

Paleoethnobotanical Investigations at Fort Center (8GL13), Florida

Thesis

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By

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Abstract

Archaeologists have long been interested in the emergence and development of social complexity. Traditional progressive theories of cultural evolution link socio-political complexity with agriculture. Recent research on groups called complex hunter-gatherers provides support for the idea that agriculture is not necessary for social complexity. This topic is addressed by examining plant use at Fort Center, an archaeological site in Southwestern Florida. Fort Center was first occupied around cal. 750 B.C., and earlier researchers proposed that the prehistoric inhabitants of the site cultivated maize (see Sears 1982). This thesis addresses the use of plants, including maize, at the site. The results of the macrobotanical analysis of samples from 2010 excavations do not support earlier claims that maize was cultivated during the prehistoric occupation of Fort Center. These results have implications for the way we view complex hunter-gatherers in North America.

Dedication

I would like to dedicate this thesis to my families, by blood, choice, and circumstance. To my first family – Pop, Mom, Aura, Sara, Brannen, Chelsea, Megan, Angie, and Josh – without you I would have never made it through this thesis. To my AMNH family – I would not be where I am without your inspiration, guidance, and advice. To my Crest family – Scott, Mark, Chris and Chris, Paul, Valerie and Bruce, Danny et al.: y’all taught me a lot about foosball and music. Which, incidentally, has nothing to do with my thesis, but it did keep me sane enough to finish it. I couldn’t have done it without all of you.

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Chapter 1: Introduction

The emergence and development of complex societies have been topics for archaeological inquiry and debate for much of the history of the discipline. Some of the earliest forays into cultural evolution, i.e. Spencer (1851; 1873), Morgan (1877), Fried (1967), and Service (1962; 1975), were unilinear and relied on typologies. Traditionally, these progressive evolutionary models link complexity with agriculture. The intensive cultivation of plants was seen as necessary to support socio-political complexity (meaning the division and control of non-kin labor, hereditary inequality, construction efforts, increased sedentism, increased social stratification, specialization and production of craft items, etc.).

In the past few decades, the assumption that agriculture is mandatory for the emergence and development of socio-political complexity has increasingly been questioned by archaeologists around the world. Recent archaeological research on groups called 'complex hunter gatherers' has challenged neoevolutionary visions of the development of social complexity (see Sassaman 2004). Complex hunter-gatherers are groups that display aspects of socio-political complexity, such as increased sedentism or hereditary inequality, while relying on the hunting and gathering of wild plants and animals. These groups, who were once thought of as exceptions to the conventional definition of hunter-gatherers, have become the focus of several challenging and exciting research

avenues. Much of this research has focused on groups on the Northwest Coast, the southern coast of California, and the southeastern United States.

In the American Southeast, the construction of large earthworks, shell rings, and shell mounds dates back to the Archaic period, well before the intensive cultivation of plants was practiced in this region. The study of these groups has proved fruitful for the examination of the relationship between complexity, manifested in part as monumentality, and subsistence strategies (Sassaman 2004; Saunders 2004; Thompson and Andrus 2011; Thompson and Pluckhahn 2012).

This paper aims to contribute to this research by examining the use of plants, particularly maize, by the prehistoric inhabitants who built monumental earthworks at the site of Fort Center, Florida beginning around cal. 750 B.C. In addition to the earthworks, there are other indications of increasing socio-political complexity through time at Fort Center, including evidence of specialization and social stratification (see Sears 1982; Thompson and Pluckhahn 2012). Some earlier researchers, following neoevolutionary models, used this evidence of complexity at Fort Center to bolster claims that the prehistoric inhabitants of the site cultivated maize (see Sears 1982). I describe the use of plants at Fort Center, including maize, based on macro- and microbotanical analysis of remains collected during 2010 excavations in order to clarify the questions surrounding the subsistence methods of the inhabitants of Fort Center.

In the following sections, I provide an overview of the Lake Okeechobee region from an archaeological and environmental perspective. Then, I describe the site of Fort

Center in detail, including previous research that has been performed at the site. Next, I present the methodology and results of my analysis of the botanical material from Fort Center. The results of my analysis of macrobotanical remains from Fort Center do not indicate that the prehistoric inhabitants cultivated maize, and support the claim that agriculture is not necessary for the emergence or development of socio-political complexity. In addition, there is little evidence for the intensive use of any one plant resource. Fort Center presents intriguing possibilities for future research on complex hunter-gatherers.

