, Richard Jefferies, and William Marquardt provided very helpful comments, which improved the overall quality of this paper. I would also like to thank David Hurst Thomas and Matt Sanger for the invitation to participate in this volume.



CHAPTER 11

GETTING FROM THE LATE ARCHAIC TO EARLY WOODLAND IN THREE MIDDLE VALLEYS (THOSE BEING THE SAVANNAH, ST. JOHNS, AND TENNESSEE)

KENNETH E. SASSAMAN

Compared to the Mesolithic-Neolithic transition in Europe, the change from Archaic to Woodland in the American Southeast elapsed with little fanfare. The European process arguably qualified as "revolutionary." Having originated in lower latitudes, the farming economies of Europe—accompanied by villages, pottery, and storage—spread in wavelike fashion north and west to thoroughly supplant Mesolithic communities. And the process was far more than the replacement of one economy by another; it involved a cultural revolution of epic proportions, the beginnings of a "disciplined" lifestyle of formal architecture, prescribed social roles, gendered divisions, and routinized religion (Hodder, 1991; Thomas, 1991; Bradley, 1998).

The picture in the Eastern Woodlands of North America is vastly different. Full-blown agriculture would not gain traction until after cal A.D. 900, when maize became a staple crop. The previous millennia of experimentation in cultivating plants—whose oily and starchy seeds or fleshy parts supplemented diets of wild resources—does not appear to have been the basis for any pervasive and sustainable culture change. We certainly do not see any evidence for the wave of advance noted for Europe; instead, low-level food production (Smith, 2004) appears to have been only local in scope and nowhere does it seem to have supported the sort of demographic push, material surplus, or ideological rationale for frontier expansion. Indeed, Eastern Woodland specialists do not generally entertain thoughts of large-scale population movements or replacements during this long period of horticultural experimentation.

Lacking the revolutionary qualities of Neolithicization, change in the Eastern Woodlands has instead been characterized by processes akin to phyletic gradualism. This perspective is exemplified in the classic work of Joseph Caldwell (1958), whose *Trend and Tradition*, despite its teleological and idealistic overtones, remains a dominant model for glossing the Archaic–Woodland transition. Caldwell attributed change to the gradual accumulation of knowledge about exploiting the economic potential of wooded environments. Eastern Woodlands populations did so by applying the engineering of pottery, groundstone, and storage to the extraction and use of mast resources, notably acorns. As a proxy for food production, mast collecting provided the economic basis for relatively permanent settlement, population growth, and the development of political economies. Pottery was critical in this process because without it the potential of mast resources could not have been met. A similar argument has been made for containers made from soapstone (Truncer, 2004), although there is little to recommend that these predate pottery in all but a few limited locales in the region (Sassaman, 2006a).

The other major difference between Europe and the Eastern Woodlands is the role of monumentality in the transition from hunting and gathering to farming. In Europe, monument construction followed the Neolithic frontier (Bradley, 1998) and thus appears to have been integral to the formation and reproduction of corporate structures of regional integration. If we suspend for the moment the centrality of horticultural production in cultural changes noted for the

Woodland period in the American Midwest, then monumentality, in the form of Hopewell ritual, indeed signals a cultural revolution that spread in European fashion. However, this pervasive religious influence in the Eastern Woodlands was not bundled together with the economic, social, and political parameters of change known for Europe; in other words, mound ritual may not have been structurally linked to other dimensions of Middle Woodland life, at least not subsistence. Moreover, monument construction predates the Woodland period by at least 4000 years in the lower South. Until recently, Poverty Point (Gibson, 2001; Kidder, 2002a), with its elaborate earthworks and presumably massive resident population, was the sole anomaly. We are now aware that mound-building traditions in Louisiana, as well as Florida, go back as much as 7000 years ago (Russo, 1994a; Saunders et al., 1994; J. Saunders, chap. 12, this volume).

Thus, long before there was any sort of transition out of things Archaic and into things Woodland, whatever that means, the Eastern Woodlands was rife with local and regional cultures whose mound building, pottery making, and gardening anticipated developments deemed central to the cultural revolution connoted in the cumbersome term “Neolithicization.” All the ingredients were in place for change to ensue at the hands of sentient agents. Perhaps “nature” had not been wrested in the manner that Childe envisioned, but clearly there were cultural regimes and even centralized living arrangements that predisposed people to certain, but diverse, ways of living.

So our inquiry into Archaic–Woodland transitions necessarily must begin by deconstructing the concept itself and then proceed with either a specific temporal benchmark or a specific outcome in mind. For instance, we could ask simply: what happened between 3500 and 3000 cal B.P.? What events, both natural and cultural, can be discerned? What were the consequences of these events on the distribution and disposition of affected populations? The widespread flooding that T.R. Kidder (2006, chap. 1, this volume) documents at ca. 3000 cal B.P. is indeed the sort of “event” that can be linked to other changes before and after. Of course, no matter how strong the associations are between two variables, explanation does not necessarily follow. We may be certain, for example, that a particular flood event explains the abandonment of a particular location, but we stretch the limits of inference to suggest that any particular event led to a wholesale restructuring of a people’s entrenched way of living.

The organizers of this conference have suggested the alternative approach, namely, addressing a particular outcome, not a particular timeframe. The outcome in this case is change from relatively sedentary, centralized, integrated, and intensified lifeways to a more mobile, socially isolated, and dispersed pattern of living. Although they need not be, these conditions are conveniently labeled as Late Archaic and Early Woodland, respectively. Contributors are asked to address the reality of these “states,” the timing and nature of the transition, and possible causes.

Thus, the “transition” of interest here can be glossed as “devolution,” or, as I prefer, “dissolution.” From my perspective of working in the south Atlantic slope, I agree that a transition of this sort occurred across much of the region, but I do not think these changes were synchronous and the possible causes among them are many. It follows that generalizable insight into the transition of interest must be assembled from detailed local histories. At the same time, none of the local histories of relevance here elapsed in a local vacuum, so we move from local reconstruction to regional comparisons to gain insight about interdependent factors.

In the balance of this paper, I turn to relatively brief sketches of three areas in the Southeast that were hotbeds of Late Archaic activity, including use of the oldest container technologies, and that later experienced some manner of regional abandonment or realignment that more or less fits the bill of the proscribed target of inquiry. Each of the study areas is the “middle” segment of a major river valley: (1) the middle Savannah of Georgia and South Carolina; (2) the middle St. Johns of northeast Florida; and (3) the middle Tennessee of northern Alabama. The respective histories of these areas are very different, but the overall patterns of change have relational parallels and some underlying pan-regional causes, which I will address at the close of this chapter.

MIDDLE SAVANNAH RIVER VALLEY

The Classic Stallings culture of ca. 4100–3800 cal B.P. represents a Late Archaic apogee of sorts in the middle Savannah River valley. At about 3800 years ago the namesake site, Stallings Island, was abandoned thoroughly, as were many of the surrounding locations of riverine settlement. This "event" did not, however, signal the demise of this cultural tradition, at least not in the regional sense. Sites with Classic Stallings pottery were established elsewhere in the region, notably up the Savannah River (e.g., Anderson and Joseph, 1988) and along its upland tributaries (Sassaman et al., 1990: 286; Sassaman, 1993a). Also, coastal occupations with some cultural affinity to Stallings continued for centuries. Compared to the elaborate material culture and "disciplined" living that was Classic Stallings, postabandonment conditions of certain descendant communities certainly meet the criteria for dissolution noted above.

Several years ago, several graduate students at the University of Florida, under my supervision and with NSF support, examined a series of paleoecological and subsistence records from Stallings Islands and surrounding sites for evidence of site abandonment. Although the analysis was hardly exhaustive, nothing in the vertebrate, invertebrate, or plant records registered evidence for any gradual reduction in the capacity of the locale to support human settlement (Sassaman, 2006b: 156–164). Our investigation did not include possible short-term, eventful causes, like flooding, although nothing in the greater Stallings record would lead one to suggest that the river valley became totally uninhabitable. Indeed, the middle Savannah floodplain is bordered in many places by steep bluffs only a few hundred meters from the main channel. As they did in the historic era, these locales would have provided refuge even during the most severe floods.

I have long argued that the genesis of Stallings culture was a process involving the integration of indigenous (Mill Branch phase) and "foreign" (early Stallings phase) peoples (Sassaman, 2006b). The multicultural genesis of Stallings was also arguably the seed of its own disruption. In fact, group fissioning, abandonment, and relocation were ongoing for centuries before the genesis and demise of Classic Stallings culture. One among several examples was the relocation of Mill Branch phase people westward to emerge in the Black Shoals phase, with an onset estimated at 3800 cal B.P. (Stanyard, 2002).

Among the diagnostic feature of the Black Shoals phase are soapstone vessels. Although its ancestral phase in the middle Savannah (Mill Branch) did not involve this particular technology (i.e., bowls), the use of soapstone for thermal functions (i.e., stone boiling/roasting) goes back to at least 5300 cal B.P. in the Piedmont, and soapstone users interacted directly with Coastal Plain neighbors who made and used pottery. In this new location, not too far from some of the largest sources of soapstone in the region (Dickens and Carnes, 1983), they began making lots of vessels. Not long afterwards, large quantities of vessels were exported in multiple directions, notably south and west toward Poverty Point. We do not know if Black Shoals people were literal agents in exportation, but they do appear to have been the instigators of vessel production in the north-central Georgia area. I return to this issue in the section on the middle Tennessee region below.

Back in the middle Savannah, the pattern of settlement following abandonment of riverine sites grew increasingly dispersed through the ensuing centuries. As noted, lineal descendants of Stallings (including Thoms Creek) are apparent at sites throughout the uplands tributaries of the middle Savannah and down throughout the interriverine Coastal Plain (Stoltman, 1974; Anderson et al., 1982; Brooks and Hanson, 1987; Sassaman et al., 1990; Braley, 1991; Sassaman, 1993b; Elliott and Sassaman, 1995; Sassaman and Anderson, 1995). The ensuing Refuge phase is equally dispersed in the middle Savannah, with few large sites along the first terrace of the main channel, but innumerable small assemblages far into tributary headwaters (Sassaman, 1993b).

One notable feature of the change from Stallings to Refuge wares was the diminished level of stylistic elaboration of pottery surfaces. Combined with a broadcast settlement pattern and seemingly small-scale coresidency, the growing "anonymity" of stamped and plain pottery was a likely outcome of more open, flexible rules of inclusion and interaction, including marriage, and less fixed social relationships at the local level than the corporate structures that enabled Classic Stallings society to exist.

MIDDLE ST. JOHNS RIVER VALLEY

The Late Archaic to Woodland timeframe in northeast Florida is represented archaeologically by the Orange and St. Johns I pottery traditions. The standard cultural-historical model for the region is continuity from the prepottery Mount Taylor period, through the Orange period, through the St. Johns I period and beyond (Milanich, 1994; Miller, 1998). Intensive use of freshwater resources, notably fish, turtles, and shellfish, beginning as early as 7000 years ago, provided a level of abundance and stability to support more or less continuous occupations without major economic change. There is indeed much truth to this. However, two recent developments in Florida archaeology weaken this standard model. First, the ceramic chronology that supported a more or less continuous sequence of change (i.e., prepottery, Orange Plain, Orange Incised, St. Johns) has been revised (Sassaman 2003a; R. Saunders, 2004a; Cordell, 2004). Rather than appearing in sequence, starting at ca. 4700 cal B.P., the five phases of Bullen's (1972) Orange series actually co-occurred, and mounting evidence suggests that St. Johns I pottery is equally old. What was once a unilineal sequence is now coeval technological and stylistic variation.

Second, the large inventory of shell mounds and ridges that crowded the St. Johns landscape is now known to contain numerous examples of especially early constructions. When Jeffries Wyman (1875), C.B. Moore (1892–1894), and others visited many of these sites, they were largely intact and typically had assemblages of St. Johns pottery on their surfaces, often the late-period variety of check-stamped wares. Long after most of these shell works were destroyed for construction fill, John Goggin (1952) assembled the region's first comprehensive inventory. Drawing on the observations of Wyman and Moore, Goggin classified most shell works as late-period constructions. Certainly Goggin, like his predecessors, recognized that preceramic Mount Taylor people erected mounds, but the scope of these earliest efforts was woefully underestimated. We now know from six years of sustained investigation in the middle St. Johns that most of the major shell works were initiated at ca. 7000 cal B.P. (Sassaman, 2003b; Randall and Sassaman, 2005; Randall, 2007). These early constructions continued to accumulate in ensuing millennia and many that were initiated during Mt. Taylor times were reoccupied and modified by later peoples. However, the history of mound construction and use was anything but gradual and accumulative.

Instead, the history of mound construction and use was one of fits and starts. Stratigraphic profiles from mounds show complex sequences of transformation, unconformity, and serial reuse. The initial episode of mound construction in many locations appears to coincide with the abandonment of residences arrayed in linear fashion along the edges of permanent or seasonal wetlands (Randall, 2010). Research is ongoing to determine the extent to which site abandonment and capping with shell coincided with downturns in the local ecology (Blessing, 2009). Intuitively this would make sense, but given that the capping of abandoned sites consisted of the collection and deposition of massive quantities of freshwater shellfish (mostly *Viviparus*), changes in the production of adjacent wetlands may have had little to do with it.

After capping sites of habitation, Mount Taylor mound builders repeatedly, and with seeming regimen, added layers in couplets of whole and burned *Viviparus*, sometimes interspersed with layers of apple snail (*Pomacea*) or bivalve (Unionids). Vertebrate fauna and material culture are rare in these layers, but crushed shell and ash attest to intensive activity on mound summits, which, it would be appear, were maintained in size as the mound grew in height by expanding the base, sometimes using shell mined from existing midden (Randall and Sassaman, 2005). The resulting shell works, after multiple stages of construction, were typically linear or crescent-shaped ridges some 120 m long, 50 m wide, and 5 m tall. St. Johns II reuse of these constructions sometimes entailed interment of the dead (Sassaman, 2003b). Mount Taylor mortuary mounds are themselves a separate affair that included the construction of earthern mounds or earthen layers within shell mounds (Aten, 1999; Endonino, 2008c).

Many Mount Taylor shell ridges and other constructions were abandoned altogether at about 4700 cal B.P. This is the onset of the so-called Orange period, when fiber-tempered pottery appears on the scene. As noted earlier, Bullen's (1972) five-phase sequence for Orange pottery is now completely defunct, and we are grappling with alternative interpretations to account for the simultaneous appearance of Orange Plain, Incised, and St. John I pottery—three substantially different technologies.

Abandonment of many Mount Taylor sites at this time coincides not only with early pottery but also a radical change in the scale and siting of shell works. After 4700 cal B.P. and for the following centuries, shell mound construction was concentrated at only a handful of locations in the middle St. Johns. Four such locations—Silver Glen Run (8LA1), Harris Creek (8VO24), Hontoon Island North (8VO202), and Enterprise—were areas of massive, U-shaped constructions (amphitheaters) some 300 m on a side and up to 10 m tall. All but Hontoon Island North are known to contain abundant assemblages of highly ornate Orange Incised pottery and its dearth at Hontoon Island North is likely a sampling bias. These four sites are roughly evenly spaced along the river (30–40 km apart) and they occupy especially prominent locations adjacent to massive lakes and lagoons.

Ongoing work at Silver Glen Run (8LA1) is beginning to clarify the nature of this radical change in shell works construction and regional land use. Although the massive shell works Wyman (1875) described were mined in 1923, their basal components are still intact. Limited testing, thus far, reveals that the outer ridge of this U-shaped complex contains abundant Orange incised pottery overlying what appears to be a Mount Taylor age shell midden. It is likely, though still speculative, that the shell deposits containing Orange Incised pottery were emplaced over an existing Mount Taylor ridge, which, in turn, was emplaced over an abandoned Mount Taylor "village." Linear shell works to the immediately west of the U-shaped construction have been dated to ca. 5500–6000 cal B.P.

The landward, backset ridge has a basal component with Orange Plain pottery. We await radiocarbon dates for this construction episode. Given recent dating or Orange Plain elsewhere, these could range as early as 4800 cal B.P. and as late as 3800 cal B.P. No matter the absolute date, the relative chronology of this second ridge is certain: it was added to the shell works after the waterfront ridge was in place.

U-shaped shell works are known for other locales in Florida, notably at coastal shell works of Late Archaic age (e.g., Horrs Island, Bonito Bay), and Russo and others (Russo and Heide, 2001; Russo, 2004b) have argued that even a shell ring that is fully enclosed has asymmetries that enable one to infer a sociological grammar to its construction and use. Also, large U-shaped shell works have been interpreted as sequential constructions, with one ridge added after the first was erected or at least initiated (Russo, 1991a). Given this pervasive pattern, it is reasonable to hypothesize that U-shaped shell works embody a dual social organization generated from the coalescence of two formerly distinct people. In this sense, the U-shaped shell works of Silver Glen Run signals an "original" people (outer ridge) and a "foreign" (inner ridge) people that coalesced into a single corporate group. Importantly, there may be no direct relationship between stipulated ancestry in this case and the actual genealogy of resident peoples. Indeed, the Orange Incised that dominates the outer ridge at Silver Glen is without precedent in the local area and most likely signals the influx of Orange populations from the coast. In this respect it is worth noting that predecessor Mount Taylor residents enjoyed a steady supply of marine shell from the coast until pottery hit the scene; thereafter, coastal materials were rare to nonexistent.

The long-term fate of these presumed coalescent societies are unknown. The greater chronological picture at Silver Glen Run suggests that ritual practices (i.e., feasting) at the shell works continued until at least 4000 cal B.P. Two centuries later, Orange fiber-tempered pottery was largely supplanted by St. Johns wares. Indirect evidence would suggest that shell works construction or even casual use of extant ridges and mounds was suspended for some time. Sites with plain St. Johns I pottery are not uncommon throughout the middle St. Johns, but we simply do not have much purchase on the age and function of these sites. If pressed to cite an "event" of abandonment and reorganization akin to that described for the middle Savannah above, I would guess it occurred at ca. 3900–3800 cal B.P. Given the proposed multicultural nature of the coalescent "event," the cause for reorganization in the middle St. Johns, like the middle Savannah, is likely to entail some manner of group fissioning along preexisting social divisions. The results of ongoing work at St. Johns shell works may some day supply the needed data to test this hypothesis.

MIDDLE TENNESSEE RIVER VALLEY

Our knowledge of the Late Archaic–Early Woodland transition in the middle Tennessee River Valley is incommensurate with the large volume of work that was conducted there in advance of reservoir construction in the early- to mid-20th century. Understandably, early investigators, led by William S. Webb, did not have independent chronological controls to cross-correlate the many stratified sequences they exposed through excavation. Subsequent work has thus suffered from an overly generalized and homogenized regional sequence of Archaic and Woodland cultures. Fortunately, a new generation of archaeologists at the universities of Tennessee and Alabama are combining new technologies and recent excavations to refine the chronology and sequence of middle Tennessee Valley prehistory. The emerging new picture bears relevance to both local and regional patterns of change.

As part of the Shell Mound Archaic, the shell-bearing sites of the middle Tennessee valley encompass a great deal of morphological, temporal, and functional variation. Their origins extend as far back as ca. 8300 cal B.P. (Dye, 1996), but very few sites in this portion of the valley may actually date that early. Conversely, the termination of shellfish accumulation at many of the massive middens along the main river channel is attenuated toward the Woodland period. There may not have been a "demise" to the Shell Mound Archaic in the middle Tennessee per se, but by ca. 3200 cal B.P., use of many, perhaps most, shell-bearing sites along the river had ended, at least temporarily. Details to chronicle these changes are sketchy, but a few of the more recent findings are insightful.

In a reanalysis of the Perry site sequence, Eugene Futato (2000) was able to demonstrate that the most intensive shellfishing coincided with the introduction of Wheeler fiber-tempered pottery at ca. 3800 cal B.P. This is also about the same time that soapstone vessels appear in the region (coincident with onset of manufacture in north Georgia; see above). Jason O'Donoughue and Scott Meeks (2007) have examined the regional distribution of Wheeler pottery and soapstone vessels in the valley and found the two to be largely mutually exclusive, with the former concentrated in the downriver aspect of the middle Tennessee, and the latter at sites up the river, to the east.

Recent excavations at the Whitesburg Bridge site (1MA10) exemplify the sort of terminal Archaic occupations know for the upriver portion of the middle Tennessee (Gage and Keeling, 2003). Dating to ca. 3600–3300 cal B.P., the Whitesburg Bridge occupation registers the waning decades of shellfish use before the area was abandoned. Soapstone vessels were commonly utilized at this time, and burials continued in the Shell Mound Archaic tradition of midden interment. Fired clay floors, storage pits, and thick accumulations of ash attest to intensive riverine habitation.

The Whitesburg Bridge occupation is roughly coeval with the apogee of soapstone vessel production and exchange associated with Poverty Point. However, the volume of soapstone vessel use in the middle Tennessee at this time was actually relatively low. In the subsequent Alexander phase, (post-3050 cal B.P.), the volume and elaboration of vessel use increased sharply. This coincides with the demise of Poverty Point exchange, suggesting that local people had either intercepted the trade and thus contributed to Poverty Point's demise, or, more likely, taken advantage of a waning "market" and redirected soapstone vessel technology toward new cultural goals. The goals in this case were expressly ritualistic. For the first time, we find soapstone vessels, and counterparts made from sandstone, included in the graves of the deceased. Those that occur in Shell Mound Archaic sites of the middle Tennessee (e.g., Webb and DeJarnette, 1948) have been routinely misclassified as Late Archaic. However, all mortuary uses of stone vessels dated thus far fall between 3000 and 2600 cal B.P. (Sassaman, 2006a). Moreover, graves with stone vessels placed over the heads of individuals or deliberately broken over graves are typically isolated affairs, even occurring some distance from locations of habitation. This sort of treatment explains in part the lack of associated Alexander material culture at some sites, and points to the possibility that Alexander undertakers sought out "ancestral" locations for the interment of the dead as a means to assert claims to heritage or ancestry. The making of social memory is paralleled in the reuse of mounds in the middle St. Johns and the interment of late-prehistoric individuals at sites such as Stallings Island (Claflin, 1931; Sassaman et al., 2006b).

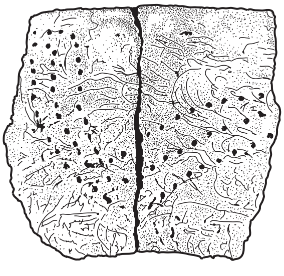
SUMMARY AND CONCLUSIONS

This brief review of terminal Archaic archaeology in three "middle" valleys reflects marked variations in the local histories of group formation and dissolution. Despite the differences in specific sequences, we can identify cultural developments in each area that signal the sort of cohesion, integration, and "discipline" connoted by the Late Archaic "condition" discussed earlier. In at least two cases (middle Savannah, middle St. Johns) the emergent corporate structures were the historical outcome of interactions between two or more hitherto distinct people. And in both these cases, the pluralistic quality of these communities may very well have predisposed them to fissioning. The ensuing pattern of settlement dispersal and seeming anonymity of a diminished artistic genre is not unusual for diasporic communities and people of resistance who assert sameness in order to facilitate interaction without hierarchy or institutionalized structure (Connerton, 1989).

The contours of historical process are not so well drawn in the third area of inquiry, but what little we know about the Late Archaic–Early Woodland transition in the middle Tennessee River valley reminds us of the effects of political economies at the macroscale. Indirect though they may have been, the forces of Poverty Point that entailed the acquisition of soapstone vessels reverberated across the lower South into source areas in northern Georgia and influenced local developments toward economic and social structures conducive to alliance making at a distance. The local turn in production and exchange that transpired at the same time Poverty Point importation waned and then ceased, is not likely coincidental, and for the first time ever in the Southeast, vessels were interred with the dead.

When all three areas are compared, at least two points of historical inflection are discerned: one at 3800 cal B.P. and a second at 3300 cal B.P. The former signals major cultural realignments in the middle Savannah and middle St. Johns, and the onset of pottery use in middle Tennessee, coupled with the regional surge in soapstone vessel production. The latter signals an overall dispersal of settlement into upland units across much of the lower Southeast, and the eventual spread of pottery technologies with relatively simple surface treatments. It is certainly worth considering the likelihood that these changes are linked to global, continental, or at least regional environmental change. But it is equally plausible that these changes are coincident as a result of linkages among all constituent societies in the greater Southeast. Of course, these are not mutually exclusive causes.

The major changes we observe at the close of the Late Archaic, whether or not they were precipitated by natural forces (e.g., floods), entailed the realignment of social collectives and the alliances that connected them. If we approach these records of change with the a priori assumption that the constituent societies were relatively like-minded and interchangeable, and predisposed to flux in membership as in the classic forager models, then we deny what the Late Archaic period shows us: that social collectives of enormous scale and diversity arose in flashes of ethnogenesis and that these were “disciplined” societies whose ritual proscriptions held sway, at least for several generations, over the choices people made. Their eventual dissolution was no less historical and influential in structuring human practice. Traditions were predicated on these sorts of “events” and the emergent new cultural identities and dispositions they enabled charted the course of history. The Late Archaic was “neolithicized” repeatedly in the American Southeast; what the ensuing Early Woodland shows is that this process was often (predictably) reversible.



CHAPTER 12

LATE ARCHAIC? WHAT THE HELL HAPPENED TO THE MIDDLE ARCHAIC?

JOE SAUNDERS

The Late Archaic–Woodland transition in northeast Louisiana is defined by the demise of the Poverty Point culture (Webb, 1982; Neuman, 1984; Gibson, 2000, 2007). Major flooding ca. 1000 cal B.C.–600 cal B.C. coincides with the decline; the riparian ecosystem and trade networks were disrupted leading to the abandonment of the Poverty Point culture area (Kidder, 2006). Recent research in northeast Louisiana has identified an earlier abrupt transformation between the preceding Middle Archaic (ca. 4000–2700 cal B.C.) and Late Archaic periods (2700–1000 cal B.C.). What a tumultuous lot those Late Archaic people were. Ongoing research (Saunders et al., 2005; Arco et al., 2006; Gibson, 2006; Kidder, 2006; Saunders et al., 2007) appears to have identified an abrupt ending of monumental architecture ca. 2700 cal B.C.; and furthermore, mound building did not resume until the beginning of the Poverty Point culture 1000 years later. The cause of cessation is unknown. It occurs in a larger area than the Poverty Point Late Archaic–Woodland transition (Kidder, 2006). Terminus dates ca. 2700 cal B.C. have been recovered from five mound sites in the Tensas Basin, the Ouachita River Valley, and the Tertiary uplands. Evidence for flooding exists, but the magnitude in the Ouachita Valley and Tertiary uplands is marginal (Saucier in Saunders et al., 1994) and seems to be insufficient to cause the simultaneous abandonment of sites. However, the evidence is preliminary and other possible related "causes" have not yet been investigated.

THE MIDDLE ARCHAIC

The existence of Middle Archaic earthworks in the lower Mississippi Valley is a certainty. Initially archaeologists assumed that Middle Archaic mounds marked the start of a continuum extending throughout the prehistory of the lower Mississippi Valley. But the acquisition of additional chronometric data from Middle Archaic (Saunders et al., 2005; Arco et al., 2006; R. Saunders et al, personal commun., 2007) and Poverty Point earthworks (Connolly, 2000; Kidder, 2006) indicates that mound building was abandoned for almost 1000 years between the Middle Archaic and Poverty Point periods, and perhaps for a shorter span of 400 years between the Poverty Point and the Woodland periods (Gibson, 1996a, 2007; Kidder, 2006). Accordingly, mound building does not signify directional development in stages of cultural historical evolution. Mound construction, magnitude, and design are not a unilineal trajectory from the simple to the complex, or from the Archaic to the Woodland. Instead, mound building is an iterative mechanism of social integration adopted and abandoned by societies of varying complexity, economy, and antiquity.

The earliest mounds in the lower Mississippi Valley date to ca. 4000, and perhaps to >5000 cal B.C. (Monte Sano). Of the 16 dated Middle Archaic mound sites in Louisiana and Mississippi, the majority of mounds date to between 3500 and 3000 cal B.C. It was tacitly assumed that as exploration continued, dates for Middle Archaic mounds eventually would overlap with those of the Poverty Point period. However, new data indicate a sudden and widespread cessation of mound building after construction of Hedgepeth Mounds, Frenchman's Bend Mounds, Watson Brake, Nolan (Kidder, 2006: 216), and Bush Mounds (Saunders et al., 2008) in northeast

Louisiana. The clustering of the youngest dates from nine mounds at these five sites is remarkable (see table 12.1). Perhaps equally remarkable is that mound building may not resume until the onset of the Poverty Point culture approximately 1000 years later.

Unfortunately, at least for the lower Mississippi Valley, Middle Archaic data come from small-scale excavations or coring at the 16 mound sites. Consequently, it is difficult, if not impossible, to discuss the Middle Archaic without talking mounds. The sites range between one and 11 mounds in number (sites with one mound = 5, two mounds = 4, three mounds = 2, five mounds = 2, six mounds = 2 and 11 mounds = 1), and earthen ridges make up part of the earthen architecture at six sites. Only two sites had more than two test unit excavations. Four sites were tested with two test units each, six sites had one test unit, and two sites were evaluated by coring alone.

Evidence of subregional interaction exists among these Middle Archaic sites. The distinctive Evans point occurs along the west side of the Mississippi, while a variant, the Tangipahoa (McGahey, 2000: 152; Brookes, personal commun., 2005;) is found along the east side. The same lapidary technology is present on both sides of the valley (Johnson, 2000; McGehe, personal commun., 2007) as are the distinctive effigy beads (Crawford, 2003). Local chert is virtually the sole source of raw material for stone tools, and except for the effigy beads, evidence of trade is negligible. Geometric fired-earthen objects are restricted to northeast Louisiana. Sassaman and Heckenberger (2004a) and others have argued that the four largest mound sites, Watson Brake, Hedgepeth Mounds, Caney Bayou Mounds, and Frenchman's Bend Mounds, all in northeast Louisiana, are laid out with the same design.

Submound architecture appears to be random in distribution, but this may be an artifact of the extent of site excavations. Submound posthole patterns were recorded at Monte Sano and Frenchman's Bend Mounds. Prepared surfaces/floors were observed under three mounds at Frenchman's Bend Mounds and internal earthen platforms were found at Monte Sano and Hedgepeth Mounds.

Collectively, these sparse data suggest autonomous Middle Archaic communities (Gibson, 2006). The variable distribution in mound number, site layout, submound architecture, and material culture does not indicate domination by any one community. For example, Watson Brake has the most mounds, but Frenchman's Bend Mounds have the most submound architecture. Each mound site appears to be an entity unto itself. Given the temporal span of the Middle Archaic, and its low number of mound sites, perhaps it would be difficult for the sites to not appear autonomous.

THE LATE ARCHAIC

The Late Archaic period starts with the end of Middle Archaic mound building ca. 2800 cal B.C. and it ends with the demise of the Poverty Point culture (ca. 1100 cal B.C.; Gibson, 2000, 2007; Kidder, 2006). The bulk of Late Archaic research has been about the Poverty Point period (see Webb, 1982; Gibson, 2000, 2007 for overviews and references). Studies of sites that fall within the 1000 year transition between the end of the Middle Archaic and the emergence of the Poverty Point culture exist (Connaway et al., 1977; Spencer and Perry, 1978; Ramenofsky and Mires, 1985; Ramenofsky, 1991), but they are few in number. Consequently, little can be said about this span of prehistory, beyond the findings that there were residential sites, some with multiple burials, and a predominant reliance on local sources of lithic raw material. The lithic assemblages from Teoc Creek, Poverty Point, and to a very limited degree Cowpen Slough, suggest a transition from straight-stemmed dart points (Carrollton, Delhi, Hale, Maçon, Pontchartrain, and Evans), to an expanding-stem (Ellis, Epps, Marcos, Marshall, and Motley), thereby indicating continuity between the Middle Archaic and Poverty Point periods (Saunders et al., 2001; Gibson, 2007). It's just that prior to Poverty Point, Late Archaic people were not building mounds.

THE HIATUS?

The evidence for a hiatus in mound construction is marginal and unfortunately the assertion is supported by negative evidence—a precarious way to conduct scientific inquiry. But it is testable and the assertion can be falsified. Simply stated, if mound sites dating to 2800–1700 cal B.C. are identified, then there was no hiatus. Conversely, if no mounds date to the proposed hiatus, the assertion is supported, but not verified, since mounds of that age may exist but their antiquity cannot be established or they may have

TABLE 12.1

Youngest Radiocarbon Dates from Five Middle Archaic Mound Sites

Code/Lab No.	Provenience	Material	Median Probability Age (cal yrs. B.C.)	Radiocarbon age, calibrated[a] (± 2σ)	
					p
Hedgepeth Mounds					
Beta-47622	Submound A hearth	wood charcoal	2880	3320–3270 B.C. 3270–3240 B.C. 3220–3220 B.C. 3170–3160 B.C. 3120–2580 B.C.	0.020 0.018 0.000 0.004 0.958
UGA-2075	Md. E, 2Ab horizon	sediments	2780	2910–2830 B.C. 2820–2660 B.C. 2650–2630 B.C.	0.314 0.655 0.036
UGA-2071	Md. E, 4Ab horizon	sediments	2810	300–2990 B.C. 2930–2830 B.C. 2820–2660 B.C. 2650–2630 B.C.	0.005 0.471 0.513 0.011
UGA-3329	Md. D. 2Ab horizon	sediments	2880	2930–2850 B.C. 2810–2740 B.C. 2730–2690 B.C. 2690–2680 B.C.	0.657 0.271 0.067 0.005
Frenchman's Bend Mounds					
Beta-61451	Md. A, hearth	wood charcoal	2740	3100–2400 B.C. 2380–2350 B.C.	0.991 0.009
Watson Brake					
Beta-93880	Md. C, hearth	charred material	2790	2920–2620 B.C. 2610–2600 B.C. 2590–2590 B.C.	0.996 0.003 0.001
TX-9002	Md. C, 2Ab	humates	2770	2910–2620 B.C. 2610–2560 B.C. 2590–2590 B.C.	0.982 0.009 0.009
UGA-1211b	Md. A core, 2Ab	charcoal	2970	3090–2890 B.C.	1.000
TX-9005	Md. D, 2Ab	humates	2580	2860–2810 B.C. 2750–2720 B.C. 2700–2470 B.C.	0.093 0.028 0.879
Bush Mounds					
Beta-247588	Md. G, 3Ab	wood charcoal	2390	2550–2540 B.C. 2490–2280 B.C. 2250–2230 B.C. 22206–2220 B.C.	0.009 0.978 0.012 0.000
Nolan (Arco 2006)					
AA-55457	Md. C, 5Ab	charcoal	2940	3080–3070 B.C. 3020–2890 B.C.	0.014 0.986

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

been destroyed—which results in a type 2 error, a false negative.

An examination of existing radiocarbon dates from Louisiana and Mississippi illustrates the absence of dated mound sites during the proposed hiatus (fig. 12.1). The data were compiled from the existing files of McGimsey and van der Koogh (2001), Sims and Connaway (2000), and one being compiled by Greenlee and Saunders (2009). A total of 1055 assays were calibrated with Calib 5.0.1 (V; Stuiver and Reimer, 2005).

Radiocarbon dates were culled if their standard deviation was >200 (*N* = 62) or if the assay was derived from bone (*N* = 31), shell (*N* = 100), and unknown material (*N* = 19). Each record was classified as a mound/earthwork (M) or other (O). The provenience of mound/ridge assays was scrutinized to be sure that it was actually from an earthwork. For example, the McGuffee (16CT17) site in Louisiana has 11 radiocarbon assays, but only seven are associated with earthworks (M). The other four samples (O) are from a buried Middle Archaic component at the site. It should be noted that at this time the “scrutiny” process has yet to be completed for the entire database and especially for the Mississippi dates.

The histogram in figure 12.1 illustrates the distribution of the calibrated median probability age of 901 cases that range between cal A.D. 2000 and 6000 cal B.C. Radiocarbon dates greater than 6000 cal B.C. (*N* = 18) are excluded from the histogram since that is greater than the age of known mound construction. The length of each bar represents the number of assays that fall within that 200-year span. For example, the McGuffee assay (Beta-128590) has a median probability age of 1524 cal B.C., which falls within the range of 1400 cal B.C.–1600 cal B.C. bin, and it is one of the 28 assays that fall within that range.

An examination of the histogram reveals three peaks in the distribution of radiocarbon assays (fig. 12.2). The first and largest peak falls between cal A.D. 2000 and 600 cal B.C., the ceramic (Neoindian) period in the study area. The second peak runs between 600 cal B.C and 2000 cal B.C, or essentially the Poverty Point/Late Archaic period. The third peak spans 2600 cal B.C.–4200 cal B.C, or the Middle Archaic period. The picture becomes even more compelling when radiocarbon dates from mounds are highlighted as in figure 12.1b. The three peaks and the hiatus are more clearly defined. It is worth noting that Kidder’s (2006: 212) statistical analysis of radiocarbon dates placed the Late Archaic transition between 1000 cal B.C. and 600 cal B.C., which the histogram matches.

Admittedly, the graph is a little deceptive. One can argue, “so what,” the length of a bar is simply the number of radiocarbon assays in that 200-year range (bin). Running 100 dates on the same mound will “stack” the corresponding bin and create a peak. That is not necessarily so. A peak is a high count defined by low counts on each tail of that portion of the histogram. Second, the peaks and valleys of the mound and nonmound counts are parallel, suggesting that the pattern is not caused by stacking. Third, a bin can’t be stacked if there are no mounds of that age. Finally, not one bar in the histogram has only assays from mound sites; each bar has one or more nonmound dates. During the proposed hiatus, nonmound sites have been radiocarbon dated, so sites of that age exist but they don’t have mounds.

An alternative means of illustrating the data is shown in figure 12.2. Instead of plotting a single point (the median probability) for each assay, it plots the time span with the greatest probability of including the sample’s true calendrical age. Specifically, this figure plots the time span represented by the greatest relative area (>.90) under the probability curve for 2σ interval calibrations. The calibration range is counted in each bin that it spans. For example, the McGuffee assay (Beta-128590) has an interval under the probability curve (relative area = .99) that spans 1640 cal B.C.–1420 cal B.C. A count of 1 is added to each of the bins for 1800 cal B.C.–1600 cal B.C. and 1600 cal B.C.–1400 cal B.C. The pattern persists and the three peaks remain, attesting to the robustness of the data. Earlier iterations plotted the entire 2σ probability range for each assay, from the lower to the upper extreme, and the pattern was much the same. However, the histogram does suggest a decline in, but not an absence of, mound building between the Poverty Point and early Woodland periods and, to a lesser degree, the Middle Archaic and Poverty Point hiatus.

POVERTY POINT

Mound building resumes during the Poverty Point period—with a bang. In fact, the magnitude of the earthworks at Poverty Point argues

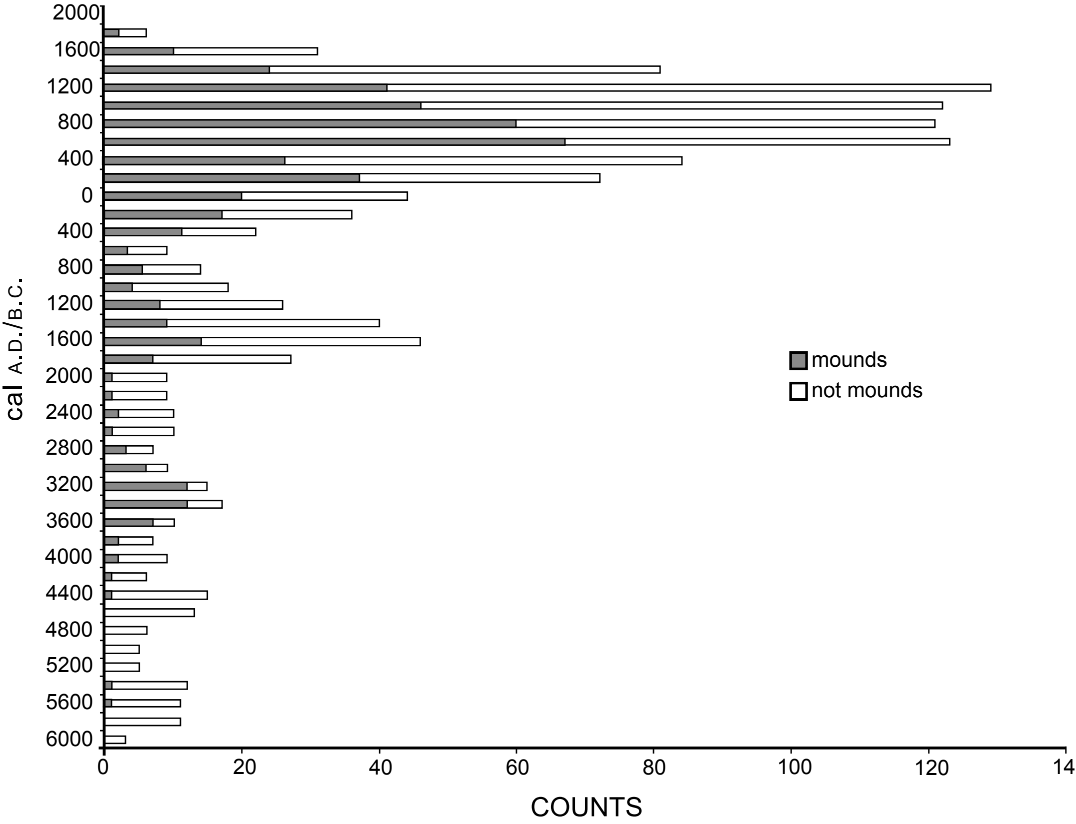


Fig. 12.1. Histogram of ^{14}C assays of radiocarbon years in Louisiana and Mississippi. Shaded areas of bars represent the number of ^{14}C assays from mound contexts; nonshaded areas represent nonmound assays. X-axis is in 200-year intervals.

against a hiatus in mound building. If earthwork construction had not been practiced for a thousand years it seems unlikely that the initial resumption would have been Poverty Point—but perhaps that explains Motley (the large Poverty Point–age mound 1.5 mi north of Poverty Point); it may have been the first attempt.

When the Poverty Point earthworks (including Motley) are excluded, Poverty Point mound architecture is very modest. Webb (1982: 10–12) identified 11 potential Poverty Point mound sites, but it appears that only Jaketown, Savory (not verified), Neimeyer-Dare, Claiborne, and recent additions Lake Enterprise (Jackson and Jeter, 1994) and Hays (Saunders, in press) are actual sites. Probable sites (mounds destroyed before verification) include Head, Neely, Garcia, and Cole Crossing. Interestingly, the second and third largest number of mounds on a Poverty Point site is in Mississippi at Savory (*N* = 8) and Jaketown (*N* = 7). The extant mound at Savory is approximately 30 m at the base and 1.5 m in height. The largest Poverty Point mound at Jaketown probably was Mound G, ca. 28 m at the base and 1.5 m in height (Ford et al., 1955). The greatest number of mounds on a Poverty Point site in Louisiana is two at Neimeyer-Dare, with each mound approximately 25 m at the base and 1.5 m tall (Webb, 1982: 11). Otherwise, only one small conical mound was built at each of the seven remaining known and potential Poverty Point mound sites. This is a striking

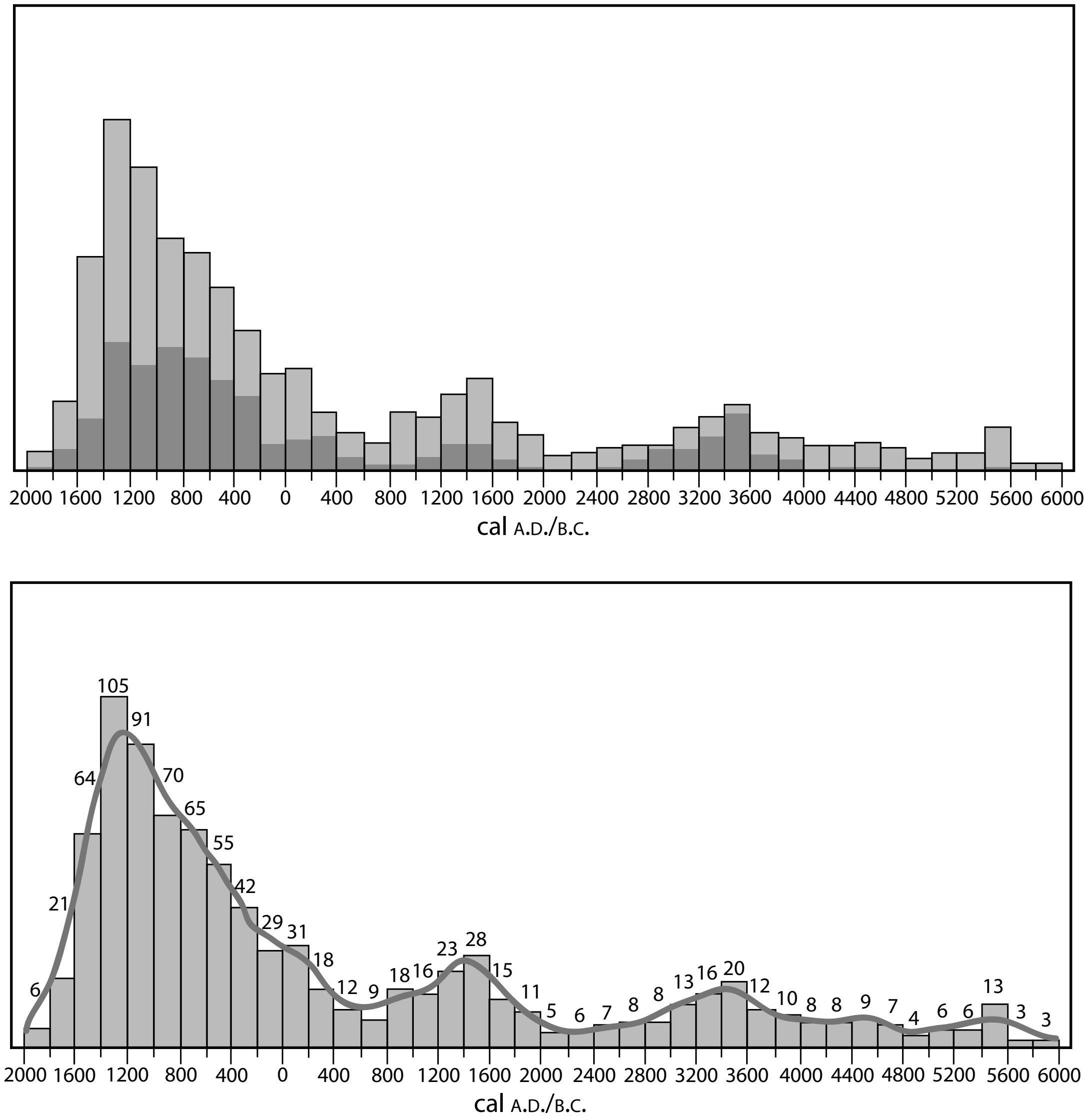


Fig. 12.2. Histograms of calibrated median probability ^{14}C assays. Number on top of each bar = total number of ^{14}C assays in a bar. Shaded areas are the number of ^{14}C assays from mound contexts. X-axis is in 200-year intervals.

difference from the "autonomy" displayed by the Middle Archaic mound builders; the Poverty Point pattern suggests centralization. To me, at least, it appears that the Poverty Point culture was channeled into building and maintaining the type site. Outliers were restricted to small conical mounds.[1] There was no competition, no autonomy, no regionalization.

SUMMARY

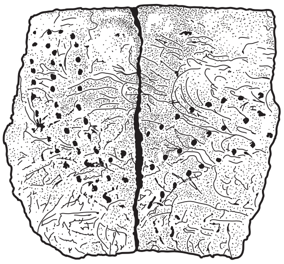
It is difficult to envision any degree of continuity in mound building between the Middle Archaic and Poverty Point periods, given the length of the hiatus. Middle Archaic mounds were once thought to be the antecedents of Poverty Point mounds (Gibson, 1996a). It now appears that the earthworks at Poverty Point are only a reincarnation of a Middle Archaic ethos that maintained a semblance of cultural continuity with the past. Does a hiatus also occur during the Late Archaic to Woodland transition? Apparently so.

Paleontologists define iteration as the disappearance and reappearance of morphologies or adaptive strategies independent of inheritance (W.B. Saunders et al., 2008). Instead, their occurrence is a response to external influences. Dunnell (1999) suggests that mound building was an adaptive response to environmental perturbations. Kidder (2006) builds a very strong case for environmental change triggering the collapse of the Poverty Point culture and he alludes to a similar source for the end of the Middle Archaic mounds (Kidder 2006: 221). Hamilton (1999) has suggested that mound-building episodes in the Middle Archaic correspond with floods initiated by pulses of the El Niño Southern Oscillation (see Sampson, 2008, for an opposite view). Pulse four, one of the largest, occurred ca. 3000 cal B.C.–2600 cal B.C.

NOTES

1. It is possible that these single-mound sites are associated with the start (practice, practice, practice) or end (glory days) of the Poverty Point culture, but at this stage of research, the chronometric data are insufficient for addressing either option.

PART IV
CONCLUDING RUMINATIONS



CHAPTER 13
THOUGHTS ON THE LATE ARCHAIC/EARLY WOODLAND TRANSITION ON THE GEORGIA AND SOUTH CAROLINA COASTS

Chester B. DePratter

The papers presented at the Third Caldwell Conference were of the highest quality. Dave Thomas and Matt Sanger, as organizers and hosts, and each of the participants, are to be commended for the results as contained in this volume. I learned a lot at the Caldwell Conference, and learned still more in reading the longer, more detailed papers as I prepared these comments.

In thinking about these papers, I looked back to a time when I was starting out in archaeology, and I am delighted to see how much progress has been made in understanding both the Late Archaic and the Early Woodland. We now have mounds that stretch back to the Late Archaic, suggesting that shell rings are not just garbage heaps but may be monuments with ties to feasting activity, and Everglades shell middens that are hidden beneath caps of natural cement. But even with those advances, it is clear that we still have a lot to learn about the enigmatic transition between the Late Archaic and Early Woodland. This volume, and the Caldwell Conference from which it originates, represents a tremendous step forward in our efforts to piece together this part of the distant past. My detailed comments will relate to the area I know best—coastal Georgia and South Carolina.

By the time this volume is published, Dave Thomas will have been working on St. Catherines Island for 35 years. Over that period of time, he has conducted systematic survey and testing over the entire island, he has worked on most of the burial mounds found there, he has located and excavated the Spanish mission at Santa Catalina de Guale, and now he has turned his attention to the shell rings on the island. Until recently, there was thought to be only one ring on St. Catherines (the St. Catherines Ring that I found in 1977), but more recently island superintendent, Royce Hayes, found a second one. Now Dave and his crew are working on both of these rings, and with every season of work they make new discoveries and refine their understanding of the rings and how they fit into the larger Late Archaic landscape.

Sanger and Thomas (chap. 3, this volume) have written a thought-provoking paper on the work in progress at the St. Catherines and McQueen shell rings. Because this work is ongoing, we will have to wait until it is completed to know the import of all that has been found in these very recent excavations.

Whenever I think about the past history of an island like St. Catherines and the shell rings and related middens that have been such an important focus of the work on these barriers, my thoughts turn to what must have come before these Late Archaic sites. Were there no inhabitants on St. Catherines prior to 4500 ^{14}C yr B.P.? Of course there were, but so far, they are not visible in the archaeological record. Remains of Early and Middle Archaic occupations must be present on St. Catherines and other coastal Georgia and South Carolina barrier islands and we need to devise a way to find them. Perhaps we need to dig deeper test units, or focus work around old springs, or along low, ponded areas like the central depression on St. Catherines, in order to isolate the most desirable habitation areas in a time when sea level was far lower and the coastline was farther east of its current location. I know that Thomas has plans for work around

St. Catherines Island's central depression, and I applaud that effort.

Thomas (chap. 8, this volume) calls the Late Archaic occupation "the initial occupation," as if those who built the shell rings arrived in a new, uninhabited place, settled down, and commenced eating oysters with no prior knowledge of the place or its environment. I imagine he is thinking that peoples prior to the Late Archaic were living closer to the then present shoreline 70 mi to the east, and that they were pushed westward as sea level rose and flooded the Continental Shelf, and that those migrants ultimately reached St. Catherines Island just as the rising water level flooded the area behind the island, thereby creating the marshes on which Late Archaic populations depended for much of their subsistence.

This line of thinking raises the question of why no one would have been living on St. Catherines Island prior to the Late Archaic. Generations of "arrowhead collectors" have picked up innumerable projectile points from across the Coastal Plains of Georgia and South Carolina. There were clearly large populations in these areas not far removed from the high ground that are today's coastal barrier islands. Would the native peoples for some reason have avoided the high, well-drained Pleistocene remnants that later became the core of the present barrier island systems? I cannot believe that they would have. Again, we need to work harder to find those earlier inhabitants.

Are the rings really the first Late Archaic habitation sites on the island? There are nonshell sites with fiber-tempered pottery on all of the coastal barrier islands. Could these sites have been occupied prior to the time when shell rings were deposited? Could the inhabitants of these sites have converted to shellfish collecting only after rising sea level filled the adjacent marshes? We do not know, but it is clearly a point worth investigating.

When it comes to Thomas's prey and patch choice models and central foraging ideas, I am a little skeptical of just how applicable they might be in the Late Archaic for two major reasons. First, the most important factor affecting habitation choices for most time periods had to be access to the marshes that were the primary sources of subsistence items. Marsh access would have been limited to places where tidal creeks touched the high ground, so even if a potential habitation site was in the most desirable "central place," it would not have been a settlement choice if there were no marsh access.

A second important factor has to do with the size of the major coastal barrier islands including St. Catherines. The part of St. Catherines Island that would have been available to Late Archaic populations is only about seven miles long and perhaps two miles wide. I know from my own experience doing archaeological survey on these islands that it would have been possible to access any part of the island at any time with a walk of only an hour or two, well within the range of hunter-gatherer populations. The same can be said of access to the marshes. Today we look at those marshes as a daunting barrier to movement by populations who possessed only dugout canoes, but to coastal Native Americans those marshes—with their array of tidal creeks—were likely no barrier at all.

In the 1930s, my father supported himself by fishing in the marshes near Brunswick, Georgia. In the days before he could afford an outboard motor, he would launch his rowboat at the Highway 17 bridge south of Darien on the ebb tide, and then he would row 12 miles to the mouth of the Altamaha River where he would gill net fish in the vicinity of Egg Island. Often he would fill the boat with fish on the low tide, and because he could not return home until the tide turned, he and his fishing buddy would sometimes poach a deer on nearby Little St. Simons Island while they waited. Then once the flood tide had reached sufficient velocity, he would row his boat back to the landing. He could not make this trip every day because the tides had to be right to allow the trip to be made in daylight, but he was able to make a good living even with those limitations.

In thinking about Thomas's models further, it seems to me that we do not yet clearly understand the choices made by island inhabitants, either in the scheduling involved in the collection of seasonally available resources, or in the selections they made from resources that were available year round. We know, for instance, that tidal creek/marsh species that would have been available year round include oysters, hard clams, ribbed mussels, etc., but do we really know that those resources were collected year round? From personal experience in collecting hard clams monthly for two years on the upper South Carolina coast, I can say with certainty that there were winter months when I would just as soon not have been wading around in the cold shallows of a tidal creek groping for clams. I know that Thomas and his staff have spent a lot of time cutting clams and looking at season(s) of collecting, but we still have a long ways to go to fully understand what is going on.

The same can be said for resources readily collected from easily accessible high marsh surfaces such as Atlantic ribbed mussels and salt marsh periwinkles. These are species that could have been collected without the use of a boat, and they are the kinds of resources that could easily have been collected by the elderly or by children. But were they collected year round, or only when other shellfish species were not so accessible due to cold? And just what proportional contribution did these species make to the diet? So far, little headway has been made in quantifying the relative presence of ribbed mussels (and razor clams for that matter) due to their aragonitic shells, which break down into tiny, hard to sort and quantify fragments. To carry this argument even farther, do we yet know the relative contributions to the diet of oysters vs. fish? Or of shellfish to mammals? Or of plant foods to shellfish? No, we do not. I am aware that Elizabeth Reitz, Donna Ruhl, and Irvy Quitmyer (among others) are working on these issues for St. Catherines Island, and one day we will know more than we do now. The good news is that Dave Thomas will be at the forefront of pushing for and funding the studies necessary to resolve these issues, and I have no doubt that he and his colleagues will ultimately provide us with good answers.

On a related issue, we need to know more about the plant species represented in these Late Archaic and Early Woodland sites before we can have any real understanding of the transition between the two. Analysis of wood species will allow reconstruction of local environments and allow us to look at changes in those environments through time due to climate change, sea level fluctuations, and storm impacts, among others. And what of plants that were clearly being domesticated in the Eastern Woodlands during the time periods in question? Marshelder (*Iva annua*) was in use in the midcontinent by 8000 cal B.P. and was domesticated by 4400 cal B.P. Chenopod (*Chenopodium berlandieri*), squash (*Cucurbita pepo*), and sunflower (*Helianthus annuas*) have similar dates for first use and for domestication elsewhere in the Eastern Woodlands (B.D. Smith, 2006). Were those species in use on St. Catherines and other coastal islands? I know that there have been some good analyses of plant assemblages from middens, but surely we will need more before we can have definitive reconstructions of local plant communities and the plant assemblages being exploited through time.

While on the subject of coastal change through time, we need to consider the impact of changes in sea level during the Late Archaic and Early Woodland before we can fully understand the transition on the southeast U.S. coast. Thomas (chap. 8, this volume) provides an overview of sea level fluctuations during the period in question. But as he notes, the best we can do at present is to plot major fluctuations while lesser fluctuations on the order of a meter or less are harder to track, though such changes would have had a significant impact of resources in the marshes and along the fringes of St. Catherines and other barrier islands.

What can be said regarding higher than present sea levels? There are respected scientists who believe that there have been higher than present sea levels along the southeast U.S. coast, and I think that there is a strong likelihood of such high stands. If they indeed occurred, then what impact would they have had on distribution of and access to marsh resources? Could such high stands be the reason why the old, first beach ridges east of the Pleistocene are no longer present on the landscape? Could high stands with associated storm surges be responsible for the planing off of the Pleistocene surfaces of the major barrier islands, thereby removing the ridges and swales dating to their original deposition and at the same time burying the pre-Late Archaic sites that should be present?

We do know, based on currently available evidence, that sea level played a dramatic role during the time when the Late Archaic transitioned into the Early Woodland on St. Catherines Island and the rest of the Georgia coast. We know that the sea rose to some point close to present levels by 4500 years ago or perhaps a little earlier (Gayes et al., 1992; Russo, 2006, 2008) This allowed the formation of the coastal marshes that Late Archaic peoples were so dependent upon, and they exploited those marsh resources for the following several hundred years. Then there appears to be a break in the occupation sequence on the coastal islands, at least if we interpret the end of the use of shell rings at around 3700 cal B.P. as evidence of such a break. If Sanger is correct in his thinking that shell rings ceased to be used at around 3700 cal B.P., it is at least conceivable that this may relate to a change in sea level and resulting modifications in the resource base on which Late Archaic populations had become dependent. There are, of course, other possible explanations, and those need to be investigated, but it is clear that there were sea level fluctuations of a meter or more during this period, and those must have had major impacts on marsh habitats.

Even more significant impacts of sea level fluctuation can be seen in the Early Woodland along the Georgia coast. Jim Howard and I published a paper more than 30 years ago detailing our discovery of Early Woodland sites occupied during a low stand and subsequently covered over by new island deposits when sea level once again rose to where it had been in the Late Archaic (DePratter and Howard, 1981). This Early Woodland drop was on the order of a meter or two, and it led to major adjustments along the Georgia coast (and likely elsewhere).

During this Early Woodland low stand, the salt marshes to the west of the Pleistocene barriers would have ceased to exist, or their extent would have been radically reduced at the very least. Populations dependent on shell fish resources would have been forced to migrate eastward to follow the shifting coastline and newly formed marshes, if indeed they were able to maintain their salt marsh adaptation at all. Refuge and early Deptford sites dating to this time period are rare on the Georgia barrier islands (at least on the high, Pleistocene portions of the barrier islands), and when they are present, they lack shellfish remains, and even the sites that Jim Howard and I reported on from beneath Little Tybee Island did not have shellfish remains associated with them. Elsewhere, we have found Refuge and Deptford sites buried beneath marsh sediments along the shorelines of current islands, and those sites could only have been occupied when sea level was lower than it is at present (Marrinan, 1975, 1976; Webb and DePratter, 1982). Clearly this Early Woodland low stand brought great change to the Georgia coast, and at the present time, the extent of that change is not currently well understood. The only way to understand this kind of evidence is through the construction of a fine-grained sea level curve which in the end will be dependent on good archaeological data combined with geological and other datasets (see Brooks et al., 1986, 1989, 1996).

An important consideration in understanding change through time on the Georgia coast (and elsewhere, of course) is accurate dating. Thomas is to be commended for finding the resources to run an immense number of radiocarbon determinations from St. Catherines Island (Thomas, 2008a: chap. 13–16; chap. 8, this volume), and the impact of that work has been dramatic in bringing the coastal chronology into the age of calibration and correction factors. In an effort to bring added precision to the St. Catherines chronology, Thomas and his students have applied a series of correction factors (Thomas, 2008a: chap. 16). I am not an authority on radiocarbon dating and the manipulation of raw determinations, but it seems to me that the very act of correcting and calibrating dates brings new problems to chronological issues.

Thomas (chap. 8, this volume) acknowledges that the simple act of calibrating will introduce “its own peak-and-valley configuration” even when you start with a continuous, uniformly sampled series of dates. The vagaries of carbon decay and short counting cycles leave us with standard deviations for even the best radiocarbon samples in the range of 40 to 70 years, surely long enough to obscure the presence of some of the shorter archaeological time periods in the coastal sequence. And then when one employs correction factors for fractionation and reservoir effect, how can we know what impact these “corrections” will have on the coastal chronology. Perhaps one day we will have an island- or estuary-specific set of correction factors that can be applied with some confidence, but at the present time, it seems that we apply such uncertain corrections with the risk of obscuring or distorting reality to the point that it is impossible to sort it all out.

As a case in point, Thomas has noted here and discussed elsewhere the absence of Savannah period dates from St. Catherines (Thomas, 2008a: chap 16; chap. 8, this volume). From my study of St. Catherines Island collections and reports, it is clear that there are both habitation sites and burial features on the island that date to the Savannah Period. The absence of radiocarbon determinations that fall within the comparatively brief time interval ascribed to the Savannah Period is not all that troubles me. I feel confident that when all is said and done and the various correction factors are formulated on a localized basis, the absent Savannah Period dates will emerge from obscurity.

The same can be said for the dating of the initial occupation of the two shell rings on St. Catherines (Sanger and Thomas, chap. 3, this volume). Based on my own experience in testing shell rings and what I know of the work of others, the lowest levels of the St. Catherines Shell Ring contain just the artifact assemblage that would be expected for an early site—plain fiber-tempered pottery in association with baked clay objects. And the lowest levels of the McQueen Shell Ring contain just what would be expected for a later site—no baked clay objects and decorated pottery. I know that this sequence is one of the options being considered by Thomas, Sanger, and their collaborators, and I remain convinced that it is the proper one. But as in all things archaeological, only time will tell!

While on the subject of the rings, we need to spend a moment thinking about the abundant large, deep, circular features that Sanger and Thomas (chap. 3, this volume) have found in the open areas in the center of the two shell rings on St. Catherines Island. These features are indeed a puzzle. Many archaeologists have tested and trenched in the middle of rings searching for just such postholelike features, but for the most part, those earlier efforts have failed or have led to discovery of only isolated postholes insufficient to allow identification of structures. Now the St. Catherines and McQueen rings have been found to shelter dozens of these large (up to a meter across), postholelike features within the confines of their encircling ridges. But are these features truly postholes?

Like Sanger and Thomas, I still have questions about just what these features represent. They do not contain shell or artifacts or charcoal in abundance, though they do contain small amounts of botanical remains, which are still in the process of being analyzed. The fill of these features is “a dark organic soil” with little in the way of artifactual content. It seems to me that if they were postholes, then the outline of the post molds would be preserved in the dark, unleached fill. And these features are quite large for postholes unless they supported an immense structure, which is, of course, one possibility. But if they are not postholes and not food storage or processing features, then what else could they be? Their straight sides and flat bottoms mean that they were dug and then refilled fairly quickly before their sides had time to weather and collapse.

At present, I have no good explanation for these postlike features, but I have created features that will one day provide a similar puzzle to archaeologists, and the story of those features is worth repeating here. When I was a teenager growing up on the Georgia coast, my father and I did a lot of fishing together. We were generally successful as fishermen, and upon returning home we always scaled and cleaned the fish on a table in our backyard. Part of my job was to bury the resulting scales, heads, and guts from the cleaned fish. I suppose that the easy way to dispose of these items would have been to dig a shallow hole with a shovel, toss in the offal, and then quickly cover it over. On every occasion that I can remember, I used a posthole digger to excavate a deep, narrow shaft for the disposal of the fish remains. So now, what was once our backyard contains many dozens (hundreds?) of randomly placed, three to four feet deep, straight-sided “postholes” with a deposit of fish bones (if they have been preserved) in the bottom. I am not saying that the “postholes” in the two St. Catherines rings were dug for the purpose of burying something, but they may have had some extraordinary use that we do not normally consider.

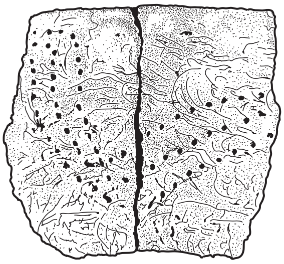
For more than a century, the investigation of Late Archaic coastal sites has focused on shell rings. While I admit that the rings are interesting sites and that I myself investigated a few rings early in my career, it is clear that rings are only one of several kinds of sites occupied during the Late Archaic (DePratter, 1976). As I have noted above, there are nonshell sites all along the Georgia and South Carolina coast and likely in Florida and along the Gulf coast as well. Where do these sites fall temporally in the Late Archaic? Are they all early or all late or do they occur throughout the Late Archaic as just one component of the settlement system at the same time that shell rings were occupied?

What can be said of the nonring shell middens that date to the Late Archaic? Not much, really, because few such sites have been tested, and even fewer have been the subject of intensive investigation. Sites of this sort on the Georgia and lower South Carolina coasts tend to be smaller than the rings, and that may be an important clue to their function or number of inhabitants. The larger size of rings could be a factor of longer occupation, rather than occupation by a substantially larger number of people compared to the numbers on the smaller sites. My question is, how can we understand the place of rings in the settlement and subsistence systems of Late Archaic coastal populations until we have excavated a full range of site types in all sizes and shapes?

This notable excavation bias toward shell rings brings me to a discussion of the feasting/monumental architecture concept championed by Michael Russo (chap. 7, this volume) and others. It seems to me that there are lots of testable hypotheses wrapped up in Russo's proposals, but at present, we do not have enough evidence so say anything with certainty about how rings were formed and what their contents represent in terms of the settlement and subsistence systems of the people who built them. There has simply been too little work at too few sites!

In another paper where Russo (2004b) presents his arguments relating to feasting, he admits that there have been "no large-scale block excavations" in rings except where the ring shell has already been removed (2004b: 44); he realizes "we lack precision tools to determine absolutely the length of time in which a pile of shell was deposited" (Russo, 2004b: 45); he acknowledges that shell ring inhabitants lacked long-term storage capabilities which would have been essential to any kind of feasting (2004b: 47); and he concludes that analyses to date "provide insufficient data to determine whether unequal distribution of food resources occurred at ring sites" (2004: 48) . When taken together, these statements by Russo argue strongly against his conclusion that feasting was involved in the deposition of shell rings. Russo is a good writer, and he leads the reader along by stacking one unproven hypothesis upon another, and in the end all we have is a just-so story relating to feasting and construction of monumental deposits without strong supporting data.

In my estimation, we have made great strides in understanding this important period of change, but we still have a long way to go. In addition to looking at only the largest sites, we need to consider the smaller, less obvious sites. We need to figure out the details of sea level change for this period. We need to find ways to quantify all species of shellfish in middens so we can better understand species selection and seasonality. We need to find ways to calibrate and correct our radiocarbon dates in ways that will provide comparability along this part of the coast. And, finally, we need to look carefully at the feasting/monumental architecture hypothesis to see if it has any viability. We have made great strides in undestanding this important period of prehistory, but in my mind, we still have a way to go.



CHAPTER 14

MOUNDS, MIDDENS, AND RAPID CLIMATE CHANGE DURING THE ARCHAIC-WOODLAND TRANSITION IN THE SOUTHEASTERN UNITED STATES

William H. Marquardt

In November 2008, I presented a paper at the Southeastern Archaeological Conference in which I discussed the epistemology of shell mound interpretation, focusing on how we might satisfy ourselves about their functional attribution as temple mounds, burial mounds, feasting locales, or designed ceremonial structures (Marquardt, 2008). I cited several such interpretations offered by southeastern U.S. archaeologists, and stated that the evidence for their functional inferences was less than compelling, at least to me. Although I do not doubt that some shell mounds were intentionally constructed, I suggested that archaeologists be more explicit about their stratigraphic interpretations and that we treat shell mound deposits as "sediments," in the geological sense of the term. I also suggested that more attention be given to climatic factors when interpreting the deposition of specific shell-bearing sediments, because such sediments often reflect human responses to short-term climate change. I cited an example from the Caloosahatchee IIA period (cal A.D. 500–800) in southwest Florida to illustrate the latter point.

Shortly after the SEAC meeting, David Hurst Thomas asked me to consider reading the papers in this book and adding my comments. This chapter is the result. I thank Dave for his courtesy in inviting me to discuss these papers, knowing that I might be critical of some of the conclusions. I also thank him for the opportunity to read them prior to publication, because I learned a great deal from the thoughtful interpretations and hard-won research results reported herein. In this chapter I comment briefly on each paper and conclude by discussing research directions that I believe will help elucidate some of the issues raised in this volume.

T.R. Kidder's chapter 1 inhabits the first section: "Part I: A Paleoenvironmental Baseline." Kidder offers less a baseline than a qualification of his previously published "Climate Hypothesis" (Kidder, 2006), in which he had set forth a climate-driven explanation for the apparently dramatic cultural changes known to have occurred in the Late Archaic period in the lower Mississippi valley. Specifically, Kidder had argued that a regionwide hiatus in human occupation of the lower Mississippi valley ca. 3000–2500 cal B.P. was caused by human responses to intense and broad-scale flooding. Kidder had reasoned that extended flooding would have disrupted local hydrology and many of the resources upon which Late Archaic peoples depended.

Gibson (chap. 2, this volume) counters that fishing people who are adapted to flood-prone areas are accustomed to adjusting to floods, and that even devastating hurricanes would not destroy a human society totally. He characterizes Kidder's model as one of megaflooding devastating an entire region, but this oversimplifies Kidder's hypothesis, which has as much to do with shifting geomorphology and its social and economic implications as it does with food and flooding.

People can respond to flooding events by moving away or temporarily adopting alternative food-gathering strategies, as Kidder realizes. The more compelling part of his Climate Hypothesis is his integration of geoarchaeological perspectives. For example, he points out that one consequence of ca. 3000–2500 cal B.P. climate-induced events was the capture of Joes Bayou by the Mississippi

River. This meant that Poverty Point sites once located adjacent to the bayou were now isolated from it (Kidder, 2006: 218).

In this book, Kidder emphasizes the variability from region to region during the transition, but he is still convinced that the period 3000–2500 cal B.P. (or, more broadly, 3200–2200 cal B.P.) was a time of significant cultural change in the Southeast, and he still believes that climatic factors are at least partially implicated. He no longer cites climate change as a causal agent, however, saying that it "is probably better thought of as a description of a process than as an explanation." In my opinion, this retreat is unfortunate. I argue that climate change is a major player that should be prominent in the studies represented in this volume. To do this, the authors need two things: (1) a more explicitly dialectical approach to the conceptualization of human landscapes and characterization of group decision-making, and (2) a closer examination of some of the more recent paleoclimate literature.

My bias toward a dialectical approach stems from historical ecology, the holistic study of human societies in their dynamic environmental contexts (Crumley, 1994, 2007; Balée, 1998). For historical ecologists, culture and environment are historically situated, influencing one another in a fundamental, constitutive manner. Historical ecologists place emphasis on the historical emergence of relations between humans and their noncultural environments. Cultural change cannot be understood in the absence of environmental context, nor can environmental conditions be considered the sole or even the main determinant of cultural patterns. Culture and environment are in a dialectical, mutually constitutive relation with one another, and form a totality that can be studied regionally and through time (on regional dynamics of landscapes, see Marquardt and Crumley, 1987; on dialectical archaeology, see Marquardt, 1992b).

Kidder's retreat from environmental causality may be stimulated in part because the same abrupt global climate change can have very different local effects from region to region, depending on local environmental conditions and modes of production, thus the causal arrow can be hard to identify. There is also still some stigma associated with so-called "environmental determinism." But it is not deterministic to recognize that both physical structures and sociohistorical structures influence human possibilities, limiting or enhancing the potential for cultural change. Cultural change is effected in the dialectical, historically situated interplay between the two (Marquardt, 1992b: 104–111).

Different social formations will react to external challenges or opportunities in distinct ways, according to their traditions, ideals, and power relations. Therefore, we should neither privilege environmental processes above human agency nor fall back to regarding abrupt climate change as mere description, but instead consider climate change as an important factor in our historical interpretations. Our challenge as archaeologists is to identify the diverse sociohistorical and physical structures that provide the stage on which the dynamics of change were played out.

The second factor that would invigorate the study of the Late Archaic–Early Woodland transition is greater attention to fine-grained studies of Holocene climate change, studies that have appeared with more frequency during the past 20 years. These paleoclimate studies have demonstrated that changes in widespread regions are characterized by atmospheric-oceanic teleconnections. In other words, global climatic changes have local effects, and these occur more or less simultaneously across the planet. Forcing factors are manifested in various regions in different ways, as Kidder realizes, depending on oceanic currents, continental wind regimes, and local hydrological and topographic conditions. Recent climate studies have also demonstrated that changes can occur relatively rapidly and synchronously in both low and high latitudes.

Archaeologists can benefit from recognizing a recent profound paradigm shift in the field of paleoclimatology, characterized by the new understanding that *climate can and does change abruptly* (that is, within periods of 50 to 100 years, sometimes within a decade) and that *the scales at which these rapid changes can occur are relevant to past ecosystems and human societies*. This new research orientation is reflected in the National Research Council's call (National Research Council, 2002) for a focus on abrupt climate change. This is based on the recognition that sudden change increases the potential for societal and ecological impacts. Consider the National Research Council's (2002: 14) definition of abrupt climate change from a societal and ecological view: "an abrupt change is one that takes place so rapidly and unexpectedly that human *or* natural systems have difficulty adapting to it." For southeastern U.S. archaeologists, climate changes within the greater North Atlantic atmospheric-oceanic region are the most relevant. Regional temperature fluctuations tend to be relatively synchronous, but precipitation and storminess trends are typically more geographically variable.

Coincident with this new paradigm is the recognition that sea level can also respond rapidly, within 50 years or less. Until recently, archaeologists were forced to rely on sea level curves and records based mainly on data derived from analysis of peat deposits. These studies provided reliable data on regressions, but little or no evidence of transgressions, and precious little information on shorter-term fluctuations, those on the order of 50 to 200 years. A further complicating factor is that some geologists, who traditionally worked at much broader temporal scales than archaeologists, tended to publish uncalibrated and uncorrected radiocarbon dates, or to be unclear about whether or not their dates had been calibrated. The result is that archaeologists had to force their fine-grained data on cultural changes into the not so fine-grained sea level curves and records of geologists. Some authors in this volume still rely on broad-scale, gradualistic models, limiting their ability to consider the dynamic interaction between environment and culture.

Prolonged study in a region often affords archaeologists a temporal resolution of 50 to 200 years, based on radiocarbon dates, comparative study of artifacts, and cross-dating of finds in known context. Therefore, what archaeologists need is a climate record or model that also has a resolution of 50 to 200 years, something closer to the temporal resolution that a long-term regional project can routinely achieve. Given the burgeoning climate change literature, which is informative of fluctuating sea levels as well as global warming and cooling trends, wet and dry periods, etc., it is more and more likely that archaeologists will have just that.

The record that has been most useful in our team's research in Florida is that of William Tanner (1993: 228), whose nuanced 7500-year sea level record is derived from extensive research on low-energy beach ridges in Jerup, northern Denmark. Slow uplift in the area has protected a very long sequence of low-energy quartz-sand beach ridges that provide data for most of the Holocene period. Built by surf and swash action, the Jerup ridges are made up predominantly of quartz sand, are unusually regular in their depositional pattern, have not been disturbed by subsequent erosion, and have accumulated on average once every 50.5 years. Nine radiocarbon dates on peats were used to establish the glacio-isostatic rebound parameters (Tanner, 1993: 229).

The initial reaction of many southeastern U.S. archaeologists might be, "Denmark? How could a Danish record be relevant to what is going on in my area?" My confidence in the Tanner record is based on the observations that (1) multiple Holocene records based on independent data of many different kinds are in remarkable accord with Tanner's, including data from the North Atlantic region, which includes the southeastern U.S. (see Gunn, 1997; Walker, n.d., for examples and discussion); and (2) Tanner's own 2000-year Gulf of Mexico sea level record (Tanner, 1993: 228, 2000: 93) is not only consistent with his Danish data but also with what we know of environmental and cultural changes on the Florida Gulf coast (see Stapor et al., 1991; Walker et al. 1994, 1995; Marquardt and Walker, 2001; cf. Tanner, 1993, 2000).

The reader is directed to Tanner's own discussion for details of his method (Tanner, 1991, 1993, 2000), but the underlying concept is that the grain-size distributions of well-behaved beach ridges are used as a proxy for global sea level fluctuations. Tanner's graphs do not chart sea level itself, but kurtosis (K) of grain-size frequency distributions from the beach ridges. Kurtosis is the concentration of values near the mean of a frequency distribution curve, relative to the normal distribution, popularly characterized as relative "peakedness." In this case, the higher the K, the lower the sea level, and vice versa.

The raw data (Tanner 1993: 231) consist of grain-size distributions measured from over 150 beach ridges that accumulated every 50.5 years on average, providing a record from 5700 cal B.C. to cal A.D. 1950 (fig. 14.1). To visualize the record in a way that makes intuitive sense, K is inverted (i.e., decreasing upwards) on the ordinate (Y axis), with time moving from left to right on the abscissa (X axis). In order to produce a graphic representation that is more intuitive and readable for archaeological purposes, I smoothed Tanner's raw data using a five-sample moving average, then averaged individual pairs of the resulting data in order to reduce the width of the graph.

The result (fig. 14.2) portrays relative sea level at a periodicity of 100 years, from 7550 to 50 cal B.P. (5600 cal B.C.–cal A.D. 1950).

I do not suggest that the Tanner record is the only source on which we should depend. In fact, we should all endeavor to keep pace with the fast-emerging paleoclimate literature, which now includes multiple records based on everything from ice cores to dendrochronology. I do believe that Tanner's Jerup record has numerous advantages, in that it provides relatively fine-grained data on sea level fluctuations (therefore, implicit climate fluctuations) through much of the Holocene. I make reference to it in the remainder of this chapter.

The first of the new substantive studies in Part II is by Matthew Sanger and David Hurst Thomas, who report preliminary investigations of two shell ring sites on St. Catherines Island. The rings are in similar environments, but on opposite sides of the island. They were occupied at about the same time (ca. 4550–3950 cal B.P.), the outer ring sediments accumulating over about a 200-year period or less. The St. Catherines Shell Ring's interior dates were younger by 200–300 years. An "anomalous" date of ca. 6530–6280 cal B.P. is also noted by the authors.

Sanger and Thomas observe that "shell rings are often the oldest sites found in the coastal regions [of South Carolina, Georgia, Florida, and Mississippi]." The timing of the shell-ring deposits is significant, as is the anomalous earlier date. The main St. Catherines Island ring deposits are *associated with a very low sea level* within the general mid-Holocene regression that lasted from about 5000 to 3500 cal B.P. The St. Catherines Island shell rings appear to have accumulated during the lowest of the low points of the mid-Holocene regression (fig. 14.2).

The " suspect date" of ca. 6400 cal B.P. is also associated with a precipitous sea level regression ca. 6450–6150 cal B.P., the lowest ebb within the mid-Holocene Warm Period (see fig. 14.2), a downturn noted by Mayewski et al. (2004: 250) as a period of rapid climate change. By 3750 cal B.P., the St. Catherines Island shell rings were abandoned, as sea level began a rise that culminated in the Poverty Point transgression of ca. 3450–3150 cal B.P. (see fig. 14.2), which I discuss below.

The authors dismiss the ca. 6400 cal B.P. date as possibly derived from an "ancient, relic oyster mixed in with much younger shells or . . . a lab error," and indeed this may be the case. But the reason the authors immediately suspect an error is that their understanding of the sea level record does not allow for shellfish habitat in the St. Catherines Island vicinity prior to 5650 cal B.P. This is because they rely on the peat-based sea level record of Gayes et al. (1992: 159), a hockey

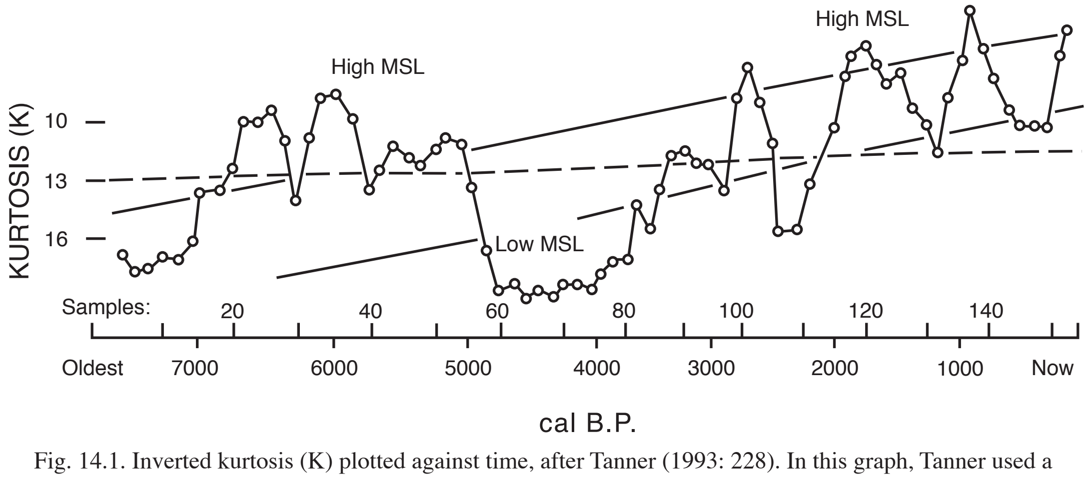


Fig. 14.1. Inverted kurtosis (K) plotted against time, after Tanner (1993: 228). In this graph, Tanner used a moving average of seven for smoothing, then combined individual pairs of data. The circles are 101 years apart. The horizontal dashed line is average kurtosis. A long-term overall rising is indicated by the two sloping lines.

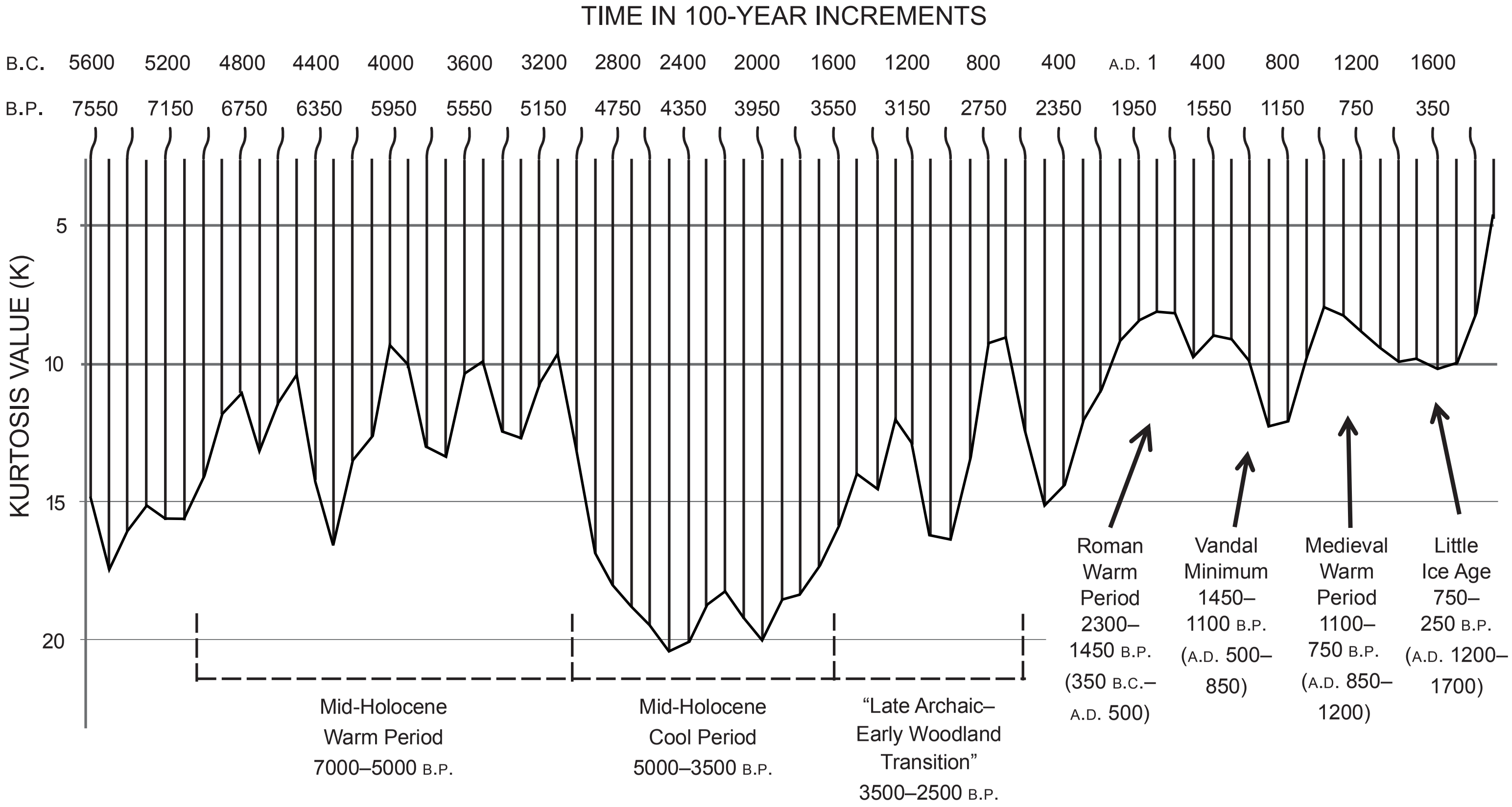


Fig. 14.2. Inverted kurtosis (K) plotted against time, based on Tanner's (1993: 231) raw data from beach ridges, Jerup, Denmark. This graph employs a five-sample moving average, with averaged individual pairs of the resulting data in order to reduce the width of the graph. The result portrays relative sea level at a periodicity of 100 years, from 7550 to 50 cal B.P. (5600 cal B.C.–cal A.D. 1950). Inverted kurtosis values serve as a proxy for sea level.

stick-like affair that provides none of the nuances archaeologists need to interpret their much finer-grained data (see discussion above).

Sanger and Thomas assert that Late Archaic shell rings are phenomena "qualitatively different from their predecessors. Their form . . . would seem to imply a greater degree of planning and purpose than the generally conical, occasionally random, shape of the Middle Archaic mounds." However, they then describe their observed stratification as alternating between relatively shell-dense layers and black sandy layers, between "mounded" shells and pockets of darker soil. They argue for "construction" of the shell rings, but do not consider the possibility that these alternating layers are evidence not of purposeful construction but instead of domestic accumulation and discard by a coastal fisher-gatherer-hunter society.

Artifacts differ somewhat between the two rings, but the excavated sample so far is small. Preliminary data suggest that the peripheries of the rings are rich in domestic features, the centers preserve evidence of large, circular "pits" containing dark organic sediments relatively rich in acorn and hickory nut shells, and the intermediate zones have little or no evidence of human activity. The interior pit features seem too large to be the remains of posts. Radiocarbon dating of bulk sediment samples returned unsatisfactory results that were consistently too recent, perhaps due to contamination from roots.

My overall impression of this chapter is that some impressive field research is underway and that ultimately these two sites may well help tease out some of the subtle human-environment interactions of the Georgia Bight during the Late Archaic. For now, I offer the alternative hypothesis that these two ring sites are not purposeful constructions, but instead domestic middens that owe their temporal placement to distinct episodes of sea level regressions within the Middle Holocene period, namely the "anomalous" ca. 6400 cal B.P. deposit, the ring middens' ca. 4550–4250 cal B.P. sediments, and the central features that date to ca. 4350–4250 cal B.P. Availability of reliable resources in a time of cool and dry climate may explain their particular place on the landscape.

Still left open is the question of why the middens are circular in shape. Until we know more, we will have to speculate that the round shape had practical advantages or ideological significance or both. Let me suggest one possible practical advantage. If, as I suggest, the Archaic middens on St. Catherines Island (including the ring middens) were occupied only during sea level regressions, the interior of the rings may have been excavated to enhance access to fresh water from below and/or to collect rainwater. In historic times, small boats were sent out from Spanish sailing vessels to replenish fresh water supplies by digging holes into the beach. The water barrels were filled with fresh water that rose to the top and perched on top of brackish water. Such accounts have led to an idea that a number of us who work in south Florida have discussed and debated over the years, particularly in regard to the low, flat topographic features that Frank Cushing called "water courts," namely that they may have functioned as water storage devices, possibly situated at locations of already active artesian wells.

In the southeastern U.S., times of low sea level are typically associated with relatively cool and dry conditions. The Late Archaic inhabitants had access to a diversity of aquatic habitats for their daily food, but could not have lived on St. Catherines Island long without a reliable supply of fresh water. Both St. Catherines Island ring middens are located on freshwater creeks that are stable today, but in times of exceptionally dry conditions, their flows may have been diminished, and a centrally located back-up supply of fresh water would have been advantageous, if not essential.

The authors "uncovered 49 features inside the interior plaza of St. Catherines Shell Ring, 36 of which are large, circular 'pits' with straight walls and flat bottoms." These "pits" generally lack artifacts but do contain some charred plant remains. If I were going to dig a hole to collect perched water, this is exactly the sort of hole I would dig: a large, straight-sided hole deep enough to reach the water table. There I would immerse my St. Simons pot and collect water for drinking and cooking. In short, maybe the features are shallow, hand-dug wells, and the circular midden deposits surrounding them are the result of people carrying out their daily activities and depositing their garbage nearby, but not where they collect their water.

Why, then, are the interior dates slightly more recent than those associated with the ring midden? One possibility is that the ring midden was deposited ca. 4550–4250 cal B.P. by people who used the ring's center as a back-up water source. More recently, a different group, or perhaps descendants of the original group, used the same locality seasonally, perhaps during the modest transgression ca. 4250–3950 cal B.P. when water was less scarce, and processed acorns and hickory nuts nearby. The detritus was subsequently deposited in the old wells and burned with other trash. This is all speculative, but one could test the practicality of the shallow-well idea by digging a similar hole in comparable sediment during a time of extreme drought and then testing the potability of the resulting water, if any, that percolates to the top. Sounds like a good student project.

In chapter 4, Rochelle Marrinan provides information on two other shell ring sites, these on St. Simons Island, located less than 50 km south of St. Catherines. The Cannon's Point shell ring was occupied year-round by people who net-fished, gathered, and hunted ca. 4825–4010 ^{14}C yr B.P. The West Ring produced a somewhat more recent date range of 4400–3770 ^{14}C yr B.P. The inhabitants exploited diverse aquatic habitats and deposited shell-bearing middens, oysters comprising the vast majority of the shellfish remains. In addition to oyster shells, the ring middens contained St. Simons fiber-tempered pottery, some lithic, bone, and antler artifacts, animal and plant remains, and sparse human bones. Unlike Sanger and Thomas, Marrinan sees no compelling evidence for feasting or intentional construction.

Like the St. Catherines Island rings, the St. Simons Island rings were deposited during the lowest part of the mid-Holocene regression by fisher-gatherer-hunters who exploited a variety of animal and plant resources. As sea level began its rise after 3850 cal B.P. (see fig. 14.2), these localities were abandoned. About 1000 years later (ca. 3025–2800 cal B.P.) during another precipitous sea level regression, St. Simons Island was again occupied by people who fished, gathered, and hunted and made sand-tempered pottery. This period of reoccupation during a sea level regression is temporally coincident with the demise of Poverty Point (fig. 14.2).

Marrinan's chapter provides a great deal of hard-won information on stratigraphy, seasonality, and subsistence. Her original work on St. Simons Island took place during the 1970s, when interdisciplinary research and the use of fine-screened sampling techniques were far less common than they are today. Her pioneering work has admirably stood the test of time, and is just as relevant today as it was a generation ago.

In chapter 5, Rebecca Saunders reports on sites in the Choctawhatchee Bay region of northwest Florida. She documents intermittent occupations of northwest Florida coastal areas, associating them with times of increases and decreases in storms and rainfall. The time period represented by her work in this near-coastal region is 7200–3500 cal B.P., covering both the mid-Holocene Warm Period (ca. 7000–5000 cal B.P.) and the mid-Holocene Cool Period (ca. 5000–3500 cal B.P.).

Dates of occupation for Mitchell River sites 1 and 4 cluster at 7200–6700 cal B.P., 5900–5300 cal B.P., 4800–4200 cal B.P., and 4000–3600 cal B.P. The first of these intervals is associated with a significant sea level transgression known at ca. 7050–6750 cal B.P. (fig. 14.2), which is reflected in Saunders' data. A sedge-marsh habitat is replaced by a cypress swamp, signifying locally deeper water conditions. There is no known occupation from 6680 to 5890 cal B.P., during a known sea level regression ca. 6450–6100 cal B.P. (fig. 14.2).

The second interval of occupation—ca. 5900–5300 cal B.P. —is during a time when the area is again a cypress or tupelo swamp, and once again this coincides with two known transgressions at ca. 6000–5800 cal B.P. and 5600–5350 cal B.P. with an intervening regression ca. 5800–5600 cal B.P. (fig. 14.2). During this time, oyster populations were within reasonable reach, although local waters are not thought to have been brackish.

After a period of abandonment ca. 5300–4800 cal B.P., habitation resumes but with "a very different environment" composed of a brackish marsh, continuing to 3600 cal B.P., interrupted only by abandonment from 4200 to 4000 cal B.P. The "very different environment" coincides with the lowest points of the mid-Holocene regression, a time of cooler and drier climatic conditions in the Southeast. An intermediate period of warming and sea level transgression is known ca. 4350–4050 cal B.P., which coincides with the period of abandonment (fig. 14.2).

The abandonment of the region ca. 3720–3560 cal B.P. coincides with the sea level transgression that signals the end of the mid-Holocene regression and climatic changes associated with the rise of Poverty Point ca. 3550 cal B.P. As Saunders notes, the period beginning ca. 2950 cal B.P. is thought by a number of paleoclimatologists to have been a warm and stormy time in the southeastern United States.

She questions Kidder's ^{14}C synthesis, and argues for more refinement. She points out that Kidder's model may account for one hiatus, but there are several others. I laud Kidder for his efforts to make sense of the radiocarbon date record vis à vis periods of abrupt climate change, but I agree with Saunders that the task is one that will require more data and attention to the relevant records of abrupt climate change, as well as attention to region-specific characteristics of geology, hydrology, and resource availability.

Completing Part II, Margo Schwadron (chap. 6) discusses Late Archaic and Early Woodland period tree-island, shell-ring, and shell-work sites in south Florida. She presents an impressive summary of recent survey, mapping, and testing she has undertaken in a remote and poorly understood part of Florida. Based on a suite of 123 new ^{14}C dates, she notes that shell crescents and rings date mostly to the Late Archaic period, whereas "shell works" are of the Woodland period and later. For both, the material culture and subsistence strategies are conservative, but for Schwadron, both shell rings and shell works are indicators of "monumentality, ceremonialism, and perhaps sacred places and landscapes."

For decades, Florida archaeologists believed that there were no sustained occupations of the Everglades region before ca. 3000 cal B.P., in part because on every tree-island site they had ever tested they had quit digging when they encountered a resistant, mineralized carbonate sediment. Using a concrete saw, Schwadron broke through this layer, discovering evidence of Late Archaic occupations buried beneath it. The resistant mineralized layer dates to about 4400–2700 cal B.P., representing a hiatus in tree-island occupation. This interval coincides with the greater part of the mid-Holocene regression, an episode of relatively cool and dry conditions. A shift to wetter conditions ca. 3450– 3100 cal B.P. is indicated by several data sources, coincident with the Poverty Point transgression. Schwadron suggests that during the Glades hiatus, populations may have moved to the coasts to seek a more reliable subsistence base.

The newly documented pre-hiatus Late Archaic occupations date as early as 5000 cal B.P., and represent occupation by fisher-gatherer-hunters who focused on aquatic resources. They accumulated dark, organic-rich middens called tree-island sites by Florida archaeologists. A second site type includes shell middens, shell crescents, and shell rings that date as early as 3650 cal B.P. Third, "shell work" sites are found mainly in the coastal zones of Charlotte Harbor–Pine Island Sound and in the Ten Thousand Islands to the south of that region, and date from the Woodland period into the contact period, ca. 2000–500 cal B.P. (Based on Sears's [1982] work at Fort Center, the period from 2700 to 500 ^{14}C yr B.P. in the Everglades is known as the Belle Glade culture.)

Schwadron defines shell works as purposefully constructed features of primary or secondary shell refuse intentionally borrowed, piled, or arranged to form mounds, ridges, rows of mounds, rings, platforms, or depressions. Technology was quite conservative through time. She interprets shell works as indicative of fisher-gatherer-hunter complexity.

If one plots the timing of the Everglades' human occupation against the Tanner sea level record, it appears that the known tree-island occupations began during the latter half of the mid-Holocene Warm Period, then lingered about 300–400 years into the mid-Holocene Cool Period. Abandonment of the Everglades (4400–2700 cal B.P.) coincided with the coolest part of the Holocene. The Everglades were reoccupied about 2700 cal B.P. There was a distinct warming ca. 2800–2650 cal B.P., followed by a cooling ca. 2650–2350 cal B.P., then a warming ca. 2300–1450 cal B.P. known as the Roman Warm period (fig. 14.2).

If one accepts Tanner's sea level record as a proxy for conditions in Florida, then Schwadron's data suggest that the tree-island middens accumulated during a warm period when sea levels and water tables were higher, and that the area was abandoned when sea levels and water tables were lower. There also seems to be a "lag" in both cases. If the radiocarbon dates are accurate and if we assume a relationship between higher sea level on the coasts and higher water table in the Everglades, then it would appear that people were able to remain in the Everglades for several hundred years after sea level precipitously regressed ca. 4900–4450 cal B.P., the end of the mid-Holocene Warm Period. Similarly, sea level began a punctuated climb ca. 3650 cal B.P., yet people did not immediately return to the Everglades. I am not a hydrologist, but if the timing of the human occupation is any indication of availability of aquatic resources, it would seem that the premodern Everglades region was slow to become saturated during increasingly warm and wet conditions, then similarly slow to become desaturated as cooler and drier conditions began to prevail.

In chapter 6, Schwadron uses the term "clean oyster shells" in describing sediments from House's Hammock and Russell Key, and for the latter site says explicitly that the flat-topped mound there is purposefully constructed. I have observed that several archaeologists refer to "clean shells" as evidence of purposeful mound construction episodes, clean shell being "shell with little or no clastic or organic sediment matrix" (Aten, 1999: 143). Randall and Sassaman (2005: 101) follow this same convention, referring to "capping" a mound with "whole, clean shell." Russo (2004b: 43) refers to clean shell or loose shell in describing shell-ring sediments.

In my opinion, the interpretation of "clean shell" as evidence of purposeful mound construction is unsubstantiated unless it can be clearly demonstrated that the shell-rich deposits are not middens. In the case of House's Hammock, Schwadron describes the sediment as "predominantly composed of clean oyster shell mixed with other marine shell and very little sediment, some faunal bone and occasional shell tools . . . ." To me, this describes a midden.

Experience at the Pineland Site Complex in southwest Florida shows that often sediments that appear to be "clean shell" are in fact more diverse than they might seem. In a 50 × 50 × 10 cm sample from one such shelly sediment, deFrance and Walker (n.d.) identified 36 different species of shellfish, 12 of which are assumed to have been food sources. They also identified 16 fish taxa and 43 fish MNI as well as one MNI each of a mud turtle, unidentified bird, and unidentified rodent. Generalizing to the whole of the apparently "clean-shell" deposit, the 2 × 2 × 1 m volume would contain about 6880 fishes, despite their invisible nature in the drawn and photographed profiles.

It is true that most of the volume was composed of small conchs and whelks, but there was a perfectly adequate environmental explanation for their unusually abundant availability (see Walker and Marquardt, in prep. b). In spite of the obvious appearance, the detailed study showed that it was not just "clean shell" after all. It was a dump of food remains, in short, not a monument but a midden. I am not familiar with the sediments at Schwadron's sites, and her interpretations may well be correct. I simply offer the caveat that without detailed stratigraphic and zooarchaeological analysis, it can be difficult to distinguish middens from constructed mounds, and that sometimes there are good environmental reasons to expect abundances of shells of certain species and sizes that have nothing to do with monumentality.

A final observation regards the timing of some of the appearance of so-called finger ridges, berms, and "water courts." Among other ideas, south Florida archaeologists have imagined water courts as canoe ports, fish traps, turtle-holding pens, community plazas, and water-storage ponds. Schwadron's research provides new dates on many different sites, and the opportunity to renew our quest for answers to some of these puzzles. For example, Russell Key—a 24 ha "shell work" site—includes mounds, ridges, rings, plazas, canals, and courts. Interestingly, the earlier "ring" portion of the complex dates to 2330–2070 cal B.P. Global cooling and sea level regression are documented ca. 2600–2400 cal B.P. (fig. 14.2), which is consistent with the theme of ring middens being associated with episodes of lowered sea level. About 2300 cal B.P., global warming began to advance to its eventual peak in the second century cal A.D., a period known in the climate literature as the Roman Warm period.

Russell Key's radiating, protruding, symmetrical shell-midden finger-ridges described by Schwadron as dating to 1400–940 cal B.P. (cal A.D. 550–1010), however, are associated not with the Roman Warm period (ca. 350 cal B.C.–cal A.D. 500), but with the succeeding Vandal Minimum (ca. cal A.D. 500–850), a cooler and drier time associated with a locally significant sea level regression. At Russell Key are no less than six individual water courts, each surrounded by berms of shell midden deposits. Schwadron has documented that the berms and water courts are contemporaneous. They date from cal A.D. 550 to 900, precisely within the Vandal Minimum. During a low-water interval, hydrostatic pressure would decrease and water flow from artesian wells would diminish. I pose the question of whether the water courts were deepened during a time of lower hydrostatic pressure, with the removed sediments being heaped up as surrounding berms.

Part III comprises six chapters that "compare and contrast." In the first of these, Michael Russo (chap. 7) sets himself the task of comparing the Late Archaic to the Early Woodland in coastal Florida. Like Schwadron, he assumes that shell rings indicate a communal ceremonial function, in his case feasting.

For the northeast Florida coast, Russo cites evidence of year-round occupation and asymmetrical social organization in the Late Archaic and thinks that achieved status is indicated by shell-ring and shell-mound "architecture" and by distributions of artifacts found in distinct ritual and mundane contexts. During the Early Woodland period, there are no large mounds or rings, but there was construction of burial mounds.

Russo notes that shell rings and mounds were not built after ca. 3600 cal B.P., and speculates that a lowering sea level could have caused abandonment of these locales, and a movement coastward, as sea level regressed. It is true that the Late Archaic is associated with the mid-Holocene Cool Period, a time of generally cool temperatures and low sea levels. However, the time period during which Russo says that shell rings and mounds were no longer built may actually coincide with a pronounced warming episode ca. 3900–3200 cal B.P. (fig. 14.2).

For southern Florida, Russo refutes Widmer's (1988) model that calls for no year-round Archaic period coastal settlement, pointing to evidence from Horr's Island and other sites in the Ten Thousand Islands region showing that substantial populations lived along the southwest Florida coast ca. 5000–3800 cal B.P. It was at about 5000 cal B.P. that the mid-Holocene Cool Period began, and the period 5000–3800 cal B.P. was characterized by a substantial sea level regression (fig. 14.2). The first period of coastal shell mound accumulation that Russo describes thus coincides with the mid-Holocene Cool Period, a time of relative sea level regression contemporaneous with the coastal ring middens on St. Catherines and St. Simons islands. Furthermore, terminal dates for substantial coastal mound-building (4000 cal B.P. for Horr's Island, 3900 cal B.P. for Bonita, 3600 cal B.P. for Hill Cottage) coincide with a period of global warming and sea level transgression (ca. 3900–3200 cal B.P.; see fig. 14.2).

Russo's first period of substantial coastal mound-building overlaps only partially with the period during which Schwadron has found evidence of tree-island sites in the Everglades (i.e., 5600–4400 cal B.P.), the latter associated with the mid-Holocene Warm Period (fig. 14.2). This would be consistent with the notion that people migrated from interior Florida to the coasts as wetland habitats diminished in the Everglades.

Russo notes that other "rings" were constructed after 3800 cal B.P., citing the Reed site on the southeast Florida coast (ca. 3500–2800 cal B.P.), the House's Hammock site reported by Schwadron (3540–2790 cal B.P.), and "other very large arc-shaped ridges." However, none of these sites is truly ring shaped. Reed is a discontinuous curvilinear ridge, C-shaped at best, but not circular (see Russo, 2004a: 32, fig. 3.1). House's Hammock is described by Schwadron (chap. 6, this volume) as "crescent shaped." In my view, these later components can be interpreted as middens that accumulated during a time of relatively high sea level contemporaneous with the rise and fall of Poverty Point. Figure 14.2 shows a transgression from 3800 to 3450 cal B.P., then a slight fall to 3350 cal B.P., then an even more dramatic rise to 3200 cal B.P., followed by a precipitous fall to a low ca. 3000 cal B.P. Sea level then rose to an even higher peak at ca. 2700 cal B.P., then fell again to a low at 2450 cal B.P. At times of higher sea levels during this volatile period of 3800–2400 cal B.P., one would predict ample marine resources along with a warmer and stormier climate.

Russo expresses dismay that dates from the Reed Shell Ring in southeast Florida (ca. 3400–2800 cal B.P.) and House's Hammock in the Ten Thousand Islands of southwest Florida (ca. 3540–3300 cal B.P.) coincide with what Widmer suggests was a nonproductive period characterized by falling sea level (3400–2800 cal B.P.). However, a fine-grained sea level record (fig. 14.2) shows a rise from 3500 to a local peak at 3200 cal B.P., then a regression again, bottoming out at 3000 cal B.P. This, of course, coincides precisely with the rise and fall of Poverty Point. Russo's reliance on broad-scale sea level records inhibits a nuanced exploration of the very question that he sets out to investigate.

Turning to the central-western coast of Florida, Russo focuses on the Canton Street shell midden and expresses surprise that deposits dated to the Late Archaic period (5000–3000 cal B.P.) underlie or are near those of the succeeding

Transitional period (3000–2600 cal B.P.). Russo's difficulty is understandable because he relies, as many archaeologists do, on broad-scale sea level records that are not of sufficient resolution to account for the kinds of questions archaeologists ask. Because Russo thinks that the Transitional period is associated with a uniformly lower sea level, he cannot imagine Late Archaic artifacts being near or underlying Transitional artifacts.

Figure 14.2 shows rising, falling, and then rising sea level between 3800 and 2400 cal B.P. One important key to unlocking what Russo calls the "mysterious and hidden record of the period 3500 to 2500 B.P." is to recognize that this 1000-year period was characterized not by one climatic condition but by several. Working from multiple lines of evidence, Mayewski et al. (2004: 250) refer to four periods of rapid climate change within the Holocene, the two most extensive of which are 6000 to 5000 cal B.P. and 3500 to 2500 cal B.P. What characterizes the time period 3500–2500 cal B.P. is volatility and dynamism. This is a prime example of the kind of abrupt climate change that archaeologists must take into account in their explanations (see discussion above).

For the northwest Florida coast, Russo discusses Meig's Pasture (ca. 4100–3000 cal B.P.) and Buck Bayou as the only two substantial Late Archaic shell middens. Buck Bayou is not dated, but like many other substantial shell middens, Meig's Pasture was occupied during the latter half of the mid-Holocene Cool Period when sea level was relatively low, and does not seem to have been occupied after the end of the Late Archaic as temperatures warmed and sea level rose.

Russo's stated goal in this chapter is "to assess the relative numbers, kinds, and distributions of sites between 3500 and 2500 cal B.P. compared to those that preceded and followed this period *in order to assess the effects of sea level changes*" (emphasis added). He then goes on to say that few archaeologists "have offered particulars as to how those changes may have affected settlement patterns or cultural traditions of Elliots Point, Transitional, pre-Glades, or other contemporaneous cultures." He expresses frustration with "discordance among the modeled sea curves," and suggests that one need only choose a particular curve in order to support almost any interpretation.

As might be evident by now, I do not share Russo's pessimism. I reject the comparison of "modeled sea curves" that Russo cites as evidence for discordant interpretations (see fig. 7.7). Fairbridge's dataset is indeed a "modeled curve," based on compiled worldwide data and first published in 1961, much earlier than the 1984 article that Russo cites. Rhodes Fairbridge, of course, was a pioneer in eustatic sea level research, having initiated the famous debate between sea level "curvers" and "smoothers," Fairbridge being a curver. But Fairbridge himself has stated (personal commun., 1992) that it was an early, tentative curve, thrown out there to challenge the "smoothers" and others to produce more precise records and models at all geographic scales. The specifics of the Fairbridge curve should not be relied upon by themselves for any given region or locale. The Walker et al. (1995) study focuses on a single sea level event and does not present a "modeled sea curve" or a "stand." Furthermore, it is misrepresented on Russo's graph because there is nothing in that paper about the 3000 to 2000 cal B.P. time range. Finally, Suguio et al.'s data represent records based on archaeological and geological samples from the Brazilian coast, beyond the circum–North Atlantic region.

The inclusion of "Widmer 2005" in Russo's figure is also questionable. Widmer presents no curve or record in that paper, but instead reproduces a table modified from one of Fairbridge's, first proposed in 1959 in *Encyclopedia of Geomorphology* (1961b). Fairbridge had proposed major periods of global sea level oscillations over the past 6000 years, including five episodes during which sea level was lower than today's and five during which it was higher. Because Widmer was discussing James Ford's (1969) diffusionist model as it relates to the Gulf of Mexico, he listed only the episodes during which it was higher than today, using Fairbridge's names for the eustatic trends, but substituting Ford's cultural classifications. Russo has thus plotted higher-than-today sea level transgressions in his figure 7.7 that are derived from Widmer's (2005: 80) table, which is excerpted from Fairbridge's 1959 table. To further complicate matters, Fairbridge's table (and thus Widmer's) is based on uncalibrated radiocarbon dates. It is no wonder that Russo is frustrated by "discordant" sea level curves.

Far more useful are the comparisons recently provided by Balsillie and Donoghue (2004: 20, figs. 10 and 11). These researchers compiled all published, dated, landward sea level data from both geological and archaeological sources for the northern Gulf of Mexico, and from these they modeled a new curve they name "Younger Data Set B." They then compare this new curve with the highly resolved isotopic record of Siddall et al. (2003) from the Red Sea (see their fig. 10). They also present a graphed comparison of the Red Sea curve with Tanner's (1991) records from St. Vincent Island, Florida, and from his (1993) Jerup record from Denmark (their fig. 11). The comparisons show general accord, demonstrating sea level teleconnections (that is, a eustatic signal) even beyond the greater North Atlantic region, just as is increasingly the case with paleoclimate records. The Siddall et al. (2003) and Balsillie and Donoghue (2004) studies represent major advances in the realm of sea level research and, along with the underappreciated 1990s work of Tanner (in both Florida and Denmark), they offer much promise for southeastern archaeology.

Archaeologists can benefit from consideration of such high-resolution sea level records, but it is important to keep in mind that global climate fluctuations can have variable local effects, depending on topography, hydrology, and established human adaptations to local regions. For example, the Charlotte Harbor/Pine Island Sound estuarine system in southwest Florida provided the aquatic resources that were the foundation of the Calusa social formation (Marquardt, 1987). A broad, flat, shallow estuary (only 0.5 to 2 m deep in most places) fed by three rivers, fringed by mangroves, enhanced by mud-flat habitats, and protected by barrier islands, this estuarine system is among the most productive environments in all of Florida. However, a sea level regression of 1 m will drastically alter the estuary; diminishing its resources and challenging its human populations to adapt to new conditions (see discussions by Walker, n.d.; Walker and Marquardt, in prep. a). A sea level regression of 1 m at the mouth of the St. Johns River or in the Ten Thousand Islands might have very different consequences.

Working from the vantage point of many years of research on St. Catherines Island, Thomas (chap. 8) poses the question, "What Happened to the Late Archaic?" In relating the environmental history of St. Catherines Island, he makes frequent reference to the sea level record of Gayes et al. (1992), which provides, in my opinion, inadequate resolution to account for subtle changes in St. Catherines Island's resources that he wishes to address.

Thomas and his research team explored gaps in the radiocarbon-date record of St. Catherines Island, setting out specifically to collect samples that were thought to date to these underrepresented periods. For example, ample dates are available for the period 4450–3300 cal B.P., but none are known for the 3300–2300 cal B.P. interval. Figure 14.2 shows that the first of these two periods is characterized by exceptionally low sea level, falling in the most pronounced part of the mid-Holocene Cool Period. The St. Catherines Island and McQueen shell ring middens (ca. 4850–4450 cal B.P.) were occupied during a sea level regression, a temporal pattern that is repeated in other Georgia and Florida coastal areas. The second of the two periods corresponds to a dynamic period of rapid climate change (Mayewski et al., 2004). During part of this time, especially ca. 2850–2550 cal B.P., marshside settlement may have been impractical due to inundation from a pronounced sea level transgression.

Figure 14.3 juxtaposes Thomas's graph of ^{14}C date probabilities for mortuary manifestations on St. Catherines Island (fig. 8.12) with an excerpt from Tanner's sea level record. The parallels are obvious. If the incidence of human interment is a reflection of human presence on the island, this suggests that more people could be supported on St. Catherines Island during warmer times, which coincided with higher sea level and more favorable lacustrine habitats. During times of diminished lacustrine resource availability, St. Catherines Island people may have had to forage more widely, and live off-island more frequently.

The interdisciplinary work at St. Catherines Island is remarkable in its long-term commitment to a combined historical and environmental approach (Thomas, 2008a). Many questions have been answered, but other mysteries remain to be solved. Having now read most of the reports on St. Catherines Island, I cannot escape the impression that St. Catherines Island's human history is intimately tied to the whereabouts and availability of water. Subsurface geology, topography, and hydrology determine where lakes, marshes, and littoral zones will be located, but all are dependent on rainfall, sea level position, and hydrostatic pressure, which influence resource availability and determine the depth of underground fresh water and the flow of freshwater streams. Timing of the presence, absence, and abundance of water—fresh and

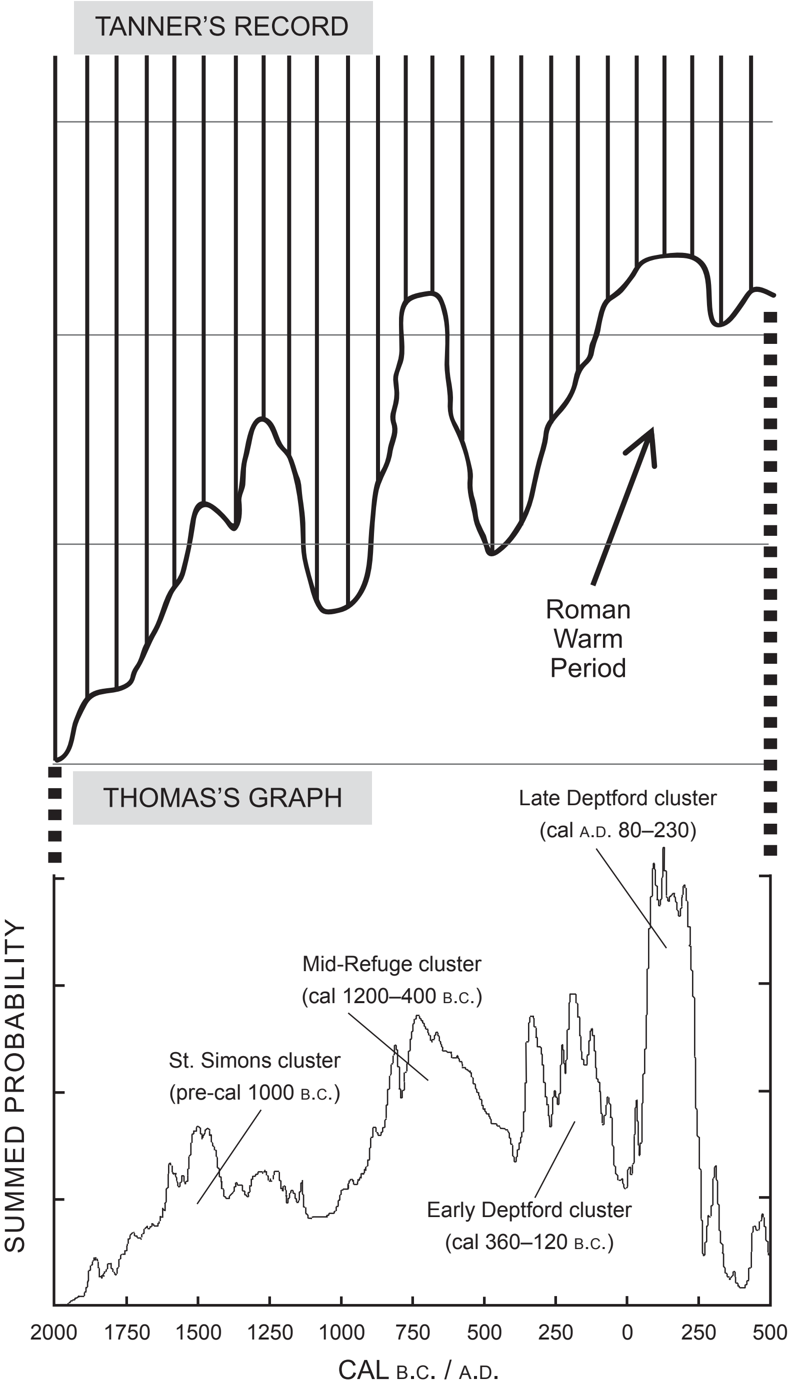


Fig. 14.3. An excerpt from Tanner's sea level record for 2000 cal B.C.–cal A.D. 500 juxtaposed with Thomas's (fig. 8.8) ^{14}C-date probability distribution graph for St. Catherines Island burials for the same time period.

salt—does not explain everything that happened on St. Catherines Island, but I believe it presented the opportunities and threw down the challenges that formed the dynamic stage on which human actions were played out.

Matthew Sanger (chap. 9) discusses the timing of shell-ring-site abandonment at the end of the Late Archaic period. For example, Sanger's and Thomas's own data (reported in chap. 3, this volume) show that the pre-ring feature on St. Catherines Island dates to 4530–4150 cal B.P. and the overlying shell deposit to 4110–3720 cal B.P. In other words, the ring "was deposited within a couple of centuries, perhaps less." The pooled mean for the primary shell deposit of the St. Catherines Island shell ring is 2500–2340 cal B.C. (4450–4290 cal B.P.). Both of the shell rings on St. Catherines Island were "abandoned" ca. 2120–1810 cal B.C. (4070–3760 cal B.P.), and although the island was later repopulated, "no additional shell rings were constructed, nor is there any evidence of the existing shell rings being utilized after their abandonment."

At a broader scale, Sanger recognizes three distinct "waves of abandonment." The first spans 2450–2140 cal B.C. (4400–4090 cal B.P.) and includes Oxeye (northeast Florida); two rings on St. Simons Island (Georgia); Fig Island rings 2 and 3 (South Carolina); and possibly Horr's Island and Hill Cottage from the Florida Gulf coast. The middle wave of abandonment occurs between 2120 and 1860 cal B.C. (4070–3810 cal B.P.). Examples are Fig Island 1; two rings on St. Catherines Island (Georgia); and Sapelo Island rings 1 and 3 (Georgia). Finally, between 1850 and 1600 cal B.C. (3800–3550 cal B.P.) the last of the shell rings are vacated, including Sewee, Coosaw 2, Large Skull Creek, and Sea Pines (all from South Carolina); Meig's Pasture (northwest Florida); and Rollins and Guana (northeast Florida).

There are no significant gaps between the three proposed "waves" of abandonment, which leads one to wonder why Sanger bothered to divide them into three periods in the first place. It is true that the available dates suggest that shell rings were abandoned between 2450 and 1600 cal B.C. (4400–3545 cal B.P.). However, the initiation of the earliest of the rings (Oxeye) dates to ca. 3000 cal B.C. (4950 cal B.P.), so another way to characterize shell rings temporally is simply to say that they were in use from ca. 3000 cal B.C. to 1600 cal B.C. (4950–3550 cal B.P.).

A look at figure 14.2 shows that coastal shell rings are distinctly a phenomenon of the mid-Holocene Cool Period, ca. 5000–3500 cal B.P. Wherever they are found, whatever practical problems they solved, whatever cultural needs they served, *they are associated with low sea level*. Sea level regressed precipitously ca. 5000 cal B.P., and the first shell ring was established. Sea level transgressed rapidly at 3500 cal B.P., and shell rings cease to be accumulated everywhere. (An exception that proves the rule is the C-shaped Reed shell ring, built ca. 3050 B.P. during another precipitous regression; see fig. 14.2). This much is trivial and obvious. Far more interesting questions involve the initiation, abandonment, and internal stratification of specific rings within the specific conditions of the regions where they were created.

Personally, I do not view shell rings as monuments or as architectural features, but instead as curvilinear middens that served as loci for habitation. Their distinct forms result from human interaction with local hydrology and topography, and have much to do with resolving the dilemma of living near reliable marine resources while guaranteeing access to adequate fresh water. The reasons for abandonment of individual ring middens may have been positive or negative, or a combination of both. When either marine resources or fresh water became inadequate to maintain the population, the ring middens were abandoned. Or, alternately, when climate changed to a point when there were opportunities to live better or with less effort elsewhere, the rings were abandoned.

Citing the reoccupation of St. Catherines Island ca. 1530–1350 cal B.C. (3480–3300 cal B.P.), some 300 to 500 years after the rings had been abandoned, Sanger states that people who reoccupied the island "were no longer in the business of building shell rings, which strongly suggests a shift in cultural mores." But by 1530–1350 cal B.C., sea level had risen to a point that habitats, water sources, and food resources would have been radically different. The question of "How did cultural mores change?" is interesting, but so is "How might environmental conditions have changed so that ring middens were no longer appropriate?"

Sanger's admirable effort to make sense of the end of the shell-ring phenomenon is ultimately unsatisfying because the tools he applies to the task are inadequate. His reliance on the broad-scale Gayes et al. (1992) sea level record leads him to claim that some rings were abandoned as sea level *rose*, inundating the rings, but contradictorily to say that some rings were abandoned because sea level *fell*. Finer-scale sea level and climate records are available and should be consulted, as I have stated above.

As Sanger points out, the problem of what local reservoir correction factor (ΔR) to apply to dates from different coastal regions is in need of serious attention by archaeologists. Thomas (2008a) has set an example for all of us who work on coastal midden sites by deriving an appropriate local reservoir correction factor (ΔR) for dating shell middens on St. Catherines Island. In southwest Florida where I work, most of us have used ΔR = –5 ± 20 as a correction factor, following Stuiver and Braziunas (1993: 156). Others (e.g., Schwadron, chap. 6, this volume) have used ΔR = 33 ± 16 from the IntCal Marine Reservoir Correction Database (2009), a figure derived from samples collected off the southern tip of the Florida peninsula. Use of the latter results in dates that are typically 35 to 40 years older than dates corrected by using ΔR = –5 ± 20. Of course, it would be preferable to have separate ΔR correction factors for northwest Florida, the central Gulf coast, Charlotte Harbor, and the Ten Thousand Islands, which are the locations for Meig's Pasture, Hill Cottage Midden, the Pineland Site Complex, and Horr's Island, respectively. Until that research has been done, it is imperative that when we report our calibrated and corrected marine-shell dates, we also report raw dates and specify what local reservoir correction factor we used in our calculations.

Sanger is absolutely correct when he writes that sea level fluctuations need not have had a uniform effect throughout the coastal zone, and that local topographic conditions, continental shelf slope, and underlying geology would have played important roles in determining local conditions. Add to this the uncertainty caused by a lack of local reservoir correction factors for our marine-shell dates, and it is clear that we have far to go in explaining the nature and timing of coastal settlement.

Victor Thompson (chap. 10) compares enduring loci of Archaic human habitation, which he calls "persistent places," for the Green River shell mounds of western Kentucky, the Georgia Bight Archaic shell rings, and the earthen mounds of the lower Mississippi River valley. He sees the Green River shell mounds as resulting from varying combinations of groups and events over a long time period. The Georgia coastal shell rings were neither exclusively middens nor monuments, but a combination of both. Dominant activities and functions may have shifted through time, and the Georgia shell rings accumulated over a much shorter time than did the Kentucky mounds. The Archaic mounds of the Mississippi valley, by contrast, were seasonally occupied and were "focal point[s] of . . . ritual and ceremony" that may have accumulated in punctuated episodes. Poverty Point is an exception to the latter because it apparently accumulated rather abruptly (see Gibson, chap. 2, this volume).

Pointing out that mound accumulation ceased in all three regions at approximately the same time—3400 cal B.P. in Kentucky, 3100 cal B.P., on the Georgia coast, and 3100–3000 cal B.P. at Poverty Point—Thompson invokes abrupt climate change. This is coincident with a well-documented episode of rapid climate change ca. 3500–2500 cal B.P. Decreased solar radiation was probably the ultimate forcing factor, but the change was manifested differently in different parts of the world (Mayewski et al., 2004: 250–251). Consulting figure 14.2, one observes a significant drop in sea level at ca. 3150–2900 cal B.P. and a rise to mid-Holocene Warm Period levels ca. 2900–2400 cal B.P.

Marquardt and Watson (2005b: 638–639) summarize what is known about the Archaic-Woodland transition in the Green River region and offer an explanation for the end of the "Shell Mound Archaic," associating its decline with the onset of wetter winters and higher river levels that would have made mussel collecting much more challenging. Mussels ceased to be collected at various times, and the Green River mounds were vacated at various times, not all at once. For the Carlston Annis mound, for example, although mussel shells were no longer accumulated after ca. 4750–4450 cal B.P., a shell-free midden continued to accumulate on top of the shell-bearing sediments as late as 4580–4420 cal B.P. At Indian Knoll a shell-free midden was being deposited as late as 3920–3630 cal B.P. (Marquardt and Watson, 2005b: 632, 2005d: 117, 2005e: 64).

Thompson's overall conclusion is that the large and enduring sites that accumulated in the three regions had distinct rhythms of formation and function, but all were persistent places. Their more or less contemporaneous collapse was caused by disruptions to broad-scale regional exchange networks, ritual activities, and local resources, and the disruptions were ultimately caused by rapid climate changes ca. 3000–2600 cal B.P. With rare exceptions (e.g., Adena in the Ohio valley), adaptation to a more dynamic, less predictable climate led to a more mobile, flexible, and smaller-scale lifestyle no longer characterized by stable, enduring places.

Kenneth Sassaman (chap. 11) compares the Late Archaic–Early Woodland transition in three regions—Savannah River Valley, St. Johns River Valley, and Tennessee River Valley, more specifically the "middle" part of each river system. For Sassaman, monumentality is a consistent theme for all three areas but so are environmental factors. While it is clear that many southeastern societies transformed from relatively sedentary societies to more mobile and dispersed ones after 3500 cal B.P., Sassaman argues that the changes were not synchronous and not attributable to a single factor. Like Thompson, he emphasizes pan-regional connectivity and contact.

Sassaman sees cultural realignments in the middle Savannah and St. Johns around 3900–3800 cal B.P. For example, in the St. Johns area, shell works cease to accumulate and by 3800 cal B.P., St. Johns pottery has replaced that of the fiber-tempered Orange series. In the upper part of the middle Tennessee Valley about 3600–3300 cal B.P., as the use of riverine shellfish waned, there was a realignment of trade patterns. More soapstone vessels came into the area, especially as the influence of Poverty Point diminished. By 3000–2600 cal B.P., when Poverty Point was no longer in the picture, stone vessels were being used in Tennessee valley mortuary contexts.

Sassaman's approach combines culture-historical narrative with awareness of climate fluctuations. He points out that factionalism may have played a role in the dissolution of established regional cultures. Particularly in times of stress, uneasy combinations of previously distinct ethnic groups may have dissolved, leading to abandonment of some areas, migrations to others, and breakdowns in long-standing relations of trade and exchange. Sassaman states that the Late Archaic–Early Woodland transitions may be "linked to global, continental, or at least regional environmental change. But it is equally plausible that these changes are coincident as a result of linkages among all constituent societies in the greater Southeast. Of course, these are not mutually exclusive causes." I could not agree more.

Joe Saunders (chap. 12) writes from the point of view of northern Louisiana and wonders not just what happened to the Late Archaic but also, what happened to the Middle Archaic. He observes that mound building was episodic, with peaks of accumulation at 4000–2700 cal B.C. and 1700–1100 cal B.C. These are not only periods of mound accumulation but also of interregional interaction between autonomous communities. The mound-building hiatus from 2700 to 1700 cal B.C. was not accompanied by abandonment of the region.

Saunders provides a histogram (fig. 12.2) representing calibrated ranges of radiocarbon dates. Peaks are observed at 1700–1100 B.C. and 4000–2700 B.C. In figure 14.4, I show a section of Saunders' graph juxtaposed with a comparable section of Tanner's sea level record from 4400 to 400 cal B.C. Tanner's graph is shown on the right; recall that higher K (kurtosis) values are associated with lower sea level, and thus cooler global climate. Generally speaking, the earlier period of mound accumulation in Louisiana is temporally coincident with the latter part of the mid-Holocene Warm Period, the hiatus in mound building with the mid-Holocene Cool Period, and the Poverty Point mound building period with an episode of rapid climate change that involved first a rapid sea level transgression and then a rapid regression.

Whatever other functions it served, the great mound complex at Poverty Point was a central marketplace for the exchange of goods and ideas. It thrived until 3250 cal B.P. when global temperature and sea level plunged precipitously. The new data presented by Saunders are essential to the task of breaking down the regional as well as the interregional causes of the Archaic-Woodland transition, as well as the dynamics of the Early Woodland to Middle Woodland transition.

Direct correspondences between global climate changes and cultural changes are provocative, but no matter how many climate graphs we compare with culture graphs and radiocarbon-date graphs, deriving causal explanations will continue to be elusive without regional understandings of how teleconnected global changes affected local-scale hydrology and resources. Warmer climate and higher sea levels must have raised the gradients of the Mississippi River and its tributar-

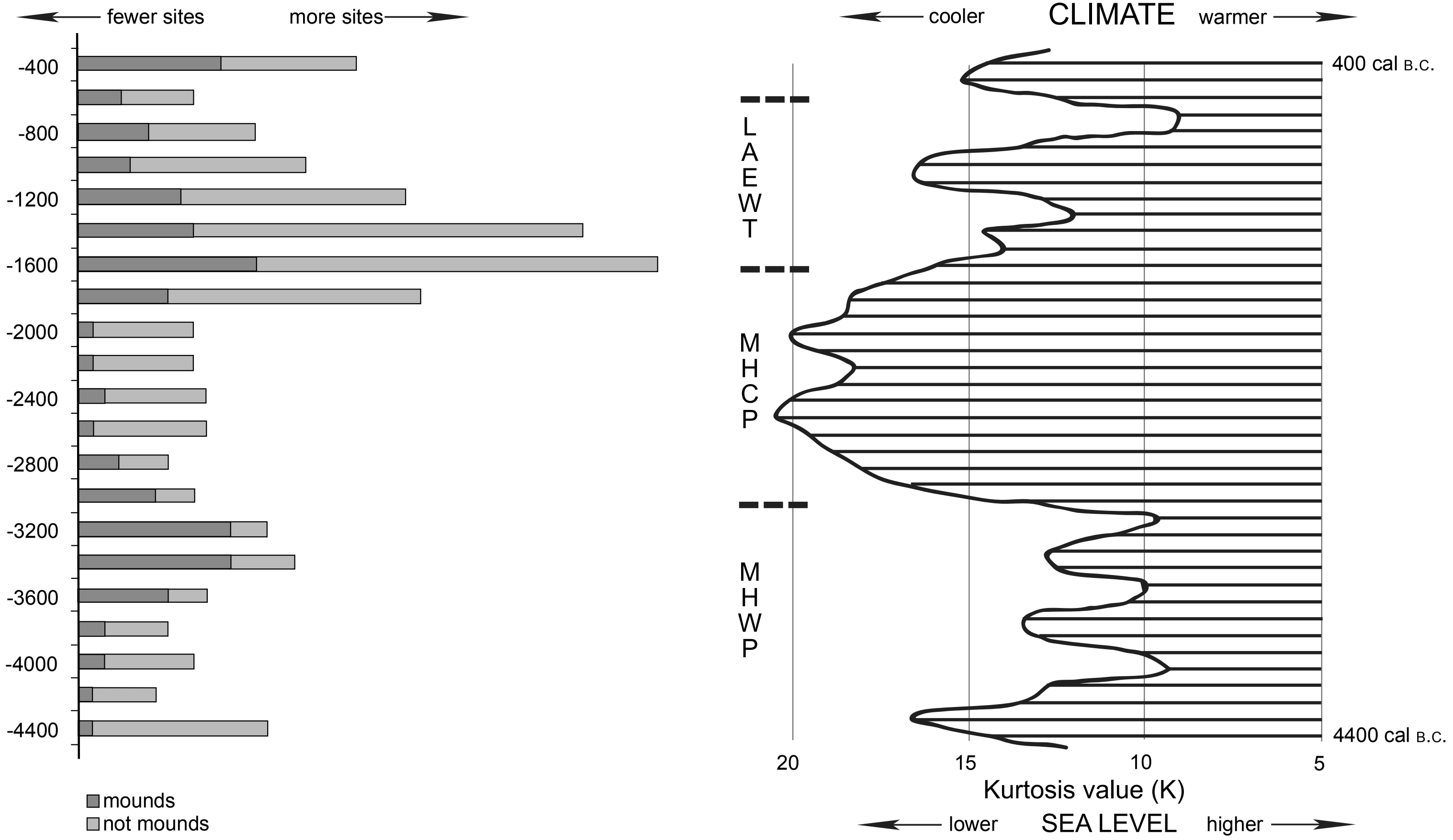


Fig. 14.4. An excerpt from Tanner's sea level record for 4400–400 cal B.C. (right) is juxtaposed with J. Saunders' (fig. 12.2) ^{14}C-assay probability distribution graph for dates in Louisiana and Mississippi (left). On the Tanner graph, higher kurtosis (K) values indicate lower sea levels. Key to abbreviations: MHWP = Mid-Holocene Warm Period; MHCP = Mid-Holocene Cool Period; LAEWT = Late Archaic–Early Woodland Transition. The complete Tanner sea level record is shown in figure 14.2.

ies, facilitating interregional river transportation and commerce on the one hand while closing off access to certain resources on the other (mussels in the Green River valley, for example).

In this connection, the comments of Jon Gibson (chap. 2, this volume) are relevant. Gibson says that even catastrophic flooding would not necessarily have shut down human settlement in the lower Mississippi valley. Higher than normal water levels can improve fishing, as he notes, and—echoing a point made by Rebecca Saunders (chap. 5, this volume)—elevated earthworks can serve as points of refuge in times of flooding. Responding to Sassaman's observation (chap. 11, this volume) that while classic Stallings culture had ebbed by 3800 cal B.P., Stallings traditions persisted upstream and downstream for centuries longer, Gibson stresses the importance of taking local social and geomorphic conditions into account when interpreting population movements. Just because some sites were abandoned, it does not necessarily follow that populations decreased. Sometimes population increases and sometimes it decreases, but people also move around, so the scale of the question is important (a point made elegantly by Cowgill [1975] over 30 years ago).

Several authors (Russo, Sanger, Sassaman, Schwadron, Thomas) interpret shell rings, curvilinear shell mounds, and "shell works" as indications of complexity, monumentality, ritual feasting, or some combination of these. I had hoped to be convinced by the data presented in these papers, but I remain skeptical. Rings and curvilinear ridges can be constructed for ritual purposes, but they can also be domiciliary middens associated, for one reason or another, with episodes of relatively low sea level. Shell works, including such site complexes as Mound Key, Big Mound Key, and Pineland in the Charlotte Harbor–Pine Island Sound region and Russell Key, Fakahatchee Key, and Dismal Key in the Ten Thousand Islands, have obvious structural similarities to one another, but the mounds, courts, fingers, and berms may be the result of solving practical problems in similar ways during the same climatic episodes. Flat-topped mounds can be temple mounds but they can also be domiciliary surfaces.

Interpretation of Archaic mounds as monuments indicative of complex social organization is an intriguing idea, but it is not one universally accepted by southeastern archaeologists. Crothers and Bernbeck (2004), for example, categorize the Green River Shell Mound Archaic sites as examples of a foraging mode of production, and propose that immediate-return foragers are perfectly capable of accumulating substantial mounds without anyone designing a plan or supervising their labor. Proposing an explanation for lower Mississippi Valley mound construction, Crothers (2004: 95) writes, "no one designed the layout of the mounds, but everyone contributed to the final design. The design had an important meaning, not as a monument but rather as an act of participation." J. Saunders (2004: 147–148) uses the term "monumental architecture" but doubts that substantial earthworks should in and of themselves indicate complexity, writing that "if monumental architecture signifies social inequality, evidence independent of mounds should exist in other aspects of the archaeological record." I get the distinct feeling that many authors in this volume are *assuming* complexity, feasting ritual, and monumentality rather than demonstrating them. Until we have hard evidence for these inferences, they are simply hypotheses.

To sum up, it has been a great pleasure reading these papers. I am impressed by the systematic data gathering and innovative ideas put forth by the various authors. Compared to 20 years ago, we all think very differently about the southeastern U.S. Archaic. Our conceptions are no longer hindered by a dominant evolutionary view that associated accumulations of earth with pyramid envy, or that characterized efficient fisher-gatherer-hunter subsistence strategies as depauperate preludes to serious stay-at-home gardening.

We now think that Archaic peoples were traders, travelers, and diplomats. They manipulated their environments and sometimes migrated from place to place. They surely came together for rituals, feasts, and good times. Like most humans, they must have imagined fantastic gods and pondered the cosmos. But Archaic people were not immune from the necessity to respond to climate changes, and sometimes these changes were abrupt. Charismatic prophets can influence their followers to build communities in specific places; some will prosper, some will not, and abrupt climate change can play a prominent role in the outcome.

Every author and commentator represented in this book is convinced that climate change, especially rapid climate change, can and did have effects on Archaic peoples in the Southeast. How people ultimately reacted to the challenges and opportunities presented by these fluctuations had as much to do with their histories and beliefs as it did with their environmental settings and modes of production, and it will require knowledge of both sociohistorical and physical structures, in their dynamic interaction, if we are to figure out what really happened during the Archaic-Woodland transition.

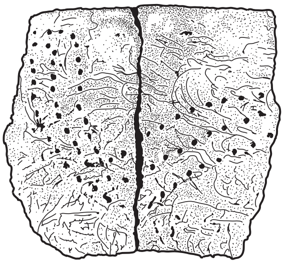
We need serious attention to the ever-increasing fine-grained climate change literature, better understandings of how climate dynamics affected the configuration and ecology of our individual study areas, more refinement and regional tuning of our dating methods, and continued discourse with one another about our common interests. Archaeologists can and should play prominent roles as producers, not just consumers, of sea level records. Rather than waiting for geologists to produce the elusive perfect sea level model, archaeologists can themselves contribute to fine-tuning of the best available models (e.g., Balsillie and Donoghue, 2004) and of those few records (Tanner, 1991, 1993; Siddall et al., 2003) that can also serve as models.

Most archaeologists underestimate the contributory role we can play in fine-tuning of sea level models. The key to archaeological fine-tuning is the inclusion of zooarchaeological and archaeobotanical studies that are focused not just on foodway and season-of-occupation questions, but also on paleoenvironmental reconstruction (see Walker, 1992a, for a comprehensive example). In stable coastal settings, zooarchaeological and archaeobotanical data combined with geoarchaeological and/or geochemical data offer a far better chance of success in refining sea level models than the use of any method by itself. When possible, archaeologists should work directly with earth scientists on such issues (see Walker et al., 1994, 1995; Walker and Surge, 2006, for examples).

Fortunately, long-term regional studies such as those represented in this book are advancing our knowledge significantly. We are seeing finer-grained chronological control, better spatial coverage, and a renewed commitment to look beyond our islands, estuaries, and river valleys to seek a broader understanding of the southeastern U.S. Archaic and its aftermath. This will take time, but if the proceedings of this conference are any indication, the prospects for success are very good.[1]

NOTES

1. Karen J. Walker (Florida Museum of Natural History) read an earlier version of this paper and made several helpful suggestions. More than anyone else, she has helped me to understand the critical importance of environmental archaeology to the pursuit of historical-ecological understanding.



CHAPTER 15

THE END OF THE SOUTHEASTERN ARCHAIC: REGIONAL INTERACTION AND ARCHAEOLOGICAL INTERPRETATION

DAVID G. ANDERSON

I appreciate being asked to comment on the papers in this volume, and want to start by thanking Dave Thomas and Matt Sanger, the organizers and editors of the May 2008 workshop on St. Catherines Island, for their hospitality and patience. All of the participants in the workshop, as well as those invited to contribute afterwards, deserve thanks for the excellent verbal and written presentations that led to this volume.

Interaction is an essential characteristic of many successful endeavors, such as that between the diverse group of scholars who produced the papers in this volume, or the peoples who built the mounds and middens in many parts of the Archaic Southeast, or who made up still larger interaction networks that spanned large parts of the region at various times. Feasting behavior at memorable places helps bind people together, and facilitates cooperative activity, and the 2008 Caldwell Conference was certainly characterized by both interaction and feasting, by people who in some cases traveled long distances to attend.[1] This volume is a tangible result of that behavior, and in its own way is every bit as valuable, in terms of the labor that it took to produce it, as the mounds, earthworks, or unusual artifacts generated by those prehistoric peoples—be they the ritual leaders or trading partners, pilgrims, or ordinary citizens—who made up the societies examined here. Cooperative behavior—in this case directed toward problem-oriented long-term research by bright and inquisitive people—can lead to significant results, especially when conditions exist to get large numbers of them, or the right mix, together. In that way, Thomas and Sanger are much like those earlier leaders who in a presumably similar fashion directed the creation of sites like Watson Brake, Fig Island, or Poverty Point. This volume is a monument to their abilities and, just as prehistoric centers were repeatedly used and modified under the direction of skilled leaders, with new mounds or layers or architectural features added, so too can we hope that future workshops will occur on St. Catherines Island, and result in similar products.

Turning to the contents of the volume itself, one of the most important things demonstrated by the papers herein is that long-term research at specific sites and in specific areas is critical to understand what was occurring at those locations, and to examining more general questions like "What happened to the southeastern Archaic?" Having teams of scholars working in an area and on specific research questions also leads to better results than individual scholars tackling complex sites and issues by themselves. The ongoing work of scholars like Marquardt, Russo, Sassaman, and Schwadron in Florida, or Kidder, Russo, R. Saunders, and J. Saunders in the lower Mississippi Valley, or DePratter, Marrinan, R. Saunders, Thomas, and Thompson on the Georgia coast (along with many others in these same or multiple areas) exemplifies this kind of long-term collaborative approach. The work by Thomas and his colleagues on St. Catherines Island, in particular, is remarkable not only for the breadth of the ongoing research program but especially for the reporting effort. The many fine monographs and edited volumes produced to date, of which this is just the latest, ensure that the work that has been accomplished will be known to future generations, and stand as an example we should all strive to emulate (e.g., Thomas and Larsen, 1979; Larsen and Thomas, 1982; Thomas, 2008a, to cite but a few of the studies that have appeared).

The papers in this volume also illustrate how multidisciplinary scholarship is of critical importance to better understanding the past, since many of the results reported herein are based upon collaborations between archaeologists and researchers in many other disciplines, including geologists, wildlife biologists, paleoclimatologists, and remote sensing and absolute dating specialists, to name a few of the many areas that have been drawn upon. Another thing the papers in this volume indicate is that having well-grounded site and locality histories is critical to archaeological interpretation, and an important way to achieve this is to have large numbers of well-collected and accurately calibrated radiocarbon determinations. The numbers of dates we have to work with are becoming truly impressive, as the papers by Kidder, Thomas, Schwadron, and others herein testify. Careful analysis of these dates is helping us identify periods of intensive use of a site or area as well as periods of less intensive use or abandonment. Coupled with this is the fact that more and more sites are being found, mapped, and excavated, as increasing numbers of people explore these questions and areas.

We have also seen that large-scale mapping and extended excavation are particularly important to understanding what was occurring at individual sites (e.g., as the papers by Russo, Sanger, Sassaman, Thomas, and Thompson, and others herein, demonstrate for shell U- or ring-shaped midden sites), and the test and small block units that once were considered sufficient are now being routinely augmented by innovative field strategies like systematic coring or probing to establish the extent and depth of shell or earthen deposits (e.g., J. Saunders et al., 1997, 2005; R. Saunders, 2002; Russo, 2004b, 2006, chap. 7, this volume). Recent research is also looking for sites in places not traditionally considered, such as within marsh areas (DePratter, 1977, DePratter and Howard, 1977, 1980, 1981 are important early exceptions), or below deposits thought impenetrable or sterile, as in the Everglades Tree Islands where Schwadron used power saws to cut through calcrete layers to reach the site (Schwadron, chap. 6, this volume), or beneath the shell hash "beach" at Oak Island (Gibson, chap. 2, this volume). The collection and analysis of paleosubsistence data have also improved markedly, with procedures like fine screening and flotation, novel approaches only 30 years ago, now routinely conducted (Marrinan, 1975, 1976, chap. 4, this volume). The older researchers at the Caldwell Conference, scholars who have worked for decades in their respective areas, over and over again offered variations on the comment that they were impressed with how much more information is now available than was the case even a decade or two ago. This is not to say that we know all we need or wish to know, far from it. But we have come far, and if research continues in the years ahead at the same pace it has in recent decades, our understanding of "What happened to the southeastern Archaic?" can only grow better.

WHAT DO WE MEAN BY "THE END OF THE SOUTHEASTERN ARCHAIC"?

Archaeologists use the terms Archaic and Woodland as *period* and *stage* formulations, respectively, to place prehistoric societies in the Southeast in specific intervals of time and by presumably roughly comparable levels of cultural development. The use of these terms varies appreciably from researcher to researcher, and while some agreement on temporal periods is emerging, we now know that the latter inference, that cultures within a stage share similar or identical technologies or organizational characteristics, is wildly inaccurate. Variability among the cultures placed in the southeastern Archaic *stage* is the norm, not uniformity, and documenting this variability, and the historical trajectories that produced it, as many authors in this volume emphasize, should be a goal for our research. Some authors call for the abandonment of stage terminology altogether in southeastern archaeology, in fact (e.g., Russo and Sassaman, chaps. 7 and 11, this volume), arguing that it constrains our thinking and channels our research into unproductive areas. I agree with this assessment, and believe terms like Paleoindian, Archaic, Woodland, and Mississippian should henceforth only be used to refer to specifically defined intervals of time in southeastern archaeology. Given their long history (e.g., Griffin, 1946, 1967) and widespread usage, however, I am unwilling to abandon the use of these terms altogether.[2] As chronological intervals, I believe they remain quite valuable, as long as we don't take their cultural connotations too seriously.

The Archaic *period* is traditionally dated from ca. 10,000 to 3000 ^{14}C yr B.P., or ca. 11,450 to 3200 cal B.P., a roughly 8000-year span separating what were known for the past half century or so as the Paleoindian and Woodland periods and cultural stages (Caldwell, 1958: 3, 6–7; Willey and Phillips, 1958; Griffin, 1967; Anderson and Sassaman, 2004: 87). The dates used to demarcate the Archaic period, 10,000 and 3000 ^{14}C yr B.P., originally had the advantage of being nice round and easily remembered numbers, something now lost as calibrated or calendar ages are increasingly used. The ensuing Woodland *period* dates from 3000 to 1000 ^{14}C yr B.P., or from roughly 3200 to 1050 cal B.P. and is succeeded in the last centuries prior to European contact by the Mississippian *period*, which is characterized by the emergence and spread of chiefdom-level societies engaged in intensive maize agriculture in many but by no means all parts of the region.

The dates delimiting the Archaic, 11,450 and 3200 cal B.P., were also once assumed to be closely tied to presumed major periods of change in global climate, the ending of the last ice age and the emergence of essentially modern climate conditions, respectively. As our knowledge and temporal resolution of past climate have improved, a similar deficiency of classificatory rigor comparable to that accompanying use of stage formulations is now apparent. The end of the ice age, or Pleistocene era, occurred in fits and starts, with major warming and cooling intervals lasting from decades to centuries over a period of several thousand years. The last major cold reversal, the Younger Dryas, ended rather abruptly about 11,650 cal B.P. (Broecker, 2003; see also Marquardt, chap. 14, this volume, for a discussion of abrupt climate change), some two centuries earlier than the 11,450 cal B.P. date currently employed by some researchers to delimit the end of the Paleoindian era. Likewise, no episode of global climate change conveniently occurs exactly at the other end of the Archaic period, although the centuries immediately following 3000 ^{14}C yr B.P./3200 cal B.P. are characterized by appreciable climatic variability (Bond et al., 1997, 2001: 2130; Fiedel, 2001: 120–125; Kidder, 2006, chap. 1, this volume; Mayewski, 2009), which is of direct relevance to the subject of this volume, "What happened to the southeastern Archaic?"

It was during the Archaic period, and particularly during the latter part of this span, after ca. 6000 cal B.P., that recognizably complex societies appeared for the first time in parts of the Southeast. Those societies differed appreciably from one another, but their complexity is inferred by the presence of one or more of the following attributes: construction of monumental architecture, typically of earth and/or shell; status-linked patterns of burial using a wide array of mortuary practices, sometimes concurrently, including individual graves, marked cemeteries, and/or mound/charnel house complexes; modest to extensive participation in the importation or exchange of materials from long distances; evidence for elaborate ceremony or ritual including the creation of specialized artifacts and facilities used in these activities; and conflict that ranged from low-intensity skirmishes to perhaps more intensive warfare (B. Smith, 1986; Steponaitis, 1986; Russo, 1994a, 1994b, 1996a, 1996b; M. Smith, 1996; Gibson and Carr, 2004; Anderson and Sassaman, 2004; Sassaman and Anderson, 2004; Anderson et al., 2007b; Kidder and Sassaman, 2009). When we think of the end of the Archaic, it is usually the changes that occur in these *kinds* of societies that receive the most attention; we should actually be thinking of what happened at this *time* in all the societies that were present.

While the ending of the Archaic period in the Southeast has been placed at about 3000 ^{14}C yr B.P. (3200 cal B.P.) by convention for many years, the actual date varies by up to several centuries in local chronologies. The reasons for this are clear: the differences between Archaic and Woodland cultures, that is, between the archaeological remains that occur in the centuries on one side or the other of the ca. 3200 cal B.P. divide, the papers in this volume demonstrate, are extensive and behaviorally significant in some areas and comparatively minimal or even unrecognizable in others. The conclusion as to which it is depends on the evidence available from the research areas of particular scholars, the time they were writing (older writings tend to see the differences as pronounced, at least over the region if not locally), and their research perspectives and theoretical orientations (i.e., how much weight is given to such matters as global climate change or historical tradition in examining change in human cultures). Thus, as Kidder (chap. 1, this volume, see also Kidder, 2006: 196) notes, to many early researchers, such as Caldwell, Ford, Phillips, or Willey, "the break between Archaic economies and those that followed ... was perhaps *the* important transition in the history of the East" (italics in original).

But was it? The papers in this volume tell a different story, one of local and subregional cultures whose size, complexity, and specific societal histories, while embedded within and shaped by broader climate trends and historical traditions, were highly varied and each to some extent unique (e.g., the papers by Thompson and Sassaman, chaps. 10 and 11, this volume, provide particularly detailed discussions of this perspective). As many authors have noted in recent years, including all of those participating in the present volume, importantly, there was no sharp or simultaneous transition from one kind (i.e., *stage*) of culture to another at 3200 cal B.P. The characteristics that traditionally defined both the Woodland stage and period—mound building, ceramics, and agricultural food production—are now recognized to have appeared much earlier, during the middle and later Archaic period (e.g., B. Smith, 1986; Sassaman and Anderson, 1995, 2004; Anderson and Mainfort, 2002b: 3). As Russo (chap. 7, this volume) observed, in an argument for the elimination of stage formulations altogether, "archaeological markers of cultural behavior and structure that first transpired in the Late Archaic, continued or [were] reinvented in the Early Woodland."

One thing is thus clear: there was no monolithic "later Archaic" culture in southeastern North America, or "Early Woodland" culture, for that matter. Instead, a wide range of vibrant prehistoric societies were present during the later part of the Archaic period, after ca. 6000 cal B.P. Some of these societies were characterized by monumental architecture, or extensive participation in long-distance exchange, or the use of domesticates, or evidence for warfare, while others were not, or at least not very much. Yet our knowledge of this variability is less developed than it should be. Sustained archaeological research on the later Archaic Southeast has tended to focus on localities where large sites with highly visible or readily accessible remains occur, such as earth or shell mounds and middens, or cemetery areas, or where unusual artifacts occur (i.e., soapstone vessels, early ceramics). Evidence from state site files shows that Late Archaic sites are found in large numbers in many parts of the region, including areas where little or no evidence for monumental architecture, large midden deposits, early ceramic or stone containers, or burials have been found, something we would do well to remember (Anderson, 1996b, 2002). In these areas, which actually encompass much of the region, we have very little idea what people were doing. Societal energies in areas lacking evidence for mound and midden complexes may have been directed to other forms of behavior, such as the construction of monuments of wood or other perishable materials, or elaborate mortuary ritual in ways that did not involve unusual artifacts or readily apparent cemeteries. Or, as Sassaman (1995, 1996, 2001, 2004a) has long observed, people in these areas may have opted out of "complex" behaviors altogether, preferring and perhaps actively enforcing a simpler life.

Perhaps the best example of a complex Archaic society lacking evidence for monumentality is the Benton Interaction Sphere of the Midsouth, dating from ca. 6500 to 6000 cal B.P. (Johnson and Brookes, 1989; Meeks, 2000; Brookes, 2004; Anderson et al., 2007b: 463; McNutt, 2008; Kidder and Sassaman, 2009: 676–677). Appearing at or slightly before the earliest mound complexes in the region, the Benton Interaction Sphere was located in the vicinity of the upper Tombigbee, middle Tennessee, and middle Cumberland rivers. In this area, hypertrophic Benton projectile points were interred with burials and apparently exchanged widely, possibly as a means of promoting alliances between groups to help alleviate subsistence or other forms of uncertainty (i.e., warfare, mate procurement). Large Benton sites occur within a few hundred kilometers of one another, and are characterized by cemeteries with burials interred with elaborate caches of normal and sometimes oversize bifaces. While Benton burial sites are easily recognizable archaeologically, comparatively little else is known about the culture.

The apparent absence of interments with elaborate grave goods, or even any ready evidence for interments at all, unfortunately, characterizes many of the cultures that built mounds and middens during the later Archaic, particularly those along the Gulf and Atlantic coasts (e.g., Russo, chap. 7, this volume; Sassaman, chap. 11, this volume, R. Saunders, chap. 5, this volume), or in the lower Mississippi Valley (Kidder, chap. 1, this volume, J. Saunders, chap. 12, this volume). This absence or low incidence of burials is a very real puzzle that warrants explanation. Perhaps, as some have suggested, burial in many societies occurred primarily at smaller, outlying sites, such as at Daw's Island in South Carolina or Conly in Louisiana (Michie, 2000; Girard, 2000). Or perhaps, as Russo, herein, suggests, ancestors became more important in the ensuing Woodland period, and as a result so too did the placement and preservation of their bodies, graves, or memory, which in some but by no means all societies was characterized by more archaeologically visible mortuary ritual.

While large sites with impressive architecture will undoubtedly continue to attract professional attention for a long time to come, a fascinating but understudied question is thus what was going on in those areas where large numbers of Late Archaic sites are known, yet virtually no large-scale excavation or effort at synthetic interpretation has occurred. The same bias can also be said to occur in areas where large and architecturally impressive sites *have* been examined . . . many small and presumably contemporaneous sites apparently exist over the surrounding landscape, yet few of these have been studied in detail (DePratter, chap. 13, this volume). Daws Island, Bass Pond, and Venning Creek are small Late Archaic sites with only diffuse pockets of associated shell that have been found along the South Carolina coast, yet they have yielded extensive quantities of ceramics, lithics, and human remains (Michie, 1979, 2000). How prevalent are these sites, and what part of the settlement system do they represent? Are they, as Jim Michie suggested (1979), where most of the people actually lived, coming together at rings only some of the time, perhaps for collective ceremony and feasting (see also Marrinan, chap. 4, this volume, who argues that rings were occupied by only a fraction of the total society's population, by "managerial" or ceremonial caretakers). We still have a long way to go before we understand what was occurring over the Southeast during the Late Archaic period; what is found on the tops of mounds or in the centers of rings, as many scholars have noted, is unlikely to be representative. If we wish to understand the end of the southeastern Archaic we need to better understand what it was that supposedly ended.

While the end of the Archaic *period* may thus be said to have been at 3200 cal B.P., what really interests us in this volume is what was occurring among the cultures in the region in the centuries around and following that date. The standard archaeological accounting of the "end of the southeastern Archaic" is that the abandonment of many major centers occurred about this time, like Poverty Point and related sites in and near the lower Mississippi Valley and the ring- and U-shaped shell midden complexes of the Atlantic and Gulf coasts, coupled with a dramatic decline in the long-distance exchange of prestige goods or the materials used to make them (B. Smith, 1986; Steponaitis, 1986; Gibson, 1996b, 2000, chap. 2, this volume; Anderson, 2001; Sassaman, 2005, 2006b, 2010, chap. 11, this volume; Kidder, 2006, chap. 1, this volume; Russo 2006, chap. 7, this volume; Kidder and Sassaman, 2009: 681–682). Pottery, which had appeared about 4500 cal B.P. in coastal settings from South Carolina to Florida, yet had remained relatively restricted in occurrence, in contrast, spread widely across the region in the centuries after 3200 cal B.P., and came into common use in many areas for the first time (Sassaman, 1993a, 2004b, 2005; Kidder, 2006: 197–198). We now know that the timing of these events varied appreciably, and that the "end" of the Archaic was a long and highly varied transition.[3]

A pattern similar to the spread of pottery occurred with domesticated plants, particularly in portions of the interior Southeast and the lower Midwest (B. Smith, 1992). The domestication and cultivation of local plants, while underway after ca. 5000 cal B.P. was, like pottery, restricted, apparently largely to the interior Midsouth and lower Midwest until the very end of the Archaic or even later (B. Smith, 1986, 1992, 2004; Gremillion, 1996, 2002). Locally domesticated plants of the Eastern Agricultural Complex—including goosefoot or chenopodium (*Chenopodium berlandieri*), sunflower (*Helianthus annus*), little barley (*Hordeum pusillum*), sumpweed (*Iva annua*), maygrass (*Phalaris caroliniana*), and knotweed (*Polygonum erectum*), and cucurbits or gourd—did not apparently assume much importance as a means of subsistence until after ca. 3000 cal B.P., during the Woodland and Mississippian periods. Again, as with other aspects of culture, use of domesticates varied widely over the region; it was clearly an important part of subsistence in some areas but contributed little or nothing in others, including in many areas where ceramics were adopted (Fritz, 1990; Fritz and Kidder, 1993; B. Smith, 1992, 2004; Gremillion, 2002).

The widespread but by no means universal co-occurrence of ceramics and agriculture in the Eastern Woodlands in the centuries following the end of the Archaic has led to suggestions that the technologies were related, perhaps because ceramics may have facilitated the preparation and cooking of the newly domesticated foods, particularly small seeds, which themselves may have partially replaced subsistence resources presumably used more intensively previously, such as shellfish or nut mast (e.g., Goodyear, 1988, Rice, 1999). An alternative model, proposed by Sassaman (1993a: 215–228), hypothesizes that elites controlling soapstone vessel (and other) exchange may have resisted or suppressed the adoption of pottery, since it would have interfered with established patterns and expectations for container use; only when exchange networks collapsed at the end of the Archaic period, seemingly counterintuitively, could pottery technology spread and become widely adopted.[4] Both explanations could well be correct, at least for explaining the changes that occurred in particular parts of the region. Neither, however, applies universally, since domesticates were not adopted in some areas, nor did soapstone vessels occur everywhere; indeed, in many parts of the Southeast soapstone vessels are rare or nonexistent, or only occur after the appearance of pottery, and in some cases continue to be used well into the Woodland period (Truncer, 2004, 2006, Sassaman 2006a; O'Donoughue and Meeks 2007).

The end of the Archaic and the initial centuries of the Woodland period are also traditionally viewed as times when major changes in collective or ceremonial behavior occur in many areas. Small earthen burial mounds and associated mortuary facilities began to be built in areas where they had not appeared before[5], and it has been suggested that mortuary ritual and ancestor veneration now served to bind peoples together from differing communities, rather than the aggrandizing behavior centered around competitive feasting and prestige goods exchange characteristic of some Late Archaic societies (e.g., see in particular Russo's paper, chap. 7, this volume, for an extended discussion of this perspective). The causes of these changes in ceremony and interaction are linked to environmental factors by several authors herein, such as an increase in the occurrence and intensity of storms and flooding, or fluctuations in sea level. These may have led to uncertainty about both subsistence and shelter, in turn leading to a loss of faith in present leaders and a switch to relying on ancestors rather than aggrandizers for comfort or help.

These changes in the focus of social action were likely gradual, however, and again were by no means universal. Climate change is unlikely to have been the sole reason for such changes, although it was likely quite important in some areas. Sea level fluctuations, for example, may have led to a relocation of coastal populations and centers to more favored areas, as apparently happened among many peoples building shell midden and ring sites, in a conscious effort to maintain effective positioning with respect to estuarine and marine resources (Sanger, chap. 9, this volume). Increased rainfall or megaflooding may have facilitated the rise as much as the fall of Poverty Point, or had little to do with either (cf., Kidder, Gibson, and R. Saunders' contributions, chaps. 1, 2, and 5, this volume). Long-distance exchange may have declined for a few centuries in some areas with the abandonment of Poverty Point, but it eventually picked up again, as new centers and interaction networks were established, as exemplified by the materials of exotic origin found at Adena and especially Hopewellian sites, and this exchange appears to be associated with aggrandizing behavior in some cases. The items interred with Woodland leaders in death were likely used by them in life, and while mortuary behavior was important, it was as much about reinforcing the social positions and organization of the living as of the dead (e.g., Carr and Case, 2005; Dancy, 2005; Charles and Buikstra, 2006). The papers in this volume teach us that how people reacted to circumstances is what we should be striving to document and understand, and not solely whether their behavior conforms or fails to conform to inferred broad general patterns (see Thompson, chap. 10, this volume, for a particularly good discussion of this point).

Mound burial is known from the Archaic in parts of Florida at sites like Harris Creek Mound (Aten, 1999), and burials are common in many of the shell middens (whether considered monuments or not) of the Shell Mound Archaic culture of the Midsouth (e.g., M. Smith, 1996; Herrmann, 2002; Marquardt and Watson, 2005). Evidence for the construction of mounds, for burial or indeed for anything at all, in fact, is absent in many parts of the eastern United States during the initial centuries of the Woodland era; the occurrence of mortuary mounds in cultures like Adena seems to be the exception rather than the rule. As with the Archaic, we really don't have good information on the mound building and mortuary practices of many Early Woodland societies in the region, making broad generalizations about what was occurring difficult to test in many specific cases. All of this reinforces the point made by many of the authors herein that we need to examine the variability in the region's archaeological cultures, and avoid accepting the broad generalizations implicit or explicit in stage terminology.

The "end of the southeastern Archaic" was thus a highly complex and varied process, as much a time of new beginnings or even continuity as of apparent endings. The changes that occurred were not the same everywhere, nor did they occur simultaneously across the region; instead they played out at different times and at different rates in different areas. Given these caveats, I now turn to some specific issues and comments regarding the study of this topic.

THE END OF THE SOUTHEASTERN ARCHAIC: COUNTING AND CALIBRATION ISSUES

Some scholars appear to accept as a given that a major decline in population, or a "gap in occupation" occurred and marked the end of the Archaic and the onset of the Woodland. The absence of monumentality or even appreciable numbers of sites presumably dating to the interval in parts of the region from ca. 3200 to 2400 cal B.P. is used in support of this inference. But equating numbers of sites, diagnostic artifacts, or radiocarbon dates with numbers of people needs to be carefully considered (Rick, 1987; Fiedel, 2001; Thomas, 2008b; Kidder, chap. 1, this volume), and the decline or low incidence appears to be by no means universal. Increases in the numbers of sites or monuments of shell or earth compared to the preceding later Archaic are reported or inferred during the Early Woodland in southern Florida and in the Alexander, Adena, and Tchfuncte culture areas (e.g., see papers by Gibson, Schwadron, Russo, and Sassaman, chaps. 2, 6, 7, and 11, this volume), for example, and increases in site numbers during the Early Woodland are also reported in western Tennessee, central Mississippi, and in the Green River/Mammoth Cave area (Kidder, chap. 1, this volume). A general pattern of increase in numbers of sites from the later Archaic through the Woodland and into the Mississippian periods, in fact, is noted when site file data from many parts of eastern North America are combined (Milner, 2004a: 28–29). These data on numbers of sites contrast with the numbers of radiocarbon dates from initial Woodland context in many areas, which appear to be low (e.g., Farnsworth and Emerson, 1986; Fiedel, 2001). What is meant by these numbers, of course, must be carefully considered: a lithic scatter and a site like Poverty Point may both have a site number, but they clearly do not represent the same amount of activity.

Authors using numbers of radiocarbon determinations as a proxy for population, or even as evidence that people were present at all, must also take particular care when examining samples dating from ca. 2750 to 2200 ^{14}C yr B.P. (Thomas, 2008b: 437–442, chap. 8, this volume, Kidder, chap. 1, this volume). The terrestrial radiocarbon calibration curve is seriously skewed and nonlinear during this time (fig. 15.1). Between ca. 2800 and 2700 cal yr B.P., for example, it exhibits a steep decline, in which three centuries of radiocarbon determinations, from ca. 2750 to 2450 ^{14}C yr B.P., actually equate with ca. 100 years of real or calendar time. This is followed by a plateau in the calibration curve from ca. 2700 to 2350 cal B.P., in which radiocarbon determinations from a roughly 50-year span from ca. 2450 to 2400 ^{14}C yr B.P. correspond to roughly 350 calendar years. Another steep decline in the calibration curve immediately follows from ca. 2350 to 2300 cal yr B.P., or ca. 2400 to 2200 ^{14}C yr B.P., in which ca. 50 calendar years corresponds to ca. 200 radiocarbon years. This is followed by a plateau around ca. 2200 ^{14}C yr B.P., in which relatively few radiocarbon years encompass the interval from ca. 2300 to 2200 cal yr B.P. (Stuiver et al., 1998; Fiedel, 2001: 122–123; Nijboer et al., 2001: 166–167; Reimer et al., 2004: 1039, 1057; Thomas, 2008b: 437–442). The fluctuations in the calibration curve indicate—assuming relative uniformity in size and continuity in settlement in the regional populations forming the archaeological record—that we should see proportionally far fewer radiocarbon determinations of from ca. 2750 to 2450 and 2400 to 2200 ^{14}C yr B.P., and proportionally many more determinations from around 2450 to 2400 and again around 2200 ^{14}C yr B.P. This is, not surprisingly, what is commonly seen in the archaeological record in areas where large numbers of determinations have been run, as on St. Catherines Island where it should be noted the effect of calibration has been carefully considered (e.g., Thomas, 2008b: 459–461, chap. 8, this volume). Thus, the occurrence of Early Woodland dates and hence sites in our regional chronologies and sequences is at least partially as much an artifact of calibration as it is of changes in human population or settlement. The effect of calibration thus needs to be carefully considered in any attempts to equate numbers of dates with numbers of sites or people during the initial Woodland period (see also Fiedel, 2001, for an extended discussion of these impacts in the interpretation of Early Woodland settlement in the Northeast).

The same variability that occurs within the radiocarbon calibration may confuse fine-grained interpretations of cultural developments earlier in time as well, like the interval of the so-called "hiatus" in mound building in the lower Mississippi Valley, between ca. 4700 and 3700 cal yr B.P. (Gibson, chap. 2, this volume; J. Saunders, chap. 12, this volume). A steep decline in the calibration curve occurs between ca. 4900 and 4800 cal B.P., corresponding to ca. 300 radiocarbon years, from ca. 4400 to 4100 ^{14}C yr B.P.; this is followed by a brief reversal and then a plateau from ca. 4750 to 4600 cal B.P., corresponding to radiocarbon dates between ca. 4200 and 4150 ^{14}C yr B.P. (Reimer et al., 2004: 1056; fig. 15.2). Fortunately, while additional minor declines, reversals, and plateaus occur, much of the time of the "hiatus" is comparatively tranquil in terms of fluctuations in radiocarbon, at least when compared to the calibration during the initial centuries of the Woodland period. This suggests that the explanation for the observed "hiatus" is at best only partially related to calibration effects. The perceived gap in monumental construction in the lower Mississippi Valley may be real or may be due to sampling and preservation, since

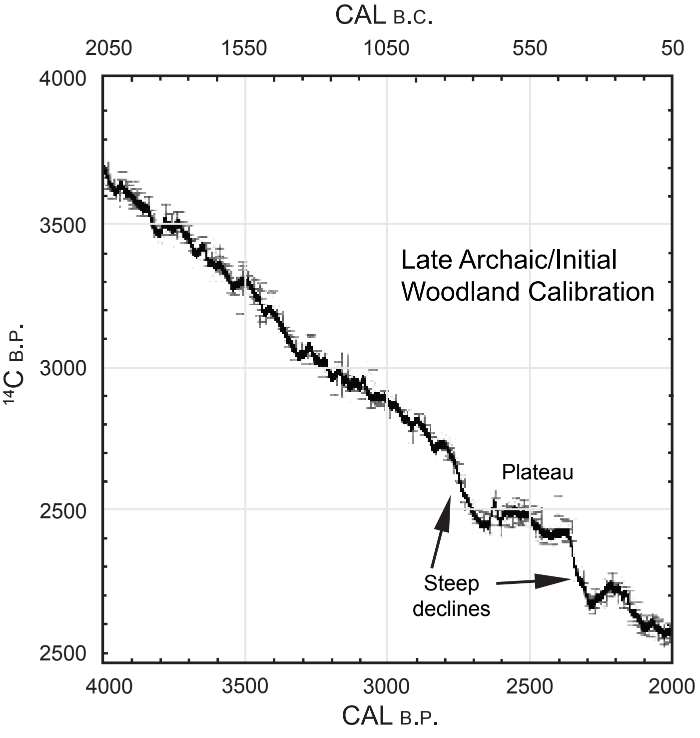


Fig. 15.1. Radiocarbon calibration curve for the end of the Archaic and the initial centuries of the Woodland periods. (Adapted from Reimer et al., 2004: 1057)

geoarchaeological research in the region in recent years has shown that many later Archaic sites have likely been lost to erosion or are deeply buried under alluvial sediments (Arco et al., 2006; Kidder and Sassaman, 2009: 672–673). Only time, and more research directed to looking for sites during this interval, will tell.

The idea that portions of the Southeast could be abandoned or largely depopulated at various times in the past, however, should not be viewed as at all unusual, but instead something that did occur from time to time. Such events are commonplace in the Mississippian period, where portions of major drainages or even larger parts of the Eastern Woodlands were depopulated at various times, for reasons as of yet incompletely understood, although both climatic and cultural factors appear implicated (Anderson, 1994, 1996c; Cobb and Butler, 2002; Meeks and Anderson, 2007); the papers in this volume indicate that similar patterns occurred earlier in prehistory in the Southeast as well (e.g., Kidder, Schwadron, Russo, J. Saunders, chaps. 1, 6,

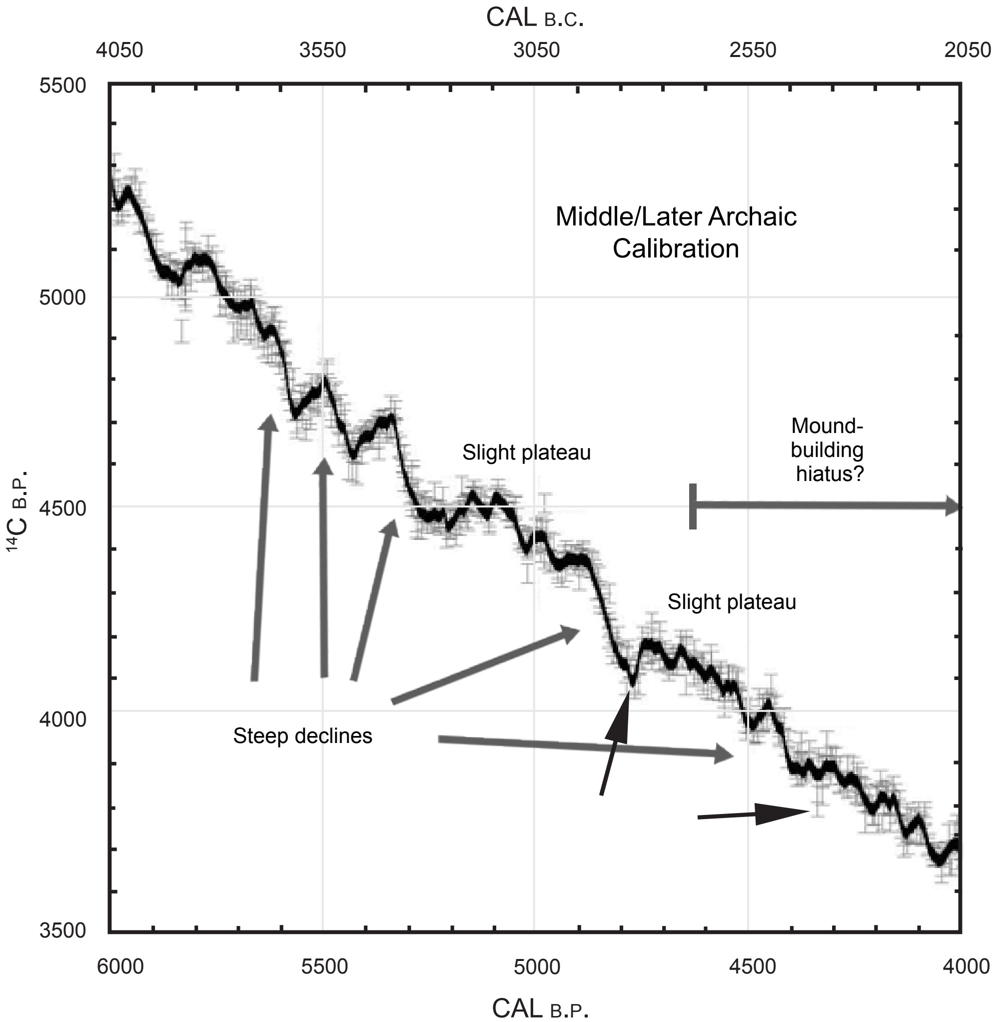


Fig. 15.2. Radiocarbon calibration curve for the period of the Middle Archaic“hiatus” in mound building in the lower Mississippi valley. (Adapted from Reimer et al., 2004: 1056)

7, and 12, this volume). The Tree Island/freshwater portion of the Everglades, for example, was abandoned from ca. 3800 to 2700 cal B.P., Poverty Point was abandoned after ca. 3200 cal B.P., and many of the shell ring- and U-shaped middens of the lower Southeast were abandoned after ca. 3800 cal B.P. (e.g., Russo and Sanger, chaps. 7 and 9, this volume). Small-scale population movements leading to the temporary or permanent abandonment of individual sites or comparatively small localities are, of course, commonplace in southeastern prehistory, and are typically directed to maintaining regular and predictable patterns of both interaction and resource procurement. Larger-scale population movement or relocation also would have occurred, however, as people positioned themselves with respect to one another to form and maintain buffer zones; to move away from or replace or incorporate allies or enemies; to maintain optimal interaction, information exchange, and mating networks; or to settle new areas.

The movement of people over a regional landscape as centers grow or decline in size, power, or influence, that commonly results in localized or larger-scale abandonments or population declines—what is sometimes called cycling—occurs in societies at a wide range of complexity, in so-called "tribal" societies just as it does in chiefdoms and states (Parkinson, 2002, Russo, chap. 7, this volume; see also Wright, 1977, 1984; Marcus, 1998; Anderson, 1994). Whatever one thinks of neoevolutionary terminology, and the use of concepts like "tribe" or "chiefdom"—and the authors of this volume are nearly unanimous in thinking not much (sensu Pauketat, 2007), since their use tends to constrain consideration of variability and history—recognizing and understanding the causes of the abandonment of centers, localities, or regions remains an important subject for research.[6] Familiarity with ethnographic examples, as we shall see below, can help us better understand the nature of the social organization that might have been present, and the kinds of behavior that might have been occurring. Thus, when a gap in occupation is indicated by site or radiocarbon data, what is going on should be carefully explored.

THE END OF THE SOUTHEASTERN ARCHAIC: CLIMATE CHANGE

In recent years cultural developments at the end of the Archaic have been linked to global and regional climatic conditions. The abandonment of Poverty Point, for example, has been tied to changes in the course and flooding patterns of the lower Mississippi River by Kidder (Kidder, 2006: 214–216, chap. 1, this volume; Kidder and Sassaman, 2009: 681–682). Kidder's "Climate Hypothesis" (2006, chap. 1, this volume), and his related collaborative and multidisciplinary research (e.g., Arco et al., 2006; Adelsberger and Kidder, 2008; Kidder et al., 2008b), is a sustained local application of the global focus on paleoclimatological research that has occurred in recent years, and is exemplary for its emphasis on the importance of understanding how human cultures responded to changes in climate in the prehistoric Southeast (see also Gunn, 1997; Anderson, 2001; Anderson et al., 1995, 2007b; Blanton and Thomas, 2008; Grissino-Mayer, 2009; and the papers by Marquardt, Sanger, J. Saunders, R. Saunders, Thomas, and others, this volume).

Following in the tradition of Fisk, Ford, and Roger Saucier, Kidder examines cultural developments in the lower Mississippi Valley with respect to changes in global climate as well as in local/subregional drainage conditions, to argue that the abandonment of Poverty Point may have been brought about by increased flooding and cooler temperatures, leading to an impoverishment of floodplain subsistence resources that its peoples relied heavily upon[7]. I concur with Kidder that how global climate change translates locally must be carefully examined.[8] Indeed, I also agree that we must employ multiple geographical and temporal analytical scales simultaneously when examining the impact of climate change on human culture (Anderson, 2001: 148–151; Anderson et al., 2007a; Mayewski, 2009; Kidder, 2006, chap. 1, this volume; Marquardt, chap. 14, this volume; Thompson, chap. 10, this volume; R. Saunders, chap. 5, this volume). In particular, we should pay attention to the effects of short-, intermediate-, and longer-term climate variability, which roughly correspond to historical developments on similar scales, such as the *evenments*, *conjunctures*, and *longue durée* of Fernand Braudel (1949 [1972], 1958 [1980]; see also Cobb, 1998: 170–171).

Short-term climate trends occur at daily to annual scales, and include such things as variation in rainfall, temperature, seasonality, or severe storm frequency, as well as more unusual or unpredictable events like volcanic eruptions, or meteor impacts. *Intermediate-term* climate variation is that which occurs at decadal to century scales, with trends at least partially observable within the lifetime of at least some individuals. These encompass periods of sustained warmer or colder temperature, rainfall, or seasonality, like those that characterized the Little Ice Age or the Medieval Warm Interval. El Niño/Southern Oscillation (ENSO) effects occur at short-term scales measured in years, but changes in the frequency and intensity of ENSO vary at longer scales, with major changes noted at ca. 6000 and 3000 cal B.P. (Sandweiss et al., 1996, 2001; Sandweiss and Quilter, 2009); such changes are thought to have influenced the development of southeastern prehistoric cultures at these times (e.g., Hamilton, 1999, Kidder, 2006, chap. 1, this volume; R. Saunders, chap. 5, this volume; J. Saunders, chap. 12, this volume; Schwadron, chap. 6, this volume). *Long-term* climate trends take place at scales of hundreds to thousands of years, and include such things as (1) the "Dansgaard–Oeschger" and "Bond" cycles operating with a periodicity of ca. 1500 years in glacial and interglacial periods, respectively (Dansgaard et al., 1989, 1993; Bond and Lotti, 1995; Bond et al., 1997); (2) Heinrich cold events occurring irregularly every ca. 7000 to 11,000 years during glacial cycles (Heinrich, 1988; Hemming, 2004; Peck et al., 2007); and (3) glacial-interglacial Milankovitch cycles operating at scales of roughly 100,000 years, at least for the past ca. 430 ky or so (Hays et al., 1976; Augustin et al., 2004). Transitions in climate may occur gradually or quite rapidly, something that must also be considered when evaluating impacts on human cultures (e.g., Anderson et al., 2007a: 3–7; Kidder, chap. 1, this volume; R. Saunders, chap. 5, this volume; Marquardt, chap. 14, this volume). Kidder makes the very good point that we lack "useful high-resolution climate proxies" from many areas, making it crucial that archaeologists not only be aware of this record, but participate in its collection and interpretation (e.g., Anderson et al., 1995; Blanton and Thomas, 2008; Grissino-Mayer, 2009).[9]

As Kidder, Marquardt, and others in this volume note, the end of the southeastern Archaic and the onset of the Woodland period were particularly challenging times for the region's inhabitants, as well as for paleoclimatologists and archaeologists exploring the relationship between climate and culture. Around 1159 cal B.C. a major short-term change in global climate apparently occurred, reflected in some two decades of narrow growth rings in the Irish Oak tree-ring record; the Hekla 3 volcanic eruption in Iceland occurred about this time or slightly later, and may be the cause of this episode (Baillie, 1988, 1991, 1999; Eiríksson et al., 2000; Fiedel, 2001: 120–121). Additionally, a Bond event (#2) took place about 2850 cal B.P., identified by the presence of ice rafting debris in North Atlantic sea cores, and that was marked by cooler temperatures worldwide; this dating is roughly coeval with the subboreal to the subatlantic transition (Bond et al., 1997, 2001; Fiedel, 2001: 121–123). The latter event at ca. 2850 cal B.P. affected global temperature and circulation, altering the uptake of radiocarbon in the ocean, and likely bringing about the fluctuations observed in the radiocarbon calibration curve at this time. ENSO frequency and intensity also appear to have increased after ca. 3000 cal B.P., leading to increased rainfall and flooding in the Southeast, possibly contributing to the collapse of Poverty Point (Kidder, 2006, chap. 1, this volume). ENSO effects were certainly felt elsewhere, most notably in Peru, where the early mound building tradition ceases about this time (Sandweiss et al., 2001, 2007: 26, 42, 45). Flooding may have not only affected Poverty Point's subsistence resources, but also may have blocked access to stone sources, since high water could have rendered gravel bars or erosional cuts inaccessible; these impacts, furthermore, could have occurred widely over the region (Kidder, chap. 1, this volume). The correlation of climatic conditions with specifics episodes of activity at Poverty Point is difficult, such as those associated with periods of large-scale construction or final site abandonment.

As Rebecca Saunders (chap. 5, this volume) also observes, in a challenge to the uniqueness of the terminal Archaic climatic events posited by Kidder (2006, chap. 1, this volume), mega-flooding occurred a number of times in the northern Gulf of Mexico in the Late Holocene (Brown et al., 1999), not just around the time Poverty point declined (see also Gibson, chap. 2, this volume). These episodes are dated to ca. 4.7, 3.5, 3.0, 2.5, 2.0, 1.2, and 0.3 thousand years ago, and, as Saunders argues, why was one period of flooding seemingly detrimental to the inhabitants of Poverty Point, while another was not? Did local peoples react differently to these climatic events? If the activity that took place at Poverty Point was "risk reduction in the face of a deteriorating climate (R. Saunders, chap. 5, this volume), a variation of the argument Hamilton (1999) proposed for Middle Archaic mound building in the lower Mississippi Valley, for example, why was it apparently successful early on ca. 3500 cal B.P. and unsuccessful later, after ca. 3200 cal B.P.? It may be that these climatic episodes varied in duration and intensity, with the one seemingly coeval[10] with the decline of Poverty Point particularly detrimental. Or, alternatively, the effects of climate on culture may have been more subtle and cumulative. Evidence for water erosion has been noted at Poverty Point, for example (see R. Saunders, chap. 5, this volume; Gibson, chap. 2, this volume). Could increased rainfall and flooding have made repairing Poverty Point's monuments more difficult, another task in a mounting series of responsibilities, until the people who lived there could or would no longer keep up?

One of the lessons of this volume, accordingly, is that we must make every effort to bring available paleoclimatological and archaeological data into congruence, while remaining fully cognizant of the temporal or spatial variation in the different data sources. Annual or decadal resolution in tree-ring or ice-core records may not be matched by archaeological data, but using tools like dendrochronology and high-precision AMS dating and wiggle matching can bring them close. Another important lesson is that appreciable effort must be made to determine how broad climatic patterns played out locally. In this regard, studies like those by Kidder, Thomas, R. Saunders, and others in this volume, attempting to determine local manifestations of global climactic events, and cultural responses to these effects, are important examples of the way in which we should proceed. In addition to Kidder's work in the lower Mississippi Valley, the sustained work by Dave Thomas's team exemplifies how climate change and human response can be examined at a smaller geographic scale, in this case on St. Catherines Island (Blanton and Thomas, 2008; Thomas, 2008c, 2008d; Thomas et al., 2008). Whatever else it might have been (i.e., a time "boring" or "good gray" cultures, after Williams's description [1963: 297] of the Late Woodland, as co-opted by Kidder, chap. 1, this volume), the interval associated with the end of the southeastern Archaic and the onset of the Woodland period was one of appreciable climate change and instability.

THE END OF THE SOUTHEASTERN ARCHAIC: CHANGES IN REGIONAL INTERACTION

Evidence for large-scale long-distance exchange is observed a number of times in the prehistory of the Eastern Woodlands, together with periods when such interaction is markedly diminished (e.g., Griffin, 1967; Brose, 1979; Goad, 1979; Johnson, 1994; Lafferty, 1994; Cobb, 1998). A reduction in long-distance exchange in the first several centuries of the Woodland period closely follows the abandonment of the regional center at Poverty Point after about 3200 cal B.P. (Gibson 1998a; chap. 2, this volume), which perhaps not coincidentally is the Archaic-Woodland temporal boundary. The resulting dissolution of ties between Poverty Point and other societies in the region undoubtedly shaped conditions that followed. As Kidder herein notes, "the collapse of the center may have disrupted the social fabric of numerous small-scale societies throughout the Mississippi basin." Yet why should the abandonment of one center, however large, have such impact over such a large area? What does societal collapse mean in regional perspective?

Direct evidence for Poverty Point interaction, widespread though it may have been, is not found in many parts of eastern North America, and even within the Southeast, only some areas appear to have been in presumably direct contact with the center (Webb, 1968; Byrd, 1991; Gibson, 1996b, 2000: 219–221, 2007: 511, 513–514). While it is possible and indeed likely that far more interaction occurred than we have tangible evidence for, this is only an assumption. That is, people, materials, and ideas could have moved over the landscape in appreciable numbers, but save for extralocal lithic raw materials imported into the center, which are present in large quantities, whatever else may have been moving has left little trace in the archaeological record, at least that we currently have found or recognize. Although raw materials, predominantly stone, were coming into the center from an array of sources, some at appreciable distances, Poverty Point is the only site in the lower Mississippi Valley—or indeed the Eastern Woodlands at the time—where such activity "was conducted on such a regular basis or grand scale" (Gibson, 2000: 221).

Furthermore, whatever the people at Poverty Point were exporting, if indeed they were exporting much of anything tangible or at least material, was apparently perishable. Whether they were organic goods like fabric, feathers, or food, or a less tangible product like an idea manifest by Poverty Point itself, that is, some form of "social, ritual, and or mythic legitimization" (Kidder, chap. 1, this volume; see also Gibson 2000, chap. 2, this volume; Sassaman 2005, 2010, chap. 11, this volume; Kidder and Sassaman, 2009) is currently unknown. The ideological underpinnings of Poverty Point were almost certainly critically important to the peoples living in and near the center, and judging by the distances materials came from, what happened at the site was likely at least generally known if not revered by peoples much farther away. It may have been perceived from afar as the equivalent of the shining city on the hill (or of the hill), the place where things were happening, a great place to see and be seen, and to party. It may indeed have been what Webb and Gibson called "The Wonderful World" (Gibson, 2007: 516, 523; Webb, 1975: 7). Exotic stone may have been the price of admission or an aid to alliance formation, if brought in by outsiders and not obtained by well-traveled locals. But if outsiders did come to Poverty Point, and helped provision it with lithics in the process, they apparently did not take much made locally back with them, although they may have stayed and settled, as Sassaman (2005, 2010) and Kidder (chap. 1, this volume) have suggested. Whether Poverty Point reflects exogenous and multiethnic as opposed to local and endogenous origins, however, is currently the subject of some debate (cf., Gibson 2007, chap. 2, this volume with Kidder and Sassaman, 2009, Kidder, chap. 1, this volume).

When Poverty Point declined, this interaction was lost; and the activities that may have made this site the ideological or party center of the later Archaic Southeast stopped with it[11]. Even Disneyland can get old, as people find new places to go or other ways of occupying their attention; perhaps changing climate rendered feasting less sumptuous or the area more challenging to get to, or the lithic materials that were the focus of great interest more difficult to access (Kidder, 2006, chap. 1, this volume; Gibson 2000, 2007, chap. 2, this volume). What was once perceived as important to peoples both locally and further afield, however, was no longer. Long-distance interaction, be it brought about by pilgrimages or trading parties, was replaced by more local concerns, perhaps directed more to memorializing past leaders than helping augment present ones, an emphasis on ancestors rather than aggrandizers (Russo, chap. 7, this volume). Similar arguments, of course, have been raised to explain changes in the Eastern Woodlands following the decline of Hopewell and Cahokia (e.g., Brose and Greber, 1979; Pauketat and Emerson, 1997; Anderson, 1997; Pauketat, 2004, 2007; Jefferies, 2004b: 124).

What happened at Cahokia, in fact, may offer some indication as to what occurred across the Southeast with the decline of Poverty Point, since Cahokia too far exceeded in size and complexity any other prehistoric center in the Eastern Woodlands at its peak in the 11th and 12th centuries, or indeed any time after.[12] When Cahokia declined after ca. A.D.1200, nothing comparable replaced it. Instead, smaller centers became dominant in their subregions, probably formed by local leaders emulating what they had seen or heard about Cahokia, at places like Etowah and Moundville early on, and later at the sites making up the societies DeSoto and other early European explorers encountered. The peoples in these successor societies had seemingly different priorities. Exchange in exotic materials and finished goods still took place, but apparently at a much-reduced scale, sites were smaller (nothing comparable to Monks Mound was ever built again), and no one of them could legitimately claim, at least on the basis of overwhelming size, to be "the center." When Poverty Point declined, however, unlike Cahokia it was not replaced by smaller-scale copies of itself. Indeed, it was centuries before even remotely comparable monumental construction and exchange occurred again within the region, at the varied centers of the Hopewellian world (save apparently in portions of south Florida [Schwadron and Russo, chaps. 6 and 7, this volume]). While vibrant cultures were present in parts of the region in the centuries immediately following the end of Poverty Point, such as Alexander and Adena, there was no longer one dominant center, no "Wonderful" place.

But how did the decline of Poverty Point play out, and why? Climate change, such as increased rainfall or flood frequency, may have affected societies across the region—by impacting their traditional food sources or foraging areas, disrupting communications arteries, or masking formerly accessible lithic and other raw material sources—not only in the lower Mississippi Valley, but elsewhere, as Kidder, R. Saunders, and others have suggested in this volume. But even assuming that we are able to resolve the cause of the collapse of the Poverty Point site itself, why didn't interaction continue, with another center or centers, either locally or in another part of the region, assuming a comparable role in terms of scale or influence? Gibson (chap. 2, this volume) suggests one answer, when he argues that Poverty Point had grown too large and complex to sustain itself for very long, which it could have only done if the people living there were willing or able to change their basic social values and organizational properties, perhaps by becoming less egalitarian.[13] In this view, Poverty Point was a precursor to the complex societies of the later Woodland or Mississippian era, yet its people failed to develop mechanisms to allow such complexity to continue over a sustained period. The means of doing so, furthermore, while perhaps present for a time at Poverty Point at its height, does not appear to have been either exported or appreciated elsewhere. The Late Archaic and Early Woodland peoples of the region, quite simply, do not appear to have been capable of, or seen the necessity for, sustaining other such social experiments.[14]

But why don't grandiose primate centers occur continuously, if not in the same place, then within a region? A number of reasons suggest themselves, one of which is related to the role dominant centers or areas play in a regional landscape. *Quite simply, once a dominant center like Poverty Point or Cahokia collapsed, it could not be easily or readily replaced. When such a center went down, what made it work went down with it: the kin, marriage and alliance networks, trading partnerships and expeditions, scheduled and impromptu pilgrimages, missionary parties and activities, collective labor arrangements, and all the other things that made it a center. Such relationships are unlikely to easily reconstitute themselves, especially if they must be formed by new peoples at new locations.*[15] Such networks, ethnographic studies suggest, (1) took time to develop, on the order of decades to centuries, (2) involved multiple partnerships between individuals, with no single person understanding or controlling the whole system, and (3) were often highly structured in terms of what was circulated and what was expected of participants (Malinowski, 1922; Wiessner, 2002: 237ff). Such networks were not easily produced or reproduced, and their influence extended to many aspects of behavior. The Tee trading cycle among the Enga of Highland Papua New Guinea, for example, grew up over many generations, and was linked to both religious cults and warfare, institutions that trade helped to spread and sponsor, respectively (Wiessner, 2002: 240–242). The mobilization of resources to support these activities involved all members of society, despite the fact that a much smaller percentage of people actually shaped specific trends and events. Like the Tee or Kula cycles, in which exchange fluctuated in intensity, we must determine how much long-distance exchange took place at various points of time during the later Archaic and, like these two ethnographic examples, whether it occurred in a punctuated fashion.

An examination of possible interaction pathways, or trail networks in the Eastern Woodlands (Anderson et al., 2007c) can help us to understand what happens when a major center is abandoned. Least cost pathways were created to explore the flow of raw materials into and finished goods out from three major centers or core areas, Poverty Point, the Scioto Valley (i.e., Ohio Hopewell), and Cahokia (fig. 15.3). Not surprisingly, save for limited areas of overlap shaped by physiographic considerations, the networks were quite different. That is, interaction networks in eastern North America were profoundly shaped by regional political geography, were situational, and changed over time. While all "All roads may lead to Rome," the road networks change when a new "Rome" appears somewhere else. Thus, when a major center declined, the physical and human networks centered upon it had to be reconstituted, something that does not appear to occur quickly. In the case of Poverty Point, the network of interactions that came together at the site, in the absence of similar centers elsewhere, could not be easily transferred and reconstituted.

Other findings of the analysis were that (1) interaction between centers was sometimes very different than interaction for raw material acquisition (i.e., the routes were typically different, since raw material sources were not always where other centers were located), (2) raw materials moved on different routes depending on where they came from, and (3) the same raw material might move on very different routes depending on whether it took a least cost path, or was routed through an intervening center. The pathway soapstone took getting from the south Appalachians to Poverty Point, for example, was very different if it was routed through Jaketown in the interior or Claiborne on the Gulf coast (see also O'Donoughue and Meeks, 2007). The analyses thus indicate that interaction patterns and pathways can change dramatically as centers emerge and decline on a regional landscape. And, since centers are defined in part in terms of their relations with their peripheries, the loss of a center does not just mean the loss of one place, but of ties with *many* places.[16] Such networks, ethnographic studies indicate, take time to develop and can also be quite fragile, depending on relationships between individuals and groups that, once broken or lost, may prove difficult to reestablish.[17]

THE END OF THE SOUTHEASTERN ARCHAIC: WHEN IS A MIDDEN ALSO A MONUMENT?

After 6000 years ago accumulations of shell, or earth and shell, appear along the Gulf and Atlantic coasts and near coastal rivers of Florida and adjoining areas, to the mouth of the

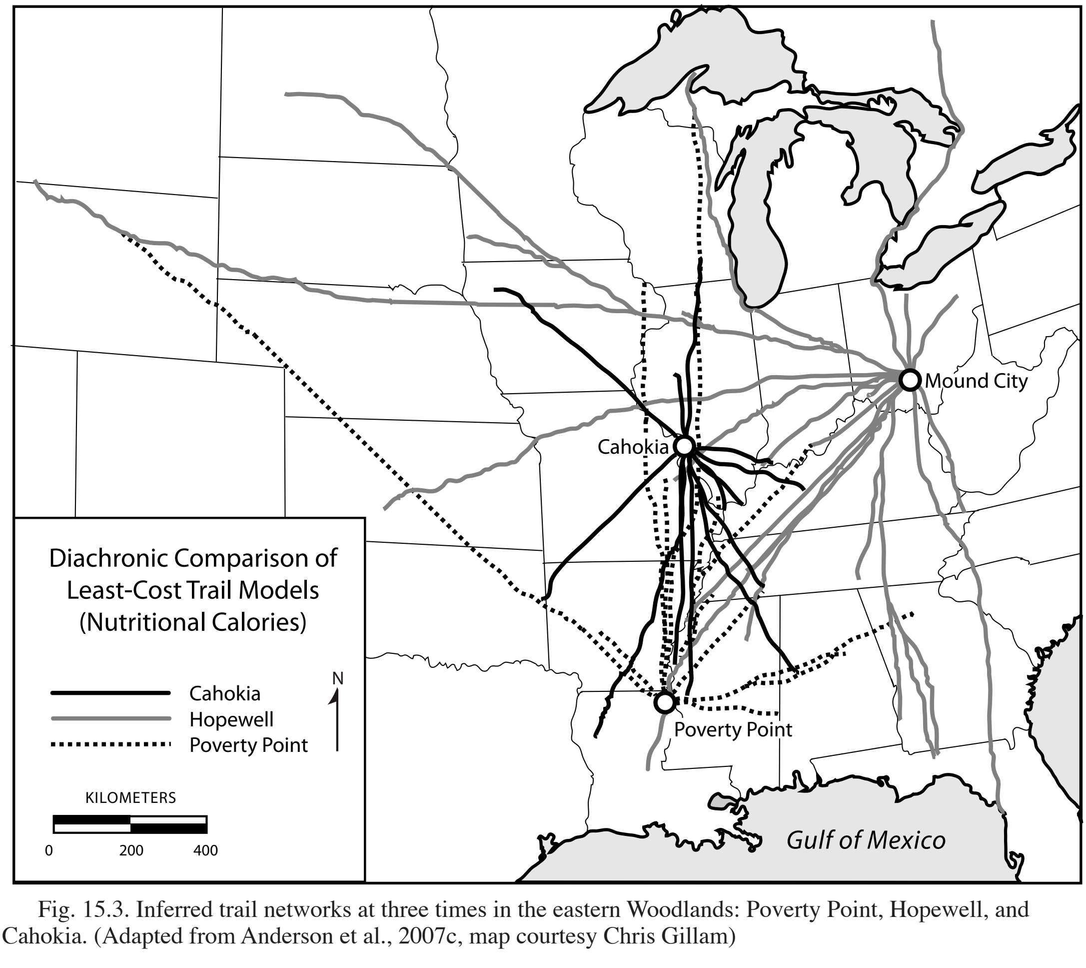


Fig. 15.3. Inferred trail networks at three times in the eastern Woodlands: Poverty Point, Hopewell, and Cahokia. (Adapted from Anderson et al., 2007c, map courtesy Chris Gillam)

Pearl River in Mississippi and along the Atlantic coast to central South Carolina, encompassing a diverse array of sizes, shapes, and functions (Russo, 1994a, 1994b, 1996b, 2004b, 2008, chap. 7, this volume; Sassaman, 1993a, 2004a, 2006b, 2010, chap. 11, this volume; Randall, 2008, Kidder and Sassaman, 2009; Anderson, 2009). Smaller accumulations appear to represent routine subsistence debris, house floors, platforms lacking evidence for structures, or burial mounds (Randall, 2008: 15). Much larger, circular and U-shaped structures were also present, particularly after 5000 years ago until about 3000 years ago, some of which appear to have been built near or on top of older settlement or mortuary facilities (R. Saunders and Russo, 2002; Russo, 2004b, 2006, 2008; Randall, 2008: 16). Some of the ring structures appear to have been built over circular villages subsequently covered with shell, while others were placed in previously presumably unoccupied areas (Russo, 2008: 18). The middens, whether U-shaped or circular, defined large plaza areas, recreating in shell an arrangement similar to that obtained using earth at sites like Watson Brake in northeast Louisiana. Whether cultural developments in the lower Mississippi Valley influenced those in the Atlantic and eastern Gulf coastal regions is unknown, but an architectural grammar detailing what properly constituted a center may have been widely, if not always perfectly, shared.

It has been suggested that the shell used at some coastal sites was obtained, in part, from feasting or other ceremonial behavior, and that the asymmetry evident in the occurrence of shell within these sites, like the difference in the sizes of earthen mounds at mid-Holocene sites in northeast Louisiana, was linked to differences in status between social groups, or perhaps tribal segments, that participated in their construction (Russo, 2004b, 2008). When carefully mapped, the coastal middens are not uniform in size and shape, but are instead characterized by significant differences in the quantities of shellfish present in different areas, with the largest amounts inferred to have been where more feasting occurred or people of higher status lived (Grøn, 1991; Russo, 2004b, 2008). Some coastal shell middens are truly massive and complex constructions, with numerous ring- or U-shaped enclosures present, or both, as at Rollins or Fig Island, suggesting spaces created for and used by a number of differing segments of society (R. Saunders, 2004b; Russo, 2004b, 2008; Sassaman, 2006b: 136–140, chap. 11, this volume). If this line of reasoning is correct, it also means that some societal segments were able to involve or mobilize larger numbers of people in earth moving or feasting activity than others, and these differences are reflected in the sizes of discrete mounds or shell accumulations within these site complexes.

In some of the major rivers of the interior Southeast, like the Tennessee River in northern Alabama and Tennessee or the Green River in Kentucky, shell or shell and earthen mounds are also found in an array of sizes, although none, interestingly, have the circular or U shapes characteristic of some sites in coastal regions, or the mound and plaza arrangements first observed in northeast Louisiana (Marquardt and Watson, 1983, 2005; Dye, 1996; Crothers, 1999, 2004; Anderson, 2009). Many of these shell middens have associated human burials, and for the past two decades, appreciable debate has occurred as to whether these sites and their associated burials represent deliberate monuments or mortuary complexes, perhaps marking territories, or instead are accumulations from routine habitation and subsistence activities (cf., Claassen, 1991, 1996; Milner and Jefferies, 1998; Milner, 2004b: 301–305; Marquardt and Watson, 2005; Marquardt, chap. 14, this volume). Relatively uncomplicated and egalitarian social formations are inferred (e.g., Marquardt and Watson, 1983, 2005; Milner, 2004a, 2004b), primarily because the architectural correlates of complexity seen in some coastal areas and in the lower Mississippi Valley—large mound or U- and ring-shaped complexes of earth or shell, often with well-defined plazas or open areas—appear to be lacking. Other evidence for complexity is found within the interior Shell Mound Archaic cultures, however, including the following: (1) an involvement in long-distance exchange; (2) status differentiation among burials albeit with no evidence for hereditary inequality; (3) trauma on skeletons suggesting fairly intensive conflict; and (4) suggestions of distinct social groups, as indicated by restricted distributions of specialized artifact forms like projectile points, atlatl weights, and bone pins (Jefferies, 1995, 1996, 2004a; Sassaman, 1996, 2010; Sassaman and Anderson, 2004; Kidder and Sassaman, 2009).

Even given other signs of complexity, appreciable differences of opinion exist about the extent to which monumentality and feasting behavior can be identified in the archaeological record where shell middens are concerned (cf., Marquardt and Russo, chaps. 14 and 7, this volume, who exemplify these differing positions; see also Milner, 2004b: 301–305 and Claassen, 1996 for very different positions on this matter). Russo (2004b, chap. 7, this volume), has argued that midden creation was an act of display, a statement about the provisioning abilities of groups or group segments. The sizes of the middens or piles of shell thus stand as a proxy for the labor that it took to collect them, and, where it can be shown that shellfish were eaten, the subsistence contributions obtained from them. Marrinan (chap. 4, this volume) calls large shell middens "intentional constructions of celebratory debris" and Russo (chap. 7, this volume) variously calls them "hypertrophic mound pilings," "food piled in display," or "shellfish . . . collected or displayed in large piles." To Marquardt (chap. 14, this volume) in contrast, these middens "are evidence not of purposeful construction but instead of domestic accumulation and discard." All of these authors, of course, are in agreement that their inferences must be subject to evaluation. Regardless of where one stands, a major question that must be considered is why, at certain times and places, people in the Southeast arranged shell in large and sometimes geometrical-shaped accumulations, while in others they didn't, but instead scattered it haphazardly or in such a way as to leave no trace, presumably back into the creeks and marshes. I personally think that many Archaic shell or shell and earth middens were intentional and planned rather than accidental or haphazard creations and, following Russo (2004b, chap. 7, this volume), that variability in their deposits can inform on social organization. I also, however, concur with Marquardt, Russo, and others in this volume that much more systematic research is needed on these sites and questions and, ideally, more unambiguous examples one way or the other.[18]

The end of the southeastern Archaic is reflected on portions of the landscape by the disappearance of the massive ring and U-shaped accumulations that had been present in previous millennia. Shell or earth and shell middens continued to be created in some coastal and riverine settings, although these accumulations, while sometimes occurring in linear or ring shape, were typically nowhere near the size and complexity of those of the preceding Archaic period. Ring middens have been noted in Florida among later Woodland Deptford and Weeden Island communities, for example, but the amount of subsistence debris making them up was much reduced in scale and visibility (Bense, 1994; Peacock, 2002; Stephenson et al., 2002; Russo, chap. 7, this volume). Russo argues that subsistence uncertainty brought on by changes in climate and sea level in turn lead to changes in communal emphases. In Russo's view, large-scale community feasting events hosted by aggrandizers and leaving massive piles of debris were replaced by more family-based activities centered in part on ancestor worship that left much less pronounced archaeological signatures. Instead of shell and other subsistence debris, earth and wood in mounds and structures formed the basis for display.

THE END OF THE SOUTHEASTERN ARCHAIC: A BRIEF NOTE ON THE POSSIBLE ROLE OF WARFARE

Whether warfare had much if anything to do with the end of the southeastern Archaic is unknown, but seems unlikely. There is no evidence at present to suggest that Poverty Point or any of the other major sites and centers of the terminal Archaic were sacked and their inhabitants massacred. Given the appreciable evidence for weapons trauma that is observed in at least some parts of the region where well-preserved human remains have been found (e.g., M. Smith, 1996), some form of regular or recurring conflict seems probable, but how it was structured is unknown. Low-intensity raiding or ambush tactics are assumed to have occurred since at least the Middle Holocene, but how common or widespread this behavior was, or the purposes it served, remains largely unknown. Archaic period warfare may have been a means by which individuals achieved higher status, a means of maintaining control over scarce resources, or perhaps a way of creating and maintaining buffer zones between groups (e.g., M. Smith, 1996; Dye, 2009).

The role of ritual combat has received little attention in discussions related to the southeastern Archaic or Early Woodland; perhaps it should be, given the appreciable evidence for weapons trauma that is observed in at least some parts of the region where well-preserved human remains have been found (e.g., M. Smith, 1996). Poverty Point and other large centers, including the coastal ring- and U-shaped midden complexes, may have been not only places of aggregation or pilgrimage or where trade fairs, feasting, or religious ceremonies took place, but also where ritual combat or even staged battles occurred or at least were promoted. Among the western Enga in Papua New Guinea, for example, cults arose as an alternative to more intensive conflict (Wiessner, 2002: 243), and conflict itself, when it occurred, was often carefully controlled multigroup aggregation, important for reasons other than the acquisition of resources or territory. Among the Enga:

> "tournament wars" were organized in which emphasis was placed on display rather than defeat and festivities rather than fighting. It was said that the Great Wars were "planted like a garden for the harvest that would follow" during the subsequent exchanges (Wiessner, 2002: 242).

The stick or ball games common in North America in the centuries after European contact were at their most intensive little removed from actual conflict. Activities at later Archaic centers with their large, open plazalike areas, may have been as much about channeling rivalries through sporting or martial activities as they were about feasting and ceremony, as a palliative to more intensive combat, and as a means of bringing together people who might have otherwise remained apart.

THE END OF THE SOUTHEASTERN ARCHAIC: COMMENTS ON INDIVIDUAL PAPERS

Before bringing this essay to a conclusion, a number of more specific observations were triggered as I listened to and then subsequently read the papers that make up this volume. My comments on Kidder's "Climate Hypothesis" as currently expressed (2006, chap. 1, this volume) were presented in detail previously, so I will begin with the second formal paper, by Jon Gibson (chap. 2, this volume), who exemplifies the tradition of distinguished archaeologists from the lower Mississippi valley, bringing a humanistic and humorous touch to their writings.[19] Gibson notes that megaflooding was occurring locally when Poverty Point was apparently flourishing at ca. 3500 cal B.P., and again probably a century or more after it had ended, from ca. 3000 to 2500 cal B.P. As noted previously, he thus doesn't think flooding had much to do with either the rise or fall of Poverty Point, whose inhabitants were, in any event, elevated well above the floodwaters. He instead suggests that the creation or existence of a large lake nearby explains the general location of the site; the exact placement of the complex was dictated by topographic conditions along Macon Ridge, notably where the best view of the horizon and sky was possible.[20]

Gibson makes the particular point that "the natural world they [the people of Poverty Point] were engaging was a *watery one*" (italics in original). Gibson also believes Poverty Point both emerged and ended quickly, perhaps with the creation and catastrophic drainage of the nearby lake. He argues that floods were unlikely to bother people used to living where they did, and that the swamp and lake environment helped them to define who they were, their "personhood" or identity. Even in extreme cases like those observed at Oak Island on the coast, where hurricane damage was extensive, the people rebuilt. As he puts it, a storm may have "wiped out a village *but not a people or their way of life*" (italics in original). Given this, I would suggest that any temporary or partial loss to their subsistence base that the Poverty Point people may have experienced from megaflooding or the draining of a nearby lake may have been far less damaging to their society's continued existence than the impact such events might have had on their collective psyche and ideological underpinnings.[21] That the site was not reused to any great extent after being abandoned may be a testament to how great its loss may have been perceived by descendant populations; from the "Wonderful Place" everyone visited, it became a place to be seemingly actively avoided.[22]

Gibson's discussion herein of how Poverty Point's peoples obtained their food includes the critically important observation that starch analyses can help document the kinds of plants that were being used without the need to find carbonized or otherwise preserved macrofossil remains (Cummings, 2006). This form of research should be routinely considered in paleosubsistence analyses. That plants like cattails or lotus root were likely being eaten, as well as other root crops, is something that has not been given perhaps as much consideration as it should in discussions of prehistoric subsistence in the Southeast.

Sanger and Thomas (chap. 3, this volume) in a description of their work on the St. Catherines and McQueen shell rings, note that decorated St. Simons fiber-tempered pottery is far more common at the latter site, which is ca. 2.3 km away from the former on the ocean or eastern side of the island. The lithic assemblage from the McQueen shell ring is far more diverse, with numerous pieces of extralocal material present. Baked clay objects, in contrast, are common at the St. Catherine's ring, and uncommon at McQueen. Radiocarbon determinations indicate that these rings were contemporaneous, with McQueen continuing slightly later, but they appear to have been used very differently, perhaps by different peoples using different methods of food preparation and display. Was there a sacred/special versus secular/mundane dichotomy in the use of space, sites and centers, and specific artifacts in this, and perhaps other Late Archaic societies, a pattern observed later in time in the region (Sears, 1973; Schwadron, this volume, chap. 6)?

The location of the McQueen Shell Ring overlooking the ocean may have meant that it was more readily accessible to people coming from greater distances, using seagoing watercraft; navigating the creeks of the tidal marshlands can be a challenging affair, with dead ends and misdirection commonly occurring if one is unfamiliar with local conditions (Thomas and Blair, 2008). Dugout canoes were certainly present by this time (Wheeler et al., 2003), and both zooarchaeological remains (Marrinan, chap. 4, this volume) and early historic accounts suggest that Native Americans were using watercraft capable of holding at least several people in near-shore waters (Thomas and Blair, 2008: 113–116). Marrinan's analysis (chap. 4, this volume), indicates that river mouth species were not being taken, at least by the people who built the Cannon's Point and West Rings on St. Simon's Island, which suggests that travel to and from the interior along rivers may have been comparatively infrequent. Could it be that interaction events with people coming from a distance, if that is what was occurring, were spatially separated from the locations of routine daily life on St. Catherines at this time? If so, could similar arrangements occur elsewhere in other coastal Archaic sites or settlement localities?

The large pits found in the center of the St. Catherines Island rings are interpreted as possible storage or cooking features (Sanger and Thomas, chap. 3, this volume; Marrinan, chap. 4, this volume), or alternatively as possible freshwater wells (Marquardt, chap. 14, this volume). Their prominent location suggests they may have been used for communal food storage or preparation, perhaps in feasting behavior. If feasting took place at both rings, it may have involved local people at the St. Catherines Ring and people from farther away at McQueen. The occurrence of evidence for earth oven or hot rock (actually, hot baked clay object) cooking primarily at the St. Catherines Ring, suggests this technology may have been preferred for ordinary cooking or communal consumption events. Cooking at the other ring, if evidence for earth ovens or hot-rock cooking is not ultimately found, in contrast, may have been conducted differently, perhaps over open fires, which would have also been a source of light if feasting occurred here and at night, as it may have at special places on special occasions. Finally, if the McQueen Shell Ring construction began a century or so later than at the St. Catherines Ring (Thomas, chap. 8, this volume; Sanger, chap. 9, this volume)—although both rings appear to have been abandoned about the same time—it may suggest that both local ceremony and external connections take a while to become established in shell ring society. That is, the more varied and elaborate ceramic and lithic remains at McQueen may reflect a community that, having been in place for a good while, was better known and had broader ties across the surrounding region. Building up such relationships, like reconstituting them once they had been lost, undoubtedly took time, as argued previously.

Shell ring and midden sites, although frequently damaged or destroyed for their fill or as a source of lime since the 18th century, have never been subject to much looting, given their dearth of artifacts and burials. C.B. Moore (1897), who dug more mounds than anyone in American archaeology, avoided the shell ring sites of the Georgia and South Carolina coast, following early work at Sapelo Island. While the shell rings and middens of the southeastern coast may not suffer as much from looting as other categories of sites, such as mounds, they are critically endangered by sea level rise. Indeed, much of the near-coastal archaeological record of our species may be lost or inundated in the next century or so, making the work accomplished now all the more important (Anderson et al., 2007a: 15).[23]

Marrinan (chap. 4, this volume) provides a useful discussion of the field procedures employed during her excavations at the Cannon's Point shell ring. Documenting procedures and logistics is a critically important part of archaeological reporting, if for no other reason than to avoid having to reinvent or rediscovery procedures year after year. In particular, Marrinan early on recognized the importance of using fine screen for the recovery of faunal remains, since much important information is lost when coarser mesh (i.e., ¼ in. or larger) is employed. About the same time Marrinan was conducting her work in the mid-1970s, Dan and Phyllis Morse (1980) were conducting similar screen size experiments at the Zebree site in northeast Arkansas, over a wide range of artifact categories, including ceramics, lithics, and floral and faunal remains, the latter by major taxonomic class. At Zebree, sand-tempered Late Woodland ceramics broke up more readily, and into smaller pieces, than shell-tempered Mississippian sherds in certain depositional environments, such as in the plow zone or general midden. Much more of sand-tempered ceramics, by weight, passed through standard ¼ inch mesh, rendering comparison between ceramic categories by either count or weight suspect (Anderson, 1980: 8–20; Roth et al., 1980: 7–14). The point to be made is that field recovery procedures must be evaluated through experimental means wherever possible. Processing fine-screened samples can be time consuming but may have unanticipated payoffs. At Zebree, use of systematic fine-screened small-scale (i.e., two gallon soil) samples was found to be about as accurate as much larger test units for documenting the distribution of artifacts in the site midden (Roth et al., 1980: 7–10 to 7–19).

At Cannon's Point, Marrinan found Early Woodland remains in the marsh around the ring, as well as fragmentary human remains. People were still using the ring area, even if they were apparently not eating shellfish, which due to lowered sea levels were too far away to be easily available. Whether the human remains dated to the earlier period when the ring was under construction is unknown, but their discovery illustrates another important point . . . we need to be looking at other parts of the landscape. In a classic paper, Mark Mathis (1994) showed how stripping large areas adjacent to and immediately away from shell middens in coastal North Carolina exposed large numbers of cultural features that would have never been found had excavations focused solely on the midden deposits.

Marrinan (chap. 4, this volume), citing R. Saunders (2002: 127), also suggests that variation in bone pins or ceramics may help reveal patterns of cultural affinity and interaction along the southeastern coast; similar ideas have been advanced about the variation observed on bone pins found on Shell Mound Archaic sites in the Midsouth (Jefferies, 1996, 1997, 2004a). As she notes, a "stylistic study of decorative motifs from the shell rings . . . might suggest whether motifs are clustered or widely distributed in occurrence," as well as document their longevity within the region. The data to conduct such a study are at hand, and preliminary analyses along these lines have already occurred (e.g., Trinkley, 1980; Sassaman, 1993a). I would predict that major physiographic features, such as sounds or rivers, may mark points where such distributional breaks or centers are likely, given their role as barriers or aides to regular movement across or along them, respectively.

Schwadron's paper (chap. 5, this volume) illustrates the impressive amount of research that can be accomplished when land management agencies support archaeology . . . a point that people working on or for other state or federal land or projects should emulate. A lesson from her tree-island work, as noted previously, is don't stop digging when you reach what you think is the bottom of the cultural deposits, even if the matrix closely resembles concrete. Her work also demonstrates a fine integration of paleoclimate and paleovegetation data; long pollen sequences and their record of vegetation change can offer great insight into prehistoric land use patterns, and charcoal particulates in the cores can also be used to monitor fire frequency. The use of shell for something other than mounds, middens, rings, or U's—for things like watercourts, causeways, walls, canals, etc.—furthermore demonstrates the cultural knowledge that existed enabling people to use shell to construct a wide range of structures and features, and produce a dramatic built landscape. There was nothing haphazard or fortuitous about much of the shell mounding that occurred in south Florida.

Schwadron also notes that the spacing of large shell works in south Florida was every few miles. If the largest sites were, as she argues, population and political/ceremonial centers, then the spacing is certainly much closer than predicted if these were the centers of independent societies, which tend to be separated by greater distances (e.g., Renfrew, 1974; Hally, 1993; Livingood, 2009). How the shell work-creating societies of south Florida were internally organized and externally configured, of course, is not currently well understood. Does the exploitation of marine resources or the occurrence of terrain characteristics making water transport critically important result in a different spacing of centers on the landscape than that observed in societies located in other environments or supported by other means, such as by rainfall or irrigation agriculture? This raises a host of questions about the spacing, and reasons for the spacing, of later Archaic centers over the southeastern landscape. What factors shaped this placement? To explore this question, we need to conduct site locational analyses like those by Thomas (2008e; chap. 8, this volume) on St. Catherines Island at a much larger scale, examining the occurrence of rings, mounds, and middens over time in relation to features like marshes, rivers, sounds, and vegetational communities (see also Marrinan, chap. 4, this volume).

Russo (chap. 7) argues convincingly that the end of the Archaic was characterized in many areas by a replacement of large-scale ceremonial feasting by ancestor veneration and burial mound construction, a change he ties to the environmental and cultural perturbations of the period. Climate change in general, and sea level fluctuations in particular, specifically the lowering after 3800 cal yr B.P. compromised coastal communities' "abilities to host feasts" on a large scale.[24] Whether people followed the receding shoreline is unknown, but Russo (chap. 7, this volume) argues that as traditional feasting and aggrandizing behavior became harder and harder to conduct, a loss of faith in these once dominant individuals occurred. As with the collapse of interaction networks, I would argue that once such patterns of behavior break down, and new traditions take their place, it becomes difficult to go back to them, to reconstitute the old ways, even if the resources are once again available to permit such a return. As changes begin, a "cascade effect" (Sanger, chap. 9, this volume) may occur, effecting sites and people who might otherwise have been able to continue unaffected by the climate or cultural triggers involved.

People along the southeastern coasts frequently lived on high ground adjacent to and quite close to tidal marshes, as several of the authors herein have observed. Thomas's (2008e, chap.8, this volume) research on settlement location on St. Catherines, in fact, models this quite nicely, noting that marshside settlements occur "along the stabilized dune remnants that fringe the maritime forest, immediately adjacent to the salt marshes and the tidal streams that drain them."[25] As sea levels fluctuated, the location of these edges, or favored zones, would move as well (see in particular papers by Russo and Sanger, chaps. 7 and 9, this volume)[26]. In areas of low relief, and where near-shore gradients are minimal, small changes in sea level can mean that marshlands may relocate appreciable distances. If we wish to find offshore archaeological sites, we must look for them in settings comparable to those predicted by Thomas, which, if surviving, may be appreciable distances out to sea. If a sea level drop of even 2 to 3 m can result in a movement of the shoreline up to several kilometers offshore from its present location (e.g., Thomas, chap. 8, this volume; Marquardt, chap. 14, this volume), we need to be considering how far offshore this shoreline is, and whether sites may exist near it, something that only underwater archaeology may be able to determine (e.g., Faught, 2004). The hiatus in shell midden deposition on St. Catherines Island during the early part of the Woodland period (Thomas, 2008b: 459–464, 2008d: 1005–1007, chap. 8, this volume) becomes more understandable if the estuaries were themselves located at some distance away during this interval, as the author himself recognizes.

I admire the effort Thomas (2008f: 348–359) has put forth to determine the local marine reservoir correction factor for St. Catherines Island. Unless or until a comparable level of effort can occur for individual coastal research areas, AMS determinations on charcoal, and ideally the seeds of annual plants, should be the preferred method of dating wherever possible if good context can be obtained. This could lead to high-precision dating without the ambiguities associated with the dating of marine shell, in the absence of analyses resolving the necessary correction. Unfortunately, finding charcoal in good context is not always easy, and the shell is usually deposited immediately after collection, making it contextually an ideal material for archaeological dating purposes.

Matt Sanger's paper (chap. 9, this volume) provides a broad synthetic picture of ring occupational histories, a perspective essential to help us to make sense of disparate site data. His analysis indicates that these sites were not initiated or abandoned at the same time, but instead that three abandonment waves occurred: (1) ca. 2450–2140 cal B.C./around ca. 2280 cal B.C.; (2) 2120–1850 cal B.C./around ca. 2020 cal B.C.; and (3) 1830–1570 cal B.C./around ca. 1720 cal B.C. Employing a local examination of Holocene sea level fluctuations (Gayes et al., 1992; Thomas, 2008c: 46), he attributes the first two episodes of ring abandonment, at least in part, to episodes of sea level rise and fall, respectively; the third wave of abandonment appears unrelated to sea level change. Bond event #3 occurs roughly coeval with the first wave of abandonments (Bond et al., 2001), which in the reconstruction Sanger is employing is also about the time of, or slightly before, a major (ca. 2 m) drop in sea level locally, after several centuries of rising waters. Sanger suggests that the settlements associated with wave 1 rings were quite literally flooded out by a marine high stand, causing the people who built them to relocate; wave 2 rings, in contrast, were abandoned because falling sea level isolated the people living in and near them from estuarine resources. Reasons for the third abandonment are stated to be unknown, yet appeared to be unrelated to sea level change.

Marquardt (chap. 14, this volume) made use of a somewhat different sea level reconstruction (Tanner, 1993, 2000), which has the first two abandonment waves both associated with low-water stands, with the third and final wave occurring during a time of rapidly rising seas, which fell again a few centuries later in the initial Woodland period. Without making too fine a point of it, the fact that two somewhat different reconstructions exist for something as important as where sea level stood along the southeastern coast during the last few millennia, and that these reconstructions can differ from one another by up to several meters at certain times, means we have a serious gap in our knowledge in need of resolution. I am not qualified to evaluate either of these models, and suspect it will take a lot of primary field research to do so. Paleoenvironmental research directed to constructing local sea level curves and hence past shorelines would appear, like efforts directed to delimiting marine reservoir correction factors, to be something that will need to be explored in specific areas to be most effective.

Importantly, Sanger (chap. 9, this volume) notes that the apparent final abandonment of the rings around 1720 cal B.C. does not mean that St. Catherines Island itself was depopulated; smaller shell midden sites exist on the eastern side of the island that have been dated to the centuries after ca. 1500 cal B.C., perhaps located on that side to be closer to the remaining marshes if a drop in sea level occurred at this time. The use of earlier rings, or the construction of new ones after ca. 1500 cal B.C. is not indicated; communal energies were apparently directed elsewhere, although towards what goals is unknown. Again, as with the predictive modeling effort, the work on St. Catherines highlights the importance of conducting intensive survey activity away from the large and spectacular shell sites that occupy much current research attention. It must be stressed, however, that much more work is needed to locate and document even the largest of the ring and midden sites, many of which are buried in marshes, or are eroded or damaged by historic development, and an appreciable fraction of which have only been found in recent decades (e.g., Russo, 2006).

The fact that some ring populations were able to continue to maintain residency in the face of challenging environmental factors (i.e., at Fig Island 1), while others were not and the sites were abandoned, Sanger (chap. 9, this volume) argues, means we cannot assume human responses will be the same everywhere. The second wave of ring abandonment Sanger documents, about 2020 cal B.C., is associated with either a major drop or low stand in sea level, depending on which reconstruction is employed; as during the initial centuries of the Woodland era, this may mean that at least some sites occupied immediately after this time may now be located up to several kilometers offshore, an inference amenable to testing. The third wave of shell ring abandonment, however, occurs at ca. 1720 cal B.C., while sea level is low or starting to rise appreciably, suggesting that the reason that the rings were abandoned was either because they were "left high and dry" or because they were being flooded out. To Sanger, (chap. 9, this volume) other (unknown and possibly cultural) factors may also be in play.

What might these be? The fact that coastal shell ring sites across much of the lower Southeast were abandoned in most areas after ca. 3800 cal B.P./1720 cal B.C. (Russo, chap. 7, this volume; Sanger, chap. 9, this volume), save for south Florida—and the fact that the Stallings

Island culture in the interior along the central Savannah River collapsed about this same time (Sassaman, 2006b: 154 ff., chap. 11, this volume; Sassaman et al., 2006: 551, 562)—suggested to Russo that prestige-based feasting and personal aggrandizement, coupled with public displays that included mounding shellfish, ended about this time in much of this part of the Southeast, except in south Florida. What happened about this time to bring such a change about? Megaflooding is reported in the northern Gulf of Mexico at ca. 3500 cal B.P. (Brown et al., 1999, referenced in R. Saunders, chap. 5, this volume), which might relate the abandonment to climate. Alternatively, if sea level was indeed rising, as Marquardt (chap. 14, this volume) suggests, the third wave of site abandonment, and not the first two, may have been the one where the rings were flooded out.

Perhaps the most interesting thing about the centuries immediately after ca. 3800 cal B.P., is that it is associated with major construction and long-distance exchange in the sites making up the Poverty Point culture, and at the type site itself (Gibson, 2000, 2004, 2007, chap. 2, this volume; Kidder, 2002a; Kidder et al., 2004, 2008). Sassaman (2006b: 173), in fact, has suggested "the rise of soapstone vessel exchange [linked to Poverty Point] may have been among the straws that broke the Stallings back." Poverty Point may have offered a new model of public interaction and ceremony to peoples of the Southeast that may have been more attractive than the system or systems in place. As another possible cultural factor in play, I would suggest that some of the periods of occupation and abandonment Sanger identifies may be tied to patterns of warfare and possibly associated buffer zone formation and maintenance, which in turn may be linked to a need to maintain prey reservoirs and hunting territories, a pattern observed in the late prehistoric and early historic eras across much of the East (Hickerson, 1965; Gramly, 1977; Anderson, 1994: 39–41, 263–274; Dye, 2009). Conflict is quite common in some parts of the region in the later Archaic, and may be a factor motivating site placement and spacing. As other authors have suggested herein, I think it would be fascinating to look at the spacing of contemporary rings or ring clusters within the region and see what items of material culture were associated with each. It would also be intriguing in such an analysis to look at the spacing of sites by the founding, midpoint, and abandonment dates for each site. I suspect that such an effort could help us understand the political history of the later Archaic along the south Atlantic coast.[27]

Victor Thompson's ideas (chap. 10, this volume) about tempo and timing, the periodicity by which sites are used or occupied—as he puts it, "an understanding of the cultural variability at multiple temporal and spatial scales that existed during these periods"—is a refreshing approach that we need to think about more.[28] He makes the very good point that the creation and use of what become or are now interpreted as monuments—the shell and earthen middens and mounds of the later Archaic—were created in different ways at different times and in different regions in terms of how space was used, and the intervals at which it was used. Archaic complexity, he argues, and as the papers in this volume illustrate, meant very different things at different times and places. His observation that the function of sites can change dramatically over time is, of course, something implicitly recognized by most scholars, although examples identified archaeologically remain relatively uncommon.[29] Thompson's argument that shell ring formation might be the result of multiple kinds of activities, from feasting to routine subsistence, and that these may change dramatically over time, has direct relevance for the interpretation of the St. Catherines Island shell rings, which although only a few kilometers apart and largely contemporary, certainly appear to have been used very differently (Sanger and Thomas, chap. 3, this volume). His approach also forces us to think more carefully about the kind of formation processes that resulted in the Southeast's rings and mounds.[30] That is, resolving behavioral episodes individually and collectively, and over time at such sites, can tell us a great deal about the societies that created these "persistent places" and "palimpsests" (Thompson, chap. 10, this volume).[31]

Sassaman's comparison (chap. 11, this volume) of broad historical trajectories between the Eastern Woodlands and the European Neolithic shows us that the spread of monumentality or agriculture can play out very differently in different regions. Like Thompson, Sassaman argues that to understand a question like "What happened to the southeastern Archaic?" we must construct and compare detailed local histories of southeastern later Archaic and initial Woodland societies. As the papers in this volume indicate, many such local histories are emerging, among the most impressively detailed of which are those generated by Sassaman and his colleagues from work in the Savannah and St. John's river valleys (e.g., Sassaman, 1993a, 2006b, 2010, chap. 11, this volume; Sassaman et al., 2006; Randall, 2008). Sassaman is engaging ethnography and history in suggesting that some later Archaic monuments or cultures represent the coalescence of differing peoples, and it is important to note that he uses archaeological artifact, feature, and site data and not simply plausibility arguments to make his points (e.g., Sassaman, 1993a, 2006b: 77, 140, 157; Sassaman et al., 2006: 557–560).[32] Finally, like several other authors in the volume, Sassaman sees significant changes occurring in cultures in many parts of the region around and immediately after ca. 3800 cal B.P., which he argues may be linked to changes in climate, but are also likely to be "coincident due to linkages among all constituent societies in the greater Southeast."

Joe Saunders (chap. 12, this volume) does an excellent job of documenting the age of Archaic mounds in the lower Mississippi valley, the foundation for the observation that a hiatus in mound building apparently occurred in this area from ca. 4700 to 3700 cal B.P. Mound building may have ceased during this interval, but he makes the case that people were still present, using Evans points[33], making effigy beads, and firing small blocks of clay that may have been precursors of Poverty Point objects. Saunders' research also reinforces the point, made by a number of the authors of the volume, that unilineal evolutionary schemes implying similar levels of accomplishment over large areas no longer have much utility in southeastern archaeology. The moundbuilding hiatus in northeastern Louisiana, for example, is a time when massive shell midden monuments were being built along the south Atlantic and Gulf coasts. There was no unbroken march toward ever greater complexity, ever larger mounds, or ever more efficient exploitation of the subsistence potential of the region. Instead, variability is now accepted as the goal we should strive to recognize and understand in prehistory. In this regard, we have indeed come a long way from the ideas of earlier generations of archaeologists, including Joe Caldwell, whom we honor with this series of conferences

Unfortunately, as Joe Saunders observes, excavations at most of Louisiana's Archaic mounds have been minimal to date, and are dwarfed by the size of these complexes. While much has been learned from the mapping, coring, and limited test pitting that has occurred, more investigation is clearly needed. Whether the mound centers were "entities unto themselves," as Saunders (chap. 12, this volume) suggests, or were integrated together into some larger social or ceremonial collective is unknown. Sassaman and Heckenberger (2004: 228) argue that the mound-terrace alignments at four early Louisiana mound sites—Caney, Frenchman's Bend, Insley, and Watson Brake—are integrated into "a regional pattern of alignment [which] suggests that entire landscapes of monumental architecture, and not just individual sites, were planned constructions." Whether this level of foresight and planning in site construction actually occurred in the Middle and later Archaic Southeast remains a subject for some debate (cf., Clark, 2004; Sassaman, 2005, 2010; Sassaman and Heckenberger, 2004, with Milner, 2004b; Gibson, 2007). If it did occur, perhaps we should be looking for similar patterns later in prehistory and in other regions.

Chester DePratter (chap. 13, this volume) makes the point that earlier Paleoindian and Archaic sites probably exist on St. Catherines Island, and are most likely to occur where fresh water would have been present when sea levels were much lower, in the central lacustrine zone, or where former stream or river channels were located. Decades of large-scale intensive survey and testing in interior coastal plain settings in the Carolinas and Georgia—primarily on military bases, in national forests or wildlife refuges, or on other government installations like the Savannah River Site in South Carolina—has shown that early prehistoric sites are rare in such areas away from major drainages and, when present, are typically isolated artifacts or small specialized activity scatters (e.g., Anderson and Logan, 1981; Sassaman et al., 1990; O'Donoughue, 2008). Recent discoveries of Paleoindian and Early Archaic sites around Carolina Bays in the interior coastal plain (Eberhard et al., 1994; Brooks et al., 1996; Cable et al., 1998) suggest that effort directed to former bays or ponded environments will be productive, assuming that these environments existed in the more remote past. Given the effects of bioturbation, wind action, and gravity on the sandy upper sediments of the coastal plain, however, early archaeological deposits in such locations may be at a depth of a meter or more (Michie, 1990; Leigh, 1998).

DePratter also suggests that we need to

examine more ethnobotanical remains from coastal archaeological sites—among other things, to answer questions such as when and whether domesticates were first used. The late adoption of domesticates in coastal and other resource-rich parts of the region (B. Smith, 1992; Fritz and Kidder, 1993; Gremillion, 2002), including on St. Catherines Island (Thomas, 2008d: 1033–1034), leads me to suspect that earlier Archaic or Early/Middle Woodland use of Eastern Agricultural Complex domesticates would be most unlikely, although this is something that needs to be tested and not assumed. Unlike both DePratter and Marquardt (chap. 14, this volume), I suspect that the large central pits in the rings on St. Catherines Island were supports for large posts, like those that adorned Mississippian plazas millennia later, or else were communal cooking or storage features, as noted previously.[34]

Marquardt[35] (chap. 14, this volume) argues that climate change plays an important role in shaping human culture, and that archaeologists need to be familiar with research on paleoclimatology, as well as pay more attention to how culture and environment exist "in a dialectical, mutually constitutive relation with one another." Furthermore, not only archaeologists but I would argue, all members of our society, need to be aware of the rapidity and extent to which climate can change, with potentially profound implications for human cultures.[36] As global climate changes progressively faster in the years to come, interest in such matters will undoubtedly increase, especially concerning the relationships between planetary warming, rainfall patterns, and sea level, given the way these variables shape agricultural productivity, fresh water availability, and areas suitable for human habitation (e.g., IPCC, 2007). Sea level fluctuations had a pronounced effect on human societies dependent on marine resources throughout our species history, shaping patterns of migration and adaptation; awareness of these patterns, as several papers in this volume demonstrate, is critical to understanding southeastern prehistory. As Marquardt argues persuasively, we need fine-grained and accurate reconstructions of past sea levels, including where shorelines would be during higher and lower stands, in each region or area where we work (DePratter, chap. 13, this volume, makes the same point in his comments). I would suggest that we should not only work with the best data currently available, but strive to see that such studies are funded, and do our best to enlist paleoenvironmental scientists to work in our areas. Given the budgets available for cultural resources management work, and continuing interest in documenting the effects of climate change, justifying paleoenvironmental research should be fairly straightforward. Such information would allow us to better situate past human cultures on the landscape, and in the process facilitate better contemporary management of environmental resources.

Marquardt and I will simply have to agree to disagree about whether shell middens and rings can be monuments; I have no doubt that they can be, for reasons discussed above, although I also agree that their intentionality and complexity must be demonstrated, rather than simply assumed. As Russo, Thompson, and others in this volume argue, these sites can be both domestic middens and purposeful constructions simultaneously, whose function and method of construction can change over time. I agree with Marquardt that the use of phrases like "clean shell" is confusing, but would note that a large-scale feasting event involving the cooking and consumption of dozens of bushels of oysters—as happened at the Saturday evening cookout associated with the 2005 meeting of the Southeastern Archaeological Conference in Columbia, South Carolina—can result in the rapid production of appreciable quantities of what might be called "clean" shellfish debris. Where and how such debris is handled makes all the difference: it can be discarded unobtrusively, or piled and displayed. And whether or not other subsistence remains are included is irrelevant . . . —in Mississippian mounds, as I know from experience working at Shiloh, some stages may be built from carefully selected fill, devoid of artifacts and of a particular color or texture, while other stages are more haphazardly constructed, with fill coming from any of a number of sources, including from nearby midden areas with subsistence remains common. Over the history of any large monument, changes in construction and maintenance practices may have occurred, meaning how they were built and used must be demonstrated rather than assumed (Pursell, 2004; Welch, 2005).

Marquardt suggests that the circular shape of southeastern ring middens may have facilitated access to or storage of fresh water, which was unquestionably an important resource for people living in a coastal environment.[37] Historic accounts suggest another, equally practical function, the protection of their inhabitants from hurricane storm surges, which can be deadly, especially for prehistoric peoples with no easy means of evacuation from coastal areas. Drayton (1972[1802]: 57) reports that an early resident near Charleston built his house within the Lighthouse Point shell ring enclosure for precisely this reason: flood waters "are said to have been completely banked out by this work." The question remains, of course, that if these rings were useful as sources of fresh water or for storm protection, why didn't later cultures build them or, at least—given the occurrence of more or less ephemeral ring middens in the later Woodland Weeden Island Culture in northern Florida (Russo, chap. 7, this volume)—build them to the same massive scale?

CONCLUSIONS: CALDWELL'S LEGACY LIVES ON

So what happened to the southeastern Archaic? The transition from the Archaic to the Woodland period, we have seen, played out in varied ways across the region. To understand what happened, the papers in this volume have shown, we must adopt a multiscalar research approach that considers broad trends and traditions while paying careful attention to documenting what happened in specific areas and places. As Caldwell (1958: 2) noted:

> what the archaeologist does discover may well be a contextual history, based on patterns seen limned against a matrix of other patterns and from which we are to infer events and processes in the context of the others. What the future could see added to studies of culture history—aside from its certain limitations and impersonality—is historical flow, the constant generation of events out of previous contexts, in effect, the very dynamism now to be found in the usual histories based on written records. Perhaps we hope for too much. In any case the approach we are proposing does at least lead directly to interpretation and inference and not, praise God, to still another classification. Patterns which can be distinguished . . . demand explanation of their significance for history or process.

These words hold as true today as they did 50 years ago. As Jon Gibson eloquently notes in his chapter, we must create "histories so precise that we can almost see the faces of those who lived them, and we must contextualize the local histories we create within the broader scope of a regional history." At the rate new knowledge is being generated and thought about, I suspect that in another 50 years we will have the kind of fine-grained social and political histories of the later Archaic and initial Woodland period Southeast, linked to broader patterns of climate and cultural change, that Caldwell would have wanted to see.[38]

NOTES

1. As an aside, we also learned at the workshop—following proper scientific experimental procedures, of course—that alcohol as well as food is an important constituent of feasting behavior (e.g., Dietler, 1990), and the former also seems to help facilitate interaction and innovative thinking, at least up to a point! Another aspect of the workshop of relevance was that the people participating came together to share esoteric knowledge, something unlikely to leave much of a trace in the archaeological record—however visible the remains of our feasting might be to some future archaeologist exploring the island.

2. Of course, the fact that I have helped edit three volumes on the Paleoindian and Early Archaic, the mid-Holocene, and the Woodland Southeast has something to do with my thinking. These books were intended from the start to be summaries of cultural developments during specific periods of time, however, and each included discussions about the problems uncritical use of stage terminology could generate (Anderson et al., 1996:7–15; Sassaman and Anderson, 1995: xvii-xviii; Anderson and Mainfort, 2002b: 3).

3. Projectile points, unlike pottery, do not receive much attention in discussions of the transition from the Archaic to the Woodland, save that they tend to be increasingly made of local materials, presumably as long-distance interaction and exchange declined. There is little or no evidence for dramatic morphological change in point forms in many areas, although a gradual decrease in size is observed in the South Appalachian region, where stemmed forms like the Savannah River, Small Savannah River, and a range of still smaller square to rounded stemmed points occur from ca. 4000 to 2000 cal B.P. (Oliver, 1981). It is only in the later Woodland period that distinctly smaller points appear in most parts of the Southeast, something thought related to the widespread adoption of the bow and arrow (Blitz, 1988, Nassaney and Pyle, 1999). Perhaps the size reduction in Woodland points, long attributed to functional considerations such as the adoption of the bow and arrow or use solely as a projectile tip rather than as a projectile tip and a multipurpose cutting tool, may instead reflect a lessening in individual need for hypertrophic display, if aggrandizing behavior became less important as exchange networks declined. While bifaces were used throughout most

of prehistory in Eastern North America, change in their size and morphology has tended to be examined primarily for chronological purposes. It would be interesting to see when and under what circumstances larger as opposed to smaller bifaces tend to occur; perhaps more larger specimens would be expected during periods of greater long distance exchange and interaction, such as during the later Archaic or Middle Woodland, for example, than during the Early Archaic or Early Woodland. Alternatively, in an explanation that may be somewhat related, Fiedel (2009) has recently suggested that changes in projectile point styles during the Eastern Archaic reflect a disruption of traditional patterns of interaction within regions, which he equates with the replacement of one group of people by another. He links these changes to major climatic events, such as the Bond and Dansgaard-Oeschger cycles.

4. Regular interaction in long-distance exchange does not mean that everything spreads over the network, only those things of interest or value to the participants. Thus, in our modern world, Chinese material goods may spread widely, but other aspects of the culture, such as Mandarin, are adopted and used by a much smaller fraction of the population. Pottery technology may not have been so much suppressed by participants in exchange networks as having been viewed as impractical or irrelevant to everyday life. To mobile foragers, pottery would have likely been considered a fragile and somewhat unreliable technology; only as mobility decreased and sites where it could be cached became more common or more frequently revisited may pottery have been considered more useful. Coastal areas where people may have been living within comparatively small areas or even at specific sites year round, not surprisingly, are where some of the earliest pottery has been found worldwide (e.g., Barnett and Hoopes, 1995; Saunders and Hays, 2004b).

5. Mound burial is reported from the Midwest well back into the Archaic in Illinois (Charles and Buikstra, 1983). In the lower Southeast, the earliest mounded mortuary complex currently recognized, dating from ca. 6300 to 5750 cal. B.P., comes from Harris Creek Mound on Tick Island, Florida, where ca. 175 individuals were placed in two stratigraphically successive mortuary deposits interspersed within or capped by layers of sand, shell, earth, and midden debris (Aten, 1999; Randall, 2008:14; Kidder and Sassaman, 2009: 674).

6. Thompson, chapter 10, this volume, accepts the idea of tribal cycling, but suggests that the best way to explore it is to examine the details of what was actually happening: the archaeological record at particular places and over differing temporal scales and comparing it with other such trajectories, employing a macroregional perspective. Use of a label like cycling, he effectively argues, doesn't really tell us the details of what was happening, and I completely agree. Of course, those of us who have explored the process in the Southeast and beyond (Anderson, 1994; Blitz, 1999, Parkinson, 2002) would like to think we have considered the details, but any couching of such arguments using a neoevolutionary framework tends to imply a uniformity or sameness to the sites and societies in the models that likely never existed in reality (see also Pauketat, 2007).

7. Gibson (chap. 2, this volume) makes a reasoned argument to the contrary, that "megaflooding did not spoil the swamp or keep people out of it." While the climate episode he is directly referring to in the quote is at 3500 cal B.P. and hence not the one that ended Poverty Point, Gibson makes clear that the effect would have been the same for the later flooding, between ca. 3000 and 2500 cal B.P.

8. That is, when it comes to climate, we must think globally but also examine how it acts, and societies react to it, locally.

9. As part of a major river basin survey in northeast Arkansas that I conducted in 1987 encompassing 90 miles on both sides of the L'Anguille River main channel, funding was obtained for palynological research under the justification that understanding past climate and vegetation was critical to interpreting the local archaeological record (Delcourt et al., 1989). The same approach was used again in the examination of Mississippian period Mound A at Shiloh in western Tennessee, in which a several thousand-year pollen record was found in a pond just off the main plaza, and within the prehistoric palisade line surrounding the mound complex (Meeks, 2005). More publicly funded archaeological projects, which frequently involve large sums of money, should include provisions for the generation of paleoenvironmental data.

10. Kidder (chap. 1, this volume) makes it clear that associations between climatic and cultural events are matters to be tested, not assumed.

11. When Poverty Point declined, did people lose a good place to go to party, or a place where they could obtain spiritual reinforcement, or both? In the spirit of the Caldwell conferences, did they lose a St. Catherines Island of the Late Archaic?

12. Cahokia, like Poverty Point two and a half millennia earlier, was a unique site within eastern North America, an order of magnitude larger than other contemporaneous centers in terms of the size and volume of its earthworks. The people at such sites would have dominated their surroundings if for no other reason than by living at a place people would have wanted to visit, perhaps for religious reasons, or simply to see what the rumors and excitement were all about. The unique size of centers like Poverty Point and Cahokia strongly suggests that they held disproportionate sway over other surrounding societies; that is, their very existence shaped the nature, extent, and routes interaction took over the landscape. Cahokia is thought, at least by some archaeologists, to have influenced developments over much of the Mississippian world simply by serving as a compelling example of what could be accomplished, rather than through any form of outright domination, at least very far from the center (e.g., Anderson, 1997; Pauketat and Emerson, 1997; Pauketat, 2004, 2007). Poverty Point, and perhaps the earlier mound complexes of northwest Louisiana, may have shaped Archaic developments over a much larger area in a similar fashion, simply by example, by showing what was possible, perhaps in combination with an effective ideology and the exchange of objects materializing those beliefs.

13. Interestingly, exchange in segmentary societies can foster conditions giving rise to patterns of social inequality (i.e., by facilitating the emergence of dominant individuals or lineages) that, if an egalitarian ethos was prevalent, may not have been long tolerated (e.g., Kelly, 1985, 1993; Wiessner, 2002: 251–252). At Poverty Point, if such processes were in play, specifically a trend toward nonegalitarian relationships, the resulting social tension may have contributed to the dissolution of the society.

14. Poverty Point thus exemplifies a pattern seen a

number of times in the Eastern Woodlands and, indeed, in many parts of the world. A primate or foremost center emerges, dominates its surroundings for a few centuries, and then collapses; in the long run nothing recedes quite so dramatically in the archaeological record as seemingly unparalleled success. In some cases the decline of the primate center was related to the existence or emergence of other centers, as perhaps occurred with Cahokia. That is, the organization, monumentality, and the idea of the primate center may be emulated, leading to the rise of other centers over time. Competition between them may result in the dissipation or reduction of the ideological significance and necessity for the primate center, with the result that what begins as emulation may lead to the decline or replacement of that being emulated. This pattern was not universal in eastern Woodlands prehistory, however. With Poverty Point and Cahokia, no other comparable contemporaneous or immediately successor primate centers are known, but in the case of Middle Woodland Hopewellian culture, in contrast, there was no one dominant center, but instead many more or less comparable centers, with emulation and interaction between them widespread, at least for a time.

15. Thompson (chap. 10, this volume) eloquently argues for much the same process, when he notes that “what happened to the Archaic was really the collapse of these persistent places and their associated interaction networks.” It is the societal responses that we should be examining, and the time it takes for such places and networks to reconstitute, if indeed they ever do. Sassaman (chap. 11, this volume) makes a similar argument, noting many later Archaic societies were linked together through alliances and exchange, and that episodes of change observed over large areas could have been caused, at least in part, by a realignment of these networks. My thoughts on the cultural adjustments and temporal scales involved in the formation and reformulation of interaction networks expressed here owe a debt to both of these scholars, as well as to the other participants in this Caldwell Conference.

16. With the decline of Poverty Point, the Alexander phase in the lower midsouth of Mississippi and Alabama seemingly takes off, with one hallmark of the culture being the widespread use of soapstone and sandstone vessels (Brown, 2004: 575–576; Sassaman and Anderson, 2004: 103–104). As Sassaman (chap. 11, this volume, see also O’Donoughue and Meeks, 2007) argues, these peoples may have taken over soapstone exchange formerly directed to Poverty Point. Alexander, however, never replaced Poverty Point; no major centers anywhere near the scale of Poverty Point are known from this culture, nor was exchange extensive or geographically widespread. The highly decorated pottery vessels that characterize Alexander, however, are anomalous in the Early Woodland Southeast, a time when most ceramic assemblages were characterized by uniform and anonymous plain, simple stamped, or cord- and fabric-impressed vessel finishes (Griffin, 1967; Bense, 1994; Jefferies, 2004b: 115–119; Sassaman and Anderson, 2004: 111–113; Sassaman, chap. 11, this volume). Alexander pottery may have been decorated in an attempt to maintain the diversity of individual expression (and aggrandizement?) that appears to have characterized earlier Archaic period ceramic traditions, such as Stalling, St. Simons, Orange, and Thom’s Creek (Sassaman, 1993, chap. 11, this volume), something that may have also been manifest in other media (baked clay balls; effigy beads?) in the preceding Poverty Point culture.

17. Thompson (chap. 10, this volume) makes the excellent point that the collapse of long-distance exchange would have also likely affected information exchange and mating networks over large areas. He suggests that increased mobility might be one means by which people overcame this loss (see also Thompson and Turck, 2009: 258). Such a pattern may indeed be indicated in some parts of the Southeast in both the early and later Woodland, following the decline of Poverty Point and Middle Woodland Hopewellian related interaction, respectively. Analyses of bone chemistry offer promise for revealing the extent of mobility of individuals within these societies, and suggest that some people during the later Archaic were moving fairly appreciable distances over the course of their lifetime, ending up hundreds of kilometers from where they were likely born (e.g., Quinn et al., 2008).

18. At the Fig Island 1 ring on the southern South Carolina coast, what appears to be clear evidence for the intentional mounding of shell debris originally deposited elsewhere has been found (R. Saunders, 2002, referenced in Sanger, chap. 9, this volume); the redeposited shell was placed in such a way as to elevate the ring crest above rising sea levels.

19. Others in this tradition include Robert S. (‘Stu’) Neitzel and William G. (“Bill”) Haag.

20. Morse (1980) made a similar argument for the location of the initial Mississippian period Zebree site in northeast Arkansas, arguing that the formation of Big Lake made the area especially rich in subsistence resources, an inference tentatively supported by a number of specialized analyses (Morse and Morse, 1980). This hypothesis was advanced by the geologist Roger Saucier (1970), and while plausible, remains incompletely evaluated. A pollen core taken in the lake bed suggests instead that it formed about the time of the New Madrid earthquake, a competing hypothesis (King, 1980). The point is that demonstrating the occurrence of a lake near an archaeological site can take a great deal of time and effort, for which the Zebree project can serve as a good example of how to proceed.

21. It may even be possible to suggest what their cosmology may have been based upon. John Clark (2004, 2006; Clark and Knoll, 2005: 300–301) has argued that Poverty Point may have contributed much to the ancient civilizations of Mesoamerica, including serving as an inspiration for the monumental architecture, astronomy, and cosmology that was so evident a few centuries later further south around the Gulf of Mexico among the Olmecs at San Lorenzo and in subsequent cultures. As Clark (2006) has suggested, perhaps Poverty Point, with its large mounds and nearby lake and swamp, was the first “altepetl” or water-mountain—the first grouping of peoples into what we think of as a town or city, and where the tree of life may have emerged—a place where the creation of much more took place than what we have traditionally assumed in southeastern archaeology.

22. Poverty Point may have been avoided because bad things may have been done by the peoples living at the site at its peak or as it went into decline, and not because of any changes in the natural environment. If a nonegalitarian ethos had taken hold, for example, it may have been actively resisted. The ensuing societal collapse may have been accompanied by a desire by those remaining to avoid anything further to do with the place that symbolized these

problems. This argument has been classically used to explain why sites like Tell el Amarna (Akhetaten's capitol) and Chaco Canyon were not reoccupied (Lekson, 1999; Watterson, 1999).

23. This assumes, of course, that well-preserved former terrestrial sites cannot survive intact or minimally disturbed in offshore waters; if they do, it would indicate that sea level rise need not be totally catastrophic to the archaeological record. Evaluating this possibility is increasingly the subject of research (e.g., Hall, 1999; Lewis, 2000; Faught, 2004).

24. Russo (chap. 7, this volume), like Kidder, is cautious about arguing for a direct relationship between specific episodes of global climate change or sea level fluctuation and the ending of feasting and aggrandizing behavior and its replacement by ancestor veneration/mound building. His argument is that these changes did not play out at the same time in every area, and indeed in some areas, like south Florida, there is little evidence for discontinuity.

25. An important finding and cautionary tale from the St. Catherines research was the discovery of settlements in the center of the island, in areas supporting freshwater ponds (Thomas, 2008e: 933–934, chap. 8, this volume). Archaeological research focusing on the marshside areas where sites are known or assumed to be present can cause researchers to miss sites in other areas. Our predictive models, Thomas (2008e) shows us, are only as good as the data used to generate them, and the assumptions we bring to the analysis. The fact that additional fieldwork has been directed to these inland lacustrine locations is commendable; even more so is the honesty and detail in the reporting, which allows other researchers to learn from and build on this effort. As a final comment, I would suggest that another factor dictating site location adjacent to marshlands would be the occurrence of major (i.e., dugout navigable) creeks, something DePratter (chap. 13, this volume) also notes. These make access to the site and marshlands easier for both ring inhabitants and visitors alike. In my own visits to shell rings and middens on the central South Carolina coast, taking a boat was far easier and safer than wading or slogging through the marsh, something I am certain prehistoric peoples were equally well aware, as were modern optimal forager-archaeologists on St. Catherines Island (Thomas and Blair, 2008: 84).

26. Russo, in an earlier version of his paper, in a literary allusion that I like called this "a strategy to follow the movable feasts as shorelines prograded."

27. Sassaman (chap. 11, this volume) has noted a regular ca. 30–40 km spacing to major U-shaped middens after ca. 4700 cal B.P. in the middle St. Johns, and Schwadron (chap. 6, this volume) has noted a much closer, but still somewhat regular spacing of large sites in south Florida. Hally (1993: 165) has argued that, at least in the Mississippian period of Georgia, sites within ca. 18 km of one another are part of the same polity, while those more than 32 km apart likely belong to different ones. If equally true for preagricultural coastal populations, the St. Johns sites may reflect relatively autonomous groups, while those in south Florida would be so close as to almost mandate some form of possible integration between them, be it through sodalities and other egalitarian formations, or a more vertical hierarchy. The greater spacing between the St. Johns sites may reflect lower population levels, permitting more spacing between centers, or alternatively may suggest a greater importance of watercraft in daily movement, which would have likely expanded the area of active foraging (Thomas and Blair, 2008; Thomas, 2008d, 2008e, chap. 8, this volume).

28. Thompson's comment that we need to avoid "focusing on trajectories of neo-evolutionary types" is something I agree with completely, even though I have argued that some southeastern Archaic societies were tribal social formations (Anderson, 2002, 2004). The point in my papers, however, was not that we should classify a society as a "tribe" or "chiefdom" and move on, but that Archaic societies were likely organized and operated on scales that seem to be rarely considered by archaeologists working within the region (Morse, 1977, is an important exception). Until this lesson is understood, we will continue to interpret the region's prehistory in terms of events at individual sites or small areas, using models of behavior that ignore the very differing structural poses (sensu Gearing, 1958), or the fluidity and flexibility in the scale of organization that can occur within these societies. Thompson's analysis of the variability in the temporal scales by which what he calls "persistent places" (after Schlanger, 1992: 97) were formed is a particularly effective and important way to explore such a perspective.

29. The change in the use of Moundville, from a burgeoning political and population center to a largely unoccupied mortuary compound/sacred precinct is a classic example from the Mississippian period Southeast (Knight and Steponaitis, 1998).

30. Research on the time it took to lay down shell or earthen deposits, through seasonality studies of associated shellfish, plants, and fauna or through geoarchaeological analyses, offers a useful means of evaluating how quickly these monuments may have gone up (Thompson, chap. 10, this volume; Thompson and Andrus, 2006). Kidder and his colleagues (2008a) have examined erosional episodes associated with mound construction at Poverty Point, for example, to suggest that at least some major building episodes at the site likely occurred quite quickly.

31. Thompson's argument that we need to adopt a macroregional and multiscalar perspective is another positive recommendation, although I would argue that the concept is not entirely foreign to the Southeast, and that we need not look to research in Mesoamerica for all of our inspiration (e.g., Anderson, 1991, 1994, 1999; Neitzel and Anderson, 1999; Blitz, 1999, Hally, 1993, 1996; Milner et al., 2001; Sassaman, 2004a; Chamblee, 2006, Livingood, 2009).

32. In the case of the creation of Poverty Point, however, his idea that the site represents the merging of differing groups remains the subject of spirited but collegial debate (cf., Sassaman, 2005, 2010; Gibson 2007, chap. 2, this volume).

33. Few studies like that by Saunders and Allen (1997) working with Evans and related points have attempted to examine the occurrence of specific categories of stone tools over large areas, particularly within and between the cultures that built the mounds and middens of the later Archaic Southeast. Sassaman's (1996, see also Knoblock, 1939) work examining the variation in bannerstone morphology is an important exception, as is Fiedel's (2001:108-112, 2009) examination of projectile points in the Northeast.

34. DePratter suggests that these pits may have had completely unanticipated functions, and while his boyhood example—being told by his father to dig holes to bury food waste—is one possibility, I have a hard time believing people would dig holes to bury food processing debris when a marsh and tidal creek was at hand. To be fair, DePratter

thinks his idea smells a bit too, just as the pits would have in prehistory, which makes me doubt this particular explanation. The presence of a few human bones or teeth might suggest that they were burial or defleshing pits, but there is no evidence for that function at present.

35. Bill Marquardt, Chester DePratter, Jon Gibson, and I were asked to comment on the papers in the volume and, being the last to submit thanks to an unexpected bout of mononucleosis, I had the opportunity to comment on their comments.

36. Archaeologists working on the Paleoindian period are perhaps the most familiar with such rapid change, given that events like the Younger Dryas, a period of intense cold and highly variable climate dating to ca. 12,850 to 11,650 cal B.P., apparently began and ended within a few years at most (Alley et al., 1993; Björck et al., 1996; Graftenstein et al., 1999; NRC, 2002).

37. This inference is testable through geoarchaeological analyses, although whether pits in the center of rings could have served as sources of water, or the rings themselves served as water courts, would also depend on where the water table was at particular times (and sea level stands) in the past. Any replication experiments that are conducted should bear that in mind. With lowered sea levels, pits that today might yield brackish water may have yielded fresh water in the past.

38. I thank Matt Sanger and Dave Thomas for the invitation to participate in the Third Caldwell Conference, and for making my first visit to St. Catherines Island a truly memorable experience. They also have my undying thanks for their patience in awaiting this manuscript, whose completion was delayed by an unexpected bout of mononucleosis. I also thank the other participants of the volume for their conversation and comments, both at the workshop and down through the years. They are all exceptional colleagues, ever willing to share ideas and information, whether we agree or disagree about a particular point or a larger theoretical perspective. The responsibility for the presentation and interpretation of the ideas herein, many of which are derived from their fine work, rests with me.

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