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Tracking Trajectories: Charting Changes of Late Archaic Shell Ring Formation and Use

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Tracking Trajectories: Charting Changes of Late Archaic Shell Ring Formation and Use

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Dedication

To my wife

Jenny

Acknowledgements

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Abstract

For the past fifty years the shell rings of the North American, southeastern, Late Archaic period, have been a continuous object of archaeological research. They have been studied within contexts of the initial creation and use of ceramics in North America, mounding and monumentality of hunter-gatherers, early sedentism and social complexity, forager feasting, ritual, and ceremonialism, and human-environment interactions. The aim of this project was to bring together the cumulative data generated by this continuous research focus and centralize it within a single database, the Late Archaic Shell Rings Repository. In utilizing this consolidated data set, it is possible to track and map, both chronologically and geographically, behavioral traditions surrounding the shell rings. This analysis posits that there are three discernable, overarching, behavioral trajectories within the shell rings of the Late Archaic period: an early, Floridian/Gulf Coastal trajectory of an open ended, large scale, social mounding tradition; a middle Savannah River centered, proto-sedentary, freshwater shell mounding, initial ceramics producing trajectory, the Stallings culture; and a subsequent Atlantic Coastal tradition that possesses a stricter maintenance of social practices that have smaller and more circular shell rings and that incorporates the social behaviors of the shell ring building trajectory and the initial ceramic using trajectory. In collecting these data together, this analysis also is able to highlight the existing gaps within the data from the shell rings, with the aim of helping to pinpoint foci for future research.

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Chapter 1

Introduction

Shell rings are defined as arcuate constructions of mounded shell that possess shell-free interior plazas; shell rings can range in both shape and size. While not exclusive to North America--similarly designed shell constructions have been found in Japan and South America (Habu 2004; Oikawa and Koyama 1981)--they are still unique within North American archaeology and, more specifically, to the North American southeast. The shapes of shell rings found with the southeastern United States range from almost fully enclosed circles to open-ended ellipses, with sizes from as small as 30 meters to well over 200 meters in diameter (Figure 1). There are currently 51 sites (Appendix A) from along the coasts of South Carolina, Georgia, Florida, and Mississippi that have been identified as both shell rings and as being built during the North American Late Archaic period (5800-3200 cal yr B.P.). In addition to these defined rings, there are additional sites that could potentially also be Late Archaic shell rings; however, either the nature of the shell mound is in question (whether or not it is actually a ring of shell) or the age of the construction of the ring is in question (whether the site was constructed during the Late Archaic), with additional work being needed to help determine their statuses (Russo 2006:111). Furthermore, there are a series of shell rings that were built after the Late Archaic, beginning within the Early Woodland through to later times (Russo 2010; Schwadron 2010). For the purposes of this research, however, only those sites that have been identified as having been both constructed during the Late Archaic and are indeed shell rings as defined here (arcuate constructions of mounded shell that possess shell-free interior plazas) will be examined.

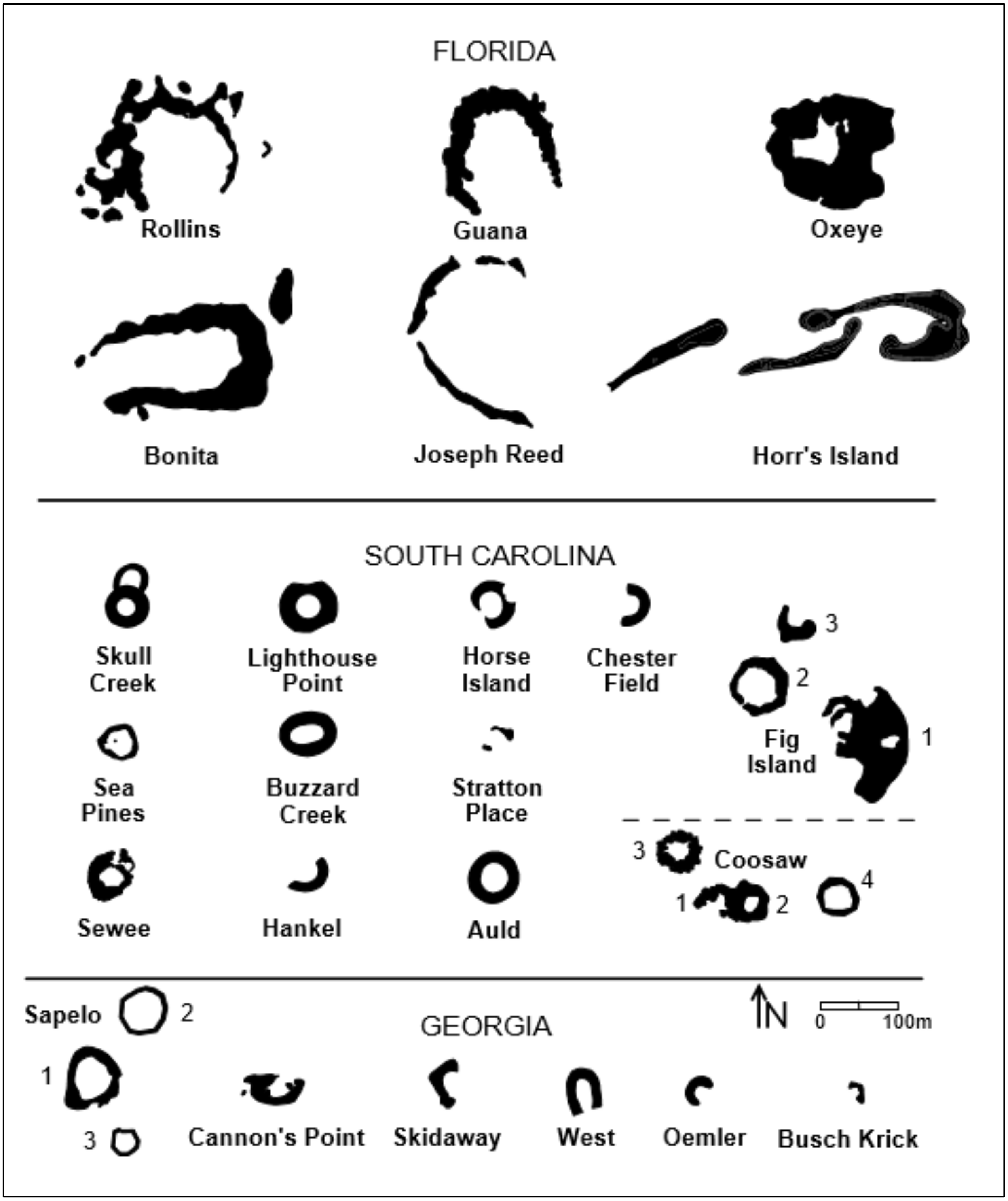


Figure 1.1 Examples of North American Late Archaic shell rings, noting both size and shape variations (adapted from Russo 2006:9)

The geographical focus of this study is the Atlantic and Gulf coastal regions of North America, ranging from South Carolina all the way around to Mississippi. The chronological focus of this study is the entire span of the Late Archaic period and the early transitional period between the Late Archaic and the Early Woodland periods (3200-2100 cal yr B.P.).

The purpose of this thesis is three-fold, to:

1) bring together, into a single database, the currently available data from the shell rings of the Late Archaic;
2) synthesize the newly centralized data set with past observations, statements, and theories regarding the Late Archaic shell rings to place the data into an historical context, and to examine broad geopolitical trends over time; and
3) highlight for future researchers where the gaps in the data exist, and to thus potentially guide future research agendas

This study is a first attempt to address a major research topic posed by two southeastern shell ring scholars, Russo and Heide (2003:30), that "a clear picture of the political relation of rings to each other and other site types in regional settlement patterns has rarely been discussed," by pulling together and examining the entire Late Archaic shell ring data set. Future additions to the data set will no doubt affect the results of this analysis and how the rings are understood, however, gaining a better understanding of chronology, structure, materiality, or environmental surroundings are all directions that will add to the data and our understandings.

Chapter 2 describes the ecological and cultural settings for the Late Archaic shell rings as well as provides a brief summary of shell ring research. Chapter 3 discusses the topic of big data and database analyses. Chapter 4 follows these discussions and presents both the data that will be utilized within this study and a description of the construction and location of the Late Archaic shell ring database, one of the results of this study. Chapter 5 sets forth a geospatial and temporal analysis that utilizes the completed database. Chapter 6 is the final chapter of this volume and will be both a conclusion to this project as well as a plan for future directions for this project and suggestions for potentially productive avenues for shell ring research in general. The appendices of this volume contain all of the collected and combined data regarding the Late Archaic shell rings in table format and include shell ring radiometric data, material culture, measurements, and their National Historic Landmark (NHL) and National Register of Historic Places (NRHP) statuses. These appendices also include all new data generated by this study, such as shell ring eccentricity values, as well as imagery for the rings themselves.

Chapter 2

Background

Ecological Setting

North American shell rings have thus far been found spread along two main coastal regions, the southern Atlantic slope spanning from just south of the Grand Strand in South Carolina to the Loxahatchee River drainage in Florida, and the Gulf Coastal Plain spanning from Cape Romano in Florida to the head of the Pearl River at the border between Mississippi and Louisiana. Although the specific flora and fauna present in and around each shell ring would have varied, the ecological settings for all of the rings that date to the Late Archaic are similar: they are found within coastal tidal zones on islands, in or near coastal marshes, or on the mainland abutting shorelines. While the actual distance between shorelines and shell ring locations during the time of shell ring use will be discussed in further detail below, the general pattern of their physical locations remains the same: coastal marine environments.

The beginning of the Holocene marks the end of the most recent glacial period and the onset of rising global temperatures and changes in climate. Although not on the scale of fluctuations at the end of the Pleistocene, significant fluctuations in global weather patterns, regional climates, and local environments still occurred during the Early and Middle Holocene, which include the Early and Middle Archaic periods of North America (Anderson et al. 2007; Anderson and Sassaman 2012:74; Koç et al. 1993:139; Rich et al. 2011:74; Steffensen et al. 2008; Viau et al. 2006:3). By the time of the Middle Archaic period in the North American southeast (8900-5800 cal yr B.P.; Anderson and Sassaman 2012:2) the rate of rising sea-levels began to slow and sea levels began to reach modern levels by the end of the period. During this time there was a regional replacement of hardwood forests with pine forests had occurred in the

Figure 2.1 Map illustrating the locations of all currently identified Late Archaic shell rings.

interior of the Coastal Plain in between river valleys, where cypress swamps were becoming established, and global temperature was at or slightly higher than at present, at least in the northern hemisphere (Anderson et al. 2007:459; Anderson and Sassaman 2012:74; Mayewski 2009; Miao et al. 2007; Moros et al. 2006; Törnqvist et al. 2004; Webb et al. 1998). While there were still significant climate events during the Early Holocene, the general trend was toward a warmer, less variable climate.

The beginning of the Late Archaic period (5800-3200 cal yr B.P.) is when both sea level and climate begin to reach modern conditions, allowing the formation of oyster beds along the coasts, which would have been integral to the construction of the rings (Anderson and Sassaman 2012:74; Colquhoun and Brooks 1983:26; DePratter 1976:16; Thomas 2008:42; Sanger and Thomas 2010:59). DePratter (1976:16) notes that "at this point in time, a chain of events began to take place which later made possible the early aboriginal occupation of the coast." He goes on to note that along the Atlantic coastline, with sea levels permitting extensive marshland and riverine systems behind a string of barrier islands, there was creation of a low energy intertidal waterway system, which would have allowed for a more consistent, and less difficult method of travel along the coasts.

The people who constructed and used the shell rings can best be described as fisher-hunter-gatherers, or fisher-foragers (Thomas 2014:179). These environments would have provided relatively easy access to a wide variety of marine fauna such as otters, fishes and sharks, mollusks, crustaceans, turtles, alligator, and water fowl, all of which have been shown to have been exploited by those living and using the shell rings. In addition, the users of the shell rings were also consuming terrestrial fauna such as opossum, shrew, mice, squirrel, rabbit, turkey, deer, dog, and bear (Colaninno 2011; Marrinan 1976, 2010; Thomas 2008). This array of fauna is accompanied by evidence for a similar broad exploitation of local flora such as pine, cedar, hickory, oak, hackberry, black cherry, holly, buckthorn, privet, grape, and mustards (Marrinan 2010:91), all of which were being utilized for subsistence via their berries, nuts, or seeds.

Cultural Setting: Late Archaic Period

By the time of the Late Archaic period the environmental setting was beginning to reach generally more stable conditions than had been previously experienced by those who had originally settled in the North American southeast during the end of the Pleistocene. This stability appears to have led to higher population densities and increases in social complexity in the region (Anderson et al. 2007; Anderson and Sassaman 2012; Gibson and Carr 2004; Russo 1994, 2004).

A rise in population is indicated via both the significant increase in the number of sites found during the Late Archaic period when compared to those present during the Middle Archaic period, as well as the increased diversity in material culture in the region (Anderson 1996; Sassaman 2010; Steponaitis 1986). These increases are seen especially within coastal zones and other previously underutilized areas (Anderson et al. 2007:459; Anderson and Sassaman 2012:74; Russo 2010:151). Anderson and Sassaman (2012:74) also state that "the most defining environmental factor of the Late Archaic period was the expansion of wetland habitat throughout the region," noting that this expansion specifically took place in riverine zones and coastal zones, the same areas in which the shell rings arise. The riverine and coastal zones of the southeastern United States were made up of a mixture of extensive wetlands and a chain of barrier islands extending all the way from Outer Banks in North Carolina to Cape Canaveral in Florida. While the coasts of Florida and Mississippi do not share the same barrier island chain as Georgia and

South Carolina, there is still an extensive marsh system that contains various bays, inlets, waterways, and inland marshes that created a similar ecological system as was found along the Atlantic Coast (DePratter 1976:10; Thomas 2008:42).

It is in this environment that the shell rings arose. Current chronologies of the rings (Appendix B) place their initial use within the first half of the Late Archaic, after which, based upon recovered dates, both their construction and use continue throughout the region for the remainder of the Late Archaic, with some of these rings being used into the Early Woodland period. There has been a considerable amount of work done to better understand the rings at the local and regional levels, given their association with events such as the expansion of human settlement and activity along the Atlantic and Gulf coasts, the first developments and uses of ceramics in North America (Sassaman 1993), and the fact that they are tied to increases in social complexity within the southeastern United States (Russo 1996, 2006; Sassaman 2010). Shell rings have been a part of archaeological literature since John Drayton (1802:39,228) first noted their presence along the South Carolina coast. Recent archaeological research regarding the shell rings began again in the late 1960's with an extensive series of surveys along the coast (Hemmings 1969, 1970b,h, 1972), and since then the shell rings have been the subject of intermittent research for much of the last century (Russo 2006:17). This has had the unfortunate effect of causing the shell ring data (e.g. field reports, conference papers, published manuscripts, Historic Register applications) to be vast, with primary data about shell ring being found in varying degrees of completeness and accessibility (e.g. Lawrence 1989a,b,c, 1991a,b) with some rings being well represented within the literature, while the data from other rings has either never been reported, published, or been made available.

Shell Ring Studies: New Beginnings

The shell rings of the Late Archaic have been recognized and recorded within archaeology and the natural sciences for over two hundred years beginning with John Drayton in 1802. Drayton's focus was on presenting a broad scale social, economic, ecological, and historical portrait of South Carolina that included everything from diseases, to botany, and the value of current estates, and only briefly mentioned the coastal shell sites. While there were many small and large scale visits and excavations conducted at these sites from the time of C.B. Moore in the late nineteenth century to the 1960's, most rings visited during this time were either underreported or not reported on at all (DePratter 1976; Russo 2006; Sanger and Thomas 2010: 45). Edwards (1965) work at the Sewee mound north of Charleston and Waring and Larson's work at the shell ring on Sapelo Island (1968) are significant exceptions. As Sanger and Thomas (2010:45) note, however, beginning in the 1970's through to today, there has been an ever increasing quality in excavations, documentation, and analysis of the rings, with different projects working to examine the shell rings within (sub)regional contexts (Calmes 1968; Crusoe and DePratter 1976; Hemmings 1970; Marrinan 1975; Russo 2006; Trinkley 1980); specific sites (Marrinan 1975; Michie 1976; Saunders 2002; Sanger and Thomas 2010; Thomas 2008; Thompson 2007; Trinkley 1975), or specific subjects such as power relations, ceramic technology, or human settlement patterns (DePratter 1976; Russo 2004; Sassaman 1992; Thompson and Andrus 2011). As both data and analyses have increased, varying assumptions, observations, and theories about Late Archaic shell rings have been proposed.

One of the main questions is that of the function of the shell rings. They have been proposed to be defensive constructions (Moore 1897:72), barriers from flooding/storm surges (Drayton 1802:57); habitation debris from circular settlements (Crusoe and DePratter 1976:14;

Hemmings 1970; Marrinan 1975:107; Thompson 2007:92; Trinkley 1985; Waring 1968; Waring and Larsen 1968); fish traps (Edwards 1965; cf. Russo 2013), centers for ceremonial/ritual activity (Cable 1997; McKinley 1873; Russo 2004; Russo and Heide 2003; Thompson 2007), or even monumental constructions (Russo 2004; cf. Marquardt 2010). While some of these theories have been largely disproved, others have taken center stage in the discussions of the use of the rings (e.g. Russo 2006; Sanger and Thompson 2010; Thompson 2007; Thompson and Turck 2009). As noted above, one of the goals of this project is to examine some of these past theories by developing a shell ring dataset, and to then highlight those areas where information is sparse, with the hope of aiding future research.

The first modern regional analysis of the shell rings was conducted as a result of a 240 km survey of the Atlantic coast from Bull Bay, SC to Sapelo Island, GA, that was conducted by E. Thomas Hemmings and Gene Waddell for the South Carolina Institute of Anthropology and Archaeology (Hemmings 1969, 1970h,b, 1972). These initial investigations resulted in the identification of 18 shell rings from 14 different sites, with four additional sites that were categorized as potential shell rings. Additionally, this survey lead to preliminary excavations at the Daw’s Island ring (38BU9), and a full trench excavation at the Fig Island 2 ring (38CH42). These data, combined with previous single site excavations by other researchers (Edwards 1965; Calmes 1968; Waring and Larson 1968) led to the first regional synthesis concerning the shell rings (Hemmings 1972) that established many of the patterns, such as shell ring locations, evidence for deliberate construction, and diet, that are still a part of most discussions of the rings today.

Following Hemmings and Waddell’s initial investigations, Crusoe and DePratter (1976) examined a number of Late Archaic sites along the Georgia coast which included portions of

Hemmings and Waddell's survey area but then extended further south. The purpose of the study was to examine the Shell Mound Archaic in Georgia and included in the data were the Late Archaic shell rings. The authors noted that the terrain behind the barrier islands was an area of low energy and that due to changes in sea levels the rings in Florida may have actually been more a part of the same inter coastal network of low energy waterways; they also hypothesized that conditions at the time allowed for the proliferation of oysters (Crusoe and DePratter 1976:2; DePratter 1976:17), which would not only come to be a staple of Late Archaic, coastal diets (Marrinan 1975; Parsons and Marrinan 2013; Thomas et al. 2008) but also would become the main construction material for the shell rings (DePratter 1976:17).

Another observation related to the lithic assemblages from the shell rings. All of the social groups that existed locally during the Middle and Late Archaic periods were hunter-gatherers, yet Crusoe and DePratter (1976:36) noted that in their study area only a few sites had any notable quantity of projectile points or even showed signs of hunting activities; furthermore, not all sites showed signs of year-round occupation. Combined, this information led to the conclusion that different sites such as mound/midden sites, ring sites, and smaller outlying shell and non-shell sites had different purposes, and were all part of a larger context/system of interrelated sites, indicating social networks for the period were larger than traditionally assumed.

Crusoe and DePratter (1976:68) identified three classes of sites within the coastal network, and five location categories. The three classes of sites were as follows: shell rings (crescent-shaped middens), simple midden heaps, and ephemeral sites where small amounts of fiber-tempered pottery were found but no traces of shell heaping. According to the authors all of these sites could be found in one of the following five location categories: sites on the mainland,

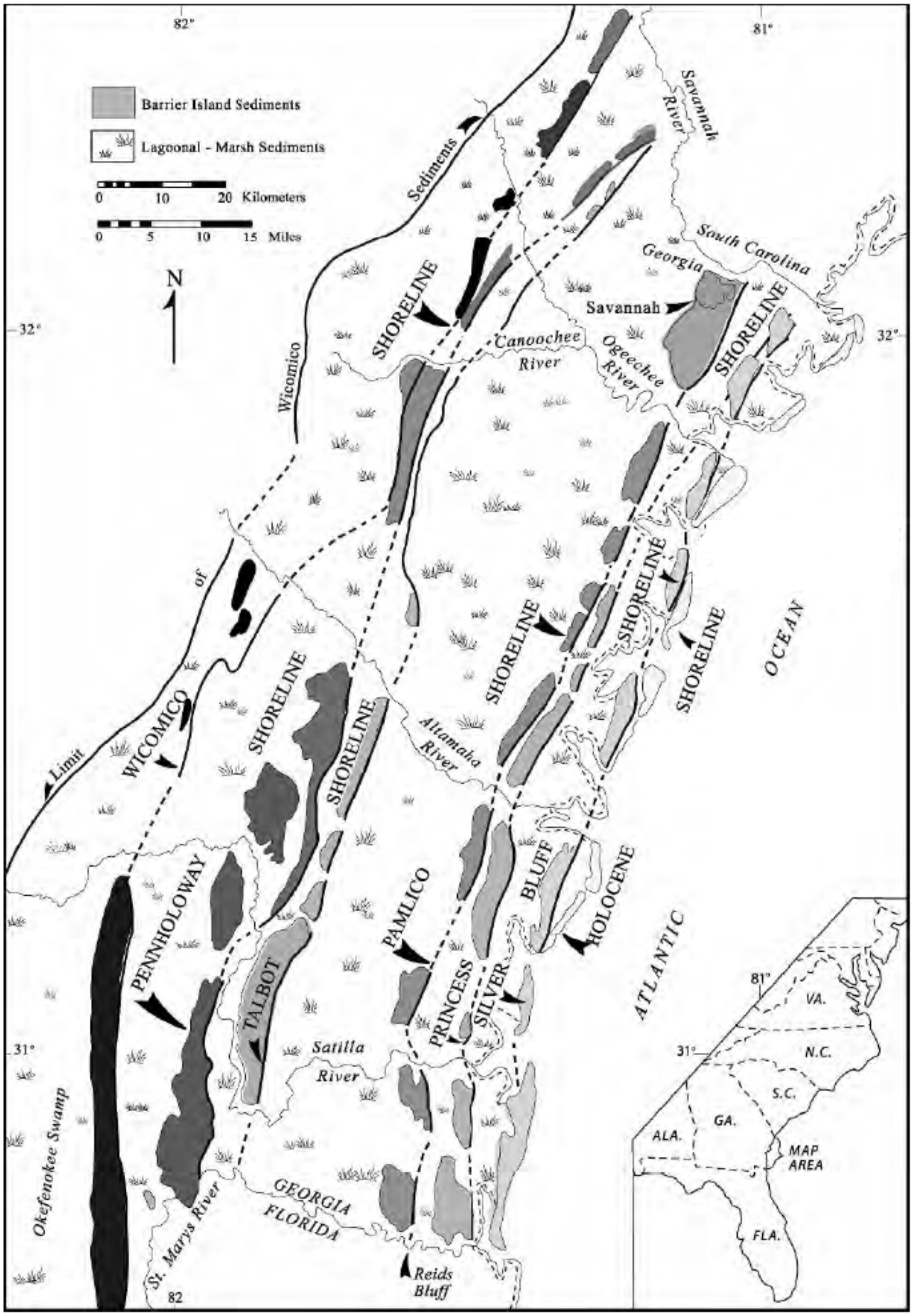


Figure 2.2 Map illustrating the locations of the five Pleistocene shorelines of the Georgia coast: Silver Bluff, Princess, Pamlico, Talbot, and Pennholoway. Modified from Figure 5.1, Thomas 2008:49 citing Hoyt and Hails, 1967:1542.

sites in the marsh between the mainland and the Silver Bluff Islands, sites on Silver Bluff Islands, sites in the marshlands between the Silver Bluff Islands and Holocene Islands, and sites found on Holocene Islands (Crusoe and DePratter 1976:1; DePratter 1975; Figure 2.2).

In their discussion of ceramics, Crusoe and DePratter (1976:42) observed that the earliest ceramics found along the Georgia coast were almost always undecorated and that decorated wares became more common later in time, during the St. Simons period (Table 2.1 and Figure 2.3). They also noted that Marrinan (1975) found that there were both decorated and undecorated ceramics evenly distributed through all levels of the rings that she was investigating. A year prior to Crusoe and DePratter's regional study, Marrinan (1975) published on work conducted at two shell rings, Cannon's Point and West, found on St. Simon's Island, Georgia. The work is notable in shell ring research for the use of fine-grained screening techniques, and in-depth faunal/subsistence analyses, and detailed reporting (Marrinan 1975, 2010; Sanger and Thomas 2010:45).

At around the same time that the Georgia coast was being examined, Trinkley was conducting an independent regional analysis of shell sites in coastal South Carolina (Trinkley 1975, 1980, 1983). From both his broad scale studies of South Carolina coastal sites and his more specific excavations at the Lighthouse Point and Stratton Place shell rings (Trinkley 1975, 1980, 1983), Trinkley was able to make a number of observations concerning both regional and site-specific behavior. One of the regional observations was that the sites associated with fiber-tempered pottery, namely the Stallings phase sites (for ceramic distributions, see Figure 2.4), were more concentrated on the Savannah River floodplain and show "little dependency on the upland" (Trinkley 1980:44), indicating that the groups associated with these sites may have had well defined, circumscribed social boundaries. In addition, Trinkley similarly to DePratter

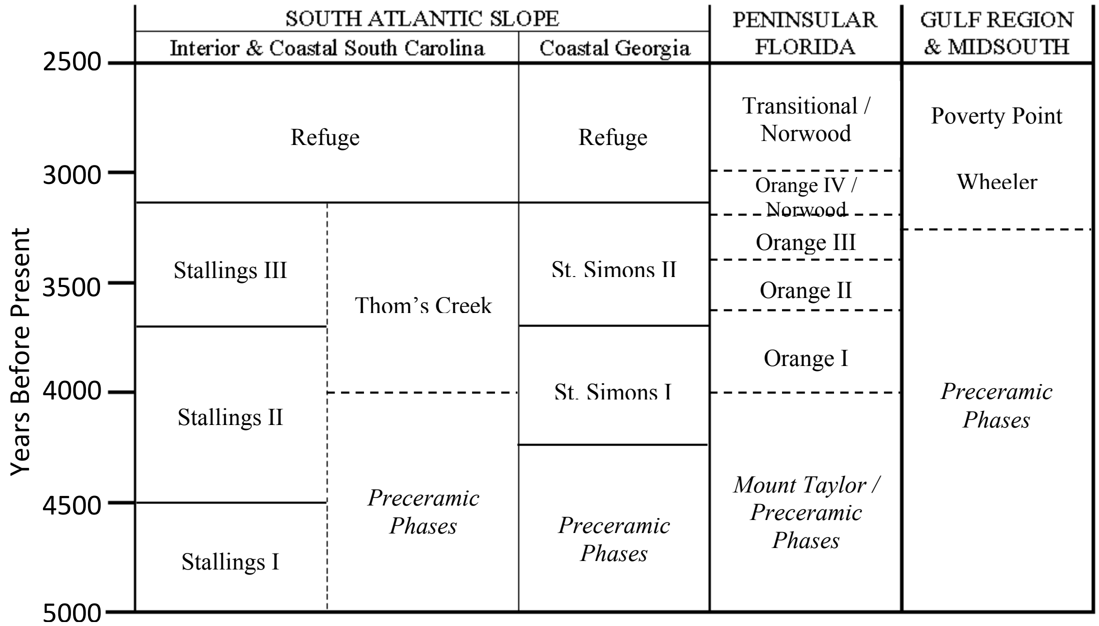


Figure 2.3: Chronological chart of the early ceramic phases of the Atlantic coastal plain, peninsular Florida, and the Midsouth. Adapted from Sassaman 1993:18.

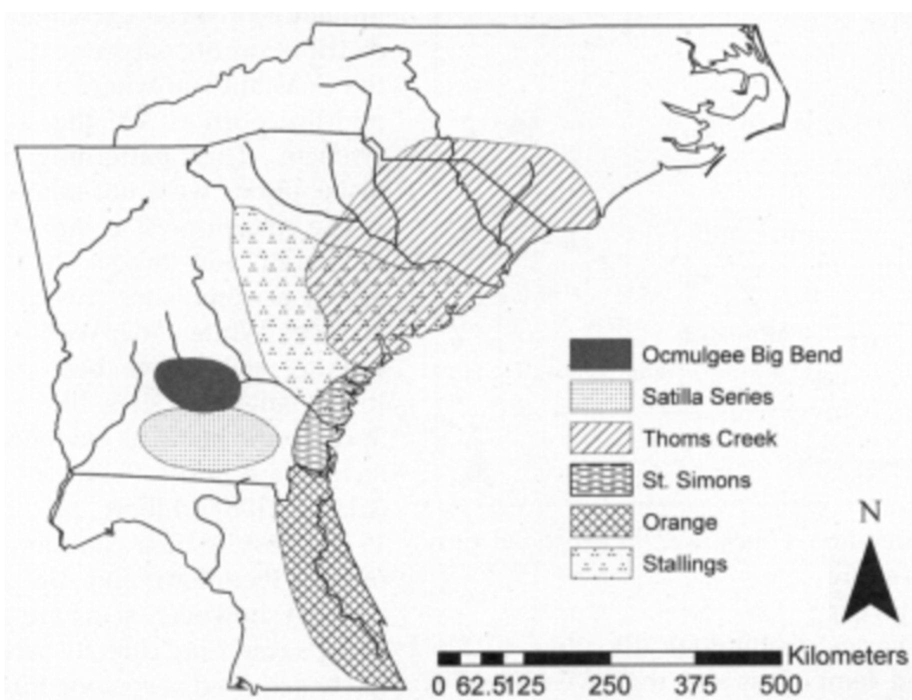


Figure 2.4: Distribution of early pottery wares along the Atlantic coastal plain. Adapted from Waggoner 2009:142, citing Sassaman 1993 and Saunders and Hayes 2004.

Table 2.1: Brief temper and decoration listings of early ceramics of the southeastern United States.

Pottery Type	Temper	Decoration
Stallings I		*Preceramic*
Stallings II	Fibers	None/Plain
Stallings III	Fibers	Plain, Incised, Punctate, and Simple Stamped
St. Simons I	Fibers, some sand present	None/Plain
St. Simons II	Fibers, some sand present	Plain, Incised, Punctate, and Incised and Punctate
Thom's Creek	Sand and Grit	Plain, Incised, Punctate, Finger Pinched, and Simple Stamped
Orange I	Fibers	Plain and Incised
Orange II	Fibers and sand	Plain and Incised
Orange III	Fibers and sand	Plain, Incised, and Punctate
Orange IV	Fibers and sand	Plain, Incised, and Punctate

(1977), also observed that the barrier islands and the marsh systems along the coasts formed a protective boundary for the human inhabitants. He observed that the Lighthouse Point shell ring was "protected from severe weather by Folly and Morris Islands and by lagoons east of James Island" (Trinkley 1980:155).

In his technofunctional analysis of the early pottery of the southeastern Unites States, Sassaman (1993) illustrated both the antiquity of ceramic use along the coast as well as the socio-political complexities that existed among local hunter-gatherers. Compiling existing dates, Sassaman (1993:23) showed that ceramic use developed towards the beginning of the Late Archaic between ca. 5200-5000 cal yr BP and not near the transition to the Early Woodland. In fact, by 4200 cal yr B.P. there were sub regional traditions that had sprung up with local groups developing their own pottery practices (Sassaman 1993:23). Sassaman also observed that, at the regional scale, "evidence for spatial patterning possibly indicative of sociopolitical boundaries has also been noted" (Sassaman 1993:8).

One aspect of Sassaman's study that is important to this current project is that much of the data for early pottery in the southeastern United States comes from shell rings sites or is associated with shell rings sites. He concluded that the Stallings tradition originated within the Savannah River and that asymmetrical social relations were present during the construction of shell rings (Sassaman 1993:8).

A major change in our understanding of the complexity of social life in the southeastern Archaic period came with the publication of assemblages and dates that firmly established that large mound construction was a part of the lives of the hunter-gatherers as far back as the Mid-Holocene, and not merely an anomaly (Anderson and Sassaman 2012:76; Russo 1994; Sassaman 2010). That hunter-gatherers could socially mobilize to create massive and long-lasting earth-works validated the possibility that shell rings were more than mere functional or accidental or unintentional constructions.

Big Rings, Big Power

The topic of mounds, rings, and monuments would continue to be carried forward and expanded upon in the ensuing period of shell ring research, from the late 1990's to the present. Where most of the previous research regarding shell rings had been driven in part by the rise of the New Archaeology (Binford 1962) and thus was more focused upon subsistence strategies, local environments, and behavioral ecology, towards the late 1990's shell ring research shifted, and began to include approaches such as sociopolitical factors, agency, and structure. As a result, shell rings began to be discussed in terms of how they marked power, hierarchy, and social complexity.

Many of the earlier approaches, such as consideration of diet breadth, site locations, or differences in material culture continued to be examined, but were fleshed out in greater detail and expounded upon. For example, by using concepts from social space theory (Grøn 1991), Russo and Heide (2001) solidified Trinkley's observation about the observed differences between shell rings that are found along the southern Atlantic slope and those that are found in Florida and the Gulf Coast. In general, rings were more circular along the Atlantic as opposed to more C-shaped within Florida, and ring diameters and heights were significantly larger and taller in Florida than further north along the Atlantic coast. The massive Fig Island complex in South Carolina is one of the few exceptions to this general pattern, which was inferred to reflect differences in organizational structures and power relations in the societies building the shell rings between the two areas (Russo 2004; Russo and Heide 2001, 2003). By combining the information provided by human behavioral ecology with more socially focused concepts from the Post-Processual movement, Russo and Heide, among others, were able to make more detailed observations about the social relations of the coastal inhabitants of the Late Archaic. Some of these observations include the fact that due to the plentiful resources that would have been available, the users of the shell rings may have had higher levels of sedentism than other foragers, which in turn would have increased the complexity of social interactions. This is seen in behaviors such as feasting activities, the rise of more specialized crafts such as pottery production, and the intentional construction and maintenance of the more specific circular architecture of shell mounds and shell rings (Russo and Heide 2001; Russo 2004:43; Russo and Heide 2003:110; Saunders 2004). Further observations include evidence for asymmetrical social relations that may have been present during the construction of rings (Sassaman 1993; Russo 2004: 53; Russo 2002; Russo and Heide 2003), as well as the existence of expansive social and economic networks that are seen through the regional exchange of bannerstones, soapstone, and shell beads (Sassaman 2004).

Trends, Traditions, and Articulated Landscapes

Using all of these past data and analyses, newer and more nuanced understandings of the shell rings have more recently begun to take shape. Thompson (2007), in his research of the Sapelo shell ring complex, showed that behaviors through time can also be complex. Thompson focused on the debate regarding the formation and function of the shell rings. He grouped together all of the various ideas about shell ring formation and use into two overarching theories: a Gradual Accumulation theory and a Ceremonial Theory. The Gradual Accumulation theory views the rings as permanent or semi-permanent circular settlements that, due to repeated use and curation of the mounded shell, eventually accumulate to form the recognizable architecture that are the shell rings. The Ceremonial theory views the rings as short-termed, intentional mounding events that are designed and built with the intention of being utilized for social ceremony or as a community monument. Thompson's research on Sapelo Island suggested that both models were accurate, in that the formation and function of the rings may change through time (Thompson 2007, 2013; Thompson and Turck 2009).

At around the same time as Thompson was highlighting the articulated behaviors of the coastal shell ring users, Sanger and Thomas (2010; Sanger 2010, 2015) focused on the two shell rings that were constructed on St. Catherines Island, the St. Catherines ring and the McQueen ring. While these two rings are not immediately adjacent to each other, as is seen at a number of the other Atlantic coastal rings, they are only 2.7 kilometers apart. Thomas and Sanger showed that the two rings were contemporaneous yet had distinct material culture patterns. Even though roughly comparable volumes have been excavated at each ring, only 1% of the ceramics found at the St. Catherines ring are decorated compared to 14% from the McQueen shell ring. In addition, the St. Catherines ring contained more than 3000 baked clay objects (BCO's) whereas the

McQueen ring had only 15.The St. Catherines ring lithics were made almost exclusively of Coastal Plain chert but at the McQueen ring a wider array of lithic materials were recovered, such as grey chert, metavolcanics, quartz, and quartzite. Thomas and Sanger postulate that there may have been a "greater degree of planning and purpose" with the McQueen ring when compared to the St. Catherines ring (Sanger and Thomas 2010:45), which led them to conclude that the McQueen ring could have been used by a different population than the St. Catherines ring or that it had greater ceremonial purpose, or both of these options.

Through all of the changes in thinking about how shell rings have been conceptualized there have been a number of consistent observations. Evidence for habitation has been found at many of the shell rings, such as shell filled pits beneath the rings (Calmes 1967; Flannery 1943; Russo 1991; Sanger and Thomas 2010; Thomas 2008; Waring and Larsen 1968), other occupation debris (Saunders 2004b:258; Russo and Heide 2003: figure 20), and food preparation and consumption (Marrinan 1975, 2010).

This brief review highlights the large amount of research that has been conducted on shell rings of the Late Archaic southeast. Not until the past decade, however, was a major synthesis prepared summarizing this information (Russo 2006). One of the goals of this thesis has been to compile primary assemblage and dating information from all of these projects, including research that has been conducted within the past decade, and organize it into a centralized database. The following chapters will document how the shell ring database was produced, and demonstrate possible uses for it.

Chapter 3

Databases and Big Data, Software and Statistical Methods, and the North American Late Archaic Shell Ring Database

One of the goals of this study is the creation of a single, searchable, and public database that combines available data regarding the Late Archaic shell rings of the North American southeast. These data include shell ring images, chronological evidence, shell ring dimensions, and summary data on material culture. While the focus of this analysis is not to examine or expound upon all of the specific issues revolving around proper data analysis or database use, it is necessary to take a moment to lay out some of the biases of this study. This project is the result of questions that the author had about both the history and the data from Late Archaic southeastern shell rings. To properly begin to examine questions regarding the shape and function of shell rings, it was necessary to take a step back to bring a number of categories of information together into a single database.

Databases and 'Big Data'

The term "Big Data" refers to "not just a lot of data, but different types of data handled in new ways" (Lohr 2013). In a separate discussion of the origins and future of Big Data, Diebold (2012) notes that "…the necessity of grappling with Big Data, and the desirability of unlocking the information within it, is now a key theme in all the sciences – arguably *the* key scientific theme of our times" (Diebold 2012:4 [emphasis added by author]). For both of these authors, Big Data is not just a descriptor for size of data sets, nor is it just a single analytical method, instead both of these definitions indicate that Big Data is a discipline unto itself (Diebold 2012:5), a discipline that is not simple rehashing old ways but is creating new directions, and "in a landscape littered with failed attempts at interdisciplinary collaboration, Big Data is emerging as a major interdisciplinary triumph" (Diebold 2012:5).

The discipline of Big Data begins with the use of large (or larger than has been usual) data sets and the results of various statistical analyses that are conducted on these data sets. Big Data is invariably tied to the collection and use of these data sets, which have been the culmination of both long-term data collection and of ever increasing technologies that allow for the collection, storage, and analyses of these data sets. Within archaeology a few notable examples of Big Data projects that are exemplars of this tradition, both in time and technology are the Paleoindian Database of the Americas (PIDBA) (Anderson et al. 2010) and the more recent Digital Index of North American Archaeology (DINAA) (Wells et al. 2014). While these databases are indeed indicative of Big Data in their scope and range, Big Data projects need not be regional projects or projects that involved great time-depth. A single site that keeps all data in a parsed out database can also fall under the purview of Big Data.

What are some of the benefits of using such databases and analyses? In short, Big Data methods can be very good at finding correlations, especially the more subtle correlations that may be missed if there were limited data sets being used (Marcus and Davis 2014). Big Data projects are also beneficial in that data is collected all in one place and thus it is easier to not only access but also examine the nature of the data (e.g. to determine what is missing from the data or what is the quality of the data). There is, however, a misconception about Big Data projects, namely that in having such large quantities of data in a central location they both help to remove researcher bias by including all data, rather than researcher selected data, and that they provide a silver-bullet-like solution to analyses. An anecdote that exemplifies the problems with this misconception is from a recent article by Marcus and Davis (2014:A23):

> A big data analysis might reveal, for instance, that from 2006 to 2011 the United States murder rate was well correlated with the market share of Internet Explorer: Both went down sharply. But it is hard to imagine there is any causal relationship between the two. Likewise, from 1998 to 2007 the number of new cases of autism diagnosed was extremely well correlated with sales of organic food (both went up sharply), but identifying the correlation won't by itself tell us whether diet has anything to do with autism.

There are three main takeaways that should be noted in the above examples. The first is the main point that the authors are noting here: correlation does not imply relationships (direct or indirect) and most definitely does not imply causation. The second takeaway is that databases are, in fact, simply centralized locations for data storage that are meaningless without human interaction; they do not analyze themselves. Lastly, while the authors above can offhandedly, and jokingly, note that murder rates are not in fact caused by, or are even related to, Internet Explorer market share prices, anthropologists and archaeologists may not have it as easy. The authors of the above example are members of the society in which they are studying and thus knew that the above correlation was not in fact causal. With the only information that archaeologists have to work with being that which is being excavated, they cannot so easily dismiss observed patterns or possible correlations, which in turn can lead to errors in giving too much credence to correlations that are coincidental. Each of these issues will be discussed in turn below.

In the field of computer science and information technology there is an acronym that is used as a watchword for sloppiness and carelessness: GIGO. GIGO stands for Garbage In, Garbage Out. As noted earlier, databases are a simple centralized collection of data, but they do not spring into existence fully formed nor do they analyze themselves for relevance and meanings. Data is collected, data is categorized, and data is analyzed; all of this is done by humans. The ‘Garbage In’ portion of the statement refers to the primary collection process of data. During this process, choices are made about what exact data to collect. One example of this is within the shell ring data itself. When one looks for ring diameters, it is impossible to find consistency in the data that has been collected. In some cases, the recorded diameter is simply the largest diameter, measured from the outside edge of the ring. In other cases, if the researchers recognized that the shapes were not circular and hence recorded two diameters, smallest and largest. In other cases all that was measured was a plaza (interior) diameter, and for some rings no measurements have been made at all, or at least no records of such measurement has been found. If one were to simply record these data without being critical of how it was obtained and what it was referring to, then any analysis that would be conducted and any relationships drawn would be skewed by the compounded error and would more than likely be incorrect. Thus, when creating databases, great care should be taken to both be critical of the data and open about its nature and quality for the sake of any future analyses. Furthermore, those that produce primary data should always take care in the process of data collection. This is especially true for a field such as archaeology, where our methods, such as excavation, are often destructive and thus, in many cases, there is only one chance to gather good data.

The ‘Garbage Out’ aspect of GIGO refers to the analysis portion of projects. As noted, if a database is not carefully created, maintained, and annotated, then, by default, any results arising from the use of the database should be suspect. However, it is still possible to get ‘garbage out’ of a perfectly good data set. One could have all of the data in the world but if one chooses to only look at selected items or if one asks bad questions then one can reasonably expect to get bad results. In the example above, if one were to only elect to look at organic food sales in relation to autism then one would feel confident in the positive correlation and emphatically state that buying organic foods leads to rises in autism. Or, in the case of the shell ring data set, if one were to only focus on one measurement of diameter in relation to location, and to not consider the effects of time, sea levels, or any other number of factors influencing ring morphology, then one could easily come to very different conclusions then those obtained from looking at different aspects of the data.

The last fact about Big Data projects, especially with its use within the field of anthropology, is that the above authors' ease in dismissing correlations comes from their unique situation of being members of the society of which they speak and can, without doubt, conclude that these correlations are coincidental. However, with anthropologists who study cultures of which they are only briefly a part of, or for archaeologists who were never a part of and are forced to look through the lens of time, it is not as easy to dismiss such correlations. In fact, Big Data analyses that are conducted within anthropology usually will lead to more questions than answers, since any correlation that is found must, inevitably, be thoroughly examined to ensure that one's own cultural or personal biases are not influencing the eventual interpretations.

In conclusion, it is always important to understand both the benefits and limitations of conducting Big Data research. The results of such data compilations and analyses are determined by both the quality of the datasets and are only as good as the questions being asked. One should always be critical of not only the data they are using but also of their own methods of collection, analyses, and interpretation.

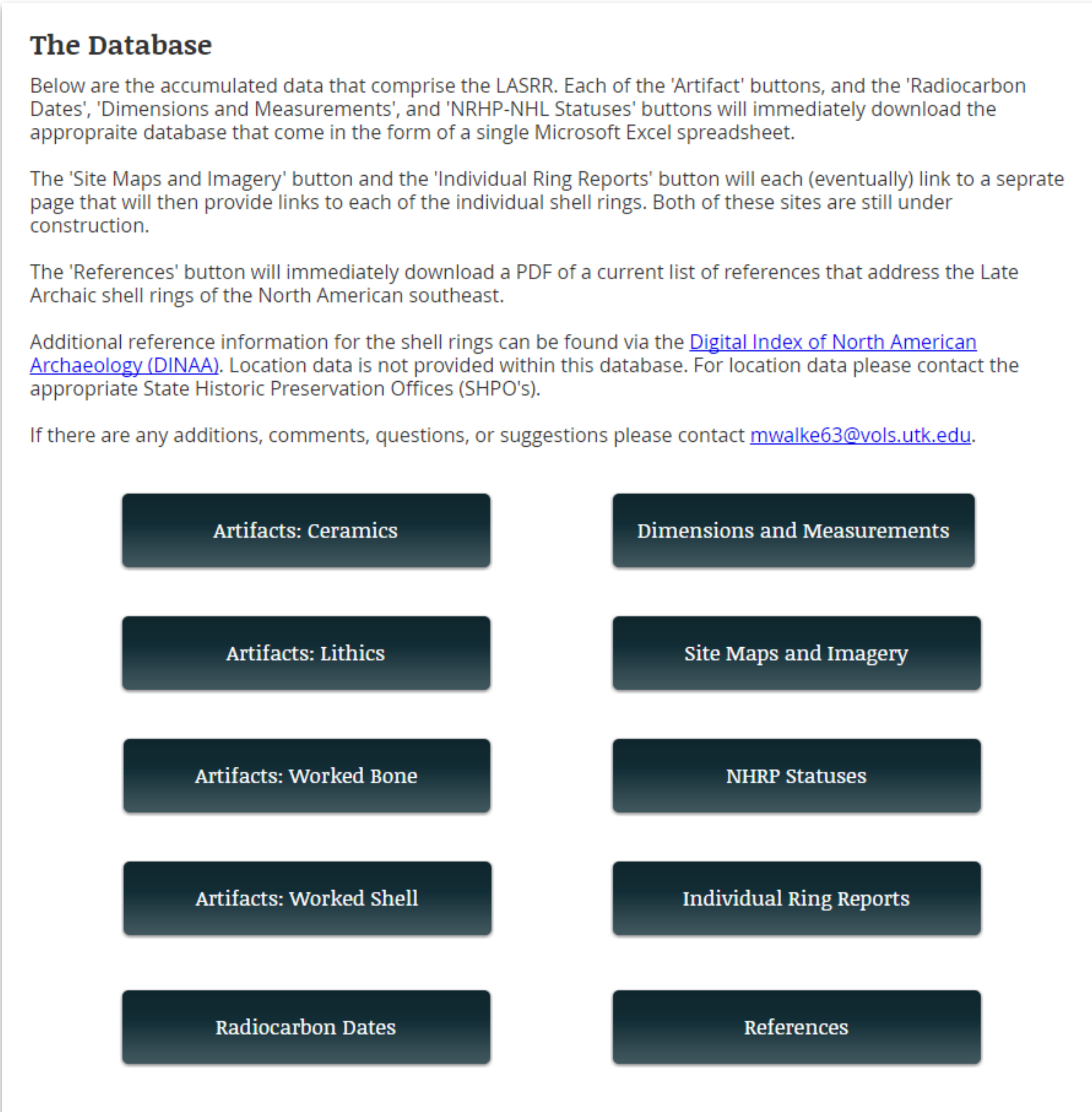
Open Source and Software Packages

The concept of "open source" is associated traditionally with coding and software and only in more recent times has it been used in relation to information such as research data and publications. In actuality, the original concept of open source can be traced back to some of the very first scholarly journals in the 17th century which were being published with the very same intentions that the current open source movement within digital journals: to make scientific information available freely to any who chose to access it (Open Source World 2015). The current definition of open source follows these main concepts: free distribution, complete and open access to all source information, the full acceptance that derived works will occur and are thus allowed to be distributed, author integrity, no discriminatory practices at any level of the process or towards any parties, and open licensing where applicable (Open Source Initiative 2007).

As noted there is a current push to make more sources of information, software, and technology open source, as defined above, with the very same underlying principles that guided those early scientific journals. This project was conducted utilizing and almost entirely open source work flow. Besides final formatting for the purposes of official submission, all word processing and database creation were performed using Google Drive, Google Docs, and Google Sheets. All spatial analysis, mapping and GIS procedures were conducted using the QGIS 2.10.1 with GRASS 6.4.4 (QGIS Development Team 2015). All mathematical calculations, statistical analyses, and some database processing were conducted using the RStudio 0.98.1103 interface (RStudio Team 2015) and using the R 3.1.0 statistical package (R Core Team 2013).

Late Archaic Shell Ring Repository

While much of the data utilized within this project was freely and publically available, it was still dispersed among dozens of reports with the data remaining in whatever format (table, graph, or list) the original authors and researchers deemed most appropriate for their respective studies. Recently, Russo (2006) gathered much of the available data together into a single report



The Database

Below are the accumulated data that comprise the LASRR. Each of the 'Artifact' buttons, and the 'Radiocarbon Dates', 'Dimensions and Measurements', and 'NRHP-NHL Statuses' buttons will immediately download the approprate database that come in the form of a single Microsoft Excel spreadsheet.

The 'Site Maps and Imagery' button and the 'Individual Ring Reports' button will each (eventually) link to a seprate page that will then provide links to each of the individual shell rings. Both of these sites are still under construction.

The 'References' button will immediately download a PDF of a current list of references that address the Late Archaic shell rings of the North American southeast.

Additional reference information for the shell rings can be found via the Digital Index of North American Archaeology (DINAA). Location data is not provided within this database. For location data please contact the appropriate State Historic Preservation Offices (SHPO's).

If there are any additions, comments, questions, or suggestions please contact mwalke63@vols.utk.edu.

Figure 3.1: Screenshot of the database page of the Late Archaic Shell Ring Repository which can be found at the following URL: http://www.martinpwalker.com/#!lasrr/cvqv. Each of the Artifacts tabs along the left, and the Radiocarbon dates, Dimension and Measurements, and NHRP Statuses tabs, will all link to a single excel spreadsheet that will include the listed data from all of the shell rings of the Late Archaic period. The Site Maps and Imagery and the Individual Ring Reports tabs will open up a new page that will include individual files for each shell ring.

with the expressed purpose of providing "the archeological and historical context for nominating nationally significant Late Archaic shell-ring sites for designation as National Historic Landmarks" (Russo 2006:8). With the data centralized it became much easier to begin to consider the regional variability in shell rings. However, these data were still all contained in the static format of printed tables. Thus, one of the major products of this project is the creation of a searchable database that has each category of data parsed out into individual columns and tables, allowing researchers to sort through and work with whichever individual or grouped data they wish to.

The database, the Late Archaic Shell Ring Repository, is structured as a series of individual excel tables and collections of images that are currently being hosted at the following website: http://www.martinpwalker.com/#!lasrr/cvqv. There are two sets of tables that can be found as a part of this database (Figure 3.1), the first set are structured such that they group together material culture types (e.g. lithics, ceramics, shell, etc.), shell ring design elements (e.g. ring dimensions, or shape descriptions), radiometric data, and current NRHP/NHL statuses. Each of these groupings have their own table that includes information from all of the shell rings. The second set of tables found in the database are individual shell ring tables that collect all of the available data listed above for each individual ring such that each shell ring has their own unique table of information.

Image data such as site maps and photographs that were taken from site reports and other documentation also exist within the database as individual image files. There also exists a geospatial relational database with all of these data mapped to the exact coordinates of each shell ring, however, this database, and the locational information of the shell rings, will not be made available via the open access database. For location data for the shell rings, researchers will need to contact the appropriate federal, state, and local agencies.

As new data becomes available and as newer analyses are conducted on the North American shell rings these data tables will be updated. Furthermore, in time this database will also expand to include the North American shell rings of the Woodland and Mississippian time periods. The following chapter provides a more detailed description of the different data that exists within the available database, and all of the available data can also be found in the appendices of this thesis.

Chapter 4

The Data

Origins of the Data

The data for this project were gathered from currently available shell ring literature, with primary sources being utilized whenever possible, and secondary recordings of data being used only when primary sources could not be obtained or for confirmation purposes. These data took many forms such as conference papers, site reports, published articles and manuscripts, and site maps. It should be noted that not all of the rings mentioned here have been excavated; some have not even had more than a cursory survey. Of the 51 known Late Archaic shell rings, 10 (19.6%) have had no archaeological work conducted beyond recording of presence, and 2 (3.9%) have had only a cursory survey. This leaves only 39 (76.5%) shell rings that have had archaeological excavations conducted. The nature of these excavations is variable, ranging from long-term and extensive to short-term and limited recovery projects. The following chapter will go into specific details about the kind of data and material culture that have been recovered from archaeological investigations at the shell rings.

National Register of Historic Places & National Historic Landmark Statuses

One illustration of the variable nature of work done at shell rings can be seen in regard to their National Register of Historic Places (NRHP) and the National Historic Landmark (NHL) listings. Of the 51 known or possible Late Archaic shell rings only 14 (27.5%) have been listed in the NRHP, all but one of which were placed there in the 1970's (Russo 2006:113; Appendix A). Furthermore, there are a number of rings that have not been evaluated (19 rings, 37.3%)

leaving their current status unknown, and with the current trends of climate change and sea level rise, if these sites are not protected or mitigated the information in them will likely be lost.

Shell Ring Chronology

There are currently a total of 163 dates from 32 of the Late Archaic shell rings (Appendix B). The distribution of these dates, however, is not evenly spread across all sites, with 85 dates (52.1% of all of the dates) belonging to only five of the rings, and with the remaining 78 dates being spread out over the remaining 27 shell rings (Table 4.1). Furthermore, not all of the dates taken from the rings are indicators of Late Archaic activity, with some of the dates collected showing both earlier and later human activity at these locations. Given the unevenness of the chronological data, the temporal analysis of the rings conducted here will be open to future revisions as newer data become available. The dates obtained thus far indicate that shell ring construction, use, and maintenance lasted for the entirety of the Late Archaic period and persisted into the Early Woodland period, though, as has been documented by Sanger (2010) and will be examined further below, activity does not appear to have been continuous through the Late Archaic at all sites, with different sites appearing, being used, and then being abandoned at different times and intervals.

Shell Ring Material Culture

Ceramics

Shell rings are directly associated with some of the earliest ceramics in the New World. Of the 51 known shell rings, 43 have been shown to have ceramics of some kind (Appendix C). The two earliest pottery types found in the shell rings are a fiber-tempered ware that is commonly referred to as Stallings and a sand-tempered ware that appears just after Stallings,

Table 4.1: Number of radiocarbon dates collected for each shell ring (Russo 2006:11-16; Sanger and Thomas 2010:62-63). For the complete table of dates and their references see Appendix B.

Site Name	Site ID	Number of Dates
A. Busch Krick	9MC87	2
Auld	38CH41	1
Barrows	38BU300	1
Bonita Bay	8LL717	4
Cannon's Point	9GN57	2
Cedarland	22HC30	1
Claiborne	22HC35	4
Coosaw 1	38BU1866	1
Coosaw 2	38BU1866	3
Coosaw 3	38BU1866	1
Fig Island 1	38CH42	3
Fig Island 2	38CH42	3
Fig Island 3	38CH42	3
Guana	8SJ2554	10
Hill Cottage	8SO2	5
Horr’s Island	8CR209	13

Site Name	Site ID	Number of Dates
Joseph Reed	8MT13	6
Lighthouse Point	38CH12	5
McQueen	9LI1648	15
Meig's Pasture	8OK102	6
Oxeye	8DU7478	4
Patent Point	38BU301	2
Rollins	8DU7510	12
Sapelo 1	9MC23	7
Sapelo 2	9MC23	1
Sapelo 3	9MC23	3
Sea Pines	38BU7	2
Sewee Shell Ring	38Ch45	3
Skull Creek, Large	38BU8	2
Skull Creek, Small	38BU8	1
St. Catherines	9LI231	35
West	9GN76	2

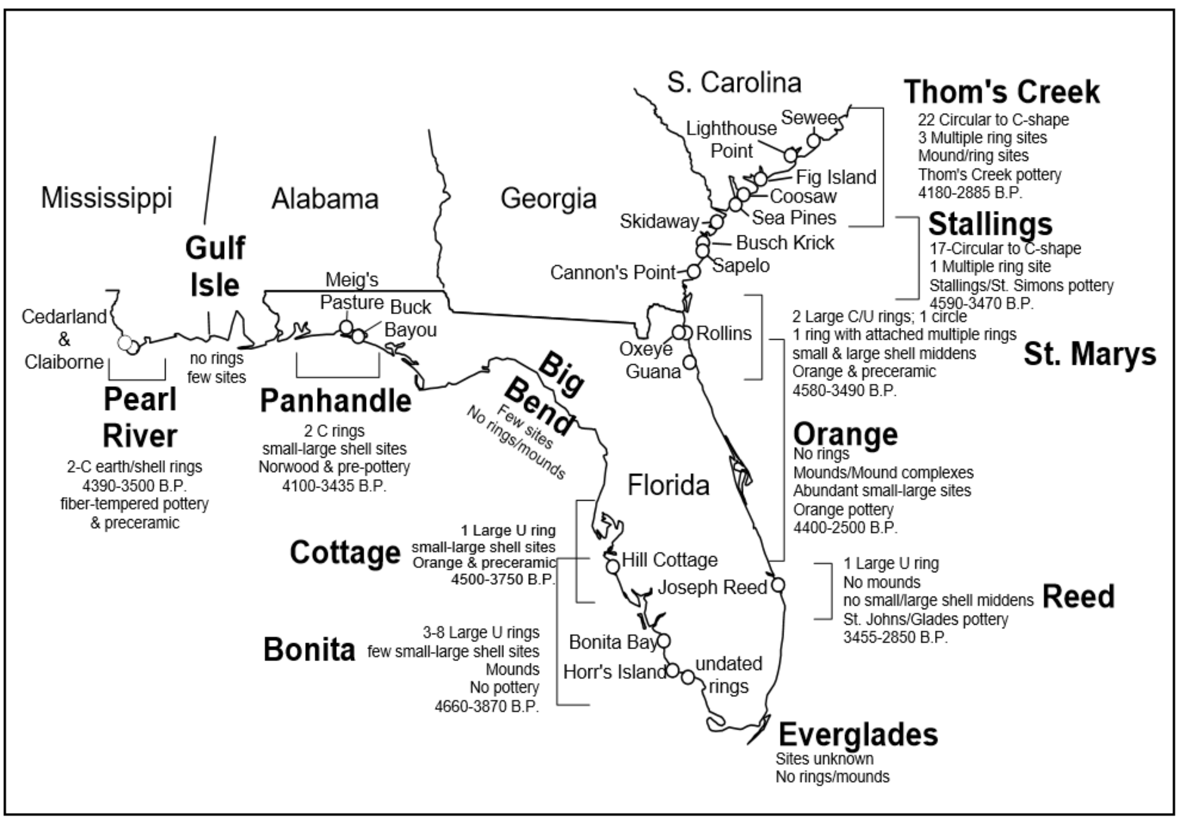


Figure 4.1 Map of shell rings by ceramic types, adapted from Russo 2006:52.

called Thom's Creek. Both of these pottery types appear in context with the Atlantic coastal rings, with ceramics appearing at the rings in Florida and along the Gulf coast later in time (Russo 2006:31). The presence of fiber tempered pottery has been reported at 31 sites; 22 site reports included specific type identifications such as Stallings, St. Simons, and Orange wares. The remaining 9 shell rings did not list specific types, simply listing the presence of fiber tempering. Of the rings where specific ceramic types were identified, 4 sites contain Orange wares, 8 sites possessed Stallings wares, and 10 sites contained St. Simon's wares.

Thom's Creek sand-tempered wares are reported from 24 sites and 3 sites are reported to have Awendaw wares. The distribution of these wares along the Atlantic coast has been extensively studied (Anderson 1975; Russo 2006; Sassaman 1993; Thompson et al. 2008; Trinkley 1980) with the overarching trend of these studies showing that fiber-temper wares (Stalling and St. Simons) are located on the southern end of the Atlantic coast, mostly on the coast of Georgia and the southern South Carolina coast, and sand-tempered wares (Thom's Creek and Awendaw) being found along the northern stretch of the lower Atlantic coast, mostly along the central coast of South Carolina. These two tempers are not mutually exclusive, with some sites containing both wares. In fact, there are 14 shell rings that contain both tempers most of which are along the southern South Carolina coast. Despite overlapping along the coast, Russo (2006:52; Figure 4.1) has mapped the distributions of these types and has shown that they do have individual distributions, indicating ceramic manufacture and use varied sub-regionally among early and middle Late Archaic shell ring users, with three major groupings evident: Thom's Creek users, Stallings users, and non-pottery users. While non-pottery users are present within the shell ring building tradition (Sassaman 1993:22), by ca. 4000 cal yr B.P., Orange wares appear in those areas where pottery was initially not being utilized.

Lithics

The recovery of lithic materials from shell ring sites, as well as Late Archaic Atlantic coastal sites in general, is rare (DePratter 1975; Russo 2006; Sassaman 1993; Sanger and Thomas 2010:68; Trinkley 1980:208). In fact when one examines the numbers, only 62.7% of the currently known Late Archaic shell rings have had lithics recovered, and when we break down these recovered items into general categories of projectile points, flakes, bifaces, and blades, lithic artifacts do not make up much of the material culture that are found at shell ring sites. There are a number of factors that could play a role in the various discrepancies that exist within these numbers: recovery methods, general prehistoric lithic availability, and shell ring use. As noted, one of the factors that could affect the recovery of certain lithic artifacts, such as quartz pebbles or pins, is the fact that different rings were excavated at different periods of time, and thus experienced varied research agendas and recovery methods, such as the use or lack thereof of screens or flotation. Another possible reason for the variability in recovery is because in some cases, some of these sites may have had more or less lithic materials due to variable access to lithic sources further inland (DePratter 1976:36). The final suggestion for the differences in recovery of lithic artifacts is the use of the shell rings themselves. If we assume that the shell rings were strictly habitation sites, then certain kinds and quantities of household artifacts should be present. However, if the use of shell rings was not only for habitation (or not habitation at all) then perhaps the reason for the discrepancies in lithic artifacts could be that lithics were not employed in the activities that occurred at the rings.

A very limited number of bifaces and blades have also been recovered from the Late

Table 4.2: Presence of lithics at shell ring sites by lithic type. See Appendix D for more detailed lithics counts and references.

	Number of Rings Where Recovered	**Percentage of Total Rings**
Lithics Present	32	62.7%
Projectile Points	13	26%
Flakes	19	38%
Bifaces	3	6%
Blades	2	4%
Hammer stones	5	10%
Groundstones	3	6%
Quartz Pebbles	2	4%
Chert Pieces	2	4%
Pins	2	4%
Bannerstones	2	4%

Table 4.3: Shell Ring Projectile Point Counts. See Appendix D for more detailed lithics counts and references.

Site Name	**Site ID**	**Projectile Points Count**
Cannon's Point	9GN57	2
Cedarland	22HC30	Uncounted
Chester Field	38BU29	2 – 5
Claiborne	22HC35	Uncounted
Guana	8SJ2554	2
Horr's Island	8CR209	1
Lighthouse Point	38CH12	10
McQueen	9Li1648	8
Sapelo 3	9MC23	1
Sewee Shell Ring	38Ch45	2
Skull Creek Large	38BU8	2 (from Skull Creek rings)
Skull Creek Small	38BU8	
St. Catherines	9LI231	18
Stratton Place	38CH24	1

Archaic coastal shell rings (Ogden 2011:72; Table 4.2). In the context of the coastal shell rings the term bifaces do not necessarily imply projectile point technology, but simply refer to lithic pieces that have been worked on two parallel sides. Such tools in these Late Archaic assemblages were utilized for a multitude of cutting and slicing tasks. Of all of the rings with lithic material recorded, only three have bifaces, and of those three, two had only one biface each, and the final ring, St. Catherines shell ring, had 36 bifaces. In regards to blades, only two sites have reported the presence of blades, the McQueen and St. Catherines shell rings, both found on St. Catherines Island, Georgia. This may be in part due to the reports from these two sites following the strict definition of a blade as "a flake with parallel or sub-parallel lateral margins, which is usually at least twice as long as it is wide" (Ogden 2011:59 quoting Andrefsky 2005:253). With only these two sites having recorded blades, it is possible that all of the other shell ring sites combined potential blades, flakes that are longer than they are wide, in with overall flake counts.

Table 4.4: Shell Ring Flake Count. See Appendix D for more detailed lithics counts and references.

Site Name	**Site ID**	**Flakes Count**
A. Busch Krick	9MC87	1
Cane Patch	9CH35	1
Cannon's Point	9GN57	Uncounted
Cedarland	22HC30	Uncounted
Chester Field	38BU29	Uncounted
Claiborne	22HC35	Uncounted
Coosaw 3	38BU1866	1
Fig Island 1	38CH42	1
Guerard Point	38BU21	2
Horr's Island	8CR209	19
Joseph Reed	8MT13	4
McQueen	9Li1648	2297
Oxeye	8DU7478	2
Rollins	8DU7510	10
Sapelo 3	9MC23	81
Sewee Shell Ring	38Ch45	1
St. Catherines	9LI231	4879
Stratton Place	38CH24	1
West Ring	9GN76	56

Of the rings with lithic materials, only 13 rings have recorded any projectile points (Table 4.3) and of these, in all but four cases (Chester Field, Lighthouse Point, McQueen, and St. Catherines), the number of projectile points is only 1 or 2 (Appendix D). Of the shell rings reporting lithics, only19 had flakes present; in many cases the quantities of flakes were either not given (listed as "Uncounted" in Table 4.4) or the counts were low (Table 4.4). Of the 15 rings with recorded flake counts, 9 have 5 or fewer flakes and 13 have under 100 present, while the remaining two sites have much large numbers, in the thousands (Table 4.4). In a review of lithic materials from the two rings on St. Catherines Island, Sanger and Thomas (2010:68) argue that the initial reduction sequence most likely took place elsewhere and not at the rings themselves. The full range of lithic materials from shell rings includes chert and flint pieces, groundstone, limestone, quartzite, and sandstone, and contained such artifacts as balls, bannerstones, beads, engravers, hammer stones, heating stones, hones, metates, pendants, pins, and scarpers (Table 4.5). However, again, the only pattern or consistency among these artifacts is that limestone is only found at the rings in Florida.

Shell Ring Design

For the purposes of this analysis, design will refer to the combined dimensions of size and shape of the shell rings with size being defined by the maximum ring diameter and shape defined as the eccentricity of the ring, which will be explained below. In order to ensure consistency of eccentricity calculations and maximum diameters, all site maps that could be collected from the literature were scanned and uploaded into the software AutoCAD 2013 where all measurements were standardized as per Russo and Heide's (2003:31) more thorough measurement labels which include inside and outside diameter dimensions for major and minor axes as well as the acknowledgment of variable wall thickness along the arc of the rings. These

Table 4.5: Additional lithic materials recovered from shell ring sites. See Appendix D for more detailed lithics counts and references.

Site Name	Site ID	Other Lithics Present
Bonita Bay	8LL717	Limestone (1)
Cannon's Point	9GN57	Groundstone (1), Quartzite pebbles (596), Quartzite cobble (1), Pieces of chert (15)
Cedarland	22HC30	Bannerstones, Sandstone slabs
Chester Field	38BU29	Hammer stone
Claiborne	22HC35	Steatite (Uncounted)
Coosaw 2	38BU1866	Pin fragment (1)
Fig Island 3	38Ch42	Debitage (Uncounted)
Guana	8SJ2554	Steatite (9)
Guerard Point	38BU21	Engraver (1)
Hill Cottage	8SO2	Limestone Metate (1)
Horr's Island	8CR209	Groundstone balls (4), Limestone (102),
Joseph Reed	8MT13	Limestone (313), Sandstone (3)
Lighthouse Point	38CH12	Other lithics (28), Steatite (3)
McQueen	9Li1648	Core (1), Hammer stone (1), Petrified wood (52)
Meig's Pasture	8OK102	Sandstone hones (2)
Oxeye	8DU7478	Ochre (1)
Patent Point	38BU301	Pieces of worked stone (2)
Rollins	8DU7510	Hammer stone (1), Sandstone (13)
Sapelo 1	9MC23	Ball (1), Bannerstone (1), Piece of flint (1)
Sewee Shell Ring	38Ch45	Bead (1)
Skull Creek rings	38BU8	Grooved abraders (Uncounted)
St. Catherines	9LI231	Cores (3), Drills (3), Groundstone (1), Hammer stone fragments (3), Pot lids (2)
Stratton Place	38CH24	Hammer stones (7),Heating stones (8), Pendant (1)
West Ring	9GN76	Pieces of chert (7), Quartzite pebbles (47)

measurements were then compared to the published measurements for those sites. There were situations in which site maps could not be located, in these situations published dimensions were used for the calculations. Unfortunately, there were also eleven reported rings (Bony Hammock, Cane Patch, Coosaw 4, Crow Island, Guerard Point, Hanckel, Hobcaw, Ossabaw 77, Skidaway 21, Skidaway 9 Large, and Skidaway 9 Small) that had to be excluded from this analysis. For these rings either site maps or published dimensions were unavailable, or the sites have yet to be positively confirmed to have been an actual shell ring, either due to erosion or the lack of enough of the ring to allow for reliable diameter measurements.

Shell Rings as Ellipses and Eccentricity Measurements

Despite the multitude of names, such as C-shaped or U-Shaped, that have been used to describe the shapes of shell rings (Appendix E), if we use basic geometric descriptions, all shell rings are either closed or open-ended ellipses. Ellipses are conic sections resulting from a plane intersecting a cone at an arbitrary angle and creating a closed curve (Figure 4.2). Circles are also ellipses, however they represent special situations where a plane intersects a cone perpendicularly to the cone's central axis. This facilitates standardized analysis as one set of calculations can cover all possible ring designs from close to circular shapes to the elongated elliptical shapes. Shell rings themselves are not perfectly symmetrical ellipses since they typically have walls of varying widths, and many have also suffered post-depositional damage from mining and farming practices. For the purposes of this analysis, however, the rings will be treated as symmetrical.

Every ellipse has a major (Figure 4.3) axis (A^I-A) and a minor axis (B^I-B), mirroring Russo and Heide's (2003:31) Major Diameter and Minor Diameter, as well as two foci (F_1 and

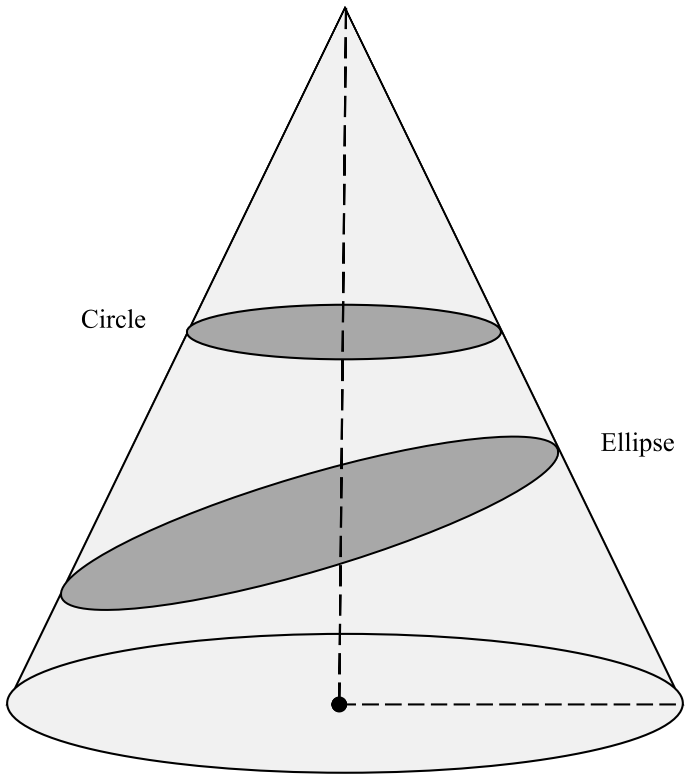


Figure 4.2: Ellipses form as a plane intersects with a three-dimensional come. Circles are ellipses formed when the plane intersects perpendicular to the central axis of the cone.

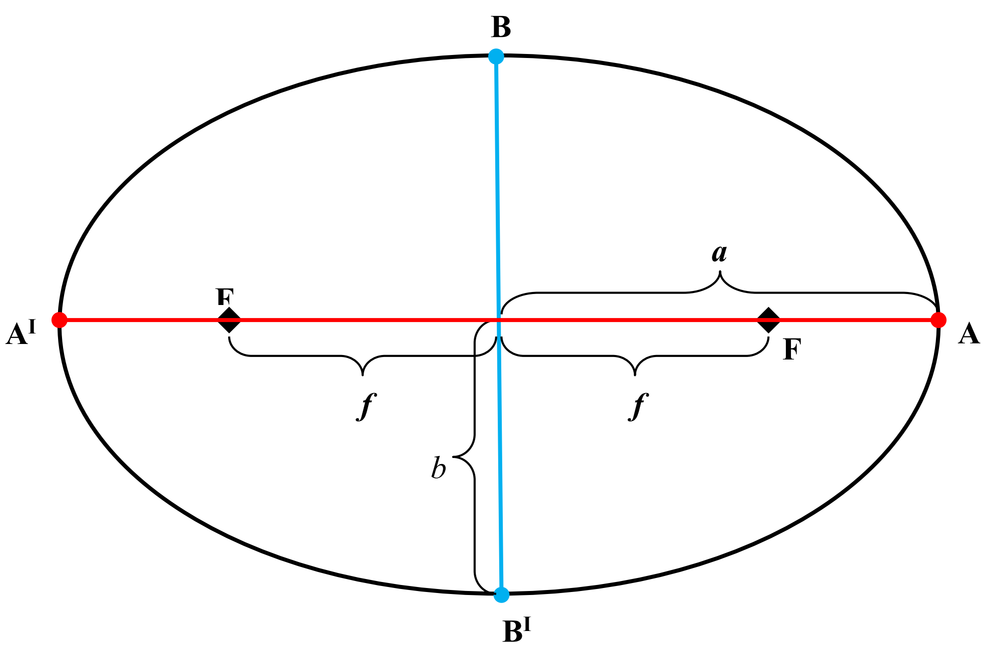


Figure 4.3. Components of an ellipse. The major axis is represented by the line segment (AI-A), and the minor axis by line segment (BI-B), and two foci are represented by the points F1 and F2 with the focal distance represented by the distance *f*.

F_2). The foci (F_1 and F_2) for perfectly symmetrical ellipses are always equidistant from the center point, which is represented by the value *f* which is calculated by the following equation,

$$f = \sqrt{a^2 - b^2}$$

where a and b are half the distances of the major and minor axes. In order to calculate the eccentricity of an ellipse we must first classify these measures of half the distance for each diameter. Here this is represented by *a* which equals half the value of the major axis and *b* equals half the value of the minor axis.

The eccentricity of an ellipse (ε) is the ratio of the focal distance (*f*) to half the length of the major axis (*a*) (Figure 4.4). More to the point, the calculated eccentricity numerically, represented by the following equation,

$$\varepsilon = \frac{f}{a}$$

represents the degree to which an ellipse is circular or elongated. Eccentricity values range between values of 0 and 1, with the eccentricity value of 0 representing a perfect circle and the eccentricity value of 1 representing a straight line, or fully flattened ellipse. By being able to assign each shell ring an eccentricity value (Appendix F) it is possible to have a descriptive metric that represents the elliptical/circular nature of the ring without having to use potentially biased categorical terms, such as horseshow-shaped or C-shaped, that have been used thus far (for past shape classifications see Appendix E).

Design Trends of Shell Ring Shape and Size through Time

Calculating eccentricity values allows for a metric for shape, but this measure does not give any indication of size of the rings. In order to discuss ring size, this analysis uses the measured major axis dimension since this metric represents the largest size the rings themselves. What follows is a brief analysis and discussion of the changes of shell ring shape and size through time. To ensure that both eccentricity and major diameter could be used simultaneously within any form analysis a test for covariance was conducted and a scatter plot of the data and a Pearson product-moment correlation were created (Figure 4.5). Each of these tests indicate that while there is a weak positive relationship between the two metrics, shape and size, it is not significant, thus allowing for the use of both variables as unique metrics for analyzing the shell rings ($r=0.2629$).

As this analysis is examining change in design elements of the shell rings (shape and size) over time, using the earliest recorded date from each ring would be the most appropriate, since that is when ring design would have likely occurred. While later dates may represent the final, and thus more completed stages of the designs of the rings, the general size of the rings would have been defined earlier rather than later, as would to a lesser extent, the general layouts.

When shell ring size, shape, and location are all organized by earliest chronological date of the rings a subtle patterns emerge. The nature of these patterns is different in the two overarching geographical regions. The pattern among the Florida and Gulf Coastal rings revolves less around the shapes (eccentricities) of the rings and more around the sizes of the rings, with eccentricities varying locally but with an increase in ring size seen through time (Table 4.7). The pattern of shell ring construction northward along the Atlantic coast is patterned by both changes in shape and size with a general decrease in size of the rings (with the exception of the Fig Island 1 ring) as well as a general increase in eccentricity (Table 4.8). One thing that should be noted here is that the shell rings of the Atlantic coast exist within a system where they are both found within small groupings of rings that form into complexes as well as being generally close to each

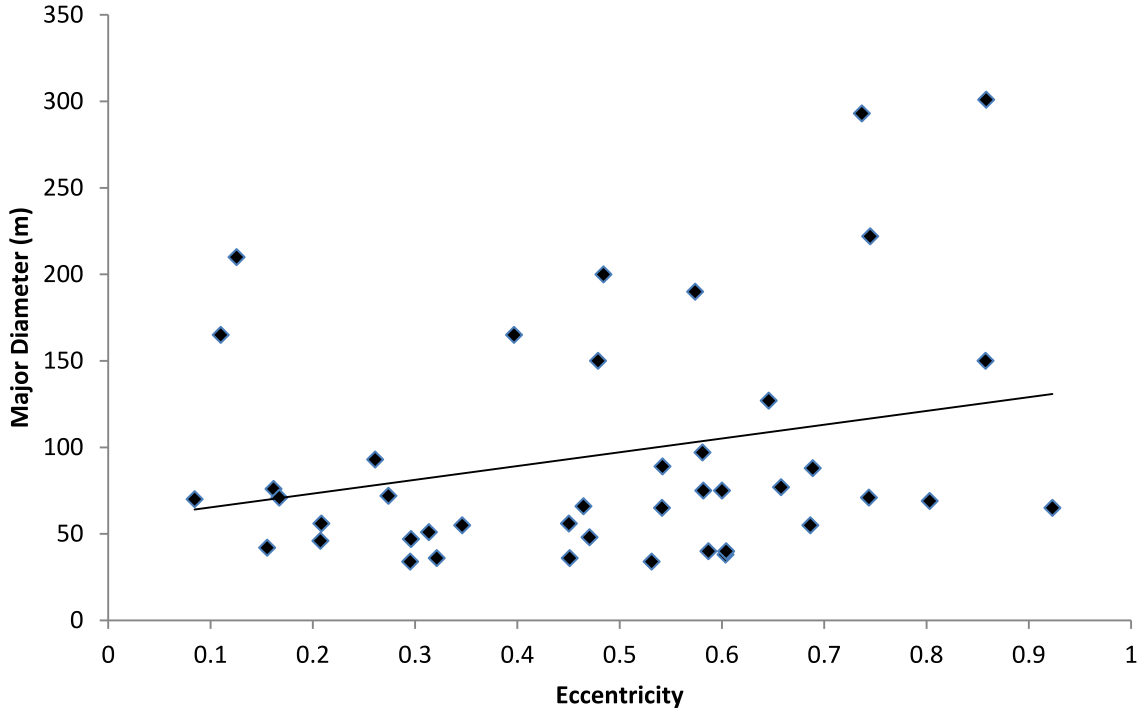


Figure 4.4: Top – Shell ring major diameter in meters and shell ring eccentricity plotted against each other to examine for correlation (Appendix E and VI). A weak positive correlation is present, as represented via the positive slope.

Table 4.6: Florida and Gulf coastal shell ring eccentricities and major diameters and grouped by geographical proximity. The rings are then listed in descending chronological order within each grouping from oldest (top) to youngest (bottom).

Shell Ring	Eccentricity	Major Diameter
Horr's Island	0.86	150
Hill Cottage	0.48	150
Bonita Bay	0.86	230
Oxeye	0.40	165
Rollins	0.57	190
Guana	0.75	222
Meig's Pasture	0.69	88
Claiborne	0.48	200
Cedarland	0.11	165
Joseph Reed	0.74	293

other along the coast. In contrast, the rings of Florida and the Gulf coast are much further from each other and do not exist in complexes at all.

There appears to be a consistency and hence an intentionality to the shapes of the rings, at least in different areas. No matter what the rings were used for they were clearly being maintained over long periods of time, which means their shapes likely held some significance to their makers (Russo 2004; Thompson 2007). As seen from the data compiled here, shell ring design runs the gamut in both size and eccentricity, with one obvious pattern being that the rings in Florida are both bigger and more eccentric than those to the north along the Atlantic coast or to the west along the Gulf coast, indicating that there may indeed be social divides in the design of these rings.

Table 4.7: Atlantic coastal shell ring eccentricities and major diameters grouped by geographical proximity with the southernmost rings at the top. The rings are then listed within descending chronological order within each grouping.

Shell Ring	**Eccentricity**	**Major Diameter**
Oxeye	0.40	165
Cannon's Point	0.74	71
West Ring	0.80	69
Sapelo 1	0.26	93
Sapelo 2	0.60	75
Sapelo 3	0.69	55
St. Catherines	0.08	70
McQueen	0.17	71
Coosaw 1	0.32	36
Coosaw 2	0.45	36
Coosaw 3	0.30	34
Fig Island 2	0.27	72
Fig Island 3	0.21	56
Fig Island 1	0.54	89
Auld	0.45	56
Sewee Mound	0.58	75

Chapter 5

Geospatial and Temporal Analysis of the Late Archaic Shell Rings

The first thing that must always be kept in mind when discussing the shell rings of the North American southeast is that they are but one site type constructed and used by coastal foragers. These sites did not form, did not exist, and did not become abandoned in a "ring-only" vacuum. Instead, their history of use exists within a larger historical network of foraging sites (Crusoe and DePratter 1976; DePratter 1975; Sassaman 1993; Trinkley 1980). Furthermore, as Thompson (2007) and Sanger (2015) have shown, the rings themselves experience variation in their use and meaning through time. Thus, any attempt to assign a single use or meaning to shell rings will inevitably be disproven; instead, any analysis of shell ring use must consider all of the data both in terms of both geography and time. To this end, this analysis will examine the data collected in the database chronologically from the earliest evidence of shell ring use through to their eventual abandonment.

Shell Ring Origins and the Floridian/Gulf Coastal Trajectory

When one examines all of the various lines of data (chronology, geography, and materiality) from all of the rings, in conjunction with a synthesis of shell ring theories, three significant and intersecting behavioral trajectories can be discerned within the contexts of the Late Archaic shell rings. The earliest of these trajectories is that of the Floridian/Gulf Coastal shell rings, which is followed by an Atlantic Coastal behavioral trajectory that then collides with, and is altered by, the Stallings ceramic trajectory that stems from the Savannah River valley. The following discussion is a first attempt to track these various trajectories with the aim of placing the data of the shell rings into an historical context.

Horr's Island, 8CR209;
Mounds A–D :8CR206–208, 211

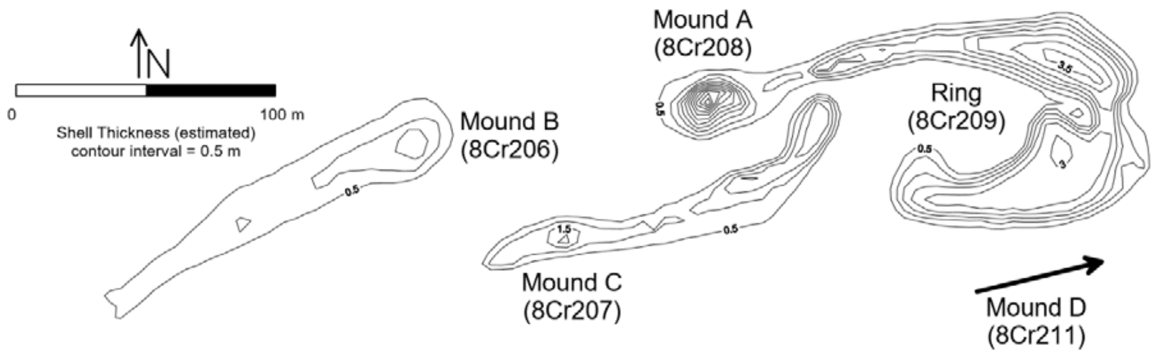


Figure 5.1 Topographic map of Horr's Island shell ring and mound, adapted from Russo 2006:94.

The earliest of the shell ring trajectories is that of the Floridian/Gulf Coastal rings. Within this trajectory, two shell rings vie for being the earliest shell ring in the southeast: the Oxeye shell ring and the Horr's Island shell ring. While our current understanding, based upon available measured chronometric data, may place the Oxeye shell ring as the oldest of the physical shell rings, this study suggests that the mounding of shell into an elliptical pattern may have originated along the Gulf coast at or around the Horr's Island shell ring. This idea is based upon a number of pieces of information. The first is the chronometric data: while the Oxeye ring may have the earliest measured date in relation to shell ring activity, the Horr's Island ring still possesses some of the earliest shell ring dates (Appendix B) that are similar in age to those from the Oxeye shell rings making them at least contemporaneous. In addition to these dates, however, there are associated mounds close to the Horr's Island shell ring, Mound A, Mound B, and Mound C (Figure 5.1), that have all been dated and pre-date the shell ring itself, indicating continuous shell mounding behavior leading up to the shell ring's initial creation (Appendix G). To date, such pre-ring mounding activity has not been detected at the Oxeye shell ring. In addition, post-holes, hearth features, and pit features, all indications of habitation practices were also uncovered during excavations at the Horr's Island shell ring (McMichael 1982; Russo 1991, 1994). The essence of the coastal practices that were taking place during the early stages of shell rings use, specifically at Horr's Island, are described by Russo and Quitmyer (2008): "Instead of seasonal migrations from the interior, this evidence indicates that the productive estuaries were exploited from large, permanently-occupied coastal villages as well as from smaller logistical foraging camps during the Archaic period." (Russo and Quitmyer 2008: 239).

In addition to these earlier mound dates, the Horr's Island ring (Figure 5.2) follows more closely to the general Floridian/Gulf Coastal ring tradition in that it is a very large, open ended, more elliptical construction, whereas the Oxeye ring (Figure 5.2), while larger than most of the Atlantic rings, still possesses characteristics of the Atlantic Coastal tradition in that it is more circular and possesses both pottery and baked clay objects, indicating that it may be a transitional ring between the two traditions. This Floridian/Gulf Coastal tradition is defined by very large, open ended constructions. In addition to their size, the rings of this tradition tend to be individual rings, with significant travel distance between rings. Many of the rings following this trajectory are either pre-ceramic, or non-ceramic and it is not until much later within this trajectory that the surrounding social context includes ceramics use.

Another reason to view the Oxeye ring as a transitional ring between the Floridian/Gulf Coastal and the Atlantic is that after the Oxeye ring becomes abandoned, no other shell ring activity occurs in the immediate area of the St. John's River until later in time causing there to be a distinct geographical separation between the shell ring users of the two traditions. Eventually, the head of the St. John's River does experience more shell ring activity, and these later rings follow almost exclusively the Floridian/Gulf Coast tradition, but by the time that this occurs, the

Figure 5.2: Active shell ring locations in Florida and along the Gulf Coast between ca 4700 and ca 4500 BP. Shell ring topology images modified from Russo 2006:94, 96.For complete listing of radiocarbon dates see Appendix B.

Figure 5.3: Active shell ring locations in Florida and along the Gulf Coast between ca 4500 and ca 4300 BP. Shell ring topology images modified from Russo 2006:104. For complete listing of radiocarbon dates see Appendix B.

Atlantic Coastal trajectory will already have spread all along the Atlantic coast.

Not long after Horr's Island's construction, a second ring following the Floridian/Gulf Coastal tradition appears along the Gulf Coast, the Hill Cottage ring (Figure 5.3). Both Horr's Island and Hill Cottage are relatively contemporaneous and experience activity for approximately the same period of time. In addition, both also appear to cease to be used around the same time as well.

After another construction hiatus, and after the Horr's Island and Hill Cottage rings had become a part of the Gulf coastal landscape, a continuous series of five new Floridian/Gulf Coastal shell rings spring up in chronological succession: Bonita Bay, Rollins, Meig's Pasture, Claiborne, and Guana. The dispersed nature of their locations begs the question of other potentially unfound rings in the vast regions between them. While the Floridian/Gulf Coastal tradition consists of large singular rings and not complexes of smaller rings, and while it is entirely possible that these few rings are indeed the only rings that are a part of this trajectory, we should not discount the fact that this coastline has seen much in the way of changes both natural and man-made that may have affected the visibility of shell ring constructions.

The Bonita Bay ring (Figure 5.4) was constructed around the height of activity of both the Horr's Island and Hill Cottage rings and, as can be seen, could still be found within an immediate region of these two rings. According to the currently available dates, by the onset of construction of both of the Rollins (Figure 5.4) and Meig's Pasture (Figure 5.5) rings, both Horr's Island and Hill Cottage appear to have been at, or very near, the end of their use-histories. Additionally, Meig's Pasture and Rollins were the first two rings of the Floridian/Gulf Coastal tradition that were constructed further from the original grouping, which represents the spread of Floridian/Gulf Coastal tradition along the Florida and Gulf coasts.

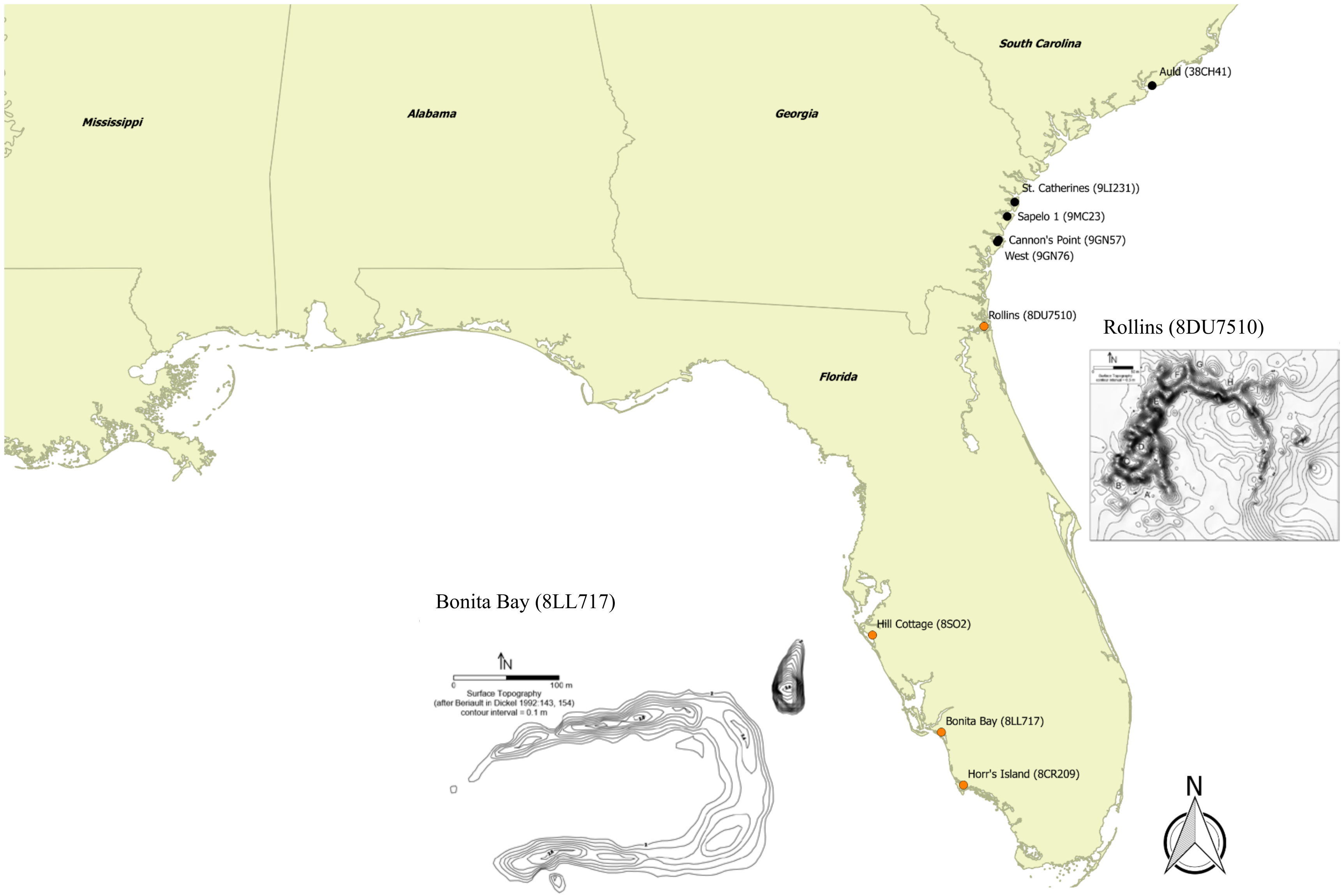


Figure 5.4: Active shell ring locations in Florida and along the Gulf Coast between ca 4300 and ca 4100 BP. Shell ring topology images modified from Russo 2006:98, 149.. For complete listing of radiocarbon dates see Appendix B.

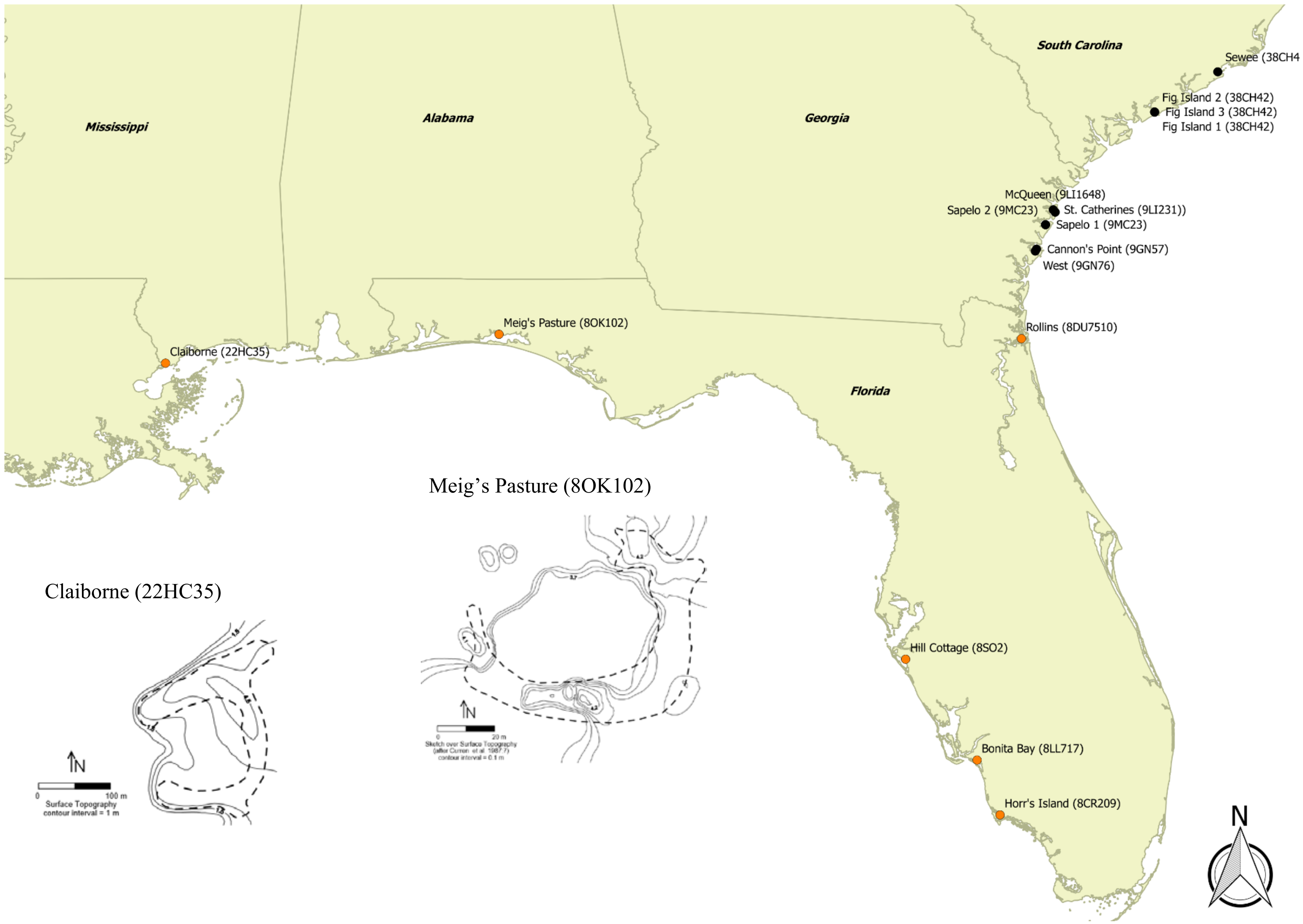


Figure 5.5: Active shell ring locations in Florida and along the Gulf Coast between ca 4100 and ca 3900 BP. Shell ring topology images modified from Russo 2006:151, 157. For complete listing of radiocarbon dates see Appendix B.

Figure 5.6: Active shell ring locations in Florida and along the Gulf Coast between ca 3900 and ca 3700 BP. Shell ring topology images modified from Russo 2006:102. For complete listing of radiocarbon dates see Appendix B.

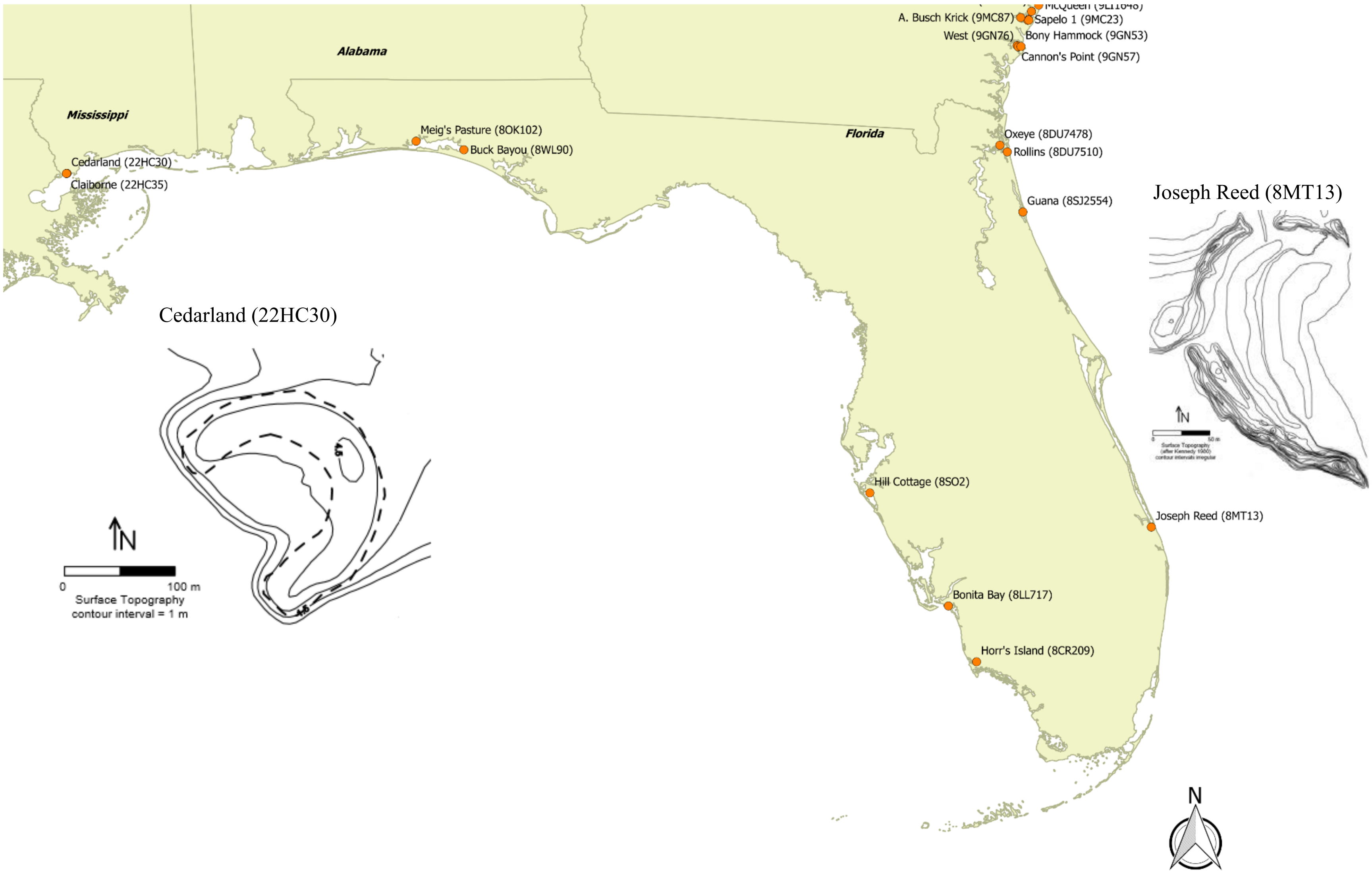


Figure 5.7: Active shell ring locations in Florida and along the Gulf Coast between ca 3600 and ca 3000 BP. Shell ring topology images modified from Russo 2006:100, 155. For complete listing of radiocarbon dates see Appendix B.

The final rings in this trajectory, the Guana and Claiborne rings, were actually constructed after the use-histories of both Horr's Island and Hill Cottage. The earliest dates that we have from the Guana ring coincide closely with the latest dates that we have from the Bonita Bay ring. This indicates that at the time of Guana's construction potentially none of the rings in the founding region were being utilized. This suggests one of three options: 1) the people who were utilizing the original rings had moved elsewhere, perhaps to these new sites; 2) the people using the rings felt that the rings had reached their maximum design and thus construction of the rings stopped but other currently undetectable/undetected activities continued; or 3) the people using these original rings remained in the region of the rungs but turned to pursuits other than creating shell mounds. It should be noted here that the Rollins ring, and then the Guana ring, represent a movement of this tradition back up along the St. John's River, possibly even to return to a potential founding area, with the Rollins ring being built very near to the location of the Oxeye ring, and the Guana ring is not much further south.

All of the rings mentioned so far belong to the Floridian/Gulf Coastal trajectory that consists of constructing large rings, some so large that they even possess attached ringlets and some are even accompanied by other mounding activities, and all are pre- or non-ceramic. There are two additional rings that are grouped in with this tradition, the Cedarland and Joseph Reed rings (Figure 5.6); however, due to their much later dating (ca. 3200 and 3400 cal yr BP), they only follow the architectural tradition that they stem from, and the people of both rings have modified the trajectory by employing ceramics. By 3400 cal yr B.P. ceramics had spread out throughout many parts of the lower southeast, including to these areas along the Gulf coast. Again, as with the Gulf coast, the Joseph Reed ring raises questions of possible loss of shell ring sites along the Atlantic coast of Florida in that the nearest shell ring along the coast from Joseph Reed is the Guana ring which is over 300 km away.

Stallings Trajectory

The oldest pottery traditions in North America are the fiber tempered wares of the Stallings tradition that arose within the Savannah River (Sassaman 1993:16; Sassaman and Rudolphi 2001:409). The Stallings pottery tradition developed within the network of waterway in and around the middle Savannah River valley and later spread down to the Atlantic coast (Sassaman and Rudolphi 2001:409). The initial development of pottery is currently thought to have occurred inland and not on the coast. Initial Stallings pottery use occurs about 5000 cal yr B.P. and is associated with the mounding of freshwater shellfish, which were not formed into rings. It was not until after pottery had already been developed that the fiber-tempered pottery of the Stallings tradition became a fixture within the practices of coastal shell ring users (Sassaman and Rudolphi 2001:410).

The Stallings people along the Savannah and nearby Coastal Plain drainages had direct interactions with non-ceramic using groups in the interior; specifically, there was trade between them and the soapstone users of the middle and upper Savannah River. As Sassaman (1993:215) argues, the initial development of pottery may have been a result of these interactions and the desire to separate from the use of soapstone, which due to the lack of stone materials on the Coastal Plain would have forced the Stallings people to acquire their soapstone from those upriver. After separating themselves from the demands of trade with the uplands the Stallings culture moved south to the coast where it began to interact with the coastally adapted shell ring users.

Atlantic Coastal Shell Ring Trajectory

While shell rings may have originated in the Floridian peninsula, the practice quickly spread northward along the Atlantic coast, presumably via the peoples who built the Oxeye shell ring. Oxeye is potentially a part of the earliest wave of shell rings following the approach initiated in the Floridian/Gulf Coastal Trajectory, however, it becomes the seed for all of the Atlantic coastal traditions in terms of other shared practices. After the construction of the Oxeye ring, a series of rings appear to the northeast, namely Cannon's Point ring (Figure 5.8) on St. Simons Island, then St. Catherines ring on St. Catherines Island, then West ring again on St. Simons Island (Figure 5.9), and finally the Sapelo 1 ring on Sapelo Island (Figure 5.10). All of these rings are built within a few hundred year period and all along the Georgia coast. This is what I call the Atlantic Coastal Shell Ring Trajectory.

The spread and construction of shell rings within the Atlantic Coastal Trajectory is much more rapid than the Floridian/Gulf Coastal Trajectory. In fact almost as soon as the practice of constructing shell rings reaches the southern Atlantic Slope, this practice immediately becomes intertwined with the Stallings Trajectory and the social practices that were coming out of the Savannah River Valley, including, as Sassaman has succinctly put it, the unique confluence of social and economic behaviors that were a part of this trajectory. This combination of trajectories alters the practice of shell ring use within Atlantic Coastal Trajectory from what is seen with the Floridian/Gulf Coastal Trajectory.

Recently, Thompson (2007) showed that there was most likely a change in tradition and use, a change in trajectory, which occurs within shell ring sites through time. In short, Thompson (2007) recommended a developmental model for shell ring formation that, following Binford’s archaeology of place (1982), would suggest that the changing formation of the rings would have

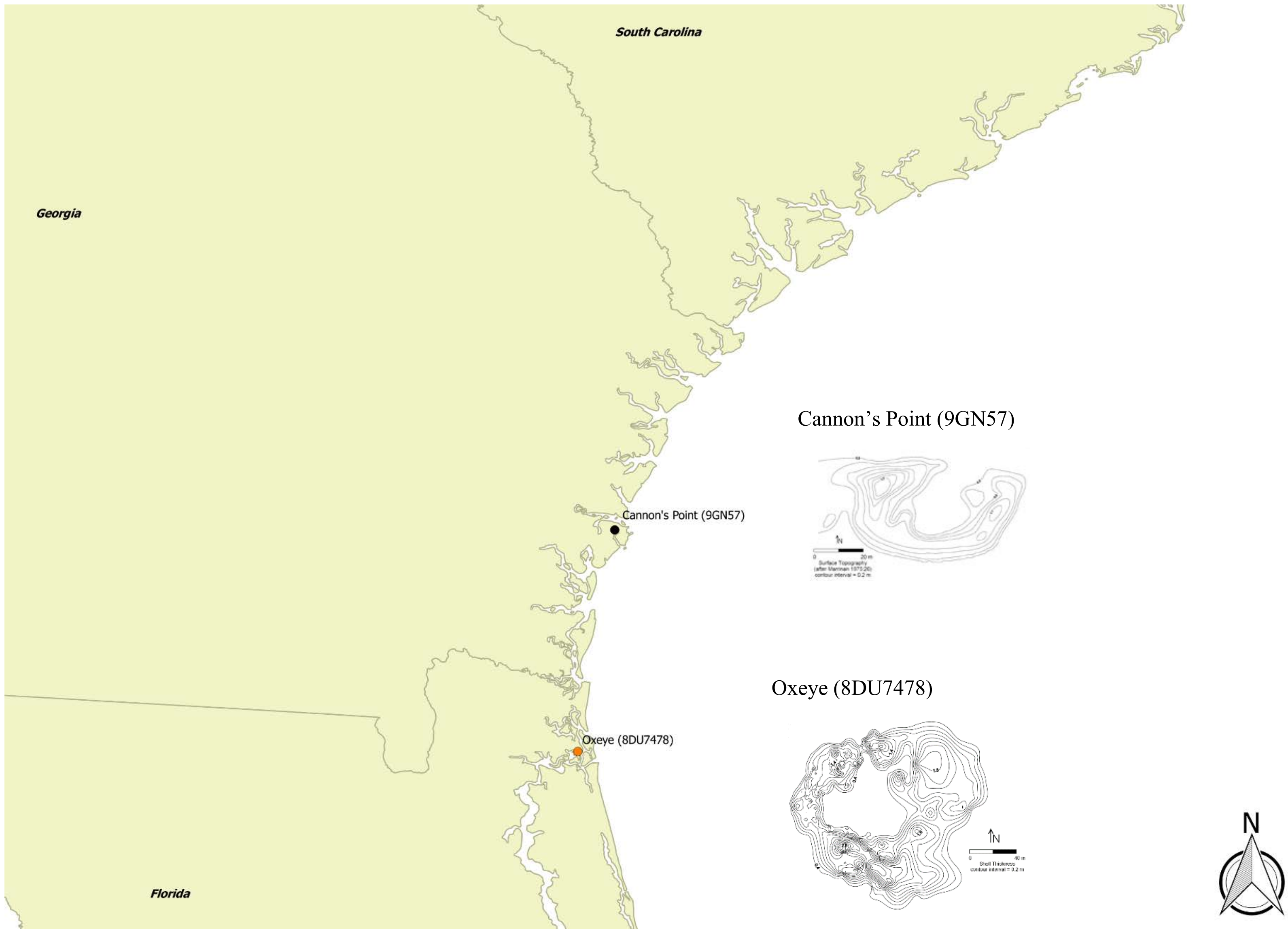


Figure 5.8: Active shell ring locations in Atlantic Coast between ca 4700 and ca 4500 BP. Shell ring topology images modified from Russo 2006:85, 96. For complete listing of radiocarbon dates see Appendix B.

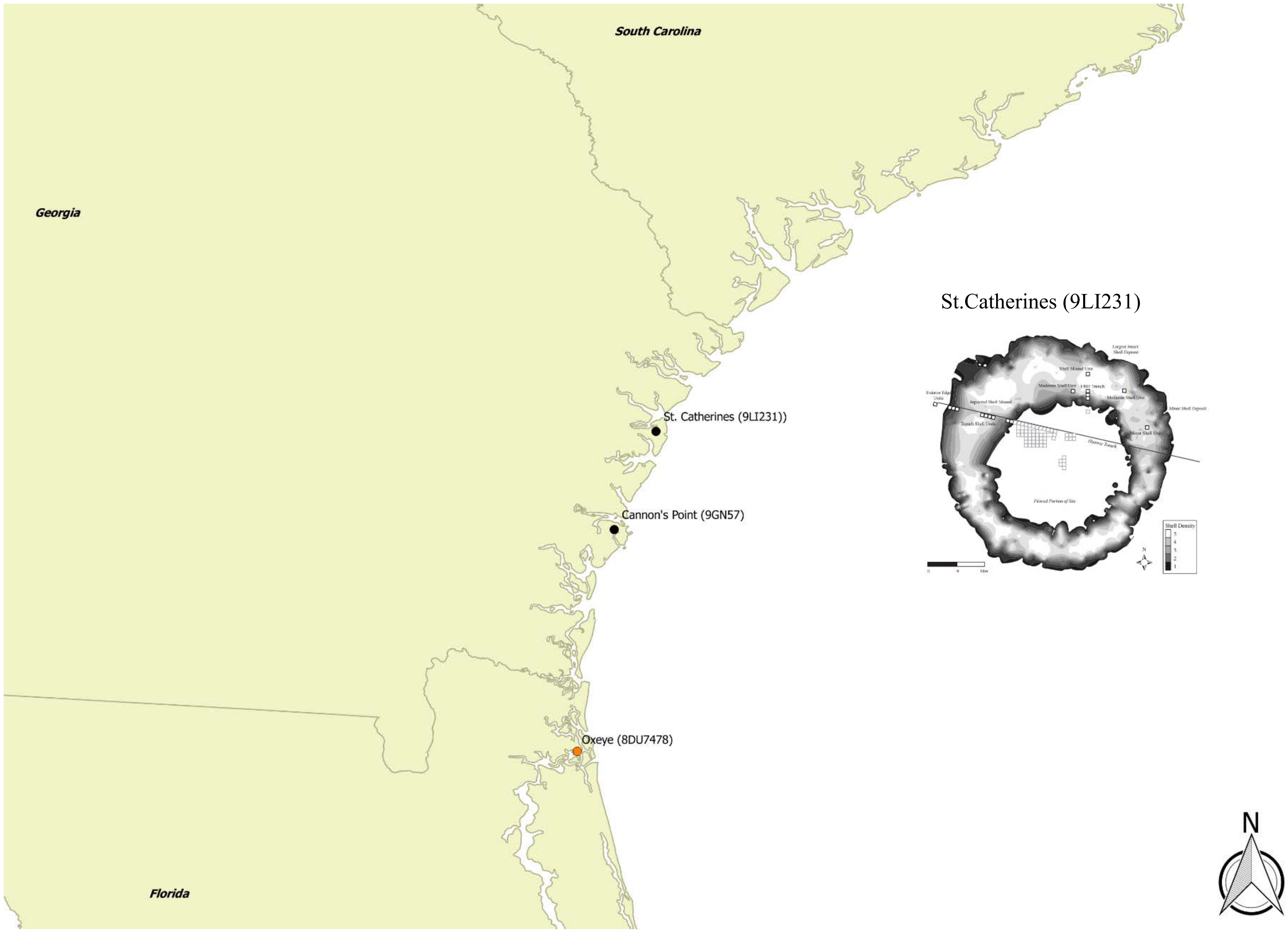


Figure 5.9: Active shell ring locations in Atlantic Coast between ca 4500 and ca 4300 BP. Shell ring topology images modified from Sanger 2015:152. For complete listing of radiocarbon dates see Appendix B.

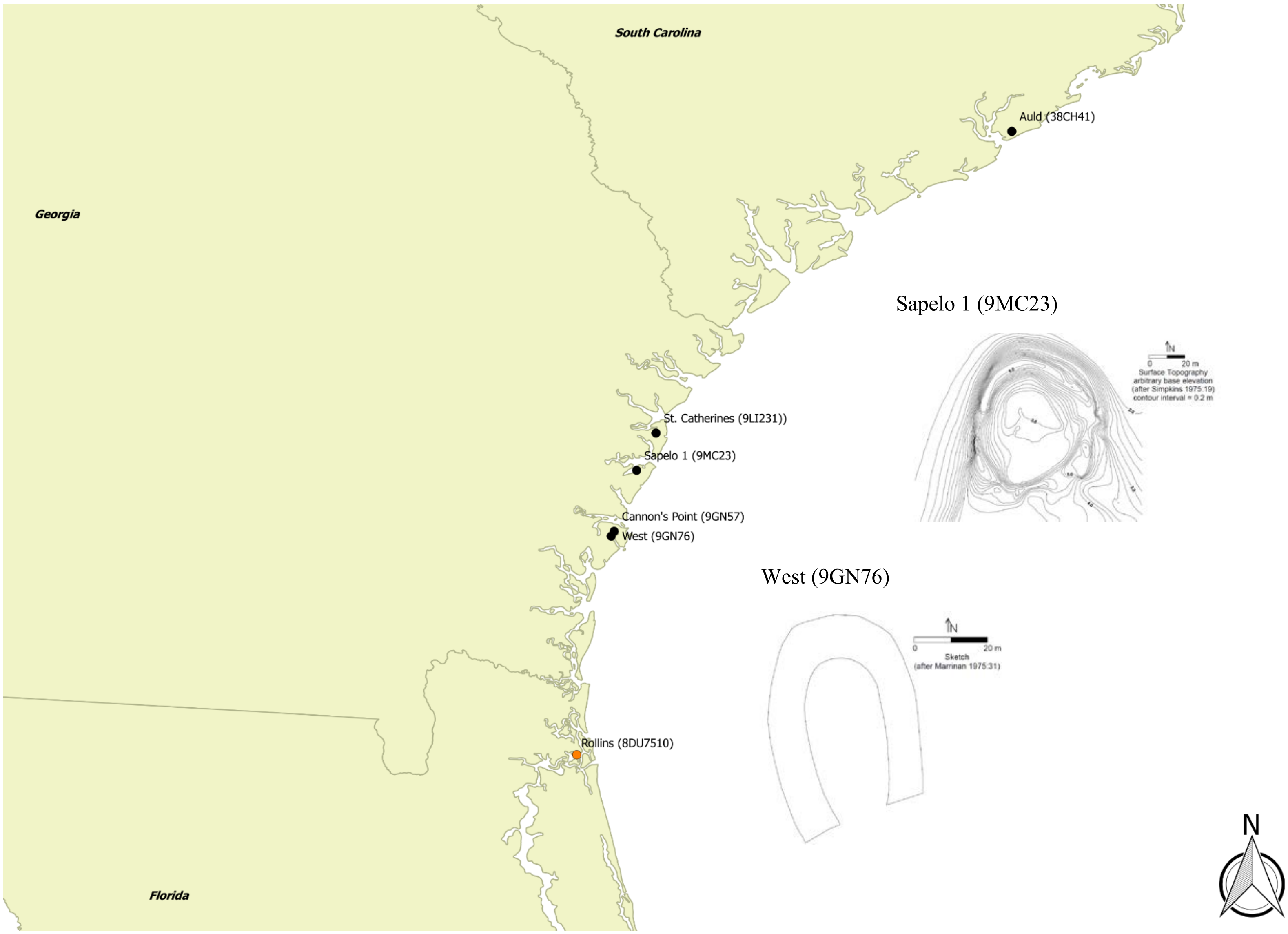


Figure 5.10: Active shell ring locations in Atlantic Coast between ca 4300 and ca 4100 BP. Shell ring topology images modified from Russo 2006:87, 88. For complete listing of radiocarbon dates see Appendix B.

tied in to the changing function of the rings. This model proposes that a ring may have begun as a habitation center consisting of circular grouping of shell pits or heaps that eventually formed into a ring. While continuing as a habitation site, the newly formed ring may have shifted activities either inside and/or outside of the ring's boundary. As shell rings became more permanent in both their architecture and in their continued social use, the function of the ring may have shifted from that of purely habitation to that of ceremonial location, and then may have progressed into a fully ceremonial center by the end of its use life. Thompson goes on to state that this model is, of course, not unilineal, and each ring should be tested to see what stages are present.

The nature of this change has been detailed by the recent work of Sanger (2015), who was able to distinguish a much more constrained period of time for when this shift in function may have occurred. In short, the number of noticeable differences between the St Catherines shell ring and the McQueen shell ring on St. Catherines Island, indicate that this trajectory shift must have occurred prior to, or at, the construction of the McQueen ring around 4400 to 4200 cal yr B.P. The marked differences between the rings that led Sanger to these conclusions are that despite there being similar volumes of materials recovered, at the St. Catherines ring only 1% of the recovered pottery represents decorated vessels, whereas at the McQueen ring at least 15% of the recovered pottery is decorated. Additionally, the St. Catherines ring possesses over 3000 baked clay objects but the McQueen ring only possesses 15. Along the coast, these objects represent the utilitarian function of heating stones, indicating a major shift in local practices between the constructions of the two rings. One other major difference between the two rings is the curation of the space and design that went into the construction of the rings. The St.

Catherines ring was constructed on top of the ground surface. In contrast, when the McQueen ring was built the topsoil was removed indicating that there was a planned design for the ring.

More than likely any ring built within the Atlantic Coastal tradition after this shift in shell ring function, was then built within this new behavioral trajectory. Thus, we can then examine the rings of the Atlantic Coastal Trajectory as those rings that were potentially built before, during, and after this transition, and we can then examine the data from the rings with this new understanding. As of right now, with the chronometric information that we currently possess, none of the shell rings that were built north of the Savannah River, north of the origins of the Stallings Ceramic Trajectory, were built fully prior to this. There are, however, a number of rings that were built at or around this transitional time along the South Carolina coast. These rings are Fig Island 2, Auld, and Sewee. Unfortunately, there are a series of rings both from the head of the Savannah River all the way up through the South Carolina coast (Figure 5.11) that lack any precise dating, thus we can only speculate based upon their architectural and material characteristics as to when they may have been built. Without having a precise understanding of this transition it is harder to tell which rings being built during this transitional period were indeed affected by the general shift in shell ring function during their initial construction and use.

Interestingly a number of the rings built at this transitional period, even the ones built along South Carolina, are all similar in size with the main difference being the presence of sand tempered pottery along with fiber tempered pottery. It is also during this time that the pattern of rings built within complexes occurs. These two factors, the diversification of ceramics as well as the intentional design and construction of specialty purpose ring sites, all speak to a change in the behaviors surrounding the purpose of the rings.

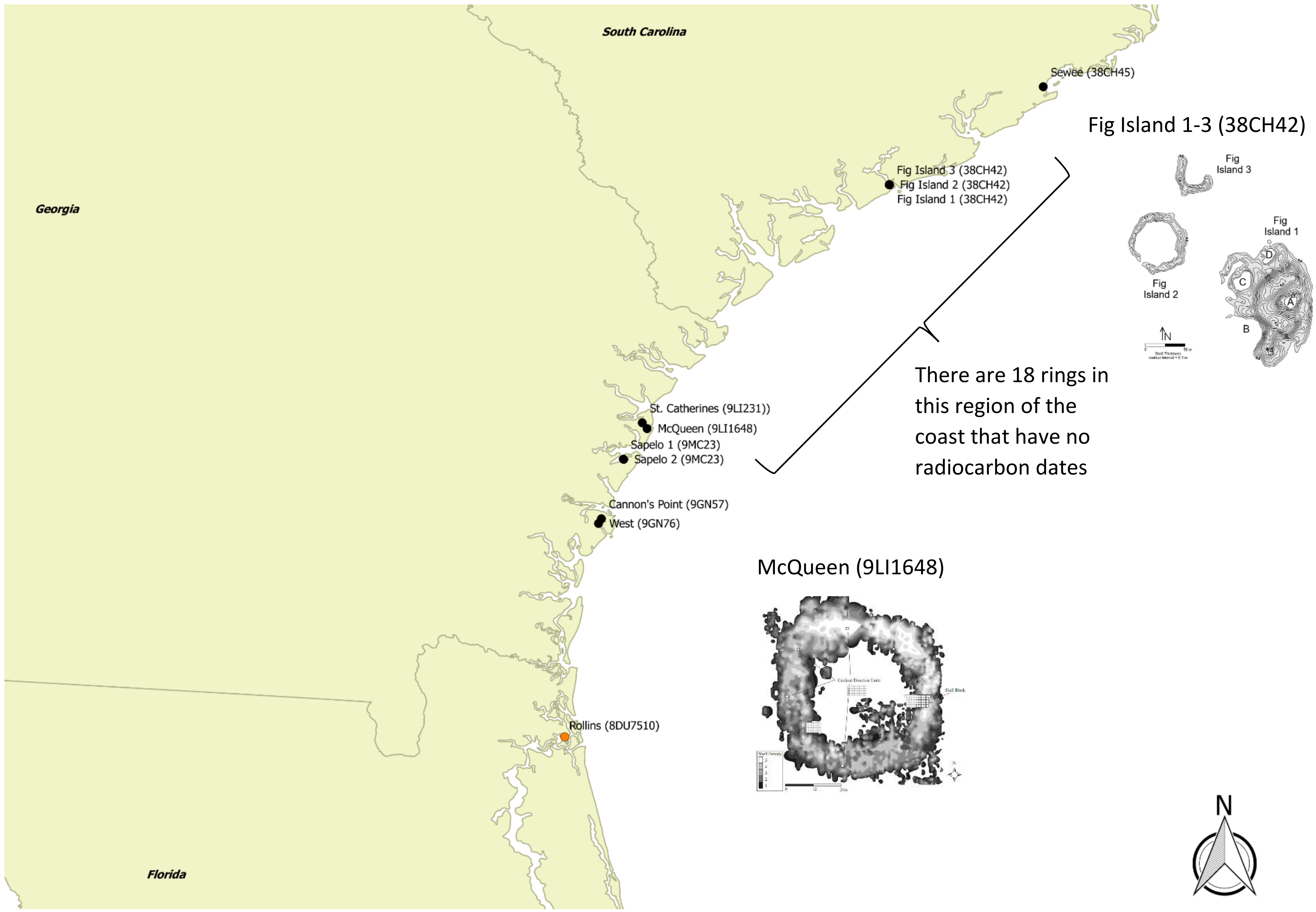


Figure 5.11: Active shell ring locations in Atlantic Coast between ca 4100 and ca 3900 BP. This period of time is the transition period. Shell ring topology images modified from Russo 2006:77 and Sanger 2015:174. For complete listing of radiocarbon dates see Appendix B.

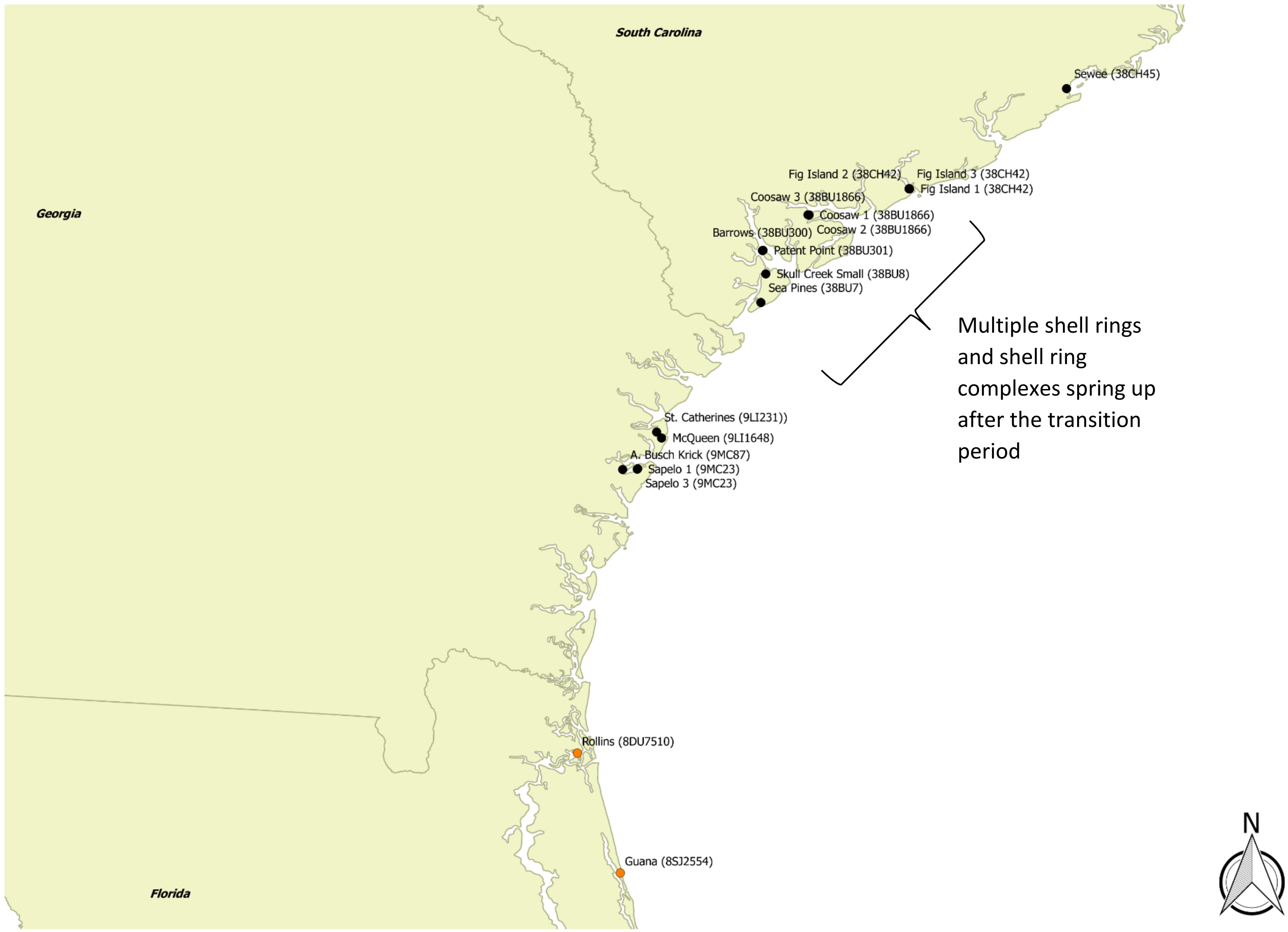


Figure 5.12: Active shell ring locations in Atlantic Coast between ca 3900 and ca 3700 BP. For complete listing of radiocarbon dates see Appendix B.

The Cane Patch ring on Ossabaw Island and the Skidaway ring on Skidaway Island are two of the rings that do not possess any currently available radiocarbon dates. However, these rings are similar in size to both St. Catherines, Sapelo 1, and Cannons Point. In addition, these rings possess solely fiber tempered pottery and are built on individual barrier islands, all south of the Savannah River. This confluence of factors potentially places Cane Patch and Skidaway rings at around or before the transition.

Some of the general trends of those rings that were constructed after the St Catherines transition (Figure 5.12), is that sites, even along the Georgia coast, possess both sand tempered and fiber tempered pottery. Also, rings, especially those at ring complexes, become smaller with each new iteration, with transition rings being between 65 to 80 meters in diameter, and post transitional rings at complexes becoming as small as 30 to 45 meters in diameter. This could be indicative of either smaller and more dispersed groups of individuals utilizing the rings, or it could be a sign that the ceremonial and ritual aspect of the rings had reached such a level that only certain individuals were allowed to participate with the activities that occurred within the rings.

This Atlantic Coastal tradition began with the rings being circular habitation foci, with potentials for social gatherings or feasting events, yet still maintaining a more utilitarian function. When this trajectory combines with the Stallings Trajectory that came down from the Savannah River, which included the use of ceramic technology that had been created with the intention of social separation from the upper Savannah River soapstone users. The shell rings then become more ritualized and moved towards ever increasing exclusionary practices. This new mixed trajectory, once formed, spread as a new tradition of rings as potentially more ceremonial and religious with associated habitation. It is also during this transition period that we see a technological shift in tempering with the introduction of sand tempered pottery along the Atlantic coastal region. This does not imply that the cultural transitions affected the change in technology, instead the change co-occurred within the milieu that was the changing social landscape. Fiber tempering continues to be used throughout the region until the very end of the Late Archaic period and even co-occurs at sites with sand tempered pottery.

Another of the noticeable features and marked changes is the creation of less inclusionary shell rings that can be seen in the shrinking of ring sizes and the maintenance of more prepared circular shapes. While the shape of a circle is commonly thought of as an indication of egalitarianism as defined by social space theory (Grøn 1992), and indeed circles do indicate this in certain situations, the shell rings themselves, however, being circular creates a divided interior-exterior structure where many of the activities being conducted inside of the ring structure cannot be seen by those outside of the rings. The size change of the rings is also indicative of more exclusionary practices in that these smaller rings mean that smaller numbers of people can participate, unless all activity were to occur outside of the ring structure.

In summary, there are three hypothesized behavioral trajectories within the shell ring using peoples. We begin with the Floridian/Gulf Coastal trajectory of shell ring users, that consist of large, mounded, open ended rings that, while by their nature we may think of them as hierarchical simply on size, in actuality far more people could participate in the activities occurring at these rings by being open ended and by being large. These rings of the Floridian/Gulf Costal trajectory are not closed off ritual spaces. From the very outset, these rings were clearly not being impacted by the inclusion of either of the other trajectories, and it is only after some time that this tradition moved back over to the Atlantic coast, let alone included ceramics.

Then there is the Atlantic Coastal Trajectory of shell ring users that possess rings that are smaller, more carefully designed, circular, and exclusionary rings, which are potentially experiencing higher levels of behavioral structure, and with potentially more hierarchy, and increased power differentials. This ring using trajectory was then influenced by the final trajectory, that of the Stallings Ceramic Trajectory that brought with it a regional socio-political agenda and when combined together altered the Atlantic Coastal ring behavior.

Chapter 6
Conclusions and Future Directions

One of the main take-aways from this analysis, as well as one of the main points that must always be considered when studying the shell rings of North America, is simply that the shell rings are dynamic structures. While there are indeed some consistent patterns within the data, the shell rings and their uses are unique both from place to place as well as through time. There is no doubt that there is an intentionality to the shape, as well as the material used for construction, this cannot be ignored. Rings of mounded shell clearly possessed some meaning, though the meaning and purpose for use of this unique architecture and its continued maintenance most certainly changed both spatially and temporally. Furthermore, due to their unique nature, shell rings provide insight into the complex nature of the human landscape, as well as providing ever more evidence for the broad range of possibilities for forager behavior.

The location of shell rings are broadly determined by access to coastal marsh systems and access to major inland waterways, yet the individual architecture of the rings (shape, size, and orientation) do not appear to be affected by any known natural environmental factor, leaving open the full realm of human practices. Furthermore, the patterns highlighted within this analysis are not governed by environmental factors as much as they are bounded by the social environment and governed by social adaptations and choices.

It appears that the practice of mounding shell into rings began within the Floridian peninsula, with the creation of circular settlements or villages with shell rings representing some of the earliest sedentary settlements along the Atlantic and Gulf coasts. As these locations gained use/practice-history, they, not unlike other man-made artifacts, would have gained meaning for coastal dwellers through time (Thompson 2007). This analysis attempts to highlight the three general practice trajectories of shell ring use: a Floridian/Gulf Coastal tradition, an Atlantic coastal tradition, and a later Atlantic coastal tradition that has been impacted by the socio-political trajectory of the Stallings culture of the Savannah River valley.

Bringing all of this data together has, if nothing else, highlighted future directions for research. Due to the natures of past shell ring projects, the nature of the specific data within the shell ring database is, as Sanger so eloquently put it, quixotic (Sanger 2010). This regional analysis was based in large part by considering changes through time, but there are currently a total of 163 dates that have been recorded from 32 of the rings. The distribution of these dates is such that 85 of the dates, a full 52%, belong to only five of the rings, with the remaining 78 dates being spread out over the remaining 27 shell rings. More intentional chronometric projects would begin to provide balance to this data set as well as, hopefully, provide newer and better understandings.

Another example of the nature of these data is that of all of the Late Archaic shell rings 12, a full 24%, have had little more than initial pedestrian surveys conducted since their rediscoveries in modern times. Simply gaining dimensional measures from these rings may in fact greatly change how we view the various trajectories along the coasts as these architectural features can then be analyzed. Furthermore, for these untested rings excavations at these rings would provide more of the material culture component, such as ceramic typologies, that could provide insight into the changes that were occurring along the coast.

An additional direction for future research stems from climate changes and the effects on people and their behaviors. When one stops to consider why humans are in fact affected by such things as drought or sea-level rise it is in part that we become tied or constrained to certain locations due to expenditures of time and energy in the creation of these locations, as well as to the fact that certain locations have historical meaning. These ties and restrictions in turn can force behavior and/or practice adaptions due to the perceived lack of mobility. The more important a certain location is to a people, the harder and/or more hurtful the loss of these locations can be. Unfortunately for the coastal dwellers of the southeastern Archaic, the innovative approach to living via increased sedentism along the water's edge, led to a pseudo-settled lifestyle, which in turn led to constructions and traditions that were coastally dependent. If the shell rings of the Late Archaic had indeed gained social, political, or economic significance and relied on maintaining a connection to the coastal environment, a more detailed study of shell ring locations, chronologies, changes in material culture, and sea level fluctuations could provide both insight into past human adaptations in the face of climate change as well as informing potential future scenarios.

Another aspect of this project was the creation of a database of the shell rings. While this database is by no means as extensive as other big data projects, it still contains a large amount of information that had to be collected, organized, and analyzed. This process did take longer than the author had originally estimated , however, the end result was a collection of spreadsheets that will make future shell ring studies more robust and complete by allowing researchers access to the full array of shell ring data for comparison and use, thus allaying the potential 'garbage in' scenario of missing data.

The goals of this project were as follows: (1) to bring together into a single location as much of the currently available data from the Late Archaic shell rings; (2) to illustrate the utility of possessing all of this data in a centralized location by providing a cursory analysis of the data as a whole; and (3) to highlight the gaps in the data to potentially guide future research agendas. The database itself will continue to evolve as more data are added and as projects continue to occur. There are potentials for expanding the database to include the shell rings of the Woodland period as well as by joining it with other databases of different site types or coastal environmental information. This project was never meant to be a finished product; instead it serves as a launching point for furthering research on the human occupation of the prehistoric southeastern coasts.

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Appendix

Appendix A: National Register of Historic Places and National Historic Landmarks Status adapted from Russo 2006:113-114.

Table A.1: NRHP and NHL statuses of Late Archaic Shell Rings

Site Name	Site ID	NRHP Status	Date Listed	Potential NHL?	Comments
A. Busch Krick	9MC87	*not evaluated*		No	Too eroded for NHL
Auld	38CH41	Listed	1970		More study needed
Barbour Island	9MC320	*not evaluated*			More study needed
Barrows	38BU300	*not evaluated*		Yes	Well preserved and protected
Bonita Bay	8LL717	Eligible			developed, but largely intact
Bony Hammock	9GN53	*not evaluated*			More study needed
Buzzards Island	38CH23	Listed	1970		More study needed
Cane Patch	9CH35	*not evaluated*			More study needed
Cannon's Point	9GN57	Eligible		Yes	Well preserved (1975)
Cedarland	22HC30	Not Eligible		No	Destroyed
Chester Field	38BU29	Listed	1970	No	Erosion and development
Claiborne	22HC35	Not Eligible		No	Destroyed
Coosaw 1	38BU1866	Eligible		Yes	Eroded, but largely intact
Coosaw 2	38BU1866	Eligible		Yes	Well preserved and protected
Coosaw 3	38BU1866	Eligible		Yes	Mined, subsurface intact
Coosaw 4	38BU1866	*not evaluated*		Yes	More study needed
Crow Island	38CH60	*not evaluated*			More study needed
Fig Island 1	38CH42	Listed	1970	Yes	Well preserved and protected
Fig Island 2	38CH42	Listed	1970	Yes	Well preserved and protected
Fig Island 3	38Ch42	Listed	1970	Yes	Well preserved and protected
Guana	8SJ2554	Eligible		Yes	Well preserved and protected
Guerard Point	38BU21	*not evaluated*		No	Mined, subsurface intact
Hanckel	38CH7	Listed	1970		More study needed
Hill Cottage	8SO2	Listed	1975	Yes	developed, but largely intact
Hobcaw	38CHXX	*not evaluated*			Vague mention of possible ring
Horr's Island	8CR209	Not Eligible		No	Mostly destroyed
Horse Island	38CH14	Listed	1970		More study needed
Joseph Reed	8MT13	Eligible		Yes	Eroded, but largely intact
Lighthouse Point	38CH12	Listed	1990	No	Architectural integrity lacking
McQueen	9Li1648				
Meig's Pasture	8OK102	unknown		No	Destroyed?
Odingsell	9CH111	*not evaluated*		No	More study needed
Ossabaw 77	9CH203	*not evaluated*			More study needed
Oxeye	8DU7478	Eligible		Yes	Well preserved, but drowned
Patent Point	38BU301	*not evaluated*		Yes	Well preserved and protected
Rollins	8DU7510	Eligible		Yes	Well preserved and protected

Table A.1: Continued

Site Name	**Site ID**	**NRHP Status**	**Date Listed**	**Potential NHL?**	**Comments**
Sapelo 1	9MC23	Eligible		Yes	Well preserved and protected
Sapelo 2	9MC23	*not evaluated*		Yes	Mined, subsurface intact
Sapelo 3	9MC23	*not evaluated*		Yes	Mined, subsurface intact
Sea Pines	38BU7	Listed	1970	Yes	Well preserved and protected
Sewee Shell Ring	38Ch45	Listed	1970	Yes	Mined, but largely intact
Skidaway	9CH77	*not evaluated*			More study needed
Skidaway 21	9CH75	*not evaluated*			More study needed
Skidaway 9, Large	9CH63	*not evaluated*			More study needed
Skidaway 9, Small	9CH63	*not evaluated*			More study needed
Skull Creek Large	38BU8	Listed	1970	Yes	Mined, more study needed
Skull Creek Small	38BU8	Listed	1970	Yes	Mined, more study needed
St. Catherines	9LI231				
Stratton Place	38CH24	Eligible			Mined/Current condition unknown
West Ring	9GN76	Eligible		Yes	Well preserved (1975)

Appendix B: Radiocarbon Dates from Late Archaic Shell Rings.

The following table for Appendix B includes all of the currently published radiocarbon dates that have been collected from the shell rings of the Late Archaic period. The data below is listed alphabetically by site name. Each row of data represents the information for each radiocarbon sample and can be identified by the unique radiometric sample number. The information listed for each sample include: the measured date for each sample, the fractionation measure, the published calibrated date, the material that was dated, the provenience of the material, and the references for each sample.

This database will be continuously open for updates and will accept any submissions of data for review. After review, if the submission is complete the data will be added to the database and publish online. In order for new data to be published within this dataset please email mwalke63@vols.utk.edu or visit the website: http://www.martinpwalker.com/#!lasrr/cvqv and the following information must be provided, and will be reviewed prior to addition:

- Site Name and Site ID
- Laboratory radiometric sample number
- Measured radiometric date
- Fractionation measures (if zero, then list “0”)
- Material type of sample that was dated
- Provenience of the sample that was dated
- Reference for the material (this can include laboratory reports)

Calibrated dates are not required for the submission but will be listed if given. Calibration will be provided upon request.

Table B.1: Radiocarbon Dates from Late Archaic Shell Rings

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
A. Busch Krick	9MC87	UGA-226	3215±80	0	3625±80	conch	5.7-6.0 ft	Brandau and Noakes 1972:494-495; Russo 2006:13
A. Busch Krick	9MC87	UGA-227	3470±85	0	3880±85	charcoal	4.6 ft	Brandau and Noakes 1972:494-495; Russo 2006:13
Auld	38CH41	M-1209	3770±130	0	4180±130	oyster	Upper level	Russo 2006:11; Williams 1977:330-331
Barrows	38BU300	Beta-213398	3200±60/70	-3.7	3890±60/70	oyster	NW baulk, base of shell, below water table, 100-105 cmbs	Beta-Analytic 2006a; Russo 2006:11
Bonita Bay	8LL717	Beta-90529	3710±70	0	4120±70	marine shell	Unit 546-547, E550, 10-20 cmbs	Houck 1996:31; Russo 2006:15
Bonita Bay	8LL717	Beta-90530	3460±70	0	3870±70	marine shell	Unit 546-547, E550, 100-110 cmbs	Houck 1996:31; Russo 2006:15
Bonita Bay	8LL717	Beta-48533	3850±70	0	4260±70	marine shell	FS 17, 0-10 cmbs	Dickle 1992:161; Russo 2006:15
Bonita Bay	8LL717	Beta-48534	3770±70	0	4180±70	marine shell	FS 18, 100-110 cmbs	Dickle 1992:161; Russo 2006:15
Cannon's Point	9GN57	UM-521	3575±90	0	4085±90	oyster	Marsh shell ring, sq. 18N, 3E, 13 cmbs, level 3, last occupation	Marrinan 1975:49; Russo 2006:12
Cannon's Point	9GN57	UM-520	4190±90	0	4600±90	oyster	Marsh shell ring, base of midden deposits 1.47 mbsm	Marrinan 1975:48-49; Russo 2006:12
Cedarland	22HC30	G-561	3200±130	-25	3200±130	charcoal	Top of midden	Gagliano and Webb 1970:69; Russo 2006:16
Claiborne	22HC35	I-3705	3100±110	-25	3100±110	charcoal	Base of midden	Gagliano and Webb 1970:69; Russo 2006:16
Claiborne	22HC35	UGA-1693	3385±140	-25	3385±140	charcoal	few cm to more than 50 cm deep	Bruseth 1991:15, 18; Russo 2006:16

Table B.1: Continued

Site Name	Site ID	Sample Number	Measured Date (BP)	C12-C13	Calibrated Date (BP)	Material	Provenience	References
Claiborne	22HC35	TX-1404	3470±160	NA	NA	NA	NA	Webb 1982:3; Russo 2006:16
Claiborne	22HC35	TX-1403	3990±80	NA	NA	NA	NA	Webb 1982:3; Russo 2006:16
Coosaw 1	38BU1866	GX-29192	3420±70	-2	3790±70	oyster	EUI base, 90-95 cmbs	Heide 2003:9; Russo and Heide 2003:31; Russo 2006:11
Coosaw 2	38BU1866	GX-29193	3190±70	-2.1	3560±70	oyster	EU2 base, 110-120 cmbs	Heide 2003:11; Russo and Heide 2003:31; Russo 2006:11
Coosaw 2	38BU1866	GX-29527	3230±70	-1.8	3610±70	oyster	EU2 top, 25-30 cmbs	Heide 2003:11; Russo and Heide 2003:31; Russo 2006:11
Coosaw 2	38BU1866	CAMS-87990	NA	0	3800±30	quahog	EU2 90-100 cmbd	Russo and Heide 2003:31; Russo 2006:11
Coosaw 3	38BU1866	GX-29194	3440±70	-2.5	3810±70	oyster	EU3 base, 25-30 cmbs	Heide 2003:13; Russo and Heide 2003:31; Russo 2006:11
Fig Island 1	38CH42	WK-9746	3467±46	-1.1	3861±46	osyter	TU2, 90cmbs	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 1	38CH42	WK-10103	3420±54	-0.9	3816±54	oyster	TU2, top	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 1	38CH42	WK-10105	3550±47	-0.5	3953±47	oyster	TU1, top	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 2	38CH42	GX-2276	1635±160	-25	1635±160	charcoal	Trench E, 0.5-1.0 ft	Geochron Laboratories 1971; Saunders 2002:114; Russo 2006:12
Fig Island 2	38CH42	WK-9762	3714±50	-0.9	4112±50	oyster	ST 4, Feature 4b	Saunders 2002:114; Russo and Heide 2003:15; Russo2006:12

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
Fig Island 2	38CH42	WK-10102	3602±55	-0.3	4009±55	oyster	ST 4, 30 cmbs	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 3	38Ch42	WK-9763	3627±50	-0.6	4030±50	oyster	TU5, Posthole test	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 3	38Ch42	WK-9747	3594±49	-0.8	3993±49	oyster	TU2, Feature 1 base	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Fig Island 3	38Ch42	WK-10104	3667±48	-0.4	4074±48	oyster	TU1, 23-30 cmbs	Saunders 2002:114; Russo and Heide 2003:15; Russo 2006:12
Guana	8SJ2554	GX-31906	2362±70	-2	2740±70	oyster	Feature 1, top	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	GX-31908	2497±70	-1.5	2880±70	oyster	Feature 1, center	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	GX-31909	3220±70	-0.8	3620±70	clam	Feature 5, center	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	GX-31907	3355±70	-1.5	3740±70	oyster	Feature 2/4, top	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	Beta-166869	3310±60	-0.5	3720±60	clam	340N, 440E	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	Beta-154816	3450±60	-0.2	3860±60	oyster	340N, 540E	Saunders and Rolland 2006:7; Russo et al. 2002:29; Russo 2006:16
Guana	8SJ2554	GX-29517	3430±70	-1.3	3820±70	oyster	469N, 453E	Russo 2006:16; Saunders and Rolland 2006:7
Guana	8SJ2554	Beta-154817	3210±50	-1.2	3600±50	oyster	469N, 453E	Saunders and Rolland 2006:7; Russo et al. 2002:29; Russo 2006:16

Table B.1: Continued

Site Name	Site ID	Sample Number	Measured Date (BP)	C12-C13	Calibrated Date (BP)	Material	Provenience	References
Guana	8SJ2554	Beta-165598	3120±60	-2.2	3490±60	oyster	380N, 400E	Saunders and Rolland 2006:7; Russo et al. 2002:29; Russo 2006:16
Guana	8SJ2554	Beta-165599	3180±70	0.5	3590±70	oyster	410N, 520E	Saunders and Rolland 2006:7; Russo et al. 2002:29; Russo 2006:16
Hill Cottage	8SO2	G-596	3350±120	NA	4040±120	busycon	Test A, 1 foot deep	Bullen 1976:13; Russo 2006:16
Hill Cottage	8SO2	G-597	3225±120	NA	3625±120	venus	Test A, 2-2.5 feet deep	Bullen 1976:13; Russo 2006:16
Hill Cottage	8SO2	G-598	3575±120	NA	3975±120	busycon	Test A, 4 feet deep	Bullen 1976:13; Russo 2006:16
Hill Cottage	8SO2	G-599	4050±125	NA	4450±125	busycon	Test A, 8 feet deep	Bullen 1976:13; Russo 1996:182-183; Russo 2006:16
Hill Cottage	8SO2	G-600	4100±125	NA	4500±125	busycon	Test A, 11 feet deep	Bullen 1976:13; Russo 1996:182-183; Russo 2006:16
Horr's Island	8CR209	UM-1926	3895±75	0	4295±75	oyster	Test 9, Stratum-H	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	UM-1927	3895±85	0	4425±85	oyster	Test 9, Stratum-B	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	UM-1928	4120±85	0	4520±85	whelk	Test 9, Stratum-A	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14

Table B.1: Continued

Site Name	Site ID	Sample Number	Measured Date (BP)	C12-C13	Calibrated Date (BP)	Material	Provenience	References
Horr's Island	8CR209	UM-1929	4080±80	0	4480±80	quahog	Test 9, Stratum-D	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	UM-1930	3975±85	0	4375±85	oyster	Test 9, Stratum-C	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	UM-1931	3890±80	0	4290±80	whelk	Test 9, Stratum-J	Russo 1991:423-424; McMichael 1982:54; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	Beta-37724	2310±70	0	2720±70	oyster	Test 8, FS 188	Russo 1991:423-424; Russo 2006:14
Horr's Island	8CR209	Beta-1273	3615±75	0	4015±75	oyster	Test 7, Stratum-B	Russo 1991:423-424; McMichael 1982:55; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	Beta-1274	4100±110	0	4500±110	oyster	Test 7, Stratum-D	Russo 1991:423-424; McMichael 1982:55; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	Beta-1275	3885±100	0	4285±100	oyster	Test 6, Stratum-D	Russo 1991:423-424; McMichael 1982:55; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	Beta-1276	4070±80	0	4470±80	oyster	Test 11, Stratum-D	Russo 1991:423-424; McMichael 1982:55; Russo 1996; 182-183; Russo 2006:14
Horr's Island	8CR209	Beta-1277	4260±90	0	4660±90	oyster	Test 11, Stratum-B	Russo 1991:423-424; McMichael 1982:55; Russo 1996; 182-183; Russo 2006:14

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
Horr's Island	8CR209	Beta-1278	3790±85	0	4190±85	oyster	Test 11, Stratum-A	Russo 1991:423-431; Russo 2006:14
Joseph Reed	8MT13	WK-7435	2870±60	0	3280±60	oyster	EU 1, Feature 3	Russo and Heide 2000:47; Russo 2006:15
Joseph Reed	8MT13	WK-7436	2930±60	0	3340±60	oyster	EU 2, 155 cmbd	Russo and Heide 2000:47; Russo 2006:15
Joseph Reed	8MT13	GX-25977	3015±75	0.3	3425±75	oyster	EU 2, 48 cmbd	Russo and Heide 2000:47; Russo 2006:15
Joseph Reed	8MT13	GX-25976	3055±80	-0.6	3455±80	oyster	EU 1, 180-190 cmbd	Russo and Heide 2000:47; Russo 2006:15
Joseph Reed	8MT13	GX-26118	2860±130	-26.6	2850±130	charcoal	EU 1, Feature 2, 122 cmbd	Russo and Heide 2000:47; Russo 2006:15
Joseph Reed	8MT13	GX-26119	2880±80	-0.7	3280±80	oyster	EU 4, 0-20 cmbd	Alexander Cherkinsky, Geochron Lab, to M. Russo 2002; Russo 2006:15
Lighthouse Point	38CH12	UGA-2901	3190±70	-25	3190±70	charcoal	230R60, Level 2	Russo 2006:11; Trinkley 1980: 209-210(191-192)
Lighthouse Point	38CH12	UGA-2902	3275±55	-25	3275±55	charcoal	230R70, Level 2	Russo 2006:11; Trinkley 1980: 209-210(191-192)
Lighthouse Point	38CH12	UGA-2903	3180±65	-25	3180±65	charcoal	Feature 33, south half, base of level 2	Russo 2006:11; Trinkley 1980: 209-210(191-192)
Lighthouse Point	38CH12	UGA-2904	2885±175	-25	2885±175	charcoal	Feature 33, north half, based of level 2	Russo 2006:11; Trinkley 1980: 209-210(191-192)
Lighthouse Point	38CH12	UGA-2905	3345±70	-25	3345±70	charcoal	Feature 37, north half, ash zone, base of level 2	Russo 2006:11; Trinkley 1980: 209-210(191-192)
McQueen	9LI1648	Beta-238324	3710±50	-0.9	4100±60	shell	TP II Top	Sanger and Thomas 2010:63

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
McQueen	9LI1648	Beta-238325	3420±50	-3.2	3780±50	shell	TP II Bottom	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-238326	3600±50	-1.3	3990±50	shell	TP II Middle	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-244618	940±40	-25.1	940±40	charred material	N229 E185 4.4-4.3m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-244619	1470±40	-0.8	1870±40	shell	Feature 4	Thomas and Sanger 2010:63
McQueen	9LI1648	Beta-244620	3800±40	-25.3	3800±40	charred material	Feature 21 4.0-3.9m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-244745	6050±40	-24.4	6060±40	charred material	Feature 19 N 4.0-3.0m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251761	3700±40	-23.9	3720±40	charred material	N243 E233 4.5-4.4m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251762	3420±50	-0.8	3820±50	shell	N243 E233 4.5-4.4m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251764	3710±40	-25	3710±40	charred material	N272 E200 5.3-5.2m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251765	3590±50	-1	3990±50	shell	N272 E200 5.1-5.0m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251766	3840±40	-27.5	3800±40	charred material	N272 E200 5.1-5.0m	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251767	3680±40	-24.8	3680±40	charred material	N243 E233 4.4-4.3m SHELL	Sanger and Thomas 2010:63
McQueen	9LI1648	Beta-251768	3540±40	-2.4	3910±40	shell	N243 E233 4.4-4.3m SHELL	Sanger and Thomas 2010:63

Table B.1: Continued

Site Name	Site ID	Sample Number	Measured Date (BP)	C12-C13	Calibrated Date (BP)	Material	Provenience	References
McQueen	9LI1648	Beta-251769	3490±40	-4.2	3830±40	shell	N243 E233 4.3-4.2m	Sanger and Thomas 2010:63
Meig's Pasture	8OK102	Beta-21253	3700±80	-0.8	4100±80	conch	Trench 2, Feature 3	Curren 1987:71; Russo 2006:15
Meig's Pasture	8OK102	Beta-21254	3670±80	-0.8	4070±80	conch	Trench 3, Feature 17	Curren 1987:71; Russo 2006:15
Meig's Pasture	8OK102	Beta-21255	3630±90	-0.8	4030±90	conch	Trench 3, Feature 17	Curren 1987:71; Russo 2006:15
Meig's Pasture	8OK102	Dicarb-3295 A	3220±50	0	3630±50	marine shell	Zone 2	Thomas and Campbell 1993; Technical Synthesis and App:506; Russo 2006:15
Meig's Pasture	8OK102	Dicarb-3295 B	3280±50	0	3690±50	marine shell	Zone 4	Thomas and Campbell 1993; Technical Synthesis and App:506; Russo 2006:15
Meig's Pasture	8OK102	Dicarb	NA	NA	3036±60	shell	Not Reported	Thomas and Campbell 1993; Technical Synthesis and App:506; Russo 2006:15
Oxeye	8DU7478	Beta-119814	4500±80	-1.8	4580±80	oyster	ST 1262, 2mbs	Russi and Heide 2000:57; Russo 2006:14
Oxeye	8DU7478	WK-7437	3990±60	0	4400±60	estuarine shell	EU5m 10-15 cmbs	Russi and Heide 2000:57; Russo 2006:14
Oxeye	8DU7478	Beta-119815	4230±70	-4.1	4570±70	oyster	Trench 1, Unit 5, bottom of shell	Russi and Heide 2000:57; Russo 2006:14
Oxeye	8DU7478	Beta-47531	3990±70	-1.9	4370±70	oyster	TP3, 60-80 cmbs	Russo 1992:110; Russo 1996:182-183; Russo 2006:14

Table B.1: Continued

Site Name	Site ID	Sample Number	Measured Date (BP)	C12-C13	Calibrated Date (BP)	Material	Provenience	References
Patent Point	38BU301	Beta-213396	3490±70/80	-2.8	3850±70/80	oyster	N Wall Profile, top of shell, 10-15 cmbs	Beta-Analytic 2006b; Russo 2006:11
Patent Point	38BU301	Beta-213397	3280±70/80	-0.2	3660±70/80	oyster	Base of shell, NE 30-40 cmbs	Beta-Analytic 2006b; Russo 2006:11
Rollins	8DU7510	WK-7433	2280±60	0	2690±60	oyster	Unit 3197, 10-20 cmbs, midden	Russo and Heide 2000:57; Russo 2006:15
Rollins	8DU7510	Beta-119816	3300±70	-2.5	3670±70	oyster	Trench 1, Unit 2, Feat 1, bottom deposit, 90-100cmbs	Russo and Heide 2000:57; Russo 2006:15
Rollins	8DU7510	Beta-119817	3300±70	-0.3	3710±70	oyster	Unit 3197, 80-90 cmbs, midden	Russo and Heide 2000:57; Russo 2006:15
Rollins	8DU7510	Beta-50155	3350±60	0	3760±60	oyster	4850N, 250E, 60-65 cmbs	Russo 1992:110; Russo and Heide 2000:57; Russo 2006:15
Rollins	8DU7510	WK-7438	3230±60	0	3600±60	oyster	Trench 1, Unit 1, Feat 1, 35 cmbs	Russo and Heide 2000:57; Russo 2006:15
Rollins	8DU7510	GX-25750	3740±80	-25.6	3730±80	bulk carbon	Trench 1, Feature 11. base. 200 cmbs	Geochron Laboratory 1999; Alexander Cherkinsky, Geochron Lab, to R. Saunders 2006; Russo 2006:15
Rollins	8DU7510	GX-29516	2100±70	-3	2460±70	oyster	TU 1097, Ringlet I, pit feature (in profile)	Alexander Cherkinsky, Geochron Lab, to G. Heide 2002; Russo 2006:15
Rollins	8DU7510	GX-30737	3556±80	-2.1	3930±80	oyster	TU 10, base of shell	Alexander Cherkinsky, Geochron Lab, to R. Saunders 2006; Russo 2006:15
Rollins	8DU7510	GX-30378	3462±70	-2	3840±70	oyster	TU 12, base of shell	Alexander Cherkinsky, Geochron Lab, to R. Saunders 2006; Russo 2006:15

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
Rollins	8DU7510	GX-30379	3278±70	-3.6	3630±70	oyster	TU 11, base of shell	Alexander Cherkinsky, Geochron Lab, to R. Saunders 2006; Russo 2006:15
Rollins	8DU7510	GX-30340	3438±70	-2	3820±70	oyster	TU 11, Feature 28 (below ringlet base)	Alexander Cherkinsky, Geochron Lab, to R. Saunders 2006; Russo 2006:15
Rollins	8DU7510	Beta-45925	3730±60	NA	4150±60	oyster	120 cmbs	Russo 1996:182-183; Russo 2006:15
Sapelo 1	9MC23	M-39(a)	3600±350	0	4010±350	oyster	Late Archaic Lev. w/plain fiber-tempered pottery	Crane 1956:665; Russo 2006:13; Williams 1979:329
Sapelo 1	9MC23	M-39(b)	3800±350	0	4210±350	oyster	Late Archaic Lev. w/plain fiber-tempered pottery	Crane 1956:665; Russo 2006:13;Williams 1979:329
Sapelo 1	9MC23	UGA-73	3430±65	0	3840±65	oyster	1 mbs in ring w/50 m diam., 2-3 m high	Noakes and Brandau 1974:133; Russo 2006:13
Sapelo 1	9MC23	UGA-74	3430±70	0	3840±70	oyster	2 mbs in ring w/50 m diam., 2-3 m high	Noakes and Brandau 1974:133; Russo 2006:13
Sapelo 1	9MC23	UGA-15084	3480±50	-17	3610±50	sooted sherd	Unit 1, Level 2, 10-20 cmbs	Russo 2006:13; Thompson 2006:183
Sapelo 1	9MC23	UGA-15085	3630±60	-18.9	3730±60	sooted sherd	Unit 1, Level 2, 10-20 cmbs	Russo 2006:13; Thompson 2006:183
Sapelo 1	9MC23	UGA-15081	4080±50	-26.2	4060±50	charcoal	Unit 3, Level 10, 90-100cmbs	Russo 2006:13; Thompson 2006:183
Sapelo 2	9MC23	UGA-75	3545±65	0	3955±65	oyster	2 mbs in remnant of ring next to one with UGA-73 and -74 assays	Noakes and Brandau 1974:133; Russo 2006:13
Sapelo 3	9MC23	UGA-15082	3600±50	-27.5	3560±50	charcoal	Unit 9, Level 4	Russo 2006:13; Thompson 2006:183

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
Sapelo 3	9MC23	UGA-15083	3740±50	-25.5	3730±50	charcoal	Unit 9, Level 7	Russo 2006:13; Thompson 2006:183
Sapelo 3	9MC23	UGA-15086	3740±50	-25.6	3730±50	charcoal	Unit 11, Level 4	Russo 2006:13; Thompson 2006:183
Sea Pines	38BU7	I-2848	3400±110	0	3810±110	clam	20-26 inches	Calmes 1968:26(163); Buckley and Willis 1969:79; Russo 2006:11
Sea Pines	38BU7	I-2847	3110±110	0	3520±110	conch	0-6 inches	Calmes 1968:26(163); Buckley and Willis 1969:79; Russo 2006:11
Sewee Shell Ring	38Ch45	GX-2279	3295±110	0	3675±110	oyster	NE quadrant, C-1, 2' bs	Trinkley 1980b:5; Russo and Heide 2003:15; Russo 2006:12
Sewee Shell Ring	38Ch45	GX-30186	3630±70	-1.8	4010±70	oyster	EU1, 33-48 cmbd	Russo and Heide 2003:14-15; Russo 2006:12
Sewee Shell Ring	38Ch45	GX-30187	3740±70	-2.3	4120±70	oyster	EU1, 150 cmbd, ring base	Russo and Heide 2003:14-15; Russo 2006:12
Skull Creek Large	38BU8	I-2849	3120±110	0	3530±110	oyster	30inches above charcoal (I-2850) in periwinkle layer and 27 in bs	Calmes 1968:25(162); Buckley and Willis 1969:79; Russo 2006:11
Skull Creek Large	38BU8	I-2850	3585±115	-25	3585±115	charcoal	Level 9, 56-57in bs, bottom half of shell deposits	Calmes 1968:25(162); Buckley and Willis 1969:79; Russo 2006:11
Skull Creek Small	38BU8	I-3047	3890±110	-25	3890±110	charcoal	Base of midden, level 4, 18-24in bs	Calmes 1968:26(163); Buckley and Willis 1969:79; Russo 2006:11
St. Catherines	9LI231	Beta-215824	3770±50	-3.8	4120±60	Crassostrea	N789 E801, 83 cmbs	Thomas 2008:370; Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-215823	3510±50	-2.5	3880±50	Crassostrea	N789 E801, 23 cmbs	Thomas 2008:370; Sanger and Thomas 2010:62

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
St. Catherines	9LI231	Beta-215822	3450±50	-2.6	3800±60	Crassostrea	N784 E801, 67 cmbs	Thomas 2008:370; Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-215821	3780±50	-3	4140±50	Crassostrea	N782 E801, 66 cmbs	Thomas 2008:370; Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-21408	3470±80	-1.7	3860±80	Mercenaria	TP I (60-70)	Thomas 2008:370; Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-21409	3980±90	-1.2	4370±90	Mercenaria	TP I (10-20)	Thomas 2008:370; Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-229422	3870±40	-3.2	4230±40	shell	922/182-66-82	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-229423	3630±50	-4.1	3970±50	shell	W82 S2 at 3.0m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-229424	3600±50	-3.3	3960±50	shell	W82 S2 at 2.0m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-229425	5490±50	-3.1	5850±50	shell	W82 S2 at 2.0m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-231331	3660±40	-25.6	3650±40	bulk soil	Feature 24 level 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-231332	3260±40	-25.4	3250±40	bulk soil	Feature 5 level 1.5-1.4m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-231333	3580±40	-25.6	3570±40	bulk soil	Feature 36 level 1.7-1.6m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-231334	3670±50	-2.2	4040±50	shell	W82 S2 base of pit feature	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-231335	3800±40	-2.7	4170±40	shell	W82 S2 base of pit feature	Sanger and Thomas 2010:62

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
St. Catherines	9LI231	Beta-231336	3270±40	-25.6	3260±40	bulk soil	Feature 23 level 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233129	3390±40	-24.6	3400±40	bulk soil	Feature 20 depth 1.9-1.13m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233130	3620±60	-0.6	4020±60	shell	Feature 23 depth 1.9-1.8m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233131	3570±40	-24.4	3580±40	bulk soil	Feature 37 depth 1.9-1.8m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233132	3640±40	-24.7	3640±40	bulk soil	Feature 17 depth 1.9-1.8m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233133	3230±40	-24.1	3240±40	bulk soil	Feature 9 depth 1.7-1.6m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-233134	3250±40	-24.4	3260±40	bulk soil	Feature 28 depth 1.6-1.5m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238322	3880±40	-25.7	3870±40	hickory nut	Feature 60 2.0-1.9m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238323	3480±40	-25.2	3480±40	bulk soil	W92 S2 2.3-2.2m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238327	3810±40	-24.2	3820±40	hickory nut	W92 S2 2.3-2.2m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238328	4110±40	-24.5	4120±40	burnt wood	Feature 76 1.9-1.8m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238329	3600±40	-25.3	3600±40	bulk soil	Feature 76 1.9-1.8m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238330	2920±40	-25.2	2920±40	bulk soil	Feature 88 1.8-1.7m	Sanger and Thomas 2010:62

Table B.1: Continued

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
St. Catherines	9LI231	Beta-238331	3830±40	-25.4	3820±40	burnt wood	Feature 88 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238332	3900±40	-26	3880±40	burnt wood	Feature 73 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238334	3590±40	-24.7	3590±40	bulk soil	Feature 73 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238335	3630±40	-24.9	3630±40	bulk soil	Feature 82 1.8-1.7m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238336	3990±60	-0.9	4390±60	shell	N771 E819 2.39-2.3m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-238337	3890±40	-26.8	3860±40	burnt wood	N771 E819 2.39-2.3m	Sanger and Thomas 2010:62
St. Catherines	9LI231	Beta-239276	3930±40	-25	3930±40	charred material	Feature 82 NE Quad 1.9-1.8m	Sanger and Thomas 2010:62
West Ring	9GN76	UM-523	3605±110	0	4015±110	oyster	West Shell Ring Test 1, 12-20 cmbs (level 2), last occupation	Marrinan 1975:35; Russo 2006:12
West Ring	9GN76	UM-522	3860±90	0	4270±90	oyster	West Shell Ring Test 1, 45-55 cmbs (level 4), initial occupation	Marrinan 1975:35; Russo 2006:12

Appendix C: Pottery Counts of the Late Archaic Shell Rings

The following table for Appendix C includes all of the currently published pottery counts that have been reported from the shell rings of the Late Archaic period. The data below is listed alphabetically by site name. Each row of data represents the pottery counts for each individual ring. The information in the table is divided up into three main sections. The first four columns are fiber tempered counts with specifically identified pottery types in the first three columns, if they were typed in the literature from the rings, and the fourth column includes the total number of reported fiber tempered pottery from the sites. The second grouping of columns represents identified sand tempered pottery from the rings with the first two columns being specifically identified pottery types, and the third columns being the total number of reported sand tempered pottery from each site. The final column of this table is that of identified baked clay objects (BCO's).

This database will be continuously open for updates and will accept any submissions of data for review. After review, if the submission is complete the data will be added to the database and publish online. In order for new data to be published within this dataset please email mwalke63@vols.utk.edu or visit the website: http://www.martinpwalker.com/#!lasrr/cvqv and the following information must be provided, and will be reviewed prior to addition:

- Site name and site ID
- Tempering identifications with counts (specific pottery types are not required)
- Reference(s) for the reported data

The references for these data below were gathered from multiple sources and can be found in Appendix H.

Table C.1: Pottery Counts of the Late Archaic Shell Rings

Site Name	Site ID	Fiber Tempered: Specific Ware Identifications			Total Fiber Tempered Collected*	Sand Tempered: Specific Ware Identifications		Total Sand Tempered Collected*	Baked Clay Objects Collected
		Stallings	St. Simons	Orange		Thom's Creek	Awendaw		
A. Busch Krick	9MC87				566			Uncounted	
Auld	38CH41					Uncounted		Uncounted	
Barbour Island	9MC320				37				
Barrows	38BU300					Uncounted		Uncounted	
Bonita Bay	8LL717								
Bony Hammock	9GN53				4				2
Bull Island	38BU475								
Buzzards Island	38CH23	Uncounted			Uncounted	153	Possible	153	
Cane Patch	9CH35		Possible		1000				2
Cannon's Point	9GN57		639		639				
Cedarland	22HC30								
Chester Field	38BU29				221	177		177	
Claiborne	22HC35				Uncounted				12000
Coosaw 1	38BU1866	169			169	3		3	
Coosaw 2	38BU1866	472			472	18		18	
Coosaw 3	38BU1866	54			54				
Coosaw 4	38BU1866								
Crow Island	38CH60								
Fig Island 1	38CH42	112			112	1182		1182	
Fig Island 2	38CH42	7			7	1746		1746	
Fig Island 3	38Ch42	7			7	325		325	
Guana	8SJ2554			405	3708				
Guerard Point	38BU21	99			99			56	
Hanckel	38CH7					48		48	
Hill Cottage	8SO2			37	37				
Hobcaw	38CH??								
Horr's Island	8CR209								

*Note: Not all reports listed specific identifications of types, as such the totals columns in this table represent the combined identified and unidentified counts.

Table C.1: Continued

Site Name	Site ID	Specific Ware Identifications			Total Fiber Tempered Collected*	Specific Ware Identifications		Total Sand-Tempered Collected*	Baked Clay Objects Collected
		Stallings	St. Simons	Orange		Thom's Creek	Awendaw		
Horse Island	38CH14					85		85	
Joseph Reed	8MT13							19	
Lighthouse Point	38CH12					11192		11192	
McQueen	9Li1648		3600		3600				15
Meig's Pasture	8OK102								Uncounted
Oemler	9CH14A				38		6	6	2
Ossabaw 77	9CH203		5		5				
Oxeye	8DU7478			Uncounted	Uncounted				122
Patent Point	38BU301					Uncounted		Uncounted	
Rollins	8DU7510			9522	9522				
Sapelo 1	9MC23		1453		1453				102
Sapelo 2	9MC23		366		366	2		2	
Sapelo 3	9MC23		663		663				
Sea Pines	38BU7				44	83		83	
Sewee Shell Ring	38Ch45					10156		10156	11
Skidaway	9CH77		173		173				
Skidaway 21	9CH75								
Skidaway 9, Large	9CH63								
Skidaway 9, Small	9CH63								
Skull Creek Large †	38BU8				129	854		854	1
Skull Creek Small †	38BU8								
St. Catherines	9LI231		7200		7200				3000
Stratton Place	38CH24					1506	15	1521	2
West Ring	9GN76		92		92				

* Note: Not all reports listed specific identifications of types, as such the totals columns in this table represent the combined identified and unidentified counts.
† The Skull Creek rings were excavated as a singular figure eight construction, as such, the reports combined many of the artifact counts.

Appendix D: Lithic Counts of the Late Archaic Shell Rings (adapted from Russo 2006:38)

The following table for Appendix D is adapted from Russo 2006:38 but has been updated to include newly published data. The data below is listed alphabetically by site name. Each row of data represents the lithic material counts for each individual ring. The information in the table is divided up such that flake counts, and projectile point counts are each listed in their own columns, with all other lithic items reported from the rings being listed in column three. This representation of the data is only for this appendix, the spreadsheet that is available for download from the database lists each individually identified tool type within its own column of data.

This database will be continuously open for updates and will accept any submissions of data for review. After review, if the submission is complete the data will be added to the database and publish online. In order for new data to be published within this dataset please email mwalke63@vols.utk.edu or visit the website: http://www.martinpwalker.com/#!lasrr/cvqv and the following information must be provided, and will be reviewed prior to addition:

- Site name and site ID
- Lithic types with counts
- Reference(s) for the reported data

The references for these data below were gathered from multiple sources and can be found in Appendix H.

Table D.1: Lithic Counts of the Late Archaic Shell Rings

Site Name	Site ID	Flakes	Projectile Points	Other Lithics
A. Busch Krick	9MC87	1		
Auld	38CH41			
Barbour Island	9MC320			
Barrows	38BU300			
Bonita Bay	8LL717			Limestone (1)
Bony Hammock	9GN53			
Buzzards Island	38CH23			
Cannon's Point	9GN57	Uncounted	2	Groundstone (1), Quartzite Pebbles (596), Quartzite Cobble (1), Chert (15)
Cedarland	22HC30	Uncounted	Uncounted	Sandstone Slabs and Bannerstones (Uncounted)
Chester Field	38BU29	Uncounted	2 to 5	Hammerstone (1)
Claiborne	22HC35	Uncounted	Uncounted	Steatite (Uncounted)
Coosaw 1	38BU1866			Biface Fragment (1)
Coosaw 2	38BU1866			Pin fragment (1)
Coosaw 3	38BU1866	1		
Coosaw 4	38BU1866			
Crow Island	38CH60			
Fig Island 1	38CH42	1		
Fig Island 2	38CH42			Biface Fragment (1)
Fig Island 3	38Ch42			General Debitage
Guana	8SJ2554		2	Steatite (9)
Guerard Point	38BU21	2		Engraver (1)
Hanckel	38CH7			
Hill Cottage	8SO2			Limestone Metate (1)
Hobcaw	38CHXX			
Horr's Island	8CR209	19	1	Limestone (102), Groundstone Balls (4)
Horse Island	38CH14			
Joseph Reed	8MT13	4		Limestone (313), Sandstone (3)
Lighthouse Point	38CH12		10	Steatite (3), "Other Lithics" (28)
McQueen	9Li1648	2104		
Meig's Pasture	8OK102			Sandstsone Hones (2)
Oemler	9CH14A			
Ossabaw 77	9CH203			
Oxeye	8DU7478	2		Ochre (1)
Patent Point	38BU301			Pieces of Worked Stone (2)
Rollins	8DU7510	10		Sandstone (13), Hammerstone (1)
Sapelo 1	9MC23			Ball (1), Flint (1), Bannerstone (1)

Table D.1: Continued

Site Name	Site ID	Flakes	Projectile Points	Other Lithics
Sapelo 2	9MC23			
Sapelo 3	9MC23	81	1	
Sea Pines	38BU7			
Sewee Shell Ring	38Ch45	1	2	Bead (1)
Skidaway	9CH77			
Skidaway 21	9CH75			
Skidaway 9, Large	9CH63			
Skidaway 9, Small	9CH63			
Skull Creek Large †	38BU8		3	Grooved Abraders (Uncounted)
Skull Creek Small †	38BU8			
St. Catherines	9LI231		18	Drill (1), Individual Uncategorized Lithic Pieces (5000+)
Stratton Place	38CH24	1	1	Hammerstones (7), Pendant (1), Heating Stones (8)
West Ring	9GN76	56		Quartzite Pebbles (47), Pieces of Chert (7)

† The Skull Creek rings were excavated as a singular figure eight construction, as such, the reports combined many of the artifact counts.

Appendix E: Shape Descriptions and Major Dimensions of the Late Archaic Shell Rings

The following table for Appendix E is adapted from Russo 2006:25-26 but has been updated to include newly published data. The data below is listed alphabetically by site name. Each row of data represents published maximum dimensions for each individual ring. These data are only the maximum dimensions. Shell rings are not uniform in shape or height and contain a number of different diameter and height measurements that can vary depending upon location of measurements. For visual representations of the rings please visit the online database and download the site maps and imagery files that are available for each ring.

This database will be continuously open for updates and will accept any submissions of data for review. After review, if the submission is complete the data will be added to the database and publish online. In order for new data to be published within this dataset please email mwalke63@vols.utk.edu or visit the website: http://www.martinpwalker.com/#!lasrr/cvqv and the following information must be provided, and will be reviewed prior to addition:

- Site name and site ID
- Shell ring dimensions
- Reference(s) for the reported data

The references for these data below were gathered from multiple sources and can be found in Appendix H.

Table E.1 Shape Descriptions and Major Dimensions of the Late Archaic Shell Rings

Site Name	**Site ID**	**Shape Description**	**Minimum Diameter Across (m)**	**Maximum Diameter Across (m)**	**Maximum Shell Height (m)**
A. Busch Krick	9MC87	Horseshoe Shaped (C or U)	18	40	2.4
Auld	38CH41	Closed Circle	50	56	1.8
Barbour Island	9MC320	Arc Shaped (C or U)	25	65	4
Barrows	38BU300	C-shaped	40	60	2
Bonita Bay	8LL717	U-shaped	140	230	1.1
Bony Hammock	9GN53	C-shaped		30	2.1
Bull Island	38BU475	Closed Circle		91	
Buzzards Island	38CH23	Closed Oval		62	0.9
Cane Patch	9CH35		61	76	3.5
Cannon's Point	9GN57	C-shaped	46	79	1.8
Cedarland	22HC30	C-shaped	165	165	4
Chester Field	38BU29	C-shaped	27	54	1.8
Claiborne	22HC35	C-shaped	175	200	2
Coosaw 1	38BU1866	C attached to Closed Circle (Possible Figure 8)	55	60	1.73
Coosaw 2	38BU1866	Closed Circle attached to C (Possible Figure 8)	55	60	1.73
Coosaw 3	38BU1866	Closed Circle	55	60	0.6
Coosaw 4	38BU1866	Closed Circle			
Crow Island	38CH60	C-shaped		60	
Fig Island 1	38CH42	Closed Circle (with Mound and Attached Ringlets)	111	157	5.5
Fig Island 2	38CH42	Closed Circle	77	82	2.1
Fig Island 3	38Ch42	C-shaped	44	49	1.9
Guana	8SJ2554	U-shaped	150	170	1.3
Guerard Point	38BU21	Closed Circle		40	0.7
Hanckel	38CH7	C-shaped		62	2.4
Hill Cottage	8SO2	U-shaped	120	140	3.7
Hobcaw	38CH??				
Horr's Island	8CR209	U-shaped (with Mounds and Ramps)	100	160	3.5
Horse Island	38CH14	Closed Circle		61	3
Joseph Reed	8MT13	U or C-shaped	150	250	1.7
Lighthouse Point	38CH12	Closed Circle	76	76	3
McQueen	9Li1648	Closed Circle		71	0.5
Meig's Pasture	8OK102	C-shaped	66	77	0.9
Oemler	9CH14A	Closed Circle		23	1.5
Ossabaw 77	9CH203	C-shaped		45	0.9
Oxeye	8DU7478	Closed Circle	130	160	3

Table E.1: Continued

Site Name	**Site ID**	**Shape Description**	**Minimum Diameter Across (m)**	**Maximum Diameter Across (m)**	**Maximum Shell Height (m)**
Patent Point	38BU301	C	45	60	1
Rollins	8DU7510	C (with Attached Ringlets)	190	235	3.5
Sapelo 1	9MC23	Closed Circle	75	80	2.7
Sapelo 2	9MC23	Closed Circle	60	75	0.5
Sapelo 3	9MC23	Oval (Closed Circle)	40	55	0.9
Sea Pines	38BU7	Closed Circle	55	60	1
Sewee Shell Ring	38Ch45	Closed Circle	61	75	3.2
Skidaway	9CH77	C-shaped	58	77	2.3
Skidaway 21	9CH75				
Skidaway 9, Large	9CH63			61	1.5
Skidaway 9, Small	9CH63			30	1.5
Skull Creek Large	38BU8	Figure 8 (Conjoined Closed Circles)		55	2.1
Skull Creek Small	38BU8	Figure 8 (Conjoined Closed Circles)		43	2.1
St. Catherines	9LI231	Closed Circle		70	1
Stratton Place	38CH24	C-shaped	40	50	0.6
West Ring	9GN76	U-shaped	43	58	0.65

Appendix F: Calculated shell ring eccentricities

The following table for Appendix F were calculated using the eccentricity equations described in Chapter 4. The data below is listed alphabetically by site name. Each row of data represents the calculated eccentricity for each individual ring. Values closer to 0 represent rings that re more circular in shape and values close to 1 represent rings that are more oval in shape.

Table F.1: Calculated shell ring eccentricities

Shell Ring Name	Calculated Eccentritcy
A. Busch Krick	0.6042
Auld	0.4503
Barbour Island	0.9231
Barrows	0.6036
Bonita Bay	0.8584
Buzzards Island	0.5810
Cane Patch	0.2074
Cannon's Point	0.7437
Cedarland	0.1099
Chester Field	0.4706
Claiborne	0.4841
Coosaw 1	0.3212
Coosaw 2	0.4511
Coosaw 3	0.2952
Fig Island 1	0.5419
Fig Island 2	0.2740
Fig Island 3	0.2084
Guana	0.7449
Hanckel	0.5414
Hill Cottage	0.4789

Shell Ring Name	Calculated Eccentritcy
Horr's Island	0.8577
Horse Island	0.4646
Joseph Reed	0.7367
Lighthouse Point	0.1617
McQueen	0.1672
Meig's Pasture	0.6887
Oxeye	0.3967
Patent Point	0.2960
Rollins	0.5739
Sapelo 1	0.2609
Sapelo 2	0.6000
Sapelo 3	0.6863
Sea Pines	0.3135
Sewee Mound	0.5818
Skidaway	0.6577
Skull Creek Large	0.3461
Skull Creek Small	0.5868
St. Catherines	0.0844
Stratton Place	0.5313
West Ring	0.8032

Appendix G: Radiocarbon Dates from the Horr’s Island Mound Complex, Florida

Table G.1: Radiocarbon Dates from the Horr’s Island Mound Complex, Florida

Site Name	**Site ID**	**Sample Number**	**Measured Date (BP)**	**C12-C13**	**Calibrated Date (BP)**	**Material**	**Provenience**	**References**
Horr's Island, Mound A	8CR208	Beta 35344	3420±100	-13	3620	human	Mound A, Z1, FS 464	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	Beta 35345	4760±170	-25	4760	charcoal	Mound A, Z5, FS 501	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	Beta 35346	4270±60	-25	4270	charcoal	Mound A, Z10, FS 507	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	Beta 36466	4140±60	-25	4140	charcoal	Mound A, Fire Pit, FS 243	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	Beta 36467	4260±80	-25	4260	charcoal	Mound A, Z3, FS 462	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	UM 1923	4335±70	0	4735	cockle	Mound A, Zone 1, Stratum A	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	UM 1924	4025±75	0	4425	oyster	Mound A, Zone 2, Stratum B	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound A	8CR208	UM 1925	4055±75	0	4455	oyster	Mound A, Zone 4, Stratum A	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound B	8CR206	Beta 35347	4030±230	-13	4230	human	Mound B, burial, FS 533	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound B	8CR206	Beta 40276	6070±90	-25	6070	charcoal	Mound B, Stratum G, FS 369	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound B	8CR206	UM 1919	4215±75	0	4615	quahog	Mound B, Stratum C	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound B	8CR206	UM 1920	6330±85	0	6730	oyster	Mound B, Stratum C	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound B	8CR206	UM 1921	4245±85	0	4645	oyster	Mound B, Stratum A	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound C	8CR207	UM 1918	4460±105	0	4860	whelk	Mound C, Stratum A	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound C	8CR207	UM 1922	4470±75	0	4870	conch	Mound C, Stratum A	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14
Horr's Island, Mound D	8CR211	Beta 35348	4450±190	-25	4450	charcoal	Mound D, submound, FS 587	Russo 1991:423-424; Russo 1994:90; Russo 2006:13-14

Appendix H: References for individual shell rings

The following table for Appendix H includes the references in which material culture counts and shell ring dimensions can be found, for each shell ring. This listing does not represent the full listing of shell ring literature, simply the location of the data that was collected for the tables within this thesis.

Table H.1: Listing of specific references for individual shell rings

Site Name	Site ID	References
A. Busch Krick	9MC87	Crusoe and DePratter 1976; Russo 2006
Auld	38CH41	Dorroh 1971; Hemmings 1970d; Judge and Smith 1991; Russo 2006
Barbour Island	9MC320	Georgia Site File; Russo 2006
Barrows	38BU300	Russo 2006; Saunders et al. 2006
Bonita Bay	8LL717	Dickel 1992; Russo 2004, 2006
Bony Hammock	9GN53	DePratter 1976; Russo 2006
Bull Island	38BU475	Bragg 1925; Hemmings 1970a; Russo 2006
Buzzards Island	38CH23	Judge and Smith 1991; Russo 2006
Cane Patch	9CH35	DePratter 1974, 1976; Russo 2006
Cannon's Point	9GN57	DePratter 1976; Marrinan 1975; Russo 2006
Cedarland	22HC30	Gagliano and Webb 1970; Russo 2006
Chester Field	38BU29	Flannery 1943; Ritter 1933; Russo 2006
Claiborne	22HC35	Bruseth 1991; Russo 2006
Coosaw 1	38BU1866	Heide and Russo 2003; Russo 2006
Coosaw 2	38BU1866	Heide and Russo 2003; Russo 2006
Coosaw 3	38BU1866	Heide and Russo 2003; Russo 2006
Coosaw 4	38BU1866	Heide and Russo 2003; Russo 2006
Crow Island	38CH60	Russo 2006; Trinkley 1980
Fig Island 1	38CH42	Heide 2002; Russo 2002, 2006; Saunders and Russo 2002
Fig Island 2	38CH42	Heide 2002; Hemmings 1970e,f; Russo 2002, 2006; Saunders and Russo 2002
Fig Island 3	38Ch42	Heide 2002; Hemmings 1970e; Russo 2002, 2006
Guana	8SJ2554	Russo 2004, 2006; Russo et al. 2003; Saunders and Rolland 2006
Guerard Point	38BU21	Moore 1898; Russo 2006
Hanckel	38CH7	Hemmings 1989; Russo 2006
Hill Cottage	8SO2	Bullen and Bullen 1976; Russo 2006; Sarney 1994

Table H.1: continued

Site Name	Site ID	References
Hobcaw	38CH?	Gregorie 1925; Russo 2006
Horr's Island	8CR209	McMichael 1982; Russo 1991, 2004, 2006
Horse Island	38CH14	Anonymous 1969; Hemmings 1989; Russo 2006; Trinkley 1976
Joseph Reed	8MT13	Fryman et al. 1980; Russo 2004, 2006; Russo and Heide 2000, 2002, 2004
Lighthouse Point	38CH12	Drayton 1802; Russo 2006; Trinkley 1980, 1985
McQueen	9Li1648	Sanger 2015; Sanger and Thomas 2010
Meig's Pasture	8OK102	Curren et al. 1987; Russo 2006
Oemler	9CH14A	DePratter 1991; Russo 2006; Waring 1968
Ossabaw 77	9CH203	DePratter 1974; Russo 2006
Oxeye	8DU7478	Russo 2004, 2006; Russo and Saunders 1999; Russo et al. 1992
Patent Point	38BU301	Russo 2006; Saunders et al. 2006
Rollins	8DU7510	Russo 2006; Russo and Saunders 1999; Russo et al. 1992; Saunders 2004
Sapelo 1	9MC23	McKinley 1873; Moore 1897; Russo 2006; Simpkins 1975; Thompson 2006; Waring and Larson 1968
Sapelo 2	9MC23	McKinley 1873; Russo 2006; Simpkins 1975; Thompson 2006; Waring and Larson 1968
Sapelo 3	9MC23	McKinley 1873; Russo 2006; Thompson 2006; Waring and Larson 1968
Sea Pines	38BU7	Calmes 1967; Russo 2006; Trinkley 1980
Sewee Shell Ring	38Ch45	Hemmings 1970g; Russo 2006; Russo and Heide 2003
Skidaway	9CH77	DePratter 1975; Howard et al. 1980; Russo 2006
Skidaway 21	9CH75	Beasley 1970; Russo 2006
Skidaway 9, Large	9CH63	Beasley 1970; Russo 2006
Skidaway 9, Small	9CH63	Beasley 1970; Russo 2006
Skull Creek Large †	38BU8	Calmes 1967; Russo 2006
Skull Creek Small †	38BU8	Calmes 1967; Russo 2006
St. Catherines	9LI231	Russo 2006 (as Long Field Crescent); Sanger 2015; Sanger and Thomas 2010
Stratton Place	38CH24	Lawrence 1991b; Russo 2006; Trinkley 1980, 1985
West	9GN76	DePratter 1976; Marrinan 1975; Russo 2006

Vita

Martin Peter Walker was born May 15, 1983 in Brooklyn, New York. He was raised in Potsdam, New York and then relocated back to New York City in 1992, to Bronx, New York and graduated from the Bronx High School of Science in 2001. He next graduate with a Bachelor's of Science Degree in Mechanical Engineering from Manhattan College. After working for two years as an engineer he returned to school and graduated with a Bachelor's of Arts Degree in Anthropology from Herbert H. Lehman College, City University of New York. He then spent two years working with the Nels Nelson North American Archaeology Laboratory at the American Museum of Natural History, New York. In the summer of 2010, he moved to Knoxville, Tennessee and began graduate school at the University of Tennessee, Knoxville (UTK) and in the spring of 2016 was awarded his Master's of Arts Degree in Anthropology. He is a member of the Society for American Archaeology, Southeastern Archaeological Conference, Archaeological Institute of America, Tennessee Council for Professional Archaeology, the Order of the Engineer, UTK Graduate Student Senate, and UTK Anthropology Graduate Student Association.