Fort Center, complexity, and maize

Fort Center, an archaeological site in south Florida, was first occupied during the Early Woodland period (approximately cal B.C. 750-690) (Thompson and Pluckhahn 2012:57). It is only one of many archaeological sites in the Lake Okeechobee basin that feature large, monumental earthworks, such as ditches, linear earthworks, and mounds. These sites have long interested archaeologists. However, they have not necessarily been considered within the context of hunter-gatherer research aimed at analyzing the relationship between complexity and subsistence. This is due in part to the fact that there has not been a significant amount of theory-driven research undertaken in Florida (Thompson and Pluckhahn 2010).

The site of Fort Center, during the later periods of occupation, was part of the larger political structure of the Calusa. The Calusa were a socially complex, hierarchical

group of hunter-gatherers who lived on the southwest coast of Florida and exercised political control over a significant portion of southern Florida during the historic period (Thompson and Worth 2011; see also Goggin and Sturtevant 1964; Widmer 1988; Marquardt 1992). It is likely that, by this time period, Fort Center was somehow integrated into the Calusa polity (Thompson and Pluckhahn 2012). The exact relationship between Fort Center and the Calusa during the prehistoric time period is less clear (see Thompson and Worth 2011 for a more in-depth discussion of the questions and debate surrounding the development of the Calusa).

While the fact that the Calusa were a complex group of hunter-gatherers has long been accepted (Thompson and Worth 2011), there has been more debate surrounding the subsistence practices of the inhabitants of Fort Center. William Sears, who excavated at the site in the 1960's and 1970's, reported the presence of maize at Fort Center at 450 B.C. (Sears 1982:193). Sears believed the Great Circle and the later linear earthworks were built to aid in the cultivation of maize. He suggested that the ditch was constructed to drain the interior of the Great Circle, thereby making it more suitable for maize, and the linear earthworks acted as raised beds for the same purpose (Sears 1982:6, 186). Sears also based his argument for maize agriculture at Fort Center on evidence from the ceremonial complex that he suggested dated to this time period. Sears asserts that the ceremonial activities that took place in this area had "agrarian overtones" (Sears 1982:188-189).

Sears thought that the practice of building these earthworks came from South America, along with the cultivars themselves (Sears 1971, 1982). This explanation, which has always been somewhat controversial (see Lusteck 2006:524; Johnson 1990), was based on the identification of maize pollen from some of the earliest contexts at Fort Center (Sears 1982; Sears and Sears 1976). While he believed that maize was the most likely cultigen, Sears suggested that the people of Fort Center might have also cultivated manioc (Sears 1982:18).

Sears believed that agriculture, and in particular maize agriculture, was necessary to support a population at the level of complexity seen at Fort Center (Sears 1982). He argued that maize cultivation has spread to Florida from South America, through the Antilles (Sears 1971). Underneath this diffusionist argument were neoevolutionary ideas concerning complexity and progress. Sears' ideas followed a long tradition of viewing hunter-gatherers as primitive, and incapable of reaching higher levels of social complexity (Thompson et al., in press).

There are additional lines of evidence that suggest that maize was not grown at Fort Center during the prehistoric occupation. Analysis of the particle size and chemical composition of the Great Circle indicate that it was not regularly cleaned out, which might be expected if it was being used for agricultural purposes. Also, the soil at Fort Center is quite acidic and high in aluminum; both of these characteristics would have made the region ill-suited for maize cultivation (Johnson 1990:210).

Recent microbotanical and macrobotanical analyses provide little evidence in support of Sears' argument that maize was grown at Fort Center during the prehistoric period (see Cummings and Yost 2011; Thompson et al. 2012). It now seems likely that the pollen that Sears recovered was either misidentified, or the result of contamination from later deposits (Thompson et al. 2012). It has become increasingly clear that the prehistoric inhabitants of the site most likely did not cultivate maize, and that Fort Center can contribute to our understanding of complex hunter-gatherers.

Chapter 2: Lake Okeechobee and Fort Center (8GL13)

Sites in the Lake Okeechobee, or Belle Glade, region commonly feature several different types of earthworks. These include long linear earthworks, mounds, circular ditches, and circular embankments, as well as ponds and borrows (Johnson 1996; Milanich 1998:114). Many of these types of earthworks can be found at Fort Center, most notably the circular ditches. In addition, several sites feature circular earthworks with linear embankments ‘spoking’ off and terminating in another small circular feature. The phrase “Big Circle” site was coined to refer to sites with these features. Fort Center is only one of several “Big Circle” sites in the Belle Glade region. Others include Tony’s Mound and Big Mound City (Allen 1948:17 in Milanich 1994:281).

In the early part of the 20th century, survey and testing of various sites in the Belle Glade region was performed by Federal Emergency Relief Agency archaeologists. The Ortona site, Big Mound City, and Tony’s Mound were all visited in the 1930’s and 1940’s. Gordon Willey also performed test excavations at the Belle Glade site, and developed a chronology for the region (Milanich 1994:281-282).

Fort Center itself has also been the subject of several archaeological investigations in the past 50 years. Charles Fairbanks directed a field school through the University of Florida in 1966 and 1967, for approximately six weeks each year. Another group of students led by John Longyear excavated three times, in January, from 1966-

1968. William Sears excavated at Fort Center for six full field seasons and 2 partial seasons; his main project ran from 1966-1971 (Sears 1982:ix-x).

There is little information available concerning Fairbanks and Longyear's work at Fort Center. However, William Sears (1982) book *Fort Center: An Archaeological Site in the Lake Okeechobee Basin* details his investigations at the site. Sears provides an overview of his analyses of ceramics, shell tools, wooden artifacts, etc. In addition, he outlines his argument that the earthworks at Fort Center were constructed to aid in the cultivation of maize.

Chapter 3: Physical environment

The region surrounding Fort Center itself can be generally characterized as a low-lying savannah, with three basic sub-environments. These include the river meander belt, the hammocks, and savannahs. The river meander belt refers to areas where the rivers have eroded down into and below the hardpan. Hammocks, and the cabbage palm and oak vegetation that characterize these areas, can be found on high ground-natural levees, and even earthworks. The low-lying savannah areas feature ponds and sloughs, and are periodically flooded (Sears 1982:3). Fort Center is located within this larger ecosystem, and contains all three sub-environments.

Fort Center is located along Fisheating Creek, which drains into Lake Okeechobee. The Lake and the surrounding wetlands dominate the physical environment of Fort Center. Today, Lake Okeechobee has a surface area that averages around 1730 square kilometers (Steinman, et al. 2002:20). Fisheating Creek, as well as the Kissimmee River and Taylor Creek, are some of the most significant sources of inflows into Lake Okeechobee (Steinman, et al. 2002:22). The lake itself, and the surrounding freshwater wetlands, provided a variety of resources for prehistoric inhabitants. These resources would have presumably made this area attractive, with people most likely settling on the higher ground.

Plant life

Southern Florida can be characterized as having a neotropical or subtropical climate. This region has a mix of tropical and temperate plant species (Scarry and Newsom 1992). The sandy soil found in the Lake Okeechobee region mainly supports temperate plants, with some tropical plants that inhabit the swamps and prairies (Hogan 1978:9). The vegetation in this area has likely been fairly stable for the past 5,000 years (Scarry and Newsom 1992).

There are several distinct plant communities in this region, including wet prairies, marshes, swamps and riverine communities, pinelands, and hardwood hammocks. The prairies and freshwater marshes are treeless areas that contain plants such as arrowhead (*Sagittaria*), cattail (*Typha*), and bulrush (*Scirpus*) (see Table 2 for common/scientific names of plants mentioned). The swamps are usually characterized by trees, such as the water oak (*Quercus nigra*), holly (*Ilex*), ash (*Fraxinus*), and cypress (*Taxodium*), and temperate plants. Many of these tree species also inhabit ponds and river margins. The pinelands feature *Pinus* with an understory of palmetto and grass (Scarry and Newsom 1992). In the southernmost portion of Florida, the most common species of pine are *Pinus elliottii*, or slash pine, and *Pinus clausa*, or sand pine (Watts, et al. 1996:32).

Hardwood hammocks occur within these pinelands, with a mix of temperate and tropical species, including holly (*Ilex*), bays (*Persea*), oaks (*Quercus*), and palmettos

(*Sabal* and *Serenoa*) (Scarry and Newsom 1992). The oak genus (*Quercus*) includes several species with their own particular ecological niches (Watts, et al. 1996:29). In the Mid- Holocene, or about 4500 BP, pine/swamp vegetation began to replace oak/herb vegetation in the southern portions of Florida (Watts, et al. 1996:37). In general, this is related to the changing climate of the time period (Watts, et al. 1996). In southern Florida, others have suggested that this shift could also be related to Holocene sea level rise (Olmsted and Loope 1984). That being said, oaks can still be found in specific environments in southern Florida, such as the upland hammocks.

The distribution of plant communities in southern Florida was and is influenced by the occurrence and frequency of fires (Gunderson 1994). Most fires occur during the summer rainy season, are fairly small in area, have a limited impact on the soils and root systems, and basically maintain the present plant communities. When these types of fires are frequent, pinelands are maintained as the fire climax community (Lodge 2005:75). These wet-season fires help deter the tropical hardwood species from overtaking the pinelands and developing hammock climax communities. Fire can be more detrimental to the hammock plant communities (Lodge 2005:75).

In addition, dry season fires also change the landscape of southern Florida. These fires occur less frequently but have a more dramatic impact on plant communities. A fully developed hammock community, while being more resistant to wet-season fires because of its open understory, can be destroyed by an intense dry season fire (Lodge 2005:68).

The role of fire in shaping the environment of Fort Center has not been addressed extensively. In the historic period Native Americans in the Southeast used fire to manage game and aid in hunting, to clear areas, to encourage growth and production of certain plants, as well as part of horticultural and agricultural regimes (see Vale 2002 for a broad overview). Myers and Peroni (1983) suggest, based on the pollen record, that the prehistoric inhabitants of Fort Center also used fire to manage the landscape. In particular, they posit that the above-mentioned increase of pineland vegetation in the mid-Holocene is due to anthropogenic fires. They also point to a resurgence of oaks, a component of the climax hammock community, as evidence of a decrease in the occurrence of fires once Fort Center was abandoned (Myers and Peroni 1983 in Fowler and Konopik 2007; see also Sears 1982 for pollen data). Although they base their conclusions on the assumption that fire was being used to aid in the cultivation of maize, which we now know was almost certainly not cultivated at Fort Center in prehistoric times, it is likely that the prehistoric inhabitants used fire for other reasons. This possibility will be addressed in more detail below.

Chapter 4: Site description

In the following sections, I provide a brief history and overview of the site of Fort Center. I focus on describing the timing and type of construction activity. One of the most distinctive features of the site, which dates to this time period, is a circular earthwork 365-meters in diameter called “the Great Circle.” In addition to this circular feature, later inhabitants constructed other large-scale earthworks. These include a channel pond, numerous linear earthworks, and at least fifteen mounds (see Figure 1). The dates for the periods are adapted from Sears (1982) and Thompson et al. (in press).

Belle Glade I (900 B.C. to A.D. 200)

Radiocarbon dates from the 2010 excavation at Fort Center place the first period of occupation at Fort Center around 750 B.C. Several dated remains from Mound B, the midden on the outside edge of the Great Circle, and the ditch itself provide dates ranging from 800 B.C.-680 (Thompson and Pluckhahn 2012:55). It is likely that the Great Circle was constructed during this time (Thompson and Pluckhahn 2012). Sears himself believed that the Great Circle dated to approximately 450 B.C., and suggested that the true beginning of the earliest period of occupation was around 800-1000 B.C. He based this earlier date on the appearance of semi-fiber tempered pottery (Sears 1982:185).

Sears recognized two smaller circular ditches that were constructed before the current “Great Circle”; recent geophysical surveys have revealed these two ditches, plus

at least one more previously undiscovered ditch (Thompson and Pluckhahn 2012). Early deposits in Mound 3, Midden B, Mound 12, Mound 13, and possibly Mounds 11 and 14, also date to this first period of occupation. More recent radiocarbon dates have also established the construction and use of the area around the charnel pond during this time period, as well (see Thompson and Pluckhahn 2012; cf. Sears 1982).

Belle Glade II (A.D. 200 to 900-1000)

The second period of occupation dates to approximately 200 A.D. to 900 A.D. The charnel pond area continued to be used during this time period, as is indicated by recent radiocarbon dates. The earliest date for the pond itself dates to the very beginning of this period (approximately A.D. 180-340) (Thompson and Pluckhahn 2012:59). The charnel pond complex is composed of the pond, a low earthwork, and Mounds A and B (Thompson and Pluckhahn 2012:57). The charnel pond contained the remains of 150 individuals, and the burial deposits of Mound B also contained remains of about 150 individuals (Sears 1982:196; see also Thompson and Pluckhahn 2012; Thompson et al. in press).

In addition, Sears suggested that the linear earthwork-mound structures, such as Mound 1, Mound 5, Mound 3, Mound 2, and Mound 8, were probably all occupied and used during this period and into the next (Sears 1982:190). He bases this assertion on data from the excavations of Mound 2. Analysis of ceramics from Mounds 1 and 5

suggest a somewhat later date for their construction and use (Thompson and Pluckhahn 2012:61).

Belle Glade III and IV (AD 900-1000 to ca. A.D. 1660)

The third and fourth periods of occupation at Fort Center date to approximately 900 A.D. to 1600 A.D. (see also Griffin 1989:186). There are several earthworks, such as the UF Mound and other linear earthworks, whose ceramic assemblage indicate that they date to this time period (Thompson and Pluckhahn 2012:61).

Historic period occupation at Fort Center (A.D. 1660-1960)

By the 16th and 17th centuries, it is likely that Fort Center was somehow part of the Calusa polity. The Calusa capital was located on Mound Key, but they exercised significant political control over a wide region of Southwest Florida (Marquardt 1986; Widmer 1988:5). Much of the information concerning this time period comes from Spanish accounts, such as Fontaneda's (1944) memoir.

In addition, the historic fort for which the site is named was occupied during the Second and Third Seminole Wars. The fort was located through geophysical survey during the 2010 summer excavation, and lies along Fisheating Creek just northeast of the "Great Circle." During this historic occupation, maize was cultivated at Fort Center. The maize remains (carbonized corn kernels, and microbotanical remains) that were found during the 2010 excavation all date to this period (Thompson et al., in press).

Chapter 5: Recent investigations at Fort Center

In the summer of 2010, a crew from the Ohio State University excavated four units, and performed various types of remote sensing at Fort Center. Test Units 2 and 4 were positioned on the on the northeast berm of the Great Circle, in midden contexts, along Fisheating Creek (see Figure 1 for a map of Fort Center). Test Unit 3 was placed inside the edge of the ditch that makes up the Great Circle. Each unit was two meters by one meter, and was excavated to varying depths (until reaching the hardpan/sterile subsoil). Bulk and flotation samples (approximately two liters each) were taken from each 10 cm unit level. Fill from features, which were scarce, were screened separately (this mainly pertains to Unit 3, where the soil that filled in the ditch was separated from the surrounding matrix). In addition, a 25-by-25 cm column unit was excavated to Test Units 2, 3, and 4 to provide samples for macrobotanical and microbotanical analysis. The microbotanical analysis of pollen and phytoliths was undertaken by PaleoResearch, Inc. (see Cummings and Yost 2011) and is discussed in detail in Thompson et al. (in press). I analyzed a series of column samples from two column units to identify macrobotanical remains. Below, I describe the methods of my analysis and discuss the results.

Chapter 6: Methods of macrobotanical analysis

The column units adjacent to Test Units 2 and 3 provided the soil samples for my analysis. In addition, two liter flotation samples were taken from each 10-cm unit/level of the Test Units. Eight of these samples were analyzed. Originally, samples were slated to be analyzed from Test Unit 4. However, it became apparent that Test Unit 4 had suffered significant disturbance and the remains from this unit were not included in my analysis.

Each column unit was excavated in 25 x 25 x 2 cm levels. Occasionally, a sample was excavated in a 4 cm level (usually due to a root that made it difficult to excavate a 2 cm level). This resulted in one liter soil samples for each 2 cm level. To insure that each 2 cm level sample was uncontaminated, a small 1 cm balk was left around the edges of the 25 x 25 column unit. In addition, after each level, the trowel in use was cleaned with distilled water and fresh paper towels.

Each sample was sifted through four standard geological sieves and separated into 4 mm, 2 mm, 1 mm, and .5 mm fractions. These fractions were then examined for botanical remains using a Leica microscope with 7-30X magnification. The residue (the fraction that passed through the .5 mm sieve) was also randomly spot-checked for botanical material. Both carbonized and uncarbonized botanical material such as seeds, seed fragments, stems, etc. were also separated and identified when possible.

Different procedures were used for fractions that were larger than 2 mm and those that were smaller than 2 mm. Wood charcoal identified in fractions larger than 2 mm was separated and weighed. In addition, faunal material was separated from fractions larger than 2 mm. The presence of both wood charcoal and faunal remains were noted in fractions smaller than 2 mm, but they were not separated.

Chapter 7: Results

The macrobotanical and microbotanical analyses provide significant information on plant use at Fort Center. Table 1 presents the results of the macrobotanical analysis (see Table 2 for common and scientific names of plants mentioned). In addition, these analyses provide evidence for what the prehistoric environment was like at the site and how cultural activities affected the vegetation. Below, I outline the results of these analyses for the different periods of occupation at Fort Center. All dates provided below are calibrated.

Belle Glade I (900 B.C. to approximately A.D. 200)

The earliest samples submitted for microbotanical analysis from Unit 2 and 3 date to approximately 760-680 B.C (Thompson and Pluckhahn 2012, Table 1). This date is supported by the semi-fiber tempered ceramics found in these deposits (however, there are later radiocarbon dates from materials in the same level; see Thompson and Pluckhahn 2012). Oak pollen is more common during this period than in the later Belle Glade occupation, but not as abundant as it is during the historic period. This suggests that the extent of oak hammock vegetation was somewhat less during the early periods of occupation of the site (semi-fiber tempered and into the Belle Glade periods). Pine pollen was also identified from these deposits, in slightly larger amounts than oak pollen (however, both of these species' pollen is wind-dispersed); another tree species, holly

(*Ilex*), was also identified. The frequency of palms during the period is lower than in later periods, based on the pollen evidence (Cummings and Yost 2011).

The understory vegetation as reflected in the pollen record included grasses (Grass family, Poaceae), members of the umbel (Apiaceae) and sunflower families (Asteraceae), the cheno-am group (*Chenopodium* and *Amaranthus*), and knotweed (*Polygonum*) (Cummings and Yost 2011). In addition, large grass pollen grains were regularly recovered. Based on their size, these were identified as river cane (*Arundinaria*) (Cummings and Yost 2011:5).

During this period of occupation of Fort Center (around 750 B.C.), there is a large amount of macroscopic and microscopic charcoal (Cummings and Yost 2011; see also Figure 2 below). The amount of microscopic charcoal recovered could indicate local burning of vegetation during this time (semi-fiber tempered and into the Belle Glade periods) (Cummings and Yost 2011). During my analysis of the macro remains from Unit 2, the amount of wood charcoal declined from an average of 0.32 grams to negligible amounts. Then, the amount of wood charcoal recovered increases at Level 34 (80-84 cmbd) to 1.29 grams, which dates to this period of 760-680 B.C. (see Figures 2 and 3). There was also a significant amount of wood charcoal recovered from the 1/8th inch screen (35.7 grams) from the same depth in the Test Unit itself. Although fewer samples were analyzed from Unit 3, this general pattern of decreasing amounts of wood charcoal with an increase during the first period of occupation is repeated in the samples that I

processed from this unit. This pattern might indicate the intentional use of fire, perhaps to clear the area for settlement or construction activities.

However, it should be noted that Unit 2 was placed in a midden context. This unit produced a large amount of domestic refuse, including faunal and botanical remains. The wood charcoal recovered could simply be the product of domestic activities, rather than indicating burning activities. Future research, in particular the processing of more samples from Unit 3, could shed more light on this issue.

This period seems to be a time in which the tree species such as oaks and pines are generally decreasing. The understory vegetation that is associated with the hammocks is still present, but in later periods this transitions to more weedy species. Several ruderal species are present during this time, but not in the amount or diversity (in terms of species) as in later time periods. In addition, there is possible evidence for the intentional use of fire by the occupants of Fort Center.

Belle Glade II-IV Periods (approximately A.D. 200 to A.D. 1660)

Information concerning the next phase of occupation at Fort Center was gained through analysis of samples from the Belle Glade periods. The samples submitted for microbotanical analysis date to approximately A.D. 120-330 (based on a radiocarbon date from Unit 2 Level 3; see Thompson and Pluckhahn 2012). During the early Belle Glade periods, that there was a slight increase in palms and a decrease in pines (Cummings and Yost 2011:4). In addition, the amount of oak pollen was fairly low, with

a higher amount of pollen recovered from plants that prefer open habitats. There was also a significant quantity of palm phytoliths recovered from the Unit 2 Belle Glade samples. Many of the other plants reported are additional understory plants (grasses and members of the Umbel family) or weedy species that prefer somewhat open or disturbed, moist habitats (members of the Bindweed [Convolvulaceae], Sedge [Cyperaceae], and Knotweed [Polygonaceae] families, as well as cheno-ams) (Cummings and Yost 2011; Thompson et al 2012).

Phytolith analyses of samples from the Belle Glade occupation at Fort Center suggest that the inhabitants were utilizing Asteraceae seeds, possibly sunflowers (*Helianthus*) or marsh elder (*Iva*). Phytoliths from the inflorescence, or flowers, of these species were identified (Cummings and Yost 2011:5). There is also evidence of a cool-season Pooideae grass, which is unusual for this region of Florida (Cummings and Yost 2011).). One of the samples submitted for microbotanical analysis from deposits in Unit 3 from this period produced one wavy-top rondel (a type of phytolith) that is most likely derived from maize (see Cummings and Yost 2011:6; Thompson et al. in press).

The majority of macrobotanical remains date to the Belle Glade occupation. These remains come from approximately 40- 10 cmbd, and based on recent radiocarbon dates from associated materials, can be estimated to date to roughly 750 B.C.- A.D. 330 (most of these remains come from levels in close association with the A.D. 120-330 date run on material from Level 3 of Unit 2 [see Thompson and Pluckhahn 2012]).

The carbonized seeds I identified, all of which came from Unit 2, included goosefoot (*Chenopodium*), grape (*Vitis*), pokeberry (*Phytolacca*), and flatsedge (*Cyperus*) (see Table 1). In addition, a number of uncarbonized remains were recovered. These taxa include copperleaf (*Acalypha*, in the Euphorbiaceae or spurge family), flatsedge (*Cyperus rotundus*), bulrush (*Scirpus*, in the Cyperaceae or sedge family), prickly fanpetal (*Sida spinosa*, in the Malvaceae or mallow family), and knotweed (*Polygonum*). I believe these remains are prehistoric, although perhaps not cultural. This issue will be addressed in more detail in the discussion section.

The samples from the early part of this period have the highest amounts of microscopic charcoal (see Cummings and Yost 2011, in particular Figure 2). In the column unit from Test Unit 2, the amount of wood charcoal fluctuated throughout the unit (see Figures 2 and 3). Charcoal increased after the first few levels and was then fairly stable. However, there were a few levels that had an unusually high amount of charcoal. Level 11 (30-32 cmbd) had triple the amount of the average of the surrounding levels. Then, the charcoal level returns to this average amount before increasing dramatically (approaching approximately double the average, or 0.9 grams) around 40 cmbd.

This fluctuation in the amount of wood charcoal could be indicative of certain activities taking place at Fort Center during these time periods. The pattern observed from the macrobotanical analysis, described above, corresponds to the pattern of microscopic charcoal recovered during the microbotanical analysis. The samples from

36-40 cmbd have the highest amounts of microscopic charcoal (see Cummings and Yost 2011, in particular Figure 2).

Interestingly, during this time period the amount of oak (*Quercus*) pollen is relatively low and the amount of charcoal seems to have a roughly inverse relationship with the amount of (oak) *Quercus* pollen. This makes sense, as compared to pines and the pineland vegetation, oaks and other hammock species have a lower tolerance for fire (Lodge 2005). The combined charcoal and pollen evidence possibly suggest that the prehistoric inhabitants of Fort Center were using fire, perhaps for clearing areas for settlement or before beginning construction of earthworks, or for encouraging the growth of certain plant species.

The picture of vegetation and plant use during the Belle Glade occupation of the site differs considerably from the previous period. The botanical record likely reflects the construction activities and increased intensity of activity at the site during the Belle Glade periods. Oak and pine vegetation declined significantly, and was replaced with a much more open and disturbed habitat. This habitat included goosefoot, sedges, bindweed, knotweed, copperleaf, and pokeberry. Several of these plants prefer disturbed, wet to moist environments. In addition, there is evidence for the possible use of fire to manage the landscape during this time period.

Historic period occupation (A.D. 1660- 1960)

The analysis of samples from the upper levels of Unit 3 provides information on the vegetation at the site during the historic period. Relative to the Belle Glade periods, there was an increase in oak pollen and a slight decrease in pine pollen. In addition, the quantity of (Arecaceae) pollen decreases, while the amount of pollen from the aster family (Asteraceae) and cheno-ams (*Chenopodium* and *Amaranthus*) increases. These samples also produced the only convincing pollen evidence for maize at Fort Center. One pollen grain that measured more than 90 microns in diameter was identified as maize (*Zea mays*) (Cummings and Yost 2011:10-11).

The macrobotanