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**THE ROLE OF BACK-BARRIER
ISLANDS IN THE NATIVE AMERICAN
ECONOMIES OF ST. CATHERINES
ISLAND, GEORGIA**

MATTHEW FRANK NAPOLITANO

THE ROLE OF BACK-BARRIER ISLANDS IN THE NATIVE AMERICAN
ECONOMIES OF ST. CATHERINES ISLAND, GEORGIA

by

Matthew Frank Napolitano

B.A., Stony Brook University, 2006

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The thesis of Matthew Frank Napolitano is approved:

John E. Worth, Ph.D., Committee Chair

Date

Victor D. Thompson, Ph.D., Committee Member

Date

Norma Harris, M.A., Committee Member

Date

Chester B. DePratter, Ph.D., Committee Member

Date

Accepted for the Department/Division:

John R. Bratten, Ph.D., Chair

Date

Accepted for the University:

Richard S. Podemski, Ph.D., Dean, Graduate School

Date

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ABSTRACT

THE ROLE OF BACK-BARRIER ISLANDS IN THE NATIVE AMERICAN ECONOMIES OF ST CATHERINES ISLAND, GEORGIA

Matthew Frank Napolitano

The majority of coastal archaeological research focuses on mainland coasts and large islands, creating a bias in the anthropological literature as small islands are seen as marginal areas for aboriginal subsistence and settlement. To fully understand the aboriginal economies, it is necessary to examine small islands with the same focus given to large islands. One area where it is possible to address this problem is on the coast of Georgia (USA). Long-term research on St. Catherines Island resulted in detailed subsistence and settlement models for the entire aboriginal occupation of the island. A systematic survey on Bull Island Hammock, a small marsh island to the west of St. Catherines Island, revealed over four thousand years of aboriginal activity. Results of this survey were then contextualized with the St. Catherines Island dataset and recent work on the small islands off Sapelo Island, Georgia. This study demonstrates that small islands played a changing role in the subsistence and settlement patterns of aboriginal populations and that archaeologists' current understanding of these models may be incomplete.

CHAPTER 1

INTRODUCTION AND BACKGROUND

Although coastal environments were once marginalized in the anthropological literature as unproductive or inhospitable for subsistence and settlement (e.g., Osborn, 1977), they are now widely recognized as productive environments that have supported human populations for millennia (see Erlandson, 2001; Erlandson and Fitzpatrick, 2006). Coastal environments were densely inhabited in part because of their ecological diversity. For example, in coastal sections of the American Southeast, there are a variety of subsistence resources ranging from easily collected flora and fauna, such as bivalves and nut mast, to high calorie, protein rich wildlife such as alligator, fishes, and white tailed deer (e.g., Claassen, 1986; Reitz, 1988, 2008; Reitz, Larsen, and Schoeninger, 2002; Thomas, 2008; Reitz et al., 2010). Coastal waterways also offer efficient means of travel (e.g., Ames, 2002; Wheeler et al., 2003) while canoes and other watercraft increase the quantity of resources an individual can transport at one time and increase the distance covered (Thomas, 2008: 227).

Beyond simply documenting how aboriginal populations relied on coastal habitats, recent archaeological research also emphasizes the role such environments play in migration, population growth, social inequality, and connectivity between groups (see Erlandson, 2001; Rick, Erlandson, and Vellanoweth, 2001; Bailey and Milner,

2002; Mannino and Thomas, 2002; Fitzpatrick, 2004; Moss, 2004; Erlandson and Fitzpatrick, 2006; Thomas, 2008; Thompson and Turck, 2009, 2010; Thompson and Worth, 2010). Indeed, within anthropological archaeology, coastal and more specifically, island archaeology has emerged as an important topic. However, the majority of island archaeological research deals with large islands, thus creating a bias against smaller islands (Keegan et al., 2008; Thompson and Turck, 2010). This is problematic because, in many cases, smaller islands support many of the same resources as large islands, making them desirable to humans for occupation or exploitation (Keegan et al., 2008); ethnographic data indicate that travel between large and small islands, and therefore access to marine or estuarine resources, was common (e.g., Moss, 2004). To understand the economies of coastal groups better, it is critical to understand the role of small islands within a larger regional context, including large islands and mainland coastal areas. One place where it is possible to study the role of small islands within a coastal forager economy is in the Georgia Bight, located on the coast of Georgia (USA).

The Georgia Bight barrier islands are part of a larger chain of islands that stretches from north Florida to South Carolina known as the Sea Islands (Hayes, 1994). Barrier islands are the easternmost edge of a diverse environment comprised of salt marsh, riverine estuaries, tidal creeks, and marsh islands (MacArthur, 1970; Reitz et al., 2008: 48–53). Along the Georgia coast, there are over 1400 islands (Albers and Alber, 2003; Albers, 2004; Thompson and Turck, 2010). The majority of these islands are small marsh islands found in the back-barrier island region.

Long term research on St. Catherines Island, one of the large barrier islands in the Georgia Bight, creates a unique opportunity to study how aboriginal groups differentially utilized small and large islands. St. Catherines Island is approximately 5670 ha, excluding surrounding salt marshes (Thomas, 2008: 9). It is currently separated from the coastal mainland by approximately 6 km of estuaries that make up the back-barrier island region (Figure 1). It is privately owned and operated by the St. Catherines Island Foundation. Moss Island and Bull Island, two marsh islands to the west of St. Catherines Island (Figure 2), are also managed by the St. Catherines Island Foundation. On each of these marsh islands are small upland areas, informally known of as hammocks.

This thesis examines the role of Bull Island Hammock, the largest of the St. Catherines Island hammocks, in the economies of coastal foraging groups on St. Catherines Island. To do this, a systematic shovel test pit and shell probe survey were conducted to understand aboriginal activity over time. This is then contextualized with archaeological data from nearby hammocks (Thompson and Turck, 2010). This study pays specific attention to the distribution of shell deposits, material culture, and faunal remains to assess aboriginal activity. Data from this survey are supplemented by four accelerated mass spectrometry (AMS) dates and stable isotope analysis of three archaeological shells. While the sample size in both additional data sets is small, the AMS dates were run when temporally diagnostic artifacts were not recovered archaeologically. Stable isotope data provide the season of capture for the shell and create a baseline dataset toward future work assessing how utilization of the hammock might have varied in different seasons.

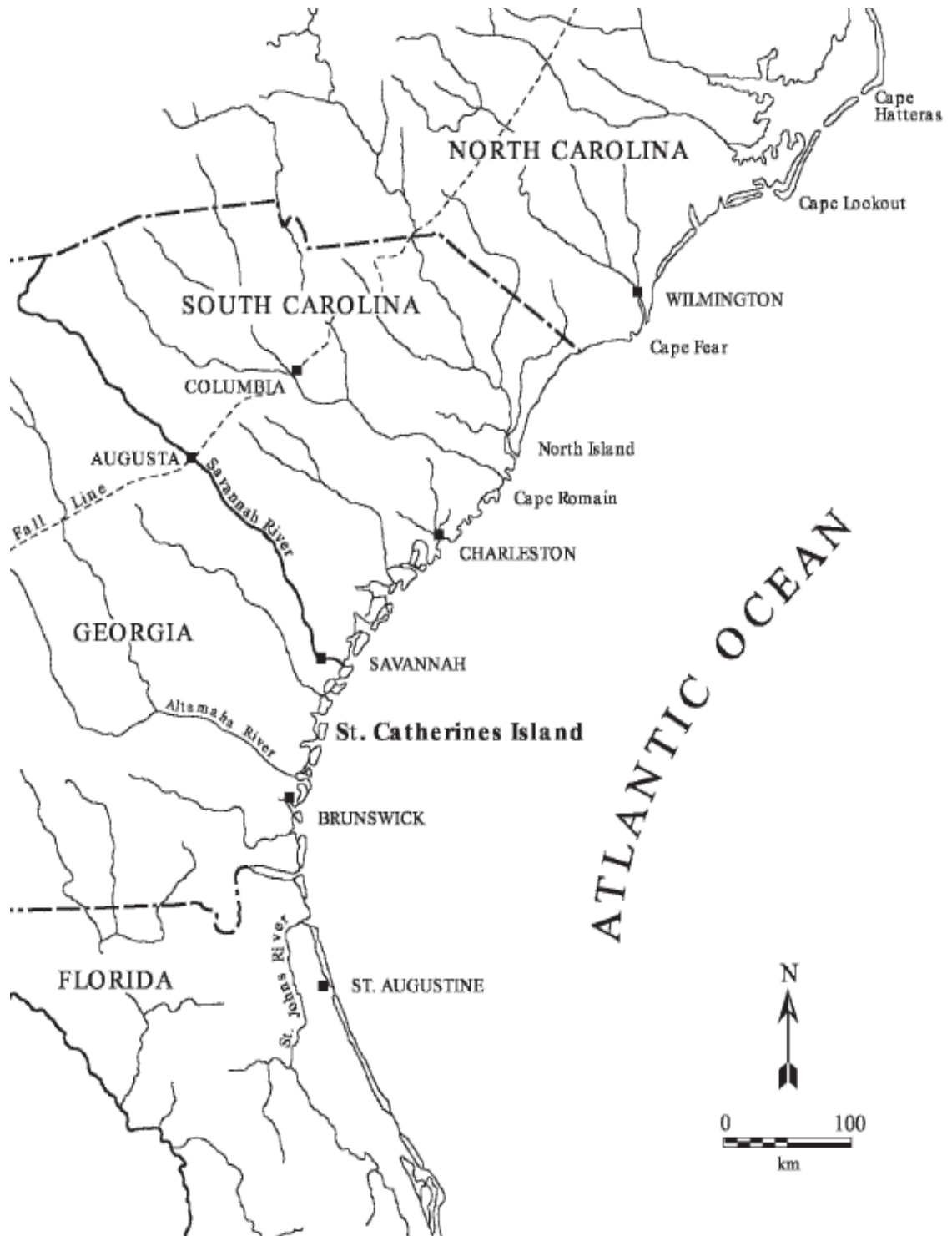


Figure 1. St. Catherines Island and its location on the southeast Atlantic coast. (Image courtesy the American Museum of Natural History; Appendix A).



Figure 2. St. Catherines Island and its associated marsh islands. Back-barrier islands are in tan and hammocks are dark green.

The temporal focus of this study is the aboriginal occupation of the coast beginning with the earliest known occupation of the coast approximately 2500 years B.C. continuing until the beginning of the Spanish mission period in approximately 1580. Chronologies were first built from ceramic typologies and supplemented with radiocarbon dates. The range for a specific cultural period fluctuates according to its location on the coast (i.e., northern Georgia versus southern Georgia; see Thomas, 2008:

table 15.3). To compare the results of this study to others in the back-barrier island region, the chronologies presented by Thompson and Turck (2010) are used; however, the reader is referred to DePratter (1979a: table 30; 1991: table 1) and Thomas (2008: table 15.3) for broader discussions with more regionally specific chronologies based on ceramic chronologies and radiocarbon inventories. When discussing St. Catherines Island culture history, local phase names are used. Phase names are presented in parentheses. The name of cultural periods often derives from the dominant pottery type of the time. Cultural periods are as follows: Late Archaic (St. Simons; 2500–1100 cal B.C.), Early Woodland (Refuge; 1100–400 cal B.C.), Middle Woodland (Deptford; 400 cal B.C.–cal A.D. 500), Late Woodland (Wilmington; cal A.D. 500–1000), Early Mississippian (St. Catherines; cal A.D. 1000–1325), Late Mississippian (Irene; cal A.D. 1325–uncal 1580) and Historic (uncal A.D. 1580–1700).

SURVEY AND SETTLEMENT ARCHAEOLOGY OF THE GEORGIA COAST

The Georgia coast has been the focus of archaeologists for over a century (e.g., Jones, 1873; Moore, 1897; Larson, 1952; Caldwell, 1971), but in the past four decades archaeologists began using various survey methods to gain a broader understanding of the occupational history of the Georgia coast (e.g., DePratter, 1974, 1975; DePratter and Howard, 1977, 1980, 1981; Pearson 1980; Thomas, 1987, 2008; Thompson and Turck 2010). Barrier islands offer somewhat unique places to conduct surveys because islands can be treated as individual units of study (see Curet, 2004). Islands as individual units of study or “laboratories” have been discussed at length in the anthropological literature and there is still a mixed consensus on the appropriateness of islands as units of study (see for example Hunt and Fitzhugh, 1997; Terrell, Hunt, and Gosden, 1997; Irwin,

1999; Rainbird, 1999, 2007; Terrell, 1999; Fitzpatrick, 2004: 5; Fitzpatrick and Anderson, 2008). However, there is agreement that since populations from different islands may have shared a common identity, language, or be linked economically or politically (Fitzpatrick, 2004: 18), it is important that data sets from individual islands be contextualized within a larger regional framework to gain a more complete understanding of aboriginal subsistence and settlement histories (Fitzpatrick, 2004: 4).

UNDERSTANDING ABORIGINAL LAND USE THROUGH SURVEY

Various survey techniques allow for the study of different types of settlement patterns. Chester B. DePratter and James D. Howard (1977, 1980, 1981) conducted a non-systematic shoreline survey on the Georgia coast, identifying hundreds of sites. The size and age of the sites vary from the Late Archaic to Historic periods. These sites were distributed across the large barrier islands and small back-barrier islands, the sizes of which vary greatly. While many of these sites were never systematically tested or excavated, DePratter and Howard's work is important in establishing a baseline for settlement patterns and the environmental history of the Georgia coast (see also DePratter, Paulk, and Thomas, 2008).

Other surveys on the large barrier islands also provide information on the trajectories of land use during various cultural periods for the Georgia coast. Most important among these are surveys conducted in the vicinity of Redbird Creek, Sapelo Island, and St. Catherines Island. The earliest of these surveys is McMichael's (1977) work on Sapelo Island. He conducted a non-systematic random survey and a stratified randomized survey of the island in different environmental zones. He concludes that settlement on the island was limited to the Pleistocene age sand ridges in areas that are

adjacent to the marsh (McMichael, 1977: 188). Further, he projects this model for all six barrier islands that have similar geological formation processes (i.e., deltaic barrier islands, McMichael, 1977: 189).

Red Bird Creek (9Bn9) is a Late Mississippian site on the mainland coast. It is 5 km south of the Ogeechee River and is adjacent to the salt marsh of the back-barrier island region (Pearson, 1984). The site was identified in the early 1970s when logging revealed the remains of a burned structure. The site also has at least two earthen burial mounds and numerous shell middens. Excavations of a structure by Pearson and DePratter revealed burnt daub and cane, a clay-lined fire pit, and charred wood interpreted as cross beams or roof supports (Pearson, 1984: 7–8). Testing in the burial mound revealed human remains and shell lenses, but previous disturbances limited interpretations (Pearson, 1984: 9). The majority of the pottery found was Irene wares. Rim treatments indicate that the site was occupied during the early end of the Irene tradition, otherwise known as the beginning part of the Late Mississippian period (Pearson, 1984: 19).

On Ossabaw Island, Charles Pearson (1979, 1980) used the combination of previous survey data (DePratter, 1974) and his own survey to calculate the changes in settlement patterns between the Savannah (Early Mississippian) and early Irene (early Late Mississippian) periods. These data were then used to form a rank-size distribution model. He first looked at the number of sites on the island during both periods and then looked at the area occupied by these sites. He finds that the number of Irene sites is five times higher and those sites occupied 20% more area compared to the Savannah period. There are also distinct changes in how sites are distributed. Both periods have larger

“primate centers.” In the Savannah period the primate center is much larger than the surrounding sites, while in the early Irene period, the primate center and surrounding sites were all much closer in size because the size of the primate center decreased and the surrounding sites increased. The change in site size suggests a socioeconomic and/or sociopolitical shift from the Savannah period to early Irene period where a single, large primate center is less important (Pearson, 1980: 183). Larger sites represent areas where resources and activity were centralized and likely were occupied year-round, while the smaller sites are briefly occupied collection or processing sites (Pearson, 1977, 1978, 1980). Survey projects like these are significant because, aside from the Irene site (Caldwell and McCann, 1941), little was known about how early Irene societies on the coast were similar or dissimilar to the contemporaneous societies in the interior of Georgia.

The most extensive survey carried out to date is David Hurst Thomas’s (2008) research on St. Catherines Island. He conducted a randomized systematic transect survey of 20% of the entire island (Thomas, 1987). Thomas (2008: 7) frames his research around four questions. The first addresses how aboriginal land use (e.g., food collection and settlement) changed over time. The second deals with the socioeconomic and environmental impacts of population increase, intensification, and the correlating competition for resources. His third question investigates the emergence of social inequality. The final question deals with the conflicting ethnohistoric accounts of aboriginal life ways, also called the “Guale problem” by Jones (1978). To investigate these questions, he employs human behavioral ecology to theoretically frame his research (see Bettinger, 1980, 1987, 1991; Smith and Winterhalder, 1981, 1992;

Winterhalder, 1981, 2001; Kelly, 1995; see also, Smith 1983 for an overview).

Specifically, he uses Central Place Theory, diet breadth, patch choice modeling and available subsistence, settlement, and ethnohistoric data to predict how and where sites should be distributed around St. Catherines Island for each cultural period.

American Museum of Natural History crews surveyed St. Catherines Island in 100 m wide transects spaced 500 m apart. The first phase of the survey was a shell probe survey to identify subsurface shell. The second phase of the survey tested each area positive for shell with at least two 1 x 1 m units. As a control to identify sites where aboriginal activity left no shell deposits, systematic shovel test pits, spaced at 50 m intervals, were dug in the southern half of each transect (Thomas, 1987: 108–110).

The survey of 20% of the island led to the identification of 122 archaeological sites. Thomas concludes that the majority of the aboriginal sites conform to the projections of Central Place Theory. One of these projections is that foragers set up their residential bases to have the most access, widest variety, and quantity of resources within an effective foraging radius (Thomas, 2008: 211–233, 871, 929–931). Using an effective foraging radius of 10 km (see Kelly, 1995: 135), a forager can reach many of the collection spots on the island including the estuarine marshes, and the lacustrine habitat in the center of the island, Sapelo and St. Catherines Sounds, and the Atlantic Ocean (Thomas, 2008: 1064). The most optimal central places are on the east and west sides of the island where the edges of the maritime forest are adjacent to the saltwater marsh and tidal streams (Thomas, 2008: 859). Importantly, marsh-side central places shifted over millennia as the geomorphology of the island changed; consequently, shifting geomorphology affected the effective foraging radius (Thomas, 2008: chap 29).

Not all sites identified in the transect survey conform to the Central Place Theory projections. Sites were found away from marsh-side settlements in the center of the island. These sites were seen as outliers to the projections of Central Place Theory because they were not situated on the landscape to allow for the greatest access to resources (Thomas, 2008: 893, 904, 915, 922, 929). However, more recent work on the hydrology models of St. Catherines Island show that before deep well drilling in the late 19th century and pulp mill production in Savannah during the early 20th century significantly lowered the water table in the Georgia Bight, the center of St. Catherines Island was a lacustrine habitat (Hayes and Thomas, 2008: 56–58). With updated hydrology models, the sites found along the center of the island are not outliers, but conform to Central Place Theory models.

Using the data from his decades of research, Thomas built subsistence and settlement models for St. Catherines Island and addressed how the changing geomorphology of the island impacted aboriginal socioeconomic structures. While his work constitutes as significant contribution to the field, the data and results from St. Catherines Island cannot be used alone to increase our understanding of the surrounding region. To gain a more complete understanding of aboriginal use of the Georgia coast, it is necessary to look at small islands with the same focus given to large islands.

The back-barrier island region is receiving renewed attention from archaeologists for the first time since DePratter and Howard conducted their surveys in the late 1970s and early 1980s. Thompson and Turck (2010) conducted systematic shovel test pit surveys on four small islands between Sapelo Island and the mainland coast. They argue that small islands played a role in the economies of forging groups and, up to this point,

have been largely overlooked for understanding questions of subsistence, settlement/mobility, the development of social inequality, and other socioeconomic and sociopolitical factors (Thompson and Turck, 2010: 283–284). They conducted a shovel test pit survey across Pumpkin Hammock, Mary Hammock, Patterson Island, and Little Sapelo Island to evaluate the range of aboriginal activity. The results of the survey are used to analyze aboriginal activity on the back-barrier island region itself and what the implications are for coastal archaeology.

Their surveys revealed a range of aboriginal activity on each hammock (Thompson and Turck, 2010: 289–294). The degree of intensity to which aboriginal groups utilized hammocks varies. The authors found evidence of intensification on the hammocks over time, peaking in the Late Mississippian period. However, the specific distribution of material culture for each period is far from uniform. For example, there was minimal, if any, activity during the Late Archaic on Mary Hammock, but a significant Late Archaic presence on Little Sapelo Island and Patterson Island. It should be noted that hammock erosion plays a role in trying to understand aboriginal utilization of the back-barrier island region. The abundance of Late Archaic sherds ($N = 42$) collected during a shoreline survey of Pumpkin Hammock suggest that a section of the hammock that had a considerable Late Archaic component has eroded away (Thompson and Turck, 2010: 293). Results show that the history of occupation and utilization on the hammocks is extensive and the back-barrier region as a whole warrants more intensive survey.

Finally, Thompson and Turck (2009) modeled settlement patterns at the regional scale using the locations of known sites from the Georgia Archaeological Site File at the

University of Georgia and data on wetland habitats. They tested the change in distribution of sites from the Late Archaic to the Early, Middle, and Late Woodland. They conclude that a dramatic shift in aboriginal activity took place on non-deltaic barrier islands on the Georgia coast during the Early Woodland (Thompson and Turck, 2009: 264–265; see Chapter 2 for a brief discussion of deltaic versus non-deltaic islands). A sea level transgression by as much as 4 m at the end of the Late Archaic likely caused a change in resource distribution, depletion of the estuarine resources and possibly freshwater resources on barrier islands (DePratter and Howard, 1981; Thompson and Turck, 2009: 270). Depletion of the estuarine resources contributed to population movement away from non-deltaic barrier islands during the Early Woodland. Populations either moved to deltaic barrier islands where estuarine resources were not as severely depleted or perhaps to the mainland. For example, one of the largest Early Woodland period sites, the Bilbo Site, is located along the Savannah River system (Waring, 1968). Sea levels rebounded during the Middle Woodland and populations returned to non-deltaic barrier islands. The presence of Woodland period shell rings suggests continuity in subsistence and social organization and land use patterns between Late Archaic and Middle Woodland peoples, although there were some significant differences between them, such as placement of the dead in burial mounds (Thompson and Turck, 2009: 272–273).

SUBSISTENCE, SEDENTISM, AND SEASON OF OCCUPATION

Settlement and survey archaeology are excellent methods for understanding long term occupational histories of regions. The chronological framework used in settlement models derives primarily from ceramic chronologies and radiocarbon/AMS inventories

(e.g., DePratter, 1979a; Williams and Thompson, 1999; Thomas, 2008: 404–432). Both techniques are helpful, but operate on different scales (Thomas, 2012). Ceramic chronologies show a broad temporal range (i.e., on the order of hundreds of years) and AMS dating shows a more refined temporal range (i.e., centuries and perhaps decades, but see Kennett and Culleton, 2012). Both of these techniques are useful but do not (and are not intended to) shed light on how sites are occupied from season to season.

One way to study human activity on a seasonal scale is to look at the floral and faunal remains. The presence of certain flora or fauna has the potential to inform archaeologists about their food collection sites and how diet changes throughout the year. Methods such as growth band analysis of hard shell clam (*Mercenaria mercenaria*) and stable isotope analysis also inform archaeologists of the environmental conditions when the animals were collected (e.g., relative water temperature and salinity). These data can be used to address questions related to mobility and the seasonal movements of aboriginal groups.

Excavations at North End site, an Early Mississippian period site on Little St. Simons Island, revealed the remains of cownose rays (*Rhinoptera bonasus*), a migratory animal that swims north from the northeastern coast of Florida to the Chesapeake Bay. The rays' migration occurs in the spring and summer months as it follows warming water temperatures. As they move north, they swim close to the barrier islands; when returning to Florida as temperature decreases, the rays swim farther from barrier islands (Weinand, Andrus, and Crook, 2000: 157–158). Cownose ray in the faunal assemblage at this site suggests this animal was not a major food source; however, their presence indicates that this site was occupied during the spring. The presence of other animals at

the same site, such as sea turtles (Cheloniidae) and Atlantic bumper (*Chloroscombrus chrysurus*) indicates occupation during summer months (Weinand, Andrus, and Crook, 2000: 160).

Sclerochronology, or growth band analysis of hard shell clams, is another important methodology to evaluate collection strategies and season of occupation. Using modern clam samples from the King's Bay locality in Georgia, Quitmyer, Hale, and Jones (1985: 59–71) found that the season of death for a clam could be determined from looking at the incremental growth bands on a cross-section of shell. While there are several assumptions built into this method, in general, the same technique can be used with archaeologically recovered specimens.

At Devils Walkingstick site, an Early Mississippian site at Kings Bay, cross-sectioned clams were analyzed for their season of capture. Most clams exhibited a fall season of death, but all other seasons were represented in smaller amounts. The presence of four seasons in the sample suggests that clams were collected all year with the heaviest clam collection period in the fall (Quitmyer, Hale, and Jones, 1985: 65, table 4.3). On St. Catherines Island, analysis of archaeological clam shells from multiple sites suggests that clams were collected in all seasons, but primarily in the fall and winter months for all cultural periods (O'Brien and Thomas, 2008). St. Simons sites exhibited more variability than later periods, although the observed variability could be a reflection of sample size with far less than that of other cultural periods (O'Brien and Thomas, 2008: 494, figure 17.5). Similarly, not all sites sampled yielded the same ratio of seasons represented, meaning that some sites were utilized at different seasons throughout the year (O'Brien and Thomas, 2008: figure 17.6).

Stable isotope analysis of shells is also used to determine season of capture and ultimately seasonal occupation of site (e.g., Andrus and Crowe, 2000, 2008; Thompson and Andrus, 2011: 328; Andrus, 2012; Cannarozzi, 2012). Stable isotope analysis measures the ratio of ^{18}O to ^{16}O (expressed as $\delta^{18}\text{O}$) absorbed over the course of a bivalve's life. Measuring $\delta^{18}\text{O}$ indicates water temperature during the individual's life and collected from incremental drilling of the growth bands on the shell. Importantly, salinity affects the relationship between water temperature and seasonal growth and it is an important part of stable isotope analysis. To control for salinity, modern water temperatures and salinity measurements serve as a proxy for paleotemperature in order to provide the season of capture for the archaeological bivalve.

Sclerochronology and stable isotope analysis can be used to address questions of mobility and social organization at both the site level and on a regional scale. Shell ring sites, for example, are Late Archaic sites that occur along the coast from South Carolina to northern Florida. The aboriginal activity that results in the formation of shell rings is debated (see Chapter 2 for a brief discussion). Recent sclerochronological and stable isotope analyses of oyster and clam shells from the Sapelo Island Shell Ring complex (three shell rings on Sapelo Island) indicate that Rings II and III formed gradually over multiple seasons, while the sampled deposit from Ring I formed rapidly in cooler months, possibly indicating that different activities were taking place at Ring I and at the other rings (e.g., feasting, Thompson and Andrus, 2011). A significant pattern such as shell ring deposits from different seasons may have been missed entirely without conducting sclerochronological and stable isotope studies.

A caveat to the studies mentioned above is that four seasons represented at an archaeological site does not necessarily represent a year-round occupation of that site (O'Brien and Thomas, 2008: 495–496; Thompson and Andrus, 2011: 318, 335). A site could be occupied in different seasons over years or even decades apart and the combination of AMS dating and season of death studies may fail to capture the variability in forager subsistence strategies, as well as the roles that reoccupied sites play in forager socioeconomic activity. A second issue in sclerochronological and stable isotope studies is sample size. An adequate sample size is necessary in order to effectively address larger anthropological themes, such as mobility and feasting (see Quitmyer, Jones, and Arnold, 1997: 837).

Many studies on aboriginal subsistence in the Southeast concentrate on the Late Mississippian period, partly because there are more sites and better preservation of botanicals and faunal remains. Additionally, Spanish ethnohistoric documents from the end of the Late Prehistoric provide some insight on subsistence strategies (e.g., Zubillaga, 1946). The combination of archaeological and ethnohistoric data allows for broad scale comparison of food collection strategies. Ethnohistoric documents at first appear to contradict each other. There are two competing settlement models that address mobility of a coastal Late Mississippian group known as the Guale. The Guale lived approximately between the Ogeechee River to the north and the Altamaha River to the south (Worth, 1995, 2004; Saunders, 2000). They were comprised of as many as six chiefdoms each with a number of communities in them. They were all under the control of a single paramount chief. They practiced a mixed economy of agriculture, fishing, hunting, and gathering (Worth, 2004). One issue in competing models of Guale mobility

is how important corn agriculture was to local economy (i.e., the scale at which it was grown).

One account in ethnohistoric documents describes Jesuits arriving on the Georgia coast during in the early to mid-1560s and encountering highly mobile populations engaged primarily in hunting and gathering. They cited Guale mobility as one reason for their inability to convert a single person during their attempt to missionize the Guale. When the Franciscans arrived less than a decade later, they were met by a sedentary Guale population primarily engaged in maize agriculture. The Franciscans were far more successful in converting the Guale and establishing missions. The two conflicting accounts suggest that the Jesuits may have exaggerated the degree of Guale mobility to explain their failure in converting anyone (see Jones, 1978; Saunders, 2002b; Thomas, 2008).

The first is The Guale Annual Model (Crook, 1986). Built from Larson's (1980) subsistence model and the translation of Jesuit accounts of their failed missionary attempts in the mid-16th century, the model posits that Guale populations practiced seasonal mobility, mostly in small groups. During winter months, the Guale subsisted on a combination of shellfish, white-tailed deer and fishes while living adjacent to estuaries. In the spring, they subsisted on smaller amounts of shellfish and supplemented their diets with stored foods and anadromous fishes while they lived on the edge of the forest in open areas later used for swidden farming. In the summer, they consumed fishes and swidden harvests and aggregated in town sites. During the fall, they consumed the mast they gathered beginning in the late summer and lived adjacent to their collection sites in the forest. Throughout the year, they hunted deer and planted maize, beans, and squash.

None of these plants grew in large amounts because of the relatively infertile soils found on the barrier islands of the Georgia coast (Crook, 1986: 17–28, figure 2).

The alternate model holds that the coastal environment was productive enough to support permanent settlements for the entire year. Guale populations were organized in dispersed towns, planted maize, and hunted; however they still ate a mix of wild resources (e.g., shellfish, mast, etc.). The locations of their villages therefore were still within an effective foraging radius for collecting wild resources (Jones, 1978, 1980; Thomas, 2008).

Bioarchaeological data support Jones' year-round model and indicate that corn cultivation began approximately around cal A.D. 1300 (Larsen and Thomas, 1982: 327–329; Schoeninger et al., 1990; Thomas, 2008: 1099). Throughout the Late Mississippian, corn became an increasingly important resource possibly reflecting shifts in socioeconomic structures and subsistence patterns (Worth, 1999; Thomas, 2008: 1107–1110). Worth (1998; 1999) argues that by the time the Spanish arrived, Guale populations were involved in large-scale intensive maize agriculture. The shift to intensive maize agriculture may have developed in the wake of the collapse of the Savannah River chiefdoms in the coastal plain (see Anderson, 1994; Thompson and Worth, 2010: 74). The transition to intensive maize agriculture resulted in decreased mobility for groups in coastal areas.

Data from Grove's Creek site (9Ch71) on Skidaway Island further corroborates the model proposed by Jones (1978, 1980). Ethnobotany, zooarchaeology, and stable isotope analysis revealed that the site was a Late Mississippian village occupied year-round and that their diet was comprised of a wide variety of seasonally available foods.

Faunal remains of migratory fishes reveal a spring to early winter occupation and the stable isotope analysis of oyster shells indicates winter, spring, and summer seasons of collections (Keene, 2004: 683). Further, the botanical remains of maize (*Zea mays*) and other agricultural crops suggest that the village was occupied from the early spring to the fall (Keene, 2004: 686).

It appears now, that instead of Crook's Guale Annual Model, Jones's model of year-round settlement is largely correct; however, Jesuit accounts of Guale mobility also are correct (Thomas, 2008: 1110–1113). Bald cypress tree ring data indicate that the Jesuits arrived in the Guale region in the middle of a historic drought and the drought contributed to increased mobility among the Guale (Blanton and Thomas, 2008). After the drought ended, populations produced corn in large amounts and consequently lived in a more permanent settlement pattern. Therefore, the high degree of mobility observed by the Jesuits was an adaptation to a time of stress.

The surveys and settlement studies described above have contributed a wealth of data on aboriginal activity on the coast. However, the role that small marsh islands play in aboriginal subsistence and settlement is unclear. Further, how reliance on the back-barrier island region shifted as a result of broad sociopolitical, socioeconomic, or environmental changes over time is also unclear. In order to better understand the role of back-barrier islands, it is necessary to study them with the same focus given to large islands. Until then, aboriginal subsistence and settlement models remain incomplete.

RESEARCH OBJECTIVES

The primary goal of this study is to determine the role of a small hammock in the subsistence and settlement models of St. Catherines Island populations. This study

builds on the work of Thompson and Turck (2010) by systematically testing Bull Island Hammock, located immediately west of St. Catherines Island (Figure 2). The results of the survey are then contextualized with the subsistence and settlement models for St. Catherines Island and the surrounding back-barrier island region.

SIGNIFICANCE

This study is significant because the back-barrier island region has been mostly overlooked by archaeologists, save for the extensive survey by DePratter and the more recent survey by Victor Thompson. The results are part of a growing body of work on small islands of the Georgia coast (e.g., Thompson and Turck, 2009, 2010; Thompson and Roberts Thompson, 2010). Until more research is conducted on the small islands of the Georgia coast, archaeologists' understanding of how populations utilized their surrounding environment remains incomplete. This study also contributes to the ongoing discussion of marsh island management in response to development (e.g., Whitaker et al., 2004; Thompson and Roberts Thompson, 2010). Finally, as sea level rise continues to impact coastal areas, it is necessary to test known sites at risk before they are inundated or eroded and test at risk areas for previously undocumented sites. A study of this order will have to be executed on both large and small islands alike.

ORGANIZATION OF THIS THESIS

This study is organized into five chapters. Chapter 2 discusses the ecology and cultural history of St. Catherines Island and Bull Island Hammock. Chapter 3 discusses the research methods used for the survey and methods of artifact and data analysis. Chapter 4 presents the results of fieldwork, artifact analysis, AMS dates, and stable isotope analysis. Chapter 5 contextualizes the results of the survey with the subsistence

and settlement models for aboriginal groups on St. Catherines Island and the greater back-barrier island region of the Georgia coast.

CHAPTER 2

ST. CATHERINES ISLAND AND BULL ISLAND HAMMOCK: GEOLOGY, ECOLOGY, AND HISTORY

This chapter presents the geological history and ecology of St. Catherines Island and Bull Island Hammock. Despite being a little under 2 km apart, each island has unique geological formation processes. The geology of St. Catherines Island is well studied (e.g., Bishop, Rollins, and Thomas, 2011) as is the significant link between aboriginal activity and geomorphology, hydrology, sedimentology, and sea level change (Thomas, 2008: chapter 29; Rollins and Thomas, 2011: 319). While less is known about the geological formation processes of Bull Island Hammock, it is possible to discuss how critical resources such as freshwater sources and sea level change around the hammock could impact aboriginal activity. Following the discussion on geology, this chapter presents the aboriginal culture history of St. Catherines Island and what is known about the 19th century occupation of Bull Island Hammock. This information is used to contextualize the results of the survey on Bull Island Hammock.

GEOLOGICAL FORMATION PROCESSES

St. Catherines Island is composed of a Pleistocene-aged island core and Holocene-aged beach ridges and salt marshes (Linsley, Bishop, and Rollins, 2008: 26).

The presence of both Pleistocene and Holocene components makes St. Catherines Island a “mixed composite” island (Oertel, 1979: 275). Including St. Catherines Island, there are eight mixed composite barrier islands in the Georgia Bight (Thompson and Turck, 2010: 284). The older Pleistocene core, that was once part of the mainland, dates to the Silver Bluff shoreline, approximately 40,000 years B.P. (Linsley, Bishop, and Rollins, 2008: 38; Bishop et al., 2011: figure 3.3). Subsequent flooding in low lying areas after the Wisconsinian sea level drop “isolated” the Pleistocene part of St. Catherines Island from the mainland (Linsley, Bishop, and Rollins, 2008: 26; Rich, Vega, and Vento, 2011: 75; Thomas, 2011). The Pleistocene-aged section of the island then eroded and became very long and narrow, extending further north and south. The transformation of the island led in part to the creation of “Guale Island” (Figure 3), a barrier island to the northeast of St. Catherines Island (Linsley, 1993; Thomas, Rollins and DePratter, 2008; Bishop, et al., 2011: figure 3.3; see also Chowns, 2011). Since then, sea levels have risen and Holocene beach ridges have accreted in the form of recurved spits to the north and south of the Pleistocene core of St. Catherines Island (DePratter and Howard, 1977; Oertel, 1979: 274–279; Linsley, Bishop, and Rollins, 2008; Thomas, 2008: 39–40). Radiocarbon, palynological, and paleontological data show that older Holocene accretions date to between cal. 3000–2670 B.C. (Booth, Rich, and Bishop, 1999; Booth et al., 1999; Thomas, Rollins, and DePratter, 2008: 837, 840, table 29.1). Because St. Catherines Island is the farthest barrier island from a major river drainage system (i.e., Altamaha, Ogeechee, or Savannah Rivers), the sediment that formed the series of Holocene beach ridges are from estuaries or eroded longshore transport sediments from

different parts of the island or elsewhere on the coast (Linsley, Bishop, and Rollins, 2008: 27; Bishop et al., 2011: 79).

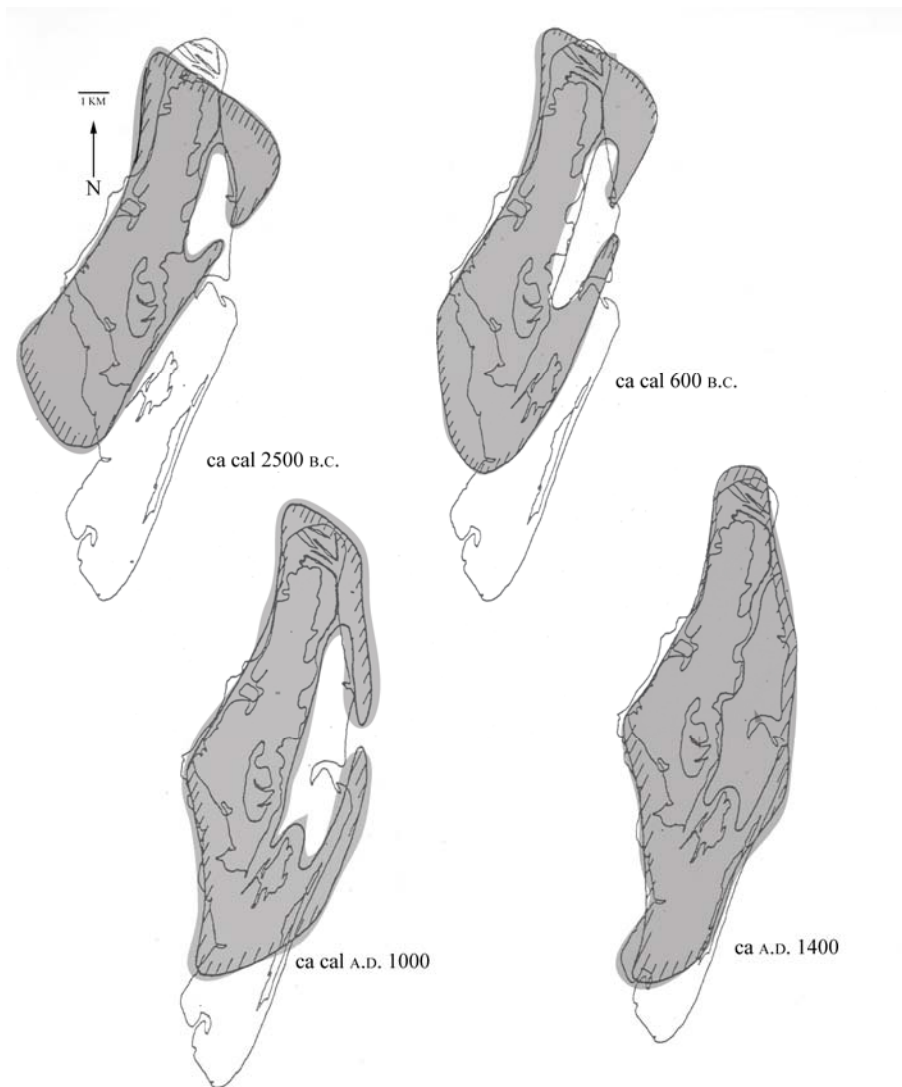


Figure 3. The changing shape of Guale Island (gray) over the current shape of St. Catherines Island (Thomas, 2008; after Linsley, 1993; image courtesy of the American Museum of Natural History; Appendix A).

The age and morphology and formation processes of back-barrier islands are similar to those that form the barrier islands. Oertel (1979: 279) argues that hammocks are discrete landforms which accrete individually. In this model, hammocks form from

coarse-grained sediments accreting together to form “marsh-encircled islands” (Oertel, 1979: 276). DePratter and Howard argue that back-barrier islands are former barrier islands of a continuous beach ridge that are partially submerged or eroded. In this scenario, Holocene sediments are deposited on top of Pleistocene remnants. A third type of hammock formation process is from modern dredge spoils and from shipping ballast (Emery et al., 1968; Thompson and Turck, 2010: 284). At this time, it is not possible to discuss the geologic formation processes for Bull Island Hammock. But a vibracore survey coupled with optically stimulated luminescence dates on Mary Hammock to the south (to the west of Sapelo Island) indicate that at least one back-barrier marsh islands are Holocene sediments lying directly on top of Pleistocene components (Turck and Alexander, in prep.).

SEA LEVEL CHANGE AROUND ST. CATHERINES ISLAND

Around 1000 cal B.C., a sea level drop of possibly up to 4 m dramatically altered the physical landscape. Lower sea level shifted the distribution of estuarine and marine habitats (DePratter, 1977; DePratter and Howard, 1977, 1980, 1981; Colquhoun et al., 1981; Colquhoun and Brooks, 1986; Gayes et al., 1992; Thomas, 2008: 45; see also Thompson and Turck, 2009). Around 350 cal B.C., sea levels began to rise again and estuarine environments subsequently rebounded. Since then, sea levels have continued to rise steadily (cf., Colquhoun and Brooks, 1986). As sea levels rose, the shape of St. Catherines Island shifted gradually reaching its present morphology. Slowly, erosion processes like wave action (or major hurricanes; see Rollins, Beratan, and Pottinger, 2011) inundated Guale Island by the Late Mississippian period. The shape and extent of Guale Marsh changed, moving southward and becoming narrower.

HYDROLOGY

St. Catherines Island has two freshwater sources: the Floridan Aquifer and the groundwater reservoir found above the aquifer (Hayes and Thomas, 2008: 56–57). The Floridan Aquifer stretches from South Carolina to Florida and inland to Alabama and is characterized by limestone, dolostone, and calcareous sands. The stratum is sloped and gets deeper further inland; on the coast near Savannah the aquifer can be found at 15–20 m below the surface (Hayes and Thomas, 2008: 56; Vance et al., 2011). Freshwater escapes through cracks and feeds natural springs, ponds, and wetlands. Because of hydrostatic pressure built up from the fissures in the marl stratum, the water “flows” when it reaches the surface.

The freshwater ground reservoir is located higher than the Floridan Aquifer. It does not flow like the aquifer because there is no hydrostatic pressure that builds up. This water source is easier to tap and is supplemented by rainfall (Hayes and Thomas, 2008: 57). The reservoir also feeds also ponds and swamps when the level is higher than the surrounding land surface (Hayes and Thomas, 2008: 57). Therefore, in wetter times of the year, it is likely that low-lying areas, like the Pleistocene core of St. Catherines Island, held freshwater sources (Hayes and Thomas, 2008; Vance et al., 2011).

The hydrology of St. Catherines Island has changed significantly in recent centuries. An increase in the number of deep wells built on the Georgia coast toward the end of the 19th century coupled with large-scale pulp mill production in Savannah and other places along the Georgia coast depleted the Upper Floridian aquifer. Times of drought would have similarly depleted the freshwater table above the aquifer.

It is only possible to speculate as to the potential for freshwater on Bull Island Hammock. A topographically low part of the island, located in the northwest part of the hammock may have supported freshwater in wetter months. The moderate to poorly draining soils found on the hammock would help keep collected rainwater and an elevated water table on the surface.

SOILS

ST. CATHERINES ISLAND

The combination of Pleistocene and Holocene components on St. Catherines Island engender a variety of soil types and the various soils support a variety of different vegetation types. Soil descriptions are taken from Looper (1982) and Reitz and colleagues (2008: 53–55). It should be noted that modern soil types may not reflect the soil types in previous millennia.

The Pleistocene core of the island is composed of a Mandarin–Rutledge blend. The blend is a mix of moderately poor to poorly draining fine sands. Both soil types are acidic. The fact that this soil blend drains poorly and is highly acidic means that it is not well suited for agriculture. Mandarin-Rutledge soils are found in nearly level areas or in shallow depressions and have a slope of 0–2%.

The periphery of the Pleistocene core of the island is made up of an Echaw–Foxworth–Centerary soil blend. Composed of fine sands, the blend is moderately well draining and occurs on ridges with little slope (0–2%). They are less acidic than the Mandarin–Rutledge soils found in the central part of the island and are moderately well suited for agriculture.

Surrounding the periphery of the Pleistocene core are the Holocene beach ridges. Holocene beach ridges are accretionary, aligned parallel to each other with intertidal marsh or freshwater ponds between them (Linsley, Bishop, and Rollins, 2008). They can be as large as 3 m in height. The soil type for the Holocene ridges is a Fripp–Duckston blend. Both of these fine sands have a medium acidity and are poorly suited for both agriculture and woodland. These soils are found on slopes of anywhere from 1–20%.

The intertidal marsh areas between the beach ridges are Bohicket–Capers soils. They are a mix of loam on top of clay. The soils are poorly draining and are neutral or slightly alkaline. Tidal and seasonal flooding takes place in this zone, making them impossible for agriculture and woodland growth.

BULL ISLAND HAMMOCK

The soils on Bull Island Hammock are an Echaw–Centenary blend. This blend contains some Rutledge–Mandarin soils in small amounts. Echaw-Centenary soils drain better when there is less Mandarin–Rutledge soil present. This soil blend is similar to the periphery of the Pleistocene core on St. Catherines Island. The combination of soil types on Bull Island is sufficient for agriculture because cotton farming took place during 19th century. The marsh area of Bull Island that surrounds the hammocks consists of Bohicket-Capers. This is the same soil type seen between the Holocene beach ridges on St. Catherines Island.

VEGETATION

ST. CATHERINES ISLAND

The vegetation zones for St. Catherines Island are taken from Reitz and colleagues (2008: 55–56), who follow Somes and Ashbaugh’s (1972) original

classifications for St. Catherines Island. There are six different naturally occurring vegetation zones found on St. Catherines Island.

The first zone, found on the eastern and western sides of the island, is tidal marsh. Smooth cordgrass (*Spartina alterniflora*) is the most frequently occurring plant in this zone. Other plants found in the tidal marsh include salt hay (*Spartina patens*), perennial saltwort (*Salicornia virginica*) and sea oxeye daisy (*Borrchia frutescens*). The second zone is meadow and defined as non-tidal areas where soil still receives fresh water for most of the year. Dominant plant species in meadows are black rush (*Juncus roemerianus*), soft rush (*Juncus effesus*), and bulrush (*Scirpus* sp.). The third zone is forest. Forest makes up the majority of St. Catherines Island. This zone is dominated by laurel oak (*Quercus laurifolia*), live oak (*Quercus virginiana*), and various species of pine, such as slash (*Pinus elliotii*). Less frequently occurring, but still common, vegetation in the forest zone is sawtooth palmetto (*Serenoa repens*), cabbage palmetto (*Sabal palmetto*), and yaupon and American hollies (*Ilex vomitoria* and *Ilex opaca*, respectively). The fourth zone is upland grassland Upland grasslands are out of the tidal zone. For example, the upper part of beaches and forest clearings are both upland grassland areas. The vast majority of the vegetation in these areas is Bermuda grass (*Cynodon dactylon*). Other, less frequently occurring plants include spangle grass (*Uniola laza*) and sea oats (*Uniola paniculata*). The fifth zone is scrub. Many of these types of plants are found in conjunction with forest vegetation. Species of this type include wax myrtle (*Myrica cerifera*), buckthorn (*Bumelia tenax*), marsh elder (*Iva frutescans*), and winged sumac (*Rhus capallina*). The sixth zone of vegetation on the island is savanna. Today on St. Catherines Island, these areas are almost exclusively

man-made. Savanna fields were created for cattle farming in the last century and are now maintained by mowing and intentional burning. The dominant species in these areas are Bermuda grass, slash pine and longleaf pine (*Pinus palustris*)

BULL ISLAND HAMMOCK

Multiple vegetation types occur on Bull Island, but overall there are fewer varieties compared to St. Catherine Island. Since Bull Island is mostly intertidal marsh, the majority of vegetation found is smooth cordgrass, salt hay, and sea oxeye daisy. On the hammocks where the elevation is higher than the surrounding marsh, the vegetation types are forest and scrub, with patches of meadow. Bull Island Hammock hosts unique vegetation not found on St. Catherines Island, including the Colonel's Island basswood (*Tilia littoralis*)

Vegetation on the hammock is incredibly dense, partly because a lightning fire within the past decade burned out most of the vegetation except for the over story of pine and oak. Numerous plant and tree species proliferated in the newly available habitat such as magnolia (*Magnolia grandiflora*), pine, and palmetto. In addition, as there is no permanent deer population, young plants and trees have a chance to survive. Now the dense understory is filled in with mostly young trees and plants.

Overall, St. Catherines Island and Bull Island Hammock have similar soils and vegetation. The same pattern is true for most barrier and back-barrier islands found in the region (Albers and Alber, 2003; Albers, 2004; see also Whitaker et al., 2004). Barrier islands and back-barrier islands that are both found within the same region (i.e., deltaic or non-deltaic regions) share similar formation processes that lead to similar vegetation types. Finally, the presence of humans and animals on large and small islands

also plays a role in the ever-changing ecology of an island. For example, Smith and McGrath (2011) document the effects of shell deposits on soil chemistry and Thompson and Roberts Thompson (2010) argue that large scale shell deposits added an anthropogenic component to Pumpkin Hammock. Shell deposits also impact vegetation types and neutralize soil making it more suitable for agriculture (Smith and McGrath, 2011).

CULTURAL HISTORY

An island-wide systematic archaeological transect survey of 20% St. Catherines Island yielded 122 sites. Thomas uses the data from these sites to build the predictive sociopolitical and socioeconomic models for each of the cultural periods on the island (i.e., Late Archaic through Mississippian periods). Overall, primary settlements (the most optimal central places) should be in marshside areas, adjacent to the maritime forest. The secondary (suboptimal) settlement areas are in seaside areas. Foragers lived adjacent to these resources allowing for the maximum access and highest energetic return rates for both men and women (Thomas, 2008: 859–860). It is worth noting, that St. Catherines Island is small enough that a forager (or group) can leave a residential base and travel by foot to any part of the island and return home within the same day. Diet breadth models hold that foragers exploited a variety of different resources (e.g., terrestrial, marine, and littoral) and varied according to seasonal availability of certain foods (e.g., sea turtles, mast, etc.; Thomas, 2008: 936). The following discussion summarizes aboriginal activity during each cultural period on St. Catherines Island within the behavioral ecology framework established by Thomas as well as material culture traditions (i.e., ceramics) and mortuary activity.

THE ST. SIMONS PERIOD (3000–1000 CAL B.C.)

The earliest cultural radiocarbon dates from St. Catherines Island are from the St. Catherines Shell Ring, dating to 2950–2470 cal B.C. (Thomas, 2008: 410–412, table 15.2; Sanger and Thomas, 2010: 59–64, table 3.1). The dates are coeval with eustatic sea level rise, the formation of the older Holocene beach ridges to the north and south of St. Catherines Island (see above), and the stabilization of the surrounding marsh habitat on the east and west sides of the island and along the Georgia coast (Marrinan, 1975; DePratter and Howard, 1977; Elliott and Sassaman, 1995; Thomas, 2008: 45–46; Thomas, Rollins, and DePratter, 2008: 837, Thompson, 2007: 99–100). The most common artifact recovered from Late Archaic sites is fiber-tempered pottery, classified as St. Simons (see DePratter, 1979a; DePratter, 1991; Williams and Thompson, 1999). On Late Archaic sites found on mainland Georgia, fiber-tempered pottery is identified as Stallings, although fiber-tempered pottery in southwest Georgia or the panhandle of Florida is identified as Norwood. In northeastern Florida fiber-tempered pottery is identified as Orange ware (see Claflin, 1931; Waring, 1968; Sassaman, 1993; Williams and Thompson, 1999). Such pottery is associated with three types of Late Archaic sites: 1) shell rings, 2) shell middens, and 3) other sites like hunting or processing camps that would not necessarily bear shell (DePratter and Howard, 1980: 78). Shell rings are large scale circular or semi-circular shaped complexes found in the Southeast (Russo and Heide, 2001: 491–492). They are composed of mostly bivalves, but a variety of other marine shells are not uncommon in the shell rings. Along the Georgia Bight, they can be as much as 5 m high and over 100 m in diameter (DePratter and Howard, 1980: 78; Colquhoun et al., 1981: 144; Russo and Heide, 2001; Saunders, 2002a). The reasons and

methods for their formation or construction are debated (e.g., rapid feasting and ceremonial deposits, gradual accumulation of community refuse, ceremonial architecture, water retention features; Waring, 1968; Waring and Larson, 1968; DePratter, 1979b; Trinkley, 1985; Russo and Heide, 2001; Russo, 2004; Saunders, 2004; Thompson et al., 2004; Thompson, 2006, 2007; Marrinan, 2010; Marquardt, 2010; Russo, 2010; Thompson and Andrus, 2011). Non-ring shell middens occur on barrier islands and have been found on the extreme edges of back-barrier islands (DePratter and Howard, 1980: 74). Sites that yield little to no shell are believed to have been hunting, collection, and/or processing areas (Waring, 1968; Waring and Larson, 1968; DePratter, 1976, 1979b; Sassaman, 1993; Elliott and Sassaman, 1995; Thompson and Turck, 2009). The two largest St. Simons sites on St. Catherines Island are the St. Catherines Shell Ring (9Li231) and the McQueen Shell Ring (9Li1678). The St. Catherines Shell Ring is on the west side of the island and the McQueen Shell Ring is situated on the eastern marsh edge. The systematic transect survey shows that St. Simons sites cluster around the northeast side of the Pleistocene core of the island around Guale Marsh and cluster around the west side of the island along the marsh (Thomas, 2008: 993–1000, fig. 32.2). A St. Simons period site (9Li137) that post-dates the utilization of the shell rings by many centuries was formerly on the northeast side of the island near Guale Marsh, but that site has subsequently eroded into the Atlantic Ocean (Thomas, 2008). Archaeological testing and AMS dates on samples collected before the last of the site eroded indicate that the site post-dated the shell ring by several centuries (Sanger, 2010: 214). Ultimately, the exact nature of activity that took place at this site remains unknown.

While the distribution of St. Simons sites generally correlates to the projections of Central Place Theory, there are some sites that do not fit the predictive models. A cluster of small sites found along the Pleistocene core of the island is identified as lacustrine sites and are located less than 1 km away from eastern and western marshside settlements. They differ from the other Late Archaic sites because they lack the typical shell deposits seen on the marsh edge sites. They do not fit the Central Place Theory models because the sites are not found where saltwater marsh and the maritime forest meet, the area where the two meet is projected to offer the greatest number and variety of desirable resources. However, since it is now known that during the Late Archaic the central part of the island supported freshwater ponds (see above), then the Central Place Theory model predicts that Late Archaic foragers should utilize those areas of the island as well (Thomas, 2008: 998–999).

There are no unequivocal mortuary data available from the St. Simons period on St. Catherines Island (Thomas, 2008: 1002–1003) and the extent to which societies were egalitarian or non-egalitarian is ambiguous and currently debated by archaeologists though most data suggest that groups were egalitarian (DePratter, 1979a; Trinkley, 1985; Russo, 1994; Anderson, 2002: 248; Sassaman, 2004; Saunders, 2004; see also Schwadron, 2010; Thompson, 2010).

THE REFUGE–DEPTFORD PERIOD (1000 CAL B.C.–CAL A.D. 350)

The Refuge-Deptford period encompasses two distinct cultures: the Refuge and Deptford (otherwise known as the Early and Middle Woodland, respectively). Both cultures produced similar sand-tempered pottery. Although each ceramic type has some distinct decorative patterns, the small sample size available on St. Catherines Island

coupled with the difficulty of distinguishing between the two wares has led Thomas and colleagues working on St. Catherines Island to lump the two periods together (Thomas, 2008: 410).

The transition between the St. Simons and Refuge periods is marked by environmental and social changes. A sea level regression caused the depletion of estuarine habitats that were available during the St. Simons period. As sea levels dropped by a rate of 50 cm per century (Gayes et al., 1992; Thomas, 2008: 46), more land was exposed. With such a significant a drop, the coastal area would look very different. What estuarine habitats that did survive were found on the extreme eastern and western edges St. Catherines Island (Thomas, 2008: 46). The back-barrier island region as a whole likely transformed as marshes and meadows desiccated. Populations adapted to a terrestrial-based subsistence economy. The transition to terrestrial-based foraging is seen in other areas along the Georgia coast as well (Marrinan, 1975; DePratter and Howard, 1980). A lack of sites and radiocarbon data from the early part of the Refuge–Deptford period suggest that island population decreased significantly (DePratter and Howard, 1981; Thomas, 2008: 1006; see also Thompson and Turck, 2009), but it is also likely that a decrease in shellfish consumption and the correlating lack of middens from this period biases the radiocarbon record. The presence of submerged Refuge–Deptford sites found on other barrier islands along the Georgia coast (Milanich, 1971, 1994; Marrinan, 1975) further indicate that the population models for this period are incomplete and require further investigation. Importantly, environmental fluctuations likely contributed to economic and sociocultural shifts in other areas of the North American Southeast as well (DePratter and Howard, 1980; Thomas, 2008, 2010;

Thompson and Turk, 2009; Gibson, 2010; Kidder, 2010; Russo, 2010; Sanger, 2010; Saunders, 2010 Thompson, 2010).

On St. Catherines Island, large-scale shell deposits in the form of shell rings ceased, although shell rings were again formed in other areas during the Middle Woodland (Thompson and Turck, 2009; Anderson, 2010; Sanger, 2010; Thompson, 2010). Early Woodland hunter-gatherers practiced different subsistence strategies. Some coastal Refuge forager groups modified their collection strategies to exploit more freshwater shellfish than during the Late Archaic, while others no longer collected vast amounts of shellfish at all (DePratter, 1977: 11; DePratter and Howard, 1980; Reitz, 1988: 147; Crook, 2007). The latter of these sites yielded artifact scatters and not shell midden deposits (Marrinan, 1975; Thomas and Larsen, 1979; DePratter and Howard, 1980: 10). Archaeological evidence indicates that hunter-gatherers relied more on terrestrial hunting, evidenced by an increase in the number of excavated projectile points (Marrinan, 1975; DePratter and Howard, 1980). Faunal analysis corroborates the archaeological evidence that hunting patterns shifted (Reitz, 2008: 656–658). The cultural transition between the St. Simons and Refuge periods is further marked by a change in pottery production. Instead of being tempered with plant fibers, sand sometimes mixed with small quartzite pebbles was used instead (DePratter, 1991: 165–167; Williams and Thompson, 1999: 99–100; Guerrero and Thomas, 2008: 375–378). The only radiocarbon data from the Refuge period are on shell and charcoal that come from mortuary contexts and are confined between cal 1200–400 B.C. and not from shell midden or habitation sites (Thomas, 2008: 1010–1011). The dates come from cemetery burials beneath Deptford and Wilmington period mounds (Thomas, 2008: 1009–1010).

Although sea level regression ended around 1600 cal B.C. (Gayes et al., 1992), the estuarine habitats around St. Catherines Island did not reach their former level of productivity until the Deptford period. Archaeological evidence indicates that when the estuarine habitats returned, groups began consuming shellfish in large quantities again, a pattern which is echoed elsewhere in the Southeast (Marrinan, 1975; DePratter, 1976; Thomas and Larsen, 1979; DePratter and Howard, 1980: 12). The Hayes Island Site (9Li1620), the oldest shell-bearing site that post-dates the sea level low stand is along the western edge of the island (Blair, 2008: 830–831; Thomas, 2008: 1007). A clam shell from the bottom of the midden dated to 2410 ± 60 cal B.P., just after estuarine habitat returned to St. Catherines Island. Similar to the St. Simons period, lacustrine sites are distributed along the edge of the Pleistocene core and the periphery. At nine sites where seasonal data are available, Refuge–Deptford sites were occupied in all four seasons (Thomas, 2008: 918).

Mortuary activity changed during the Deptford period. Instead of cemetery burials, the first burial mounds were built on St. Catherines Island. Supine-extended individuals were found with bundle burials and cremations (Thomas, 2008: 1012, 1014).

THE WILMINGTON PERIOD (CAL A.D. 350–800)

There is a significant gap in the radiocarbon record between the end of the Refuge–Deptford period and the beginning of the Wilmington period on St. Catherines Island, the reasons for which are still unclear. The gap is likely connected to a shift in estuarine resources from the west to the saltwater marsh on the east side of the island (Thomas, 2008: 1017). The emergence of the Wilmington period marks another sociocultural shift. Pottery producers tempered their pottery with clay and crushed bits

of fired clay or sherds, also called grog (DePratter, 1979a: 121, 1991: 177; Williams and Thompson, 1999; Guerrero and Thomas, 2008: 381–382).

Sites dating to the Wilmington period match the projections based on Central Place Theory models. The largest sites occur along the western side of the island along the marsh edge. Smaller sites are found on the Pleistocene core of the island. Archaeological sites and components from this period also cluster on the southern part of the island, reflecting the changing shape of Guale Marsh and demonstrating how aboriginal foragers adapted to a changing landscape (Thomas, 2008: 905). Similar shifts in settlement have been observed on Skidaway and other islands (DePratter, 1978). The majority of sites were occupied in four seasons (Thomas, 2008: fig. 30.26).

Despite the fact that the marshes around St. Catherines Island were as productive as they were in the Late Archaic, Wilmington foragers consumed a diet similar to that in the Deptford period, because it was higher in terrestrial-based resources (Thomas, 2008: 1020). The sites closer to the marsh edge contained more shellfish and terrestrial mammals, but the sites found on the interior of the island yielded a significantly greater amount of fish (Reitz, 2008).

Mortuary data show that social status and rank continued to be earned throughout the course of an individual's life according to his or her achievements, not ascribed at birth (Thomas, 2008: 1023–1025, 1075). Burials from this period were found in Cunningham and Seaside Mound groups, including a central tomb in McLeod Mound that contained five adult female burials (Thomas, 2008: 1023). Mounds from the Wilmington period were constructed over the Refuge-Deptford period cemetery burials. Therefore, despite different inhumation processes, the reuse of space for mortuary

activity suggests some kind of ideological continuity between Refuge-Deptford groups and Wilmington groups. Mortuary activity during this period was very similar to the mortuary activity of the Refuge–Deptford period; an individual’s burial indicated his or her rank in society. It should be noted that radiocarbon data suggest that mortuary activity on St. Catherines Island for the Wilmington period occurred within one century, early in the Wilmington period.

THE ST. CATHERINES PERIOD (CAL A.D. 800–1300)

There were dramatic environmental and social transformations during the St. Catherines period. In terms of radiocarbon data and material culture, the Wilmington culture blends into the St. Catherines culture without significant breaks (Thomas, 2008). Pottery still had clay tempering and there were many stylistic similarities to Wilmington pottery. Clay and grog fragments used for temper were appreciably smaller and decoration elements (e.g., cord marking) were finer. Guale Marsh was still extant; however, Guale Island was much smaller than during previous periods.

The larger St. Catherines period sites are located along the western side of the island, close to the marsh. Smaller sites are located further inland, near the lacustrine habitats. These sites appear as “miniaturized” versions of the marsh side sites, meaning that they contain all the same kinds of archaeological materials (i.e., artifacts, ecofacts, etc.), but are spatially constrained (Thomas, 2008: 1030). The distribution of sites during this period is the best fit for the Central Place Theory model. From the sites where seasonal data are available, the majority were occupied in all four seasons. Those sites that were not are mostly along the edges of the eastern or western sides of the island near larger four season sites (Thomas, 2008: fig. 30.18).

The significant shift in social structure is evidenced in treatment of the dead and their placement in burial mounds. After an approximately 400 year hiatus, the dead were placed in burial mounds once again. Johns Mound, Mary's Mound, and South End Mound II all contained burials dating to the St. Catherines period. Excavations at these burial mound sites revealed central tombs with multiple individuals in log-lined pentagonal pits which, in the case of Mary's Mound, intruded into Refuge and Wilmington period burials (Thomas, 2008: 1031, 1075–1076). South End Mound II contained multiple cremations of individuals who were interred with copper fragments and galena cubes. Cremains from the St. Catherines period is the only context and cultural period where copper and galena have been recovered on St. Catherines Island (Larsen and Thomas, 1982).

For the first time in the broad social history of St. Catherines Island, there was a pronounced increase in the number of children placed into burial mounds. Children show up in late Deptford–early Wilmington mounds at a rate of approximately 10%. The number of buried sub-adults in the St. Catherines period is over 40% (Thomas, 2008: 1031–1032). The marked increase in children burials suggests that by the St. Catherines period, social status was ascribed at birth instead of earned in life (Thomas, 2008: 1031–1032). A transition from achieved to ascribed rank indicates a significant departure from previous sociopolitical and economic structures. Previous scholarship on inherited inequality during the Mississippian period in the Southeast typically associates the shift to inherited social inequality coeval with maize agriculture. However, bioarchaeological data from St. Catherines Island indicate that maize agriculture was not present on the coast during the St. Catherines period (Thomas 2008: 1038).

There were fluctuations in the natural environment as well. Data on seasonal wetness, obtained from bald cypress tree rings show that a major drought from cal A.D. 1176–1220 dramatically influenced aboriginal subsistence and settlement. Paucity in cultural radiocarbon data and mortuary sites from this period suggests a cessation of traditional cultural activities (i.e., shellfish consumption and midden construction) on St. Catherines (Thomas, 2008: 1078).

It should be noted that discussion of the cultural history of St. Catherines period does not include a discussion of the Savannah period. The Savannah period is omitted because Thomas (Blanton and Thomas, 2008: 801–802) argues that there are no Savannah period sites on St. Catherines Island. A gap in the radiocarbon record attributed to the severe drought is contemporaneous with the Savannah period. The gap in radiocarbon dates is interpreted as a possible partial depopulation of the island or a cessation in traditional cultural activities (i.e., shellfish consumption and midden construction). There are, however, Savannah period sherds recovered. In other words, while there are some Savannah period radiocarbon dates and Savannah period pottery recovered from sites, there is significant a break between the St. Catherines and Irene periods in the radiocarbon record to argue for a Savannah period occupation on St. Catherines Island (Thomas, 2008). The issue deserves more study, but is beyond the scope of this thesis. Savannah and St. Catherines period pottery and radiocarbon dates will be referred to as the Early Mississippian.

THE IRENE PERIOD (CAL A.D. 1300–UNCAL 1580)

The Irene period on St. Catherines Island is the best represented both in terms of number of sites and amount of material culture. The onset of the Irene culture on St. Catherines

Island is concomitant with the end of the St. Catherines period (Thomas, 2008: 1035).

Stabilization of the marsh environments followed. Guale Island was completely washed over by the Atlantic Ocean. The shape of St. Catherines Island during the Irene period is the same as that of the present day with the exception of spits prograding on the southern extent of St. Catherines Island.

Pottery makers produced a new type of pottery during the Irene period. Instead of clay tempering, aboriginal foragers tempered their pottery with quartzite pebbles or grit (DePratter, 1979a, 1991: 189; Williams and Thompson, 1999; Guerrero and Thomas, 2008: 389–390). Vessel surface treatments bear similarities to St. Catherines period pottery (e.g., burnished and plain wares), but decorations were dramatically different as there was a greater emphasis on incising and complicated stamping. From a regional perspective, Irene pottery has many construction and stylistic similarities to Lamar pottery (Williams and Thompson, 1999; Williams, 2009). The predominant design is complicated stamping (most often in a filfot pattern) made with a carved paddle.

The majority of Irene sites are located on the western and eastern margins of St. Catherines Islands along the marsh edges. Instead of the sites clustering around what was once Guale Marsh, they are further south, near McQueen Marsh and Cracker Tom Hammock. The sites on the west side are evenly distributed along the western side of the island. Sites are also found in the southern Holocene beach ridges of the island (Thomas, 2008: 1037, figure 32.13). Seasonal data indicate that the majority of these sites are four season occupations. The sites that were not occupied year-round were occupied in a mix of one, two, or three seasons.

Island population during the Irene period was the highest ever seen on St. Catherines Island. However, the economic and sociopolitical activities of the populations were different from those of the St. Catherines period. During the Irene period, populations on St. Catherines Island were organized into chiefdom-level societies and were linked into the Mississippian economic and political systems in the Southeast (Blanton and Thomas, 2008: 802; Thomas, 2008: 1038–1039). Integrated into the Mississippian system, St. Catherines Island Native Americans began practicing intensive maize agriculture to offer as tribute toward ceremonial centers (Worth, 1999; Larsen, 2002: 64; Reitz, Larsen, and Schoeninger, 2002; Thomas, 2008). From a behavioral ecology perspective, the transition to intensive maize agriculture is problematic because the energetic return rates are so low when compared to return rates shellfish, fish, or mammals (Thomas, 2008: 207–209, fig. 9.4). Bioarchaeological data show that once people switch to a mostly corn diet, overall skeletal, dental, and physical health deteriorate (Thomas and Larsen, 1982; Hutchinson and Larsen, 2001; Schultz, Larsen, and Kreutz, 2001; Simpson, 2001). Just such a change is noted during the Irene period on St. Catherines Island (Schoeninger et al., 1990; Larsen, Ruff, and Schoeninger, 1992; Hutchinson, Larsen, and Schoeninger, 1998; Larsen, 2001: 29; Reitz, Larsen, and Schoeninger, 2002: 50, 53, 54). The archaeology of Irene period sites indicates that much of the Irene period people's time had to be devoted to intensive agriculture to account for such notable decreases in overall health (Worth, 1998: 6; Larsen, 2002: 64; Reitz, Larsen, and Schoeninger, 2002: 45). The question then becomes, why Irene populations switched to such a costly (in terms of return rates and nutrition) subsistence practice in the first place. John Worth (1998) suggests that the

reason for the switch was the increased participation in the larger Mississippian tribute systems by Irene groups living on St. Catherines Island (see also Thomas, 2008).

South End Mound I contained the majority of the excavated burials dating to the Irene period. Unlike in previous periods, there was no central tomb feature in the burial mounds. Unique to this period was the incorporation of urn burials. Urn burials account for 12% of the burials at South End Mound I (Thomas, 2008: 1037).

THE ALTAMAHA PERIOD (UNCAL A.D. 1580–1700)

The Altamaha period is coeval with the Spanish occupation of St. Catherines Island. The geomorphology was very similar to today, except the northern and southern ends of the island prograded, but eroded in the past 300 years.

Pottery production shifted again during this period, but there is continuity in temper and decoration. The majority of vessels were still stamped with a carved paddle, but motifs lacked any curvilinear elements that were characteristic of Irene period pottery (DePratter, 2009). Designs were rectilinear (i.e., line blocked), cross simple stamped, or check stamped. Some vessels were also incised and punctated. The size of aplastics increased in size during the Altamaha Period as well (Deagan and Thomas, 2009a: 209) Another hallmark of the Altamaha period is Red Filmed ware, in which a red film or slip was applied to one or both sides of vessels (Williams and Thompson, 1999; Guerrero and Thomas, 2008: 390) When typing sherds, the similarity between Irene and Altamaha makes differentiating between the two wares difficult (see Deagan and Thomas, 2009b). Exactly when and where along the east coast Altamaha pottery developed and how this relates to the distribution of aboriginal groups is still unclear (DePratter, 2009; Thomas, 2009; Worth, 2009). What is clear, however, is that by the

time the Spanish set up a mission on St. Catherines Island in 1580s, the population was exclusively producing Altamaha pottery (Thomas, 2009). Regionally, this pottery was produced from South Carolina to northern and northwestern Florida. When recovered from South Carolina and northern Georgia it is identified as Altamaha; when found in southern Georgia and Florida it is identified as San Marcos pottery (see Deagan and Thomas, 2009b). Differences between the two types are minimal; the separate type names are the product of archaeologists working in separate region than separate pottery producing traditions.

The distribution of people across the island changed completely during the Altamaha period because of the establishment of Mission Santa Catalina de Guale (9Li274) at Wammassee Head. The establishment of the mission drew people toward the village which was set up around the mission. Of the 14 sites found during the systematic transect survey that contained Altamaha pottery, seven of those sites come from within 1 km of Mission Santa Catalina de Guale and the surrounding pueblo (Thomas, 2008: 1039). The tight distribution of Altamaha sites is a significant change compared to the distribution of Irene sites identified during the transect survey.

All of the mortuary data during this period comes from the mission cemetery inside the church and were the converted Catholic who probably lived closest to the mission. Many of the individuals were recovered with grave goods, including religious medallions, crosses, and almost 70,000 glass trade beads (Thomas, 1993; Blair, Pendleton, and Francis, 2009). The bioarchaeology of the mission demonstrates that the mission population subsisted on a diet heavy in maize. A maize-heavy diet had significant and deleterious impacts on their overall health (Larsen, 1990, 2002).

HISTORIC OCCUPATION OF BULL ISLAND HAMMOCK

Little is known about the occupational history of Bull Island Hammock. During the late 1970s, Chester DePratter and James Howard observed shell on the surface but did not make any collections of pottery. They also surveyed the smaller hammocks to the north of Bull Island Hammock (still on Bull Island) and observed no sites. Others who have visited the hammock observed Refuge or Deptford pottery on the surface of a large shell midden (Royce Hayes, personal communication, 2009).

During the late 18th and early 19th century, a family of farmers occupied Bull Island Hammock. It is unclear if they lived on Bull Island Hammock year-round or just camped there at various times in the year. They grew cotton, and the remnants of the cotton rows are still visible on the surface of the hammock (Jack Waters, personal communication, 2010). In the center part of the island, rows are aligned north/south and on the edges of the island, they are aligned east/west. In the north part of the hammock, there is a drainage ditch that drains to an area of low elevation near the center of the hammock. The ditch runs directly into the marsh and was probably built to manage water from the center of the hammock so it could be farmed. At the southern part of the island, the remains of a historic period dike are still visible. The dike runs east west across the island and on the eastern edge, the dike shifts to a north-south orientation. Both of these historic features suggest that water management was a necessity during the historic period to allow for cotton agriculture. However, without complete hydrology models for the back-barrier island region, it is ultimately unclear how these features were used.

The family that occupied the hammock was struck by tragedy in 1804 when a violent hurricane hit the Georgia Coast. The eye of the storm passed over St. Simons and Sapelo Islands on September 8, 1804 (Sullivan, 1997: 69). Along the coast, over 800 people, most of them slaves, died when they could not escape the flooding during high tide as the tide was over 2 m above the normal high tide mark. As told to a family friend, when the storm passed over Bull Island, the father climbed an oak tree with his son in hand to avoid the storm surge. The rest of his family, including his wife and other children, drowned in the flood. Four generations of descendants have grown up and lived in the Savannah area, each passing on the story of the hurricane of 1804 to the next generation (Jack Waters, personal communication, 2010). There is no evidence to suggest that Bull Island Hammock was occupied after the hurricane.

However, the Sapelo Island hammocks have been farmed more recently by Geechee populations (Crook et al., 2003), creating the possibility that the St. Catherines Island hammocks were also farmed in the late 19th century. Jack, Moses, and Little Moses Hammocks are three of the small islands that are known to have been farmed (Crook et al., 2003: 153–154; 274–275). Future archaeological investigation could test other hammocks for evidence of post-emancipation occupation.

CONCLUSIONS

Ecology is linked closely to human activity on both St. Catherines Island and Bull Island Hammock. The location and geological formation processes of barrier and back-barrier islands controls for what kind of soil types and vegetation are found. In turn, geology and island ecology impacted aboriginal activity on both St. Catherines Island and the hammocks. On St. Catherines Island, aboriginal activity is well understood.

Long-term archaeological research demonstrates that populations were living on St. Catherines Island more or less continuously since the Late Archaic. Radiocarbon data suggest that large-scale depopulation events correlate with shifts in the environment, specifically a sea level low stand at the end of the Late Archaic and a long drought period during the St. Catherines period. It is probable that the island was never completely abandoned. Instead, aboriginal activity likely diminished and adapted during periods of stress and those changes are not detectable in the archeological/radiocarbon record. As the Central Place Theory models predicted, the majority of the settlements were along the edges of the marsh and maritime forest and allowed the greatest access to the variety of resources within an effective foraging radius. Canoes also increased carrying capacity and provided a means of transportation to and from the back-barrier island region and other islands. Changing geomorphology shifted where subsistence resources were located and therefore where central places were located. What Central Place Theory did not predict, but was found during the island-wide systematic transect survey, was that for every period of occupation, groups utilized the interior Pleistocene core of the island. Poor draining soils supports a littoral environment and groups likely hunted freshwater animals and terrestrial mammals in those areas.

In the Late Archaic and Refuge–Deptford periods, groups appear to have been organized as egalitarian, with social status earned by achievement over the course of an individual’s life. Burial mound construction began during the Deptford period and continued briefly into the Wilmington period. After a hiatus, burial mound construction began again toward the end of the Wilmington period and emerged again during the St. Catherines period. But St. Catherines period mound construction differed from previous

periods. Log-lined pits were constructed for the dead and the combination of bundle burials and an increase in the number of sub-adults found in burial mounds suggests that social inequality became an inherited trait during the St. Catherines period. During the Irene period, island population increased and sociopolitical organization was connected to the more complex Mississippian system prevalent in the coastal Southeast and elsewhere. Populations were living in aggregated villages practicing intensive maize agriculture. Evidence for community organization and subsistence patterns is supported by the number of sites found along the suboptimal Holocene beach ridges that date to the Irene period. The occurrence of sites in suboptimal areas (i.e., farther away from collection areas and soils suitable for agriculture) further suggests that Irene groups were socially organized with differential access to resources. The founding of Mission Santa Catalina de Guale by the Spanish ushered in a new way of life for the island populations, as groups were brought in as *congregaciones* to live in and around the mission village.

CHAPTER 3

RESEARCH METHODS

This chapter presents the research methods for the fieldwork on Bull Island Hammock. In order to determine the degree to which aboriginal groups utilized the hammock, systemic shovel test pit and shell probe surveys were conducted. Bull Island Hammock was selected for survey because it is the largest of the St. Catherines Island hammocks and was already known to have some shell deposits and aboriginal pottery on the surface (Royce Hayes, personal communication, 2009). This chapter is divided into three sections. The first addresses field methods, specifically mapping and excavation. The second part summarizes the protocols for artifact analysis. The third part summarizes the strategy and methods for AMS dating and stable isotope analysis.

FIELD METHODS

Fieldwork took place over two weeks in late March and early April of 2010. Funding for this project was generously provided by the St. Catherines Island Foundation and the American Museum of Natural History. Eight crew members from various institutions volunteered for fieldwork. Transportation to and from the hammock each day was provided by the staff of St. Catherines Island.

MAPPING

The locations of the shovel test pits were determined using an NAD-83 coordinate system projected with Universal Transverse Mercator (UTM). Locations of the shovel

test pits were set using a handheld Trimble Global Position System (GPS) unit and antenna. Shovel test pits were set at 20 m intervals (Figure 4). Each shovel test pit was labeled according to its coordinate location. For example, shovel test pit N9240 E1180 was at UTM coordinates E481180 N3499240. The location of each was marked with a labeled PVC pin flag. Shovel test pits in topographically low areas (i.e., in meadows, the edges of the marsh, or in areas with standing water) were omitted. When shovel test pit locations were obstructed by a tree or vegetation was too dense to receive a signal, they were offset and labeled accordingly.

During survey, two areas north of Bull Island Hammock stood out because they had higher elevation compared to the surrounding flat, tidal marsh. Each area looks like a small mound. The first area (Area 1) is located approximately 100 m north of the northeastern tip of Bull Island Hammock. The second area (Area 2) is approximately 250 m north of the hammock. Informal probing around both areas revealed a buried tree stump or root system at the edge of each. The stump is located at E481316 N3499693. It is located 2 cm below the marsh surface. A buried tree stump buried beneath the marsh surface is an important find because an AMS date from the stump itself (and not the root system) will provide a date when the tree was alive. A date from the tree stump can then be used to shed light on sea level rise around the hammock because the date indicates when the surrounding saltwater marsh rose to a high enough point that the tree died. Also, while the tree is in an intertidal area, the elevation is not dramatically different than the hammock itself. In periods of lower sea level, this area would have been exposed.

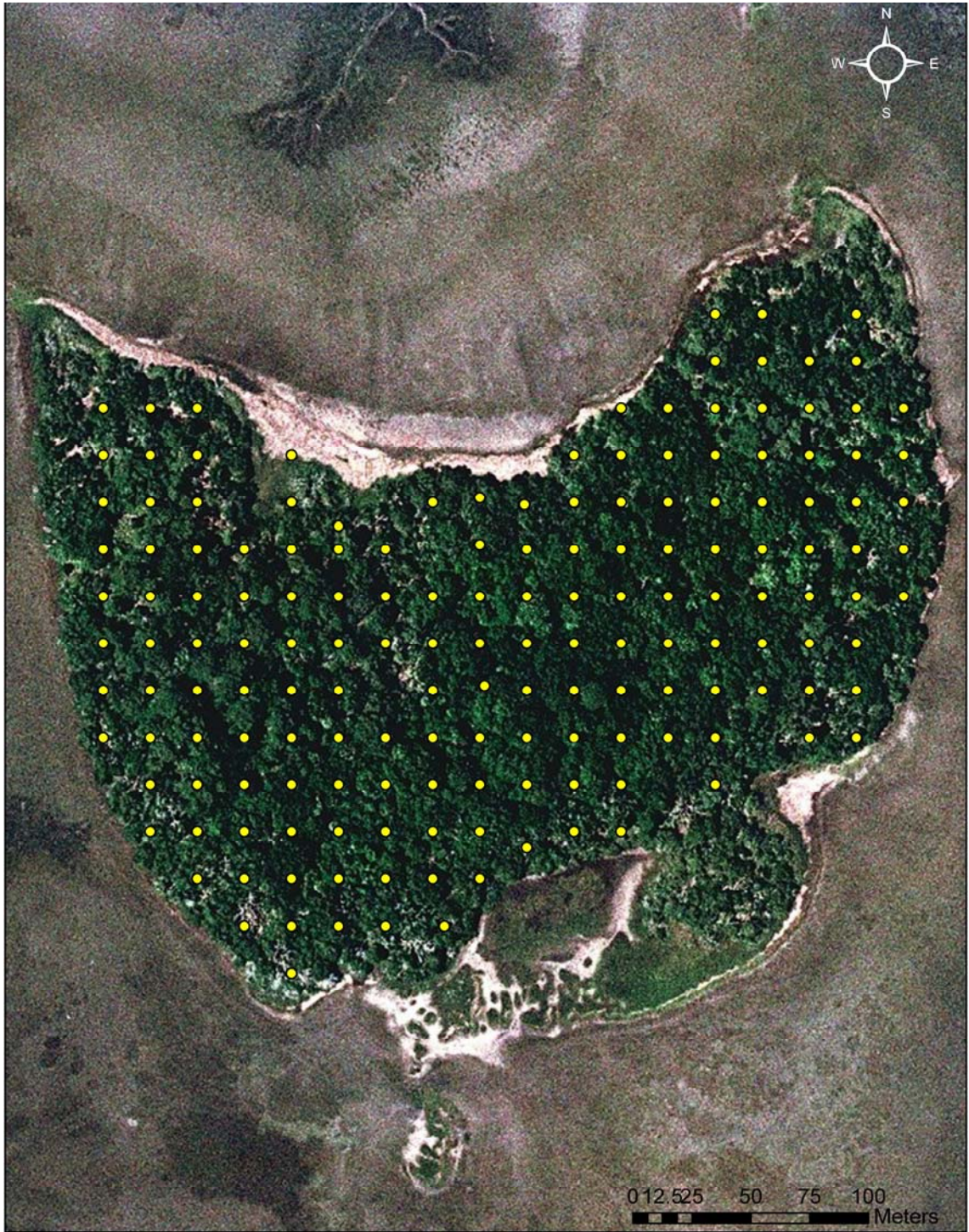


Figure 4. Bull Island Hammock and the shovel test pit grid.

The location of the tree stump in Area 1 was recorded using a Trimble Total Station. Since there are no datum markers set on or around Bull Island, the elevation of the tree stump was collected using datum markers on St. Catherines Island. The closest one to Bull Island is at Persimmon Point (formerly English Cut). The datum was set in 1858 by the United States Coast and Geodetic Survey. From this datum, on the opposite side of Johnson River (the Intracoastal Waterway), the location and elevation of the stump and surrounding area were collected (Figure 5).

The third mapping component was of the historic features on Bull Island Hammock. They were mapped with the GPS unit and antenna. Two areas used to manage water were mapped: a dike located at the southern part of the island and a drainage ditch running north south from the depression area to the marsh. The other (probable) historic feature is an excavated depression that appears to be a well or pit of some kind that is now filled in. It is located near a shell midden that had historic period brick.

SHOVEL TEST SURVEY

Two person teams dug shovel test pits. Soil was dry screened through 1/8 in mesh. The small screen size was chosen in an attempt to recover a variety of fauna, including small fishes. Each shovel test pit was 50 cm in diameter. Soil was excavated in 20 cm arbitrary levels until sterile subsoil was encountered and averaged 60–80 cm below surface. Some randomly chosen shovel test pits were dug to 1 m below surface to ensure that cultural material was not in the subsoil. When shell was encountered, it was weighed, then mixed with the back dirt and put back in the test pit.

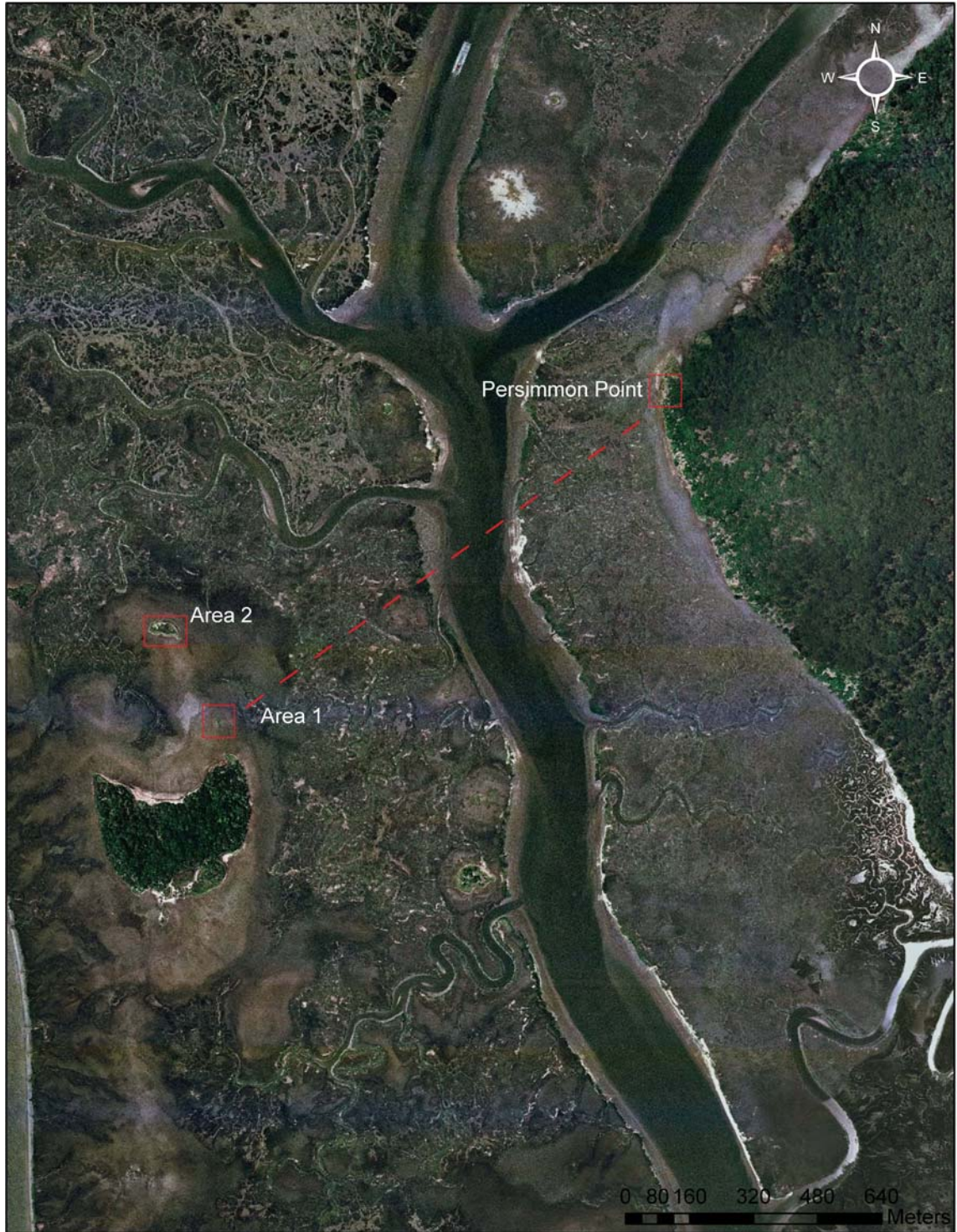


Figure 5. Map of Bull Island Hammock with Areas 1 and 2 highlighted along with the location of the Total Station on St. Catherines Island. Notes on the stratigraphy, soil color, and texture were recorded.

Oyster and clam shell samples were collected in the interest of having samples for AMS dating, stable isotope analysis, and possible future sclerochronological studies (on the clams). Only left oyster valves were collected. Clams with an umbo or leading edge were collected. All whelks and cultural material were collected and brought back from the field for analysis.

Based on the results of the shovel test pit survey, four judgmental test pits were excavated off the 20 m grid in areas of interest. The distribution of shell and cultural material were used to evaluate such areas. Judgmental test pits were mapped in with the goal of reveal more detail about aboriginal activity in specific areas of the hammock (Figure 6). Each was 50 x 50 cm and excavated in 10 cm arbitrary levels. In addition to the same shell sampling strategy, when possible, three whole clams per level were mapped *in situ* to gain better horizontal and vertical control over possible AMS dates. Test pits were dug until subsoil was reached. At least one profile in each test pit was mapped.

SHELL PROBE SURVEY

A probing survey was conducted at 5 m intervals to map the distribution of shell over the hammock. A crew of four, spaced 5 m apart from each other, walked in north south transects with steel probes, probing the ground every fifth meter. When shell was detected, the crew probed out from that spot to find the extent of the shell. When the shell deposit of midden was outlined, it was mapped with the handheld GPS unit with antenna.



Figure 6. Bull Island Hammock with the green squares indicating the locations of four judgmental test pits.

SOIL ANALYSIS

Soil from a sterile shovel test pit was sampled to understand the grain size ratio of the hammock. Soil samples were removed from the sidewall at 10 cm intervals beginning 10 cm below surface. The samples were analyzed by Dr. Clark Alexander of the Skidaway Institute of Oceanography.

MATERIAL CULTURE PROTOCOLS AND ANALYSIS

CATALOGING PROTOCOLS

Proveniences for all artifacts were recorded at the end of each day of fieldwork. All artifacts were washed and dried before being assigned a catalog number. Catalog numbers were generated from the St. Catherines Island catalog at the Nels Nelson North American Archaeology Laboratory at the American Museum of Natural History. All oyster and clam shell samples were assigned provenience numbers, but not given catalog numbers. Artifact analysis took place in the archaeology laboratory on St. Catherines Island or in the Nels Nelson North American Archaeology Laboratory at the American Museum of Natural History in New York. Artifacts, records, and photographs are curated at the American Museum of Natural History in the St. Catherines Island Foundation collection. Shell samples are housed on St. Catherines Island. Data were then entered into the St. Catherines Island database using Microsoft Access. Field forms were digitized and added to the St. Catherines Island Archive.

CERAMIC ANALYSIS

Ceramics were analyzed according to the standard typologies for the Georgia coast with the assistance of Chester DePratter of the South Carolina Institute for Archaeology and Anthropology (see DePratter, 1979a, 1991; Williams and Thompson,

1999; Guerrero and Thomas, 2008). Once catalogued, each ceramic was weighed on a digital scale. For each sherd, temper, surface treatment (e.g., plain, complicated stamped, etc.), finish (e.g., scraped interior, burnished interior, etc.), and form were recorded. Small unidentifiable sherds were weighed and typed as “unidentified aboriginal.”

WHELK ANALYSIS

Whelks were analyzed with the assistance of Ms. Christina Friberg then of the American Museum of Natural History, now at University of California, Santa Barbara according to the conventional typologies for south Florida (see Marquardt, 1992; Eyles, 2004). Despite the fact that in south Florida the species of whelk vary more, Marquardt’s typology is used here because it is the most comprehensive shell tool typology for the Southeast. For each whelk, the weight, length, and width were recorded. Whelks were analyzed for signs of anthropogenic modification or use. In order to determine anthropogenic modification, the lip was analyzed for wear or breakage, and any damage to the outer whorl, columella, apex, and spire were noted. If a whelk only exhibited natural breakage, it is an “ecofact.” There are two classes of likely tools. The first is “indeterminate tool” which means the shell does not show enough evidence of anthropogenic modification, but breakage does not seem natural. The second class is “probable tool” which means that they exhibit modification and were most likely used as tools, but there was no use wear on the whelk (e.g., pitting or spalling) so it is ultimately unclear (see Eyles, 2004; Friberg, in prep). Unequivocal tools were classified according to their tool type.

FAUNAL ANALYSIS

Faunal remains were analyzed by Ms. Sarah Bergh, University of Georgia Museum of Natural History. Taxa and species were identified when possible. Numbers of individual specimens present were used to generate minimum number of individuals counts. The spatial distribution of the faunal remains was also investigated.

AMS DATING

To understand the temporal range of aboriginal activity on the hammock, five samples were collected for AMS dating. Three of the samples were clam shells taken from middens with no temporally diagnostic artifacts (i.e., ceramics). The fourth sample, a Late Archaic sherd, was sent for dating because there were intact fibers in the paste of the sherd. The goal was to find enough fibers in the paste of the sherd, for an AMS date would tell when the vessel was constructed. The fifth sample sent for AMS dating was a sample from the buried tree stump north of the hammock in Area 2. All samples were processed at Beta Analytic Laboratories in Miami, Florida. The dates from the clam shells were corrected using the reservoir curve developed for St. Catherines Island (Thomas, 2008). Reservoir corrections are commonly used to calibrate the age of marine shell dates. Marine shell dates need to be corrected because they will always date older than terrestrial samples (e.g., charcoal) of the same age (Thomas, 2008: 346). However, the standard Atlantic coast corrections are not well suited for the Georgia Bight because they were calculated for distant regions. For example, the closest available marine reservoir corrections are from Long Island, New York and the Florida Keys region (Thomas, 2008: 357–358). The local reservoir correction was derived specifically for St. Catherines Island using modern oysters of a known age (i.e., pre-atomic bomb oysters

from 19th century oyster boilers) from the island. When calculated, the local reservoir correction for St. Catherines Island calculates to $\Delta R = -134 \pm 26$. The reservoir correction was applied to each marine shell date. For terrestrial samples, the standard IntCal04 was used, following Reimer and colleagues (2004). Thomas, Sanger, and Hayes (in prep.) modified the reservoir correction with more samples from known-age oysters from mainland coastal Georgia. The updated reservoir correction is $\Delta R = -119 \pm 16$. The difference between these two corrections is statistically negligible and the first correction is used in this thesis.

STABLE ISOTOPE ANALYSIS

Stable isotope analysis was conducted on oysters and clam shell samples in an attempt to understand how subsistence strategies vary according to season. Shells were collected from shovel test pits in Late Mississippian period middens. Any multiple component middens (e.g., middens with ceramics from more than one cultural period) were excluded from the stable isotope analysis since the temporal context would be unclear. Late Mississippian period middens were specifically chosen because the season of capture results from these shells could be contextualized with the existing models for Gule subsistence (Jones, 1978; Crook, 1986; Keene, 2004; Thomas, 2008).

A total of seven shells were processed at the Department of Geological Sciences at the University of Alabama, Tuscaloosa by Dr. C. Fred T. Andrus. A minimum of twelve samples were collected from each shell using a microdrill, beginning with the terminal growth band of the clam or oyster moving back to the older part of the shell. The goal was to collect samples that represented one year of growth for the shell. From the microdrilled samples, $\delta^{18}\text{O}$ was determined and was then used to calculate salinity

and water temperature during the life of the shell. Water temperature during the shell's season of capture indicates which season the shell was collected.

CONCLUSIONS

This chapter presents the methods of fieldwork and lab analysis for the survey of Bull Island Hammock. All field methods and lab analyses were conducted using standard procedures and protocols for current archaeological research in southeastern North America. The combination of shovel test pit survey, shell probe survey, artifact analysis was used to determine the general occupational or utilization history. AMS dating was used to further secure temporal control on aboriginal activity when diagnostic artifacts were unavailable. Finally, stable isotope analysis was used to determine the season(s) for shellfish processing/consumption on the hammock during the Late Mississippian period. Results of the surveys are presented in the following chapter.

CHAPTER 4

RESULTS

The shovel test pit and shell probe surveys on Bull Island Hammock revealed long term use by aboriginal groups spanning over four millennia. Activity was evidenced in two ways: aboriginal ceramics and shell deposits. Positive shovel test pits had combinations of cultural material, shell, or both cultural material and shell. In total, over 100 ceramics, multiple gastropod tools, fauna, and a small amount of historic period brick were recovered. The shell probe survey revealed 29 discrete shell deposits, ranging from isolated shell scatters to large, dense, midden deposits. The presence of both small shell scatters and large middens indicates that shellfish processing took place to varying degrees over time. Over time, utilization of the hammock increased before rapidly declining just after Spanish contact. The distribution of shell and cultural material across the hammock show that shellfish processing was limited to specific areas on the hammock, suggesting a possible freshwater resource or different activity areas on the hammock.

SHOVEL TEST PIT SURVEY

SYSTEMATIC SHOVEL TEST PITS

A total of 167 shovel test pits were excavated on Bull Island Hammock. A majority of the shovel test pits ($N=107$) were negative for evidence of aboriginal activity (Table 1). The positive shovel test pits reveal an interesting distribution of shell and

cultural material. Of the total number of shovel test pits, 16% ($N=26$) were positive for shell but lacked cultural material; 10% ($N=16$) were positive for cultural material but lacked shell and 11% ($N=18$) were positive for both shell and cultural material.

TABLE 1.
Results of the Shovel Test Pit (STP) Survey on Bull Island Hammock.

STP Content	Number of STP	Percentage of STP
Pottery and shell	18	11
Pottery only	16	10
Shell only	26	15
Sterile	107	64

Cultural material and shell were both found in similar areas (Figure 7). Therefore, while some shovel test pits with shell contained no ceramics, ceramics were often recovered from adjacent shovel test pits. The close proximity of ceramic to shell does not mean that cultural material is related to nearby shell deposits, however. When ceramics were recovered from shell middens, they often dated to a different cultural period than ceramics from adjacent test pits. It does suggest that the same areas of the hammock were repeatedly utilized by aboriginal groups.

The average depth of each shovel test pit was 55 cm below surface. Strata in the shovel test pits were relatively consistent. The O horizon, composed of a high amount of organics and roots, ended at approximately 5 cm below surface. The A zone was 10YR 2/1 loamy sand and gradually turned to B zone soil which is marked by 10YR 4/2 loamy sand 20–30 cm below surface. The C zone began 40–60 cm below surface and consisted of 10YR 5/1 loamy sand. The stratigraphy and soil colors are similar to Holocene sections of St. Catherines Island. The only exceptions to typical stratigraphy were two small loci of test pits located on the east side of the hammock. The C zone in these

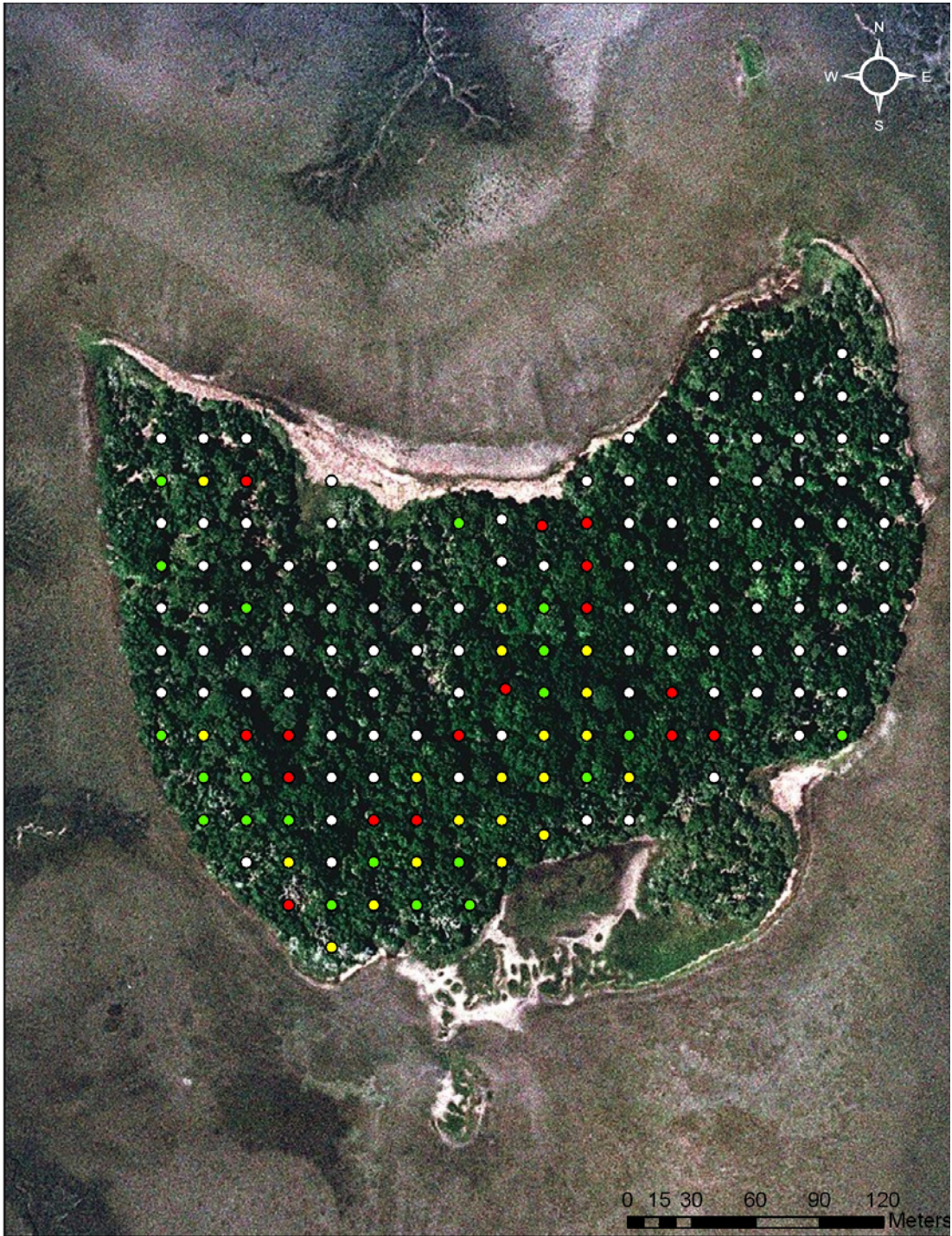


Figure 7. Results of the shovel test pit survey on Bull Island Hammock. Red indicates shovel test pits positive for cultural material, yellow indicates shell and cultural material, green indicates shell, and white indicates no shell or cultural material.

shovel test pits consisted of 10YR 6/4 silty sand and began around 40 cm below surface. The lighter C zone soil is similar to the Pleistocene core of St. Catherines Island. Yellow-brown subsoil was only observed in four test pits.

In positive shovel test pits lacking shell, cultural material was recovered between the surface and 40 cm. No cultural material was recovered from subsoil. Additionally, with the exception of one judgmental shovel test pit (see below), no artifacts were recovered from below the water table.

Most shell deposits in shovel test pits were visible on the surface or began just below the surface. Shell middens that began on or near the surface generally terminated at approximately 40 cm below the surface. The deepest middens encountered during the shovel test pit survey did not appear until approximately 20 cm below the surface and terminated at a depth of 50–80 cm below surface. Thickness of shell deposit ranged between 9 and 65 cm with an average of 34 cm (Figure 8). Like the distribution of cultural material, shell deposits are mostly found in the central and southern parts of the hammock.

SOIL ANALYSIS

Soil from test pit N9280 E1380 was sampled to understand grain ratio. Samples were collected from this sterile test at 10 cm levels beginning at 10 cm below surface. The samples were analyzed by Clark Alexander of the Skidaway Institute of Oceanography and Georgia Southern University. Soil from the test pit is primarily sand with small amounts of clay and silt (Clark Alexander, personal communication; Table 2). The stratigraphy from this shovel test pit is like the majority of the shovel test pits on

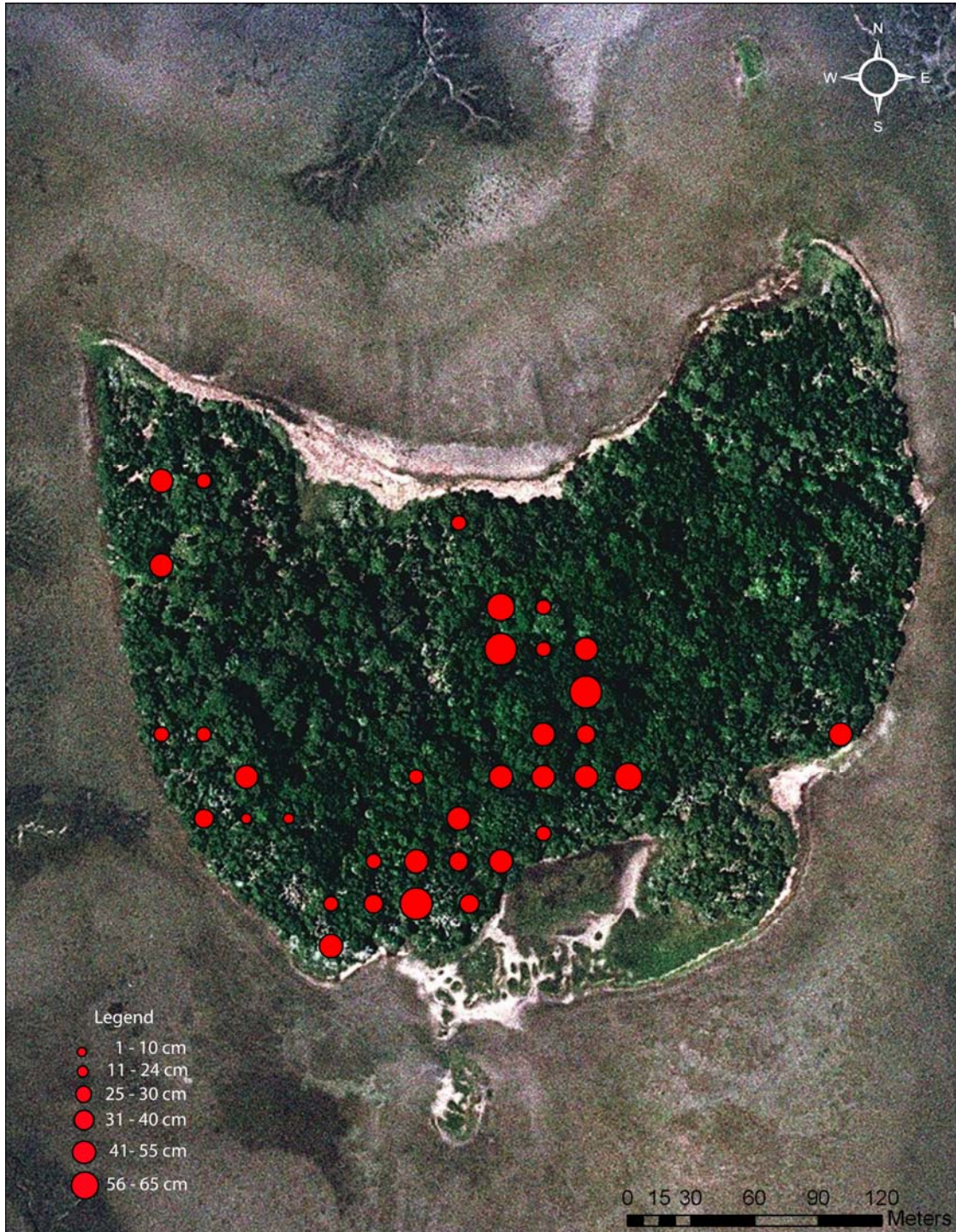


Figure 8. Distribution and thickness of shell on Bull Island Hammock.

the hammock, with dark gray, grayish brown, and gray strata. Therefore, the grain ratio sample of the hammock likely represents the majority of the hammock soil.

TABLE 2.
Percentages of Sand, Silt, and Clay in Bull Island Hammock Soil.

Depth (cm below surface)	%Sand	%Silt	%Clay
10	90.49	7.26	2.25
20	91.66	6.89	1.45
30	92.86	6.26	0.88
40	91.37	7.39	1.24
60	93.43	5.30	1.28

JUDGMENTAL TEST PITS

As explained in chapter 3, four judgmental test pits were excavated after the systematic shovel test pit survey. Overall, they revealed little additional information.

TEST PIT A (N9242 E1170): The judgmental test pit was placed in an area where two shovel test pits yielded Refuge–Deptford ceramics with no shell deposits. The area surrounding the shovel test pits have thin shell deposits. In the area surrounding Test Pit A, shovel test pits yielded small amounts of aceramic shell deposits. The goal in excavating Test Pit A was to better understand the relationship between the shell deposits and the Refuge–Deptford pottery. Test Pit A only yielded one additional Refuge–Deptford sherd and no shell. The test pit was excavated to a depth of 85 cm and stopped when the water table was reached. The stratigraphy is typical for the rest of the hammock: a 5 cm O horizon, 5–15 cm of A horizon, characterized by very dark gray sandy silt, 15–45 cm of dark brown sandy silt, and 45–85 cm of dark brown sandy silt (Figure 9).



Figure 9. Test Pit A, north profile.

TEST PIT B (N9186 E1240): This judgmental test pit was put near the shovel test pit at N9180 E1240. The initial shovel test revealed a dense, aceramic midden. The midden was present at the surface and consisted of mostly whole oyster and clam shell. The midden terminated approximately 63 cm below surface and yielded the majority of the total fauna recovered in the survey and one possibly utilized whelk. The goal of excavating Test Pit B was to try and recover temporally diagnostic material. Since the shovel test pit was through the thickest part of the midden, Test Pit B was placed closer to the edge of the midden where shell was not as thick. Test Pit B did not yield any temporally diagnostic artifacts or additional fauna, although one gastropod hammer was

recovered from the second level (10–20 cm below surface). Shell was considerably less dense than the shovel test pit and ended at 38 cm below surface (Figure 10).

The stratigraphy consisted of an approximate 5 cm O horizon, 5–28 cm of dense oyster and clam shell with a very dark grayish brown sandy silt, 28–38 cm of slightly less dense shell mixed with dark gray sandy silt, 38–56 cm buried A horizon, characterized by gray sandy silt, and 56–68 cm of B zone, characterized by loamy sand and 68–70 cm of C zone, characterized by mottled light gray with yellow brown loamy sand.

TEST PIT C (N9358 E1299): This judgmental test pit was placed near a shovel test pit (N9360 E1320) that yielded a single St. Simons sherd and another test pit (N9340 E1320) that yielded one Refuge period sherd. It was excavated in the hope of finding more Late Archaic or Early Woodland material. No shell or cultural material was recovered from this test pit. The stratigraphy consisted of a 3–5 cm O horizon, 5–20 cm A horizon, characterized by very dark gray sandy silt, 20–50 cm of B zone soil, characterized by light brown gray with pockets of dark grayish brown sandy silt, and grayish brown sandy silt.

TEST PIT D (N9331 E1249): This judgmental test pit was placed in the center of the depression area near the center of the hammock. When fieldwork began, this area had standing water in it and the gridded shovel test pit (N9340 E1240) in this area was omitted from the survey. Toward the end of fieldwork, the depression area was somewhat dry. Non-systematic probing in the depressed area revealed a submerged midden approximately 30–40 cm below the surface. Instead of testing with a shovel test pit, a judgmental test pit was excavated into the shell deposit.



Figure 10. Test Pit B, south profile.

Excavation hit the water table at about 20 cm below surface, which complicated digging. Shell flecking was present in the first three levels but it was not weighed because the soil was too damp to screen and separate from the shell. Aboriginal ceramics were recovered from the 20–30 cm level. At 30–40 cm below surface, excavation revealed a midden comprised of dense crushed shell including oyster, clam, and ribbed mussel. Late Mississippian ceramics and fauna were mixed in with the shell. Due to the anaerobic conditions, preserved wood in the 40–50 cm level was recovered. A sample was collected. The shell ended at approximately 70 cm below surface. The stratigraphy of the unit was not very clear since the water table obscured any color or

texture changes in the soil. The shell midden ranged from 15–30 cm thick. It was thickest in the northeastern part of the test pit and thinnest in the southwestern part. In the east and south profiles, the shell deposit slumps with its lowest part in the southeastern corner (Figure 11). The slumping in the profiles indicates that the excavated area is a slumped portion of a midden and is on the edge of the depression area.

ARTIFACT ANALYSIS

WHELK ANALYSIS

Thirteen whelks were recovered from the survey. One of the whelks was a channeled whelk (*Busycotypus canaliculatus*) and the rest were whelks were knobbed whelks (*Busycon carica*). The majority of the whelks recovered were ecofacts. While they all exhibited some wear, typically a worn or chipped apex, siphonal canal, or knobs, it was not a result of anthropogenic modification. One whelk, 28.8/1077, was indeterminate for anthropogenic modification. It had oyster growth inside the shell which indicates that it was collected after the animal died. Therefore, since it was not collected for food use, it is possible that it was collected to be used. The shell exhibits a chipped apex and a section above the shoulder is not present. However, the breakage could be natural or cultural.

Two of the whelks were worked into tool or tool blanks. One, 28.8/1116, was not completely finished, but the outer whorl was removed at the shoulder and was scored. The second tool recovered was an unhafted gastropod hammer. The tool exhibits pitting and use wear spalling. Three were “probable tools” meaning that they were most likely used as tools, but there was no use wear on the whelk (e.g., pitting or spalling) so it is



Figure 11. Test Pit D, south profile highlighting the slumped midden.

ultimately unclear (Eyles, 2004; Friberg, in prep). For example, artifact 28.1/1061 exhibits a removed outer whorl, chipped lip, and the anterior columella is not present, however the spire is intact. Therefore, the shell was worked, but it is not possible to detect use wear.

CERAMIC ANALYSIS

A total of 104 aboriginal sherds were recovered from the survey, spanning the entire known ceramic producing history of the Georgia coast (Table 3). Over time, there is a general increase in the number of sherds per cultural period, peaking during the Late Mississippian and then dropping off precipitously during the Spanish contact (Altamaha)

period, although since the exact temporal range of Altamaha pottery is unclear, it is possible that the Altamaha sherds were manufactured prior to the arrival of the Spanish. Late Mississippian ceramics account for 57% of the total ceramic count and 61% of the total weight (Figures 12 and 13).

Ceramic density varied little because no more than ten sherds were recovered within a single test pit, with the exception of N9260 E1360. This test pit yielded 16 sherds, all but two of which were from the Late Mississippian period. In the areas where ceramics were recovered, there is no discernible distribution pattern by cultural period. However, many of the shovel test pits that had cultural material have more than one temporal period represented.

FAUNAL ANALYSIS

Fauna was recovered from three areas, a shovel test pit at N9180 E1240, N9302 E1280 and from Test Pit D (N9331 E1249). The majority of the faunal remains were freshwater or brackish turtles. Four different species of turtles were identified, although the majority of turtle was indeterminate. The majority of the turtle fragments were carapace. These parts are the primary cuts when butchering turtles. The middens that yielded fauna date to the Late Woodland and the Late Mississippian. Catfish and indeterminate mammal were recovered in small amounts (Tables 4 and 5).

SHELL PROBE SURVEY

The shell probe survey revealed 29 discreet shell deposits of varying sizes and densities. They range from light subsurface shell scatters to large sheet middens, the depth of which was as much as 65 cm below the surface. As the shell probe survey was conducted at a smaller interval than the shovel test pit survey, smaller shell deposits not

TABLE 3.
Aboriginal Ceramic Sherd Counts and Weights in Grams.

Period ¹	Sherd Count	% Total Count	Sherd Weight (g)	% Total Weight
LA	2	1.92	10.0	1.52
EW	1	0.96	4.5	0.68
EW/MW	7	6.73	21.5	3.27
MW	1	0.96	2.3	0.35
LW	4	3.85	101.4	15.43
LW/EM	5	4.81	49.9	7.59
EM	5	4.81	16.9	2.57
EM/LM	9	8.65	6.3	0.95
LM	60	57.69	395.3	60.17
LM/HC	6	5.77	21	3.19
HC	3	2.88	27.7	4.21
UKN	1	0.96	0.5	0.07

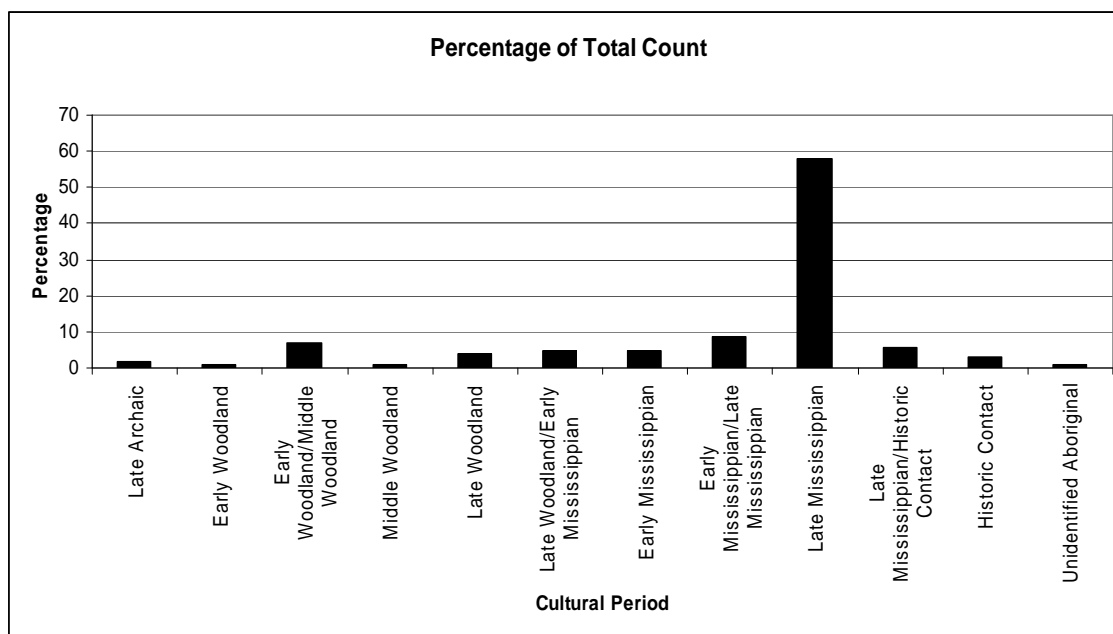


Figure 12. Percentage of total sherd count

¹ Cultural periods are as follows: LA (Late Archaic), EW (Early Woodland), (MW (Middle Woodland), (LW (Late Woodland), EM (Early Mississippian), LM (Late Mississippian), HC (Historic/Contact), UKN (Unknown).

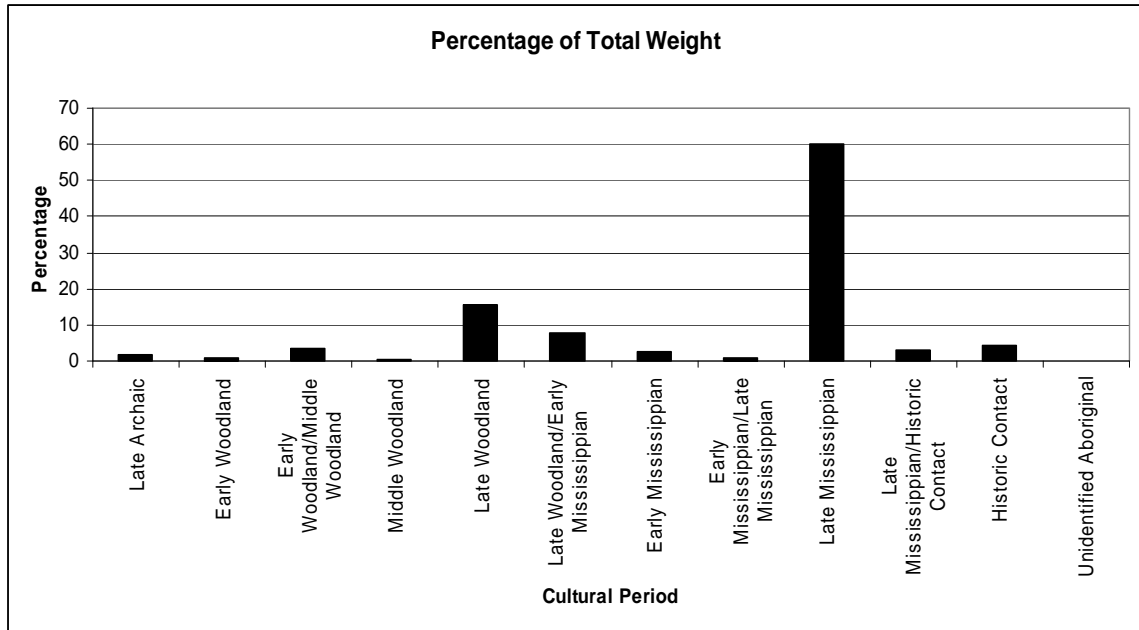


Figure 13. Percentage of total sherd weight.

detected in the shovel test pit survey were identified. The copious amounts of shellfish indicate that a large part of the aboriginal activity on the hammock was shellfish processing.

TABLE 4.
Taxa, Number of Individual Specimens Present (NISP), Minimum Number of Individuals (MNI) Counts, and Weight in Grams for Faunal Remains from Bull Island Hammock.

<i>Taxon</i>	<i>Family Name</i>	<i>NISP</i>	<i>MNI</i>	<i>Weight (g)</i>
Ariidae	Sea catfishes	1		0.292
<i>Ariopsis felis</i>	Hardhead catfish	2	1	0.880
Testudines	Indeterminate turtles	44		51.979
Emydidae	Pond turtles	6		8.348
<i>Deirochelys reticularia</i>	Chicken turtles	2	1	6.341
<i>Malaclemys terrapin</i>	Diamondback terrapin	7	2	14.905
<i>Terrapene Carolina</i>	Box turtle	1	1	0.762
Mammalia	Indeterminate mammals	4	1	5.339
		67	6	88.846

TABLE 5.
Faunal Remains by Test Pit, Level, and Number of Individual Specimens Present (NISP).

<i>Unit</i>	<i>Level</i>	<i>Taxon</i>	<i>Family name</i>	<i>NSIP</i>
N9180 E1240	20-40	Ariidae	Sea catfish	1
		<i>Ariopsis felis</i>	Hardhead catfish	1
		<i>Deirochelys reticularia</i>	Chicken turtle	2
		<i>Malaclemys terrapin</i>	Diamondback terrapin	4
		Mammalia	Indeterminate mammal	2
		Testudines	Indeterminate turtle	37
N9180 E1240	40-60	Mammalia	Indeterminate mammal	1
N9302 E1280	20-40	Testudines	Indeterminate turtle	2
Test Pit D	30-40	<i>Ariopsis felis</i>	Hardhead catfish	1
		Emydidae	Pond turtle	4
		<i>Terrapene Carolina</i>	Box turtle	1
		Testudines	Indeterminate turtle	5
Test Pit D	50-60	Emydidae	Pond turtle	2
		<i>Malaclemys terrapin</i>	Diamondback terrapin	3

Shell is mostly found in the southern and central parts of the hammock (Figure 14). The south and central parts of the hammock are also where the densest shell deposits are located. Shell deposits are also found on the far western and southeastern areas of the island. The shell deposits on the western side are smaller deposits ranging

There are two large areas of the hammock that did not have any shell at all. The first area is the topographically low area of the hammock. It is possible that this part of the island supported brackish or fresh water. Throughout almost the entire survey there was standing water in the topographically low area. Considering that the water table was considerably higher before the rise of paper production in Savannah, it is very possible that this part of the hammock supported water. The historic features further corroborate that there was freshwater present. The drainage ditch running away from the

topographically low area indicates that some kind of water management system was put in place for farming. Second, the possible well feature could suggest that there was potable water available as recently as the 19th century. The aboriginal evidence for a water source on the hammock comes from the distribution of shell deposits; the concentration of midden and cultural material suggests that aboriginal activity (i.e., processing of shell fish) took place around this freshwater resource.

The second area without shell is the east side of the island. When shell deposits are present, they are restricted to the southern part of the island. Probing and shovel testing indicate that middens are 31–40 cm thick, on par with other middens on Bull Island Hammock. It is possible that aboriginal activity took place in this area of the hammock but did not leave an archaeological signature. It is unlikely that farming during the historic period obliterated any evidence of aboriginal activity because the entire island was used during the historic period. Unlike the topographically low area of the island, it is not feasible that the east part of the island supported freshwater.

AMS DATING

Five samples were sent to Beta Analytic Laboratories for AMS dating. Three of the samples were clam shells from aceramic middens, one was from a Late Archaic sherd with possible preserved organics in the paste, and one was a wood sample from the buried tree stump in the marsh north of the hammock (Table 6). All dates are calibrated at two sigma.

One of the middens is on the far southeastern side of the hammock (E1140 N9260). The shell was sampled from the base of the midden, close to the bottom of the 40–60 cm level. The shell dates to cal A.D. 1050–1270, dating it to the Early



Figure 14. Results of the shell probing survey with cream denoting a shell deposit.

Mississippian (or St. Catherines period). One clam shell from E 1240 N9180 and another from E1180 N9220 returned nearly identical dates, cal A.D. 680–890 and cal A.D. 660–870, respectively. These date to the Late Woodland (or Wilmington Period).

In order to extract the organics from the paste of the Late Archaic sherd, it was crushed at Beta Analytic. Unfortunately, there were not enough fibers left in the sherd to date. Before the sherd was crushed, a possible organic residue was sampled instead. The residue did not return a date from the Late Archaic probably because the residue was not from the Late Archaic or because leaching from the younger soils above the sherd contaminated the organics in the residue. Either way, this AMS date is excluded from the discussion.

The tree stump sample dated to 300 cal B.C.–cal A.D. 10 or the Early Woodland (or Refuge/Deptford period). While this sample is not “cultural” and does not directly date aboriginal activity on the hammock, it does provide a departure point for considering sea level rise around Bull Island and can be incorporated with the “noncultural” radiocarbon database for St. Catherines Island (see Bishop, Rollins, and Thomas, 2011: 379–381). The noncultural radiocarbon database facilitates the interpretation of archaeological site patterning and geomorphology on St. Catherines Island (Thomas, 2008: chaps. 32–35) and the date from Bull Island Hammock could eventually be used to test the geomorphological models for St. Catherines Island.

STABLE ISOTOPE ANALYSIS

Three clam and four oyster shells were analyzed for stable isotope ratios in order to determine their season of capture. At present, only three shells have been processed (Table 7). The shells were selected from E1240 N9200 and Test Pit D (E1249 N9331).

TABLE 6.
Accelerated Mass Spectrometry (AMS) Dates from Bull Island Hammock.

Lab ID Number	Location	Sample Type	Raw 14C year (B.P.)	13C/12C Ratio	Conventional Radiocarbon Age (B.P.)	Radiocarbon Age Calibrated (2 sigma)
Beta-281062	North of Bull Island	wood	2250 ± 40	-22.2	2300 ± 40	300 B.C.–A.D. 10
Beta-281063	N9180 E1240	<i>Mercenaria</i>	1080 ± 40	-0.9	1480 ± 40	A.D. 680–890
Beta-281064	N9220 E1180	<i>Mercenaria</i>	1120 ± 40	-1.5	1510 ± 40	A.D. 660–870
Beta-281065	N9240 E1140	charred material	740 ± 40	-22.4	780 ± 40	A.D. 1180–1280
Beta-28006	N9260 E1140	<i>Mercenaria</i>	720 ± 40	-1.2	110 ± 40	A.D. 1050–1270

STABLE ISOTOPE ANALYSIS

Both of these middens contained Late Mississippian pottery. The shell from E1240 N9200) was a clam shell from 0–20 cm below surface. The sinusoidal curve indicates that this shell was collected in the summer months.

TABLE 7.
Results of the Stable Isotope Analysis.

Sample Number	Unit	Level (cm)	Sample Type	Season of capture
110420	N9200 E1240	0-20	<i>Mercenaria</i>	summer
110548	Shovel Test D	40-50	<i>Crassostrea</i>	summer
110557	Shovel Test D	60-70	<i>Crassostrea</i>	fall

The next two samples were oysters from Test Pit D. The first oyster sample (#110548) came from 40–50 cm below surface and the second sample (#110557) came

from 60–70 cm below surface. Sample 110548 returned a summer season on capture and sample 100557 returned the season of capture as fall.

While the sample size is small, the three stable isotope ratios indicate that the hammock was utilized in at least two seasons, summer and fall. More analysis is necessary before contextualizing these results into a broader subsistence or mobility model.

CONCLUSIONS

The results of the Bull Island Hammock surveys show that aboriginal groups utilized the hammock to varying degrees as early as the Late Archaic and in every subsequent cultural period until the Late Prehistoric or mission period. The extent to which groups utilized the hammock varied across time but appears to have increased over time. The cultural materials recovered, specifically pottery and post-processing shell refuse, were concentrated mostly around the topographically low part of the island which possibly supported fresh or brackish water.

The amount and distribution of shell indicates that groups utilized the hammock for processing shellfish. The type of turtle remains recovered indicates that the hammock was utilized for field processing of turtles and that the smaller remains were butchered elsewhere. Stable isotope analysis of three shells from Late Mississippian middens show that the hammock was utilized in two seasons, summer, and fall.

In order to better understand how the aboriginal activity on Bull Island Hammock articulates with the economic models in the surrounding region, it is necessary to compare these results to the work of Thompson and Turck (2010) on the Sapelo Island hammocks. Results of this survey also need to be compared with the subsistence and

settlement models for St. Catherines Island (see Thomas, 2008). The following chapter discusses Bull Island Hammock in these two ways.

CHAPTER 5

DISCUSSION

This chapter discusses the results of the survey on Bull Island Hammock by comparing it to other studies from the surrounding area. There are two levels of analysis with this chapter. First, the Bull Island data set is compared to the results of the Sapelo Island hammock survey (chapter 1; Thompson and Roberts Thompson, 2010; Thompson and Turck, 2010). The data are used to see how the aboriginal activity on Bull Island Hammock articulates with other small islands on the Georgia coast. Collectively, these data can be used to compare to the subsistence and settlement models found on St. Catherines Island.

Second, data from Bull Island are compared with the subsistence and settlement models from St. Catherines Island (Thomas, 2008). The data are insufficient, in themselves, to fully test the human behavioral ecology models for St. Catherines Island, but it is possible to discuss the survey results in the context of two of Thomas' four questions that frame his research on St. Catherines Island. The first question addresses how human land use patterns changed over time. The second question asks how subsistence and settlement patterns were shaped by intensification, population increase, and the development of social inequality. As data are insufficient for the earliest utilization of the hammock, discussion of socioeconomic structures and aboriginal activity is limited to the Late Woodland and Mississippian periods.

UNDERSTANDING BULL ISLAND HAMMOCK: THE SAPELO ISLAND HAMMOCK SURVEYS

This section compares the Bull Island dataset to that collected from a systematic survey on four small islands in the back-barrier island region off Sapelo Island, Pumpkin Hammock, Mary Hammock, Patterson Island, and Little Sapelo Island (Thompson and Turck, 2010). The Sapelo study is briefly summarized in Chapter 1. Like the results in this study, positive shovel test pits yielded a combination of shell, pottery, or shell and pottery. The level of aboriginal activity on Bull Island Hammock appears most similar to Pumpkin Hammock, the smallest of the four Sapelo hammocks that were surveyed. Bull Island Hammock is approximately 8 ha and Pumpkin Hammock is 3 ha. In terms of material culture, a total of 63 sherds were recovered on Pumpkin Hammock compared to the 104 on Bull Island Hammock and both assemblages indicate the same long term utilization. Pumpkin Hammock is the only one of the four hammocks where the majority of the shovel test pits were negative. A total of 53% of the test pits on Pumpkin Hammock were negative, while 64% of the shovel test pits on Bull Island Hammock were negative. Recent stable isotope analysis on samples from Pumpkin Hammock indicates that groups were active (i.e., processing shellfish) on the hammock in all seasons, suggesting to some that groups lived on the hammock (Victor Thompson, personal communication, 2011). However as mentioned above, four season utilization of a site does not automatically correlate to year-round occupation or habitation.

The next hammock closest in size is Mary Hammock, which is 10 ha. The aboriginal activity on Mary Hammock is very different than Bull Island Hammock. Nearly three times as many ceramics were recovered ($N=269$). The shell deposits are

much larger and denser as well (Thompson and Turck, 2010: table 1, figures 5–7). Mary Hammock also contained the most positive shovel test pits (68%) compared to the 36% positive shovel test pits on Bull Island Hammock.

Aboriginal activity on the larger hammocks is significantly different than Bull Island Hammock. Patterson Island is 18 ha and the material cultural assemblage and shell distribution is remarkably different. Four times as many ceramics were recovered ($N=469$) and 40% of shovel test pits were negative. In other words, it not only appears that the island was being utilized more intensively, but that more of the island was utilized. Lastly at 47 ha, Little Sapelo Island is by far the largest island surveyed. A total of 841 ceramics were recovered, which dwarfs the Bull Island Hammock assemblage. Only 35% of the Little Sapelo Island shovel test pits were negative, indicating that larger sections of the island were being utilized.

The most significant similarity shared by Bull Island Hammock and the Sapelo Island hammocks is the dramatic increase of activity during the Mississippian periods (Thompson and Turck, 2010: figure 7; table 2). The work on St. Catherines Island tells us that there was a large scale population increase during this period (Thomas, 2008: chap. 35). With the exception of Pumpkin Hammock, activity on each of the hammocks appears to decrease precipitously at the beginning of the Historical Contact period. The majority of sherds recovered from Pumpkin Hammock were Altamaha ($N=16$) and accounted for 33% of sherds recovered (Thompson and Turck, 2010: table 2).

Each island surveyed contained shovel test pits with shell and no pottery and pottery without shell. The occurrence of pottery without any association with shell underscores the importance of systematic survey on small islands because simply using

shell to identify sites would miss a substantial segment of aboriginal activity (Thompson and Turck, 2010: 289).

UNDERSTANDING BULL ISLAND HAMMOCK: THE ST. CATHERINES ISLAND DATASET

CHANGE IN LAND USE OVER TIME

This section compares the results of the Bull Island Hammock survey with the subsistence and settlement models on St. Catherines Island to address how land use on Bull Island Hammock changed over time. For St. Catherines Island, Thomas (2008: chaps. 32–35) evaluates changing land use over time by using Central Place Theory, diet breadth, and patch choice modeling. The majority of sites identified in the systematic transect survey match the prediction of Central Place Theory, which dictates that foraging groups will situate their residential bases adjacent to the maritime forest and estuarine habitats. The major outliers to the projections of Central Place Theory are sites found along the Pleistocene core of the island. Recent paleo-hydrology models show this topographically low part of the island (the “central depression”) supported freshwater ponds and springs. More recently, an 18th century historic account describes the central depression area as meadow (Hayes and Thomas, 2008: 57). The stable lacustrine habitat drew groups to that part of the island.

On Bull Island Hammock, the activity areas for which we have sufficient archaeological data (post-Middle Woodland) cluster around the topographically low part of the hammock. There is a possibility that the area supported freshwater in wetter periods when the water table was higher or there was ample rainfall. Depending on the ratio of soil types (specifically, the amount of Mandarin-Rutledge), water may have

drained poorly on this part of the hammock (see Chapter 2). In fact, standing water was found within this low area during fieldwork. If this area once supported freshwater, then this habitat is similar to the lacustrine habitat in the central depression of St. Catherines Island. However, without hydrological studies on the hammock, it is not possible to definitively say whether there was a permanent or seasonal freshwater resource on the island.

There were multiple changes in aboriginal land use over time on St. Catherines Island caused in part by the shifting geomorphology and estuarine habitat on the east side of the island. For example, during the Wilmington period, sites shifted further south on the island as rising sea levels eroded Guale Island and changed the location of Guale Marsh. However, on the west side of the island, geomorphology changed little after sea level rose during of the Early Woodland (Thomas, Rollins, and DePratter, 2008: 844; Thomas, 2011). During this period, sites are found along the western margin of St. Catherines Island. The pattern continues for Woodland and Mississippian sites, the only difference being that the number of sites and site size increased (Thomas, 2008: chap. 32). Therefore, the west side of the island was a “central place” for every cultural period except the Early Woodland (Refuge) period. It appears that as long as sites were occupied along the western margin of St. Catherines Island, foragers were utilizing Bull Island Hammock. The effective foraging radius models that Thomas built for populations on St. Catherines Island posit that a forager can travel 10 km a day or 30 km by canoe and still return to the residential base (Thomas, 2008: 228, 1064; see also Kelly, 1995: 135; Ames, 2002: 47). The hammock also fits within the range of the effective foraging radius given the large distances one can travel using canoes, taking

advantage of the twice daily high and low tides. A freshwater source would create the possibility of the hammock serving as a temporary processing camp allowing foragers to stay longer.

To summarize, despite the changing distribution of sites across St. Catherines Island, many sites from each cultural period were consistently found on the marsh edge of the western side of the island since the Early Woodland. Even for the Late Archaic, where fewer sites are recorded, the largest sites are found on the eastern and western marsh. As the number and size of sites increased throughout the Middle-Late Woodland and Mississippian on St. Catherines Island so did intensification on the hammock. Except for the scale of utilization, activity changed little over the course of millennia on Bull Island Hammock as the primary activity area was around the topographically low part of the hammock.

POPULATION GROWTH AND INTENSIFICATION

Utilization of Bull Island Hammock intensified throughout the Woodland and Mississippian periods, which underscores its importance in forager economies. The importance of the hammock in forager economies is especially true during the Late Mississippian period, when the population on St. Catherines Island increased exponentially (Thomas, 2008: 1050–1052), coeval with the most intensive occupation of Bull Island Hammock. Research on the Sapelo Island hammocks corroborates this research (Thompson and Turck, 2010).

A consequence of population growth is increased taxation on subsistence resources. As Thomas (2008: 1060) argues, an increased population likely resulted in an increased consumption of shellfish, which may have depleted some shellfish beds on the

island. It is possible that shellfish beds were “managed” (i.e., older oysters were collected to prevent overharvesting, (see Thomas, 2008: 1059-1060) so as not to wipe out an entire harvesting site. Groups could have relied on the shellfish beds in the back-barrier island region to supplement the growing need for food without depleting the resources on St. Catherines Island. Additionally, non-cultural factors like unseasonal dryness, major storm activity, season of the year, and water temperature all impact shellfish availability impacted subsistence strategies (e.g., Rollins, Prezant, and Toll, 2008; Prezant, and Toll, 2011; Rollins and Thomas, 2011: 322–337).

SYNTHESIS: ABORIGINAL ACTIVITY ON BULL ISLAND HAMMOCK

Bull Island Hammock was utilized for over four millennia. The presence of Late Archaic pottery suggests that at least a portion of Bull Island formed around the same time that Holocene beach ridges prograded to the north and south of the Pleistocene core of St. Catherines Island. It is approximately at this time that large sites on St. Catherines Island were in use, like the St. Catherines and McQueen shell rings.

When local sea level dropped around the Late Archaic-Early Woodland transition, it is believed that depleted estuarine resources led in part to a large-scale shift in settlement on St. Catherines Island. At present it is unclear whether groups switched to more terrestrial based foraging or depopulated the island and moved west to follow migrating estuarine resources (Thomas, 2008; see also Thompson and Turck, 2009). The lack of middens and artifacts dating to the Early-Middle Woodland period mirrors what is seen during the Refuge-Deptford period on St. Catherines Island, albeit on a much smaller scale.

The nature of aboriginal activity on Bull Island Hammock shifted during the Late Woodland period, evidenced by the increased number of ceramics and aceramic midden deposits. The presence of ceramics in middens and two AMS dates from aceramic middens indicate that there is an increase in the amount of shellfish being processed. On St. Catherines Island, both marsh habitats on the east and west sides of island were productive, yet groups consumed more fishes during the Late Woodland (Reitz, 2008). There is also a decrease in turtle remains from this period (Thomas, 2008: 1020). Interestingly, on Bull Island Hammock, one of the Late Woodland period middens yielded the vast majority of fauna recovered from the hammock, almost all of which was turtle. There is also an increase in the number of ceramics recovered from the hammock during the Late Woodland.

The quantity of ceramics decreased on Bull Island Hammock during the Early Mississippian period (which includes both Savannah and St. Catherines sherds). One AMS date from an aceramic midden on the extreme southeastern edge of Bull Island Hammock dates to the Early Mississippian period. On St. Catherines Island, data on seasonal rainfall indicate that there was a severe drought from approximately cal A.D. 1200–1300. The drought is believed to have contributed to a shift in subsistence strategies for St. Catherines Island populations. Consequently, increased terrestrial-based hunting and gathering resulted in fewer shell midden deposits (Blanton and Thomas, 2008: 801–802). It is not possible at this point to say if there was any correlating activity on Bull Island, however, the decrease in number of ceramics does indicate a change in utilization of the hammock. Thompson and Turck (2010: figure 7)

do not report a similar change on the Sapelo Island hammocks; therefore the pattern may be unique to the vicinity around St. Catherines Island.

The dramatic increase in Late Mississippian sherds on the hammock mirrors demographic changes occurring on St. Catherines Island. An exponential population increase led to increased competition for resources and led to increased utilization of the hammock. A dramatic increase in activity during the Late Mississippian period has also been observed on the hammocks off Sapelo Island (Thompson and Turck, 2010).

During the period of Spanish occupation on St. Catherines Island, it appears Bull Island Hammock was used very little, if at all. The sudden disuse of the hammock is not surprising given the Spanish tradition of moving the aboriginal population into *congregaciones*, living within the immediate vicinity of the Mission Santa Catalina de Guale and populations at that point were engaged in large-scale intensive maize agriculture, further tying them to the area surrounding the mission (Thomas, 2008: 205–207; see also Bushnell, 1994; Milanich, 1999).

Importantly, one cannot assume *a priori* that the groups that utilized Bull Island Hammock were residents of St. Catherines Island. It is likely that the hammocks were utilized by many different groups who may have lived on the mainland coast or other barrier islands. If freshwater outlets did exist on the hammock, then this creates the possibility of people staying temporarily on the hammock. If one assumes an effective foraging radius for an individual or small group traveling by canoe to be 30 km (Ames, 2002; Thomas, 2008: 227), then Bull Island Hammock is within the effective foraging radius for a significant portion of the coastal area. However, since Bull Island Hammock

is less than 2 km away from St. Catherines Island it is most appropriate to contextualize the Bull Island Hammock dataset to the St. Catherines Island dataset.

THE ROLE OF SMALL ISLANDS ON THE GEORGIA COAST

The aboriginal activity on Bull Island Hammock makes it clear that small islands played a role in the subsistence and settlement patterns of groups who occupied St. Catherines Island and other nearby coastal areas. While it appears as though the island did not play a significant role in the aboriginal economy prior to the Late Woodland, utilization was present by the Mississippian period. In other words, while the pottery recovered is evidence for over 4000 years of utilization, the hammock was probably used intermittently during each cultural period.

The results of this study corroborate other studies of small islands (Keegan et al., 2008; Thompson and Turck, 2010): that small islands often played a role in the economies of groups that inhabited larger islands and coastal zones. At present, small islands are not studied with the attention given to large islands; however, this study demonstrates that until archaeologists examine small islands with the same intensity given to large islands, subsistence and settlement models remain incomplete.

DIRECTIONS FOR FUTURE RESEARCH

This study creates a number of avenues for further research. In order to understand fully the nature of aboriginal activity on Bull Island Hammock and how it changed over time, in-depth geological and hydrological investigation is necessary. Expanding the work of Turck and Alexander (in prep.), vibracoring and dating the basal deposits from Bull Island will help elucidate formation processes and age of the hammock. Further, geological testing may contribute to a better understanding of why

the east half of Bull Island Hammock was not utilized the same way the rest of the hammock was (i.e., for shellfish and vertebrate processing). Second, building hydrological models for the hammock will answer the question of whether there was a freshwater source available. A detailed soil analysis of the hammock will also contribute to determining whether there was a freshwater source on the hammock at any point. By analyzing the exact soil type ratio, it might be possible to determine if different parts of the island drained better than other parts.

Shellfish samples collected from the middens can be used for multiple studies. Stable isotope analysis of both oysters and clams can be used to interpret what season of the year groups were using the hammock. Sclerochronological analysis of clam samples can also be used for season of capture studies. Following Crook (1992), oysters from the hammock can be analyzed to determine from what kind of habitat they were collected. Reconstructing habitats is potentially important because if oyster bed growth (i.e., clusters, banks, or reefs) is significantly different in later periods, it may partially explain why utilization of the hammock was less intensive prior to the Late Woodland. Utilization could also be affected by the changing distribution of estuarine habitats over time, following the movement of streambeds and river channels (Chowns, 2011).

As the hammock appears to have only been utilized periodically and not continuously, exactly what seasons groups were foraging and hunting on the hammock may prove interesting and may be a future research direction. More AMS dating and season of capture studies may prove a link between times of stress on the St. Catherines Island and increased utilization of Bull Island Hammock.

Finally, while small islands were in fact utilized, island size may correlate in some way to aboriginal activity. Size of the Sapelo Island Hammocks and Bull Island Hammock ranges considerably as does aboriginal activity. Recent work on two hammocks smaller than Bull Island Hammock revealed almost no evidence for aboriginal activity (Sanger, in prep.). It is possible to test whether there is a threshold for island size and aboriginal behavior by comparing island size with the rate of positive and negative shovel test pits with shell and ceramic density.

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APPENDIX

APPENDIX A

Copyright permission letter, Dr. David Hurst Thomas

Matthew Napolitano
Division of Anthropology
American Museum of Natural History
Central Park West @ 79th Street
New York, New York 10024

April 2, 2012

David Hurst Thomas, Ph.D., D.Sc., Curator
Division of Anthropology
American Museum of Natural History
Central Park West @ 79th Street
New York, New York 10024

Dear Dr. Thomas:

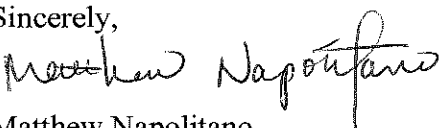
I am completing a master's thesis at The University of West Florida entitled "The Role of Back-barrier Islands in the Native American Economies of St. Catherines Island, Georgia." I am writing to request your permission to reprint the following material in my thesis:

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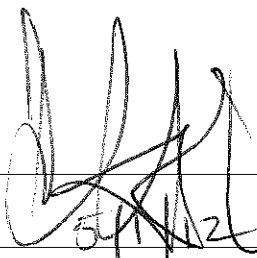

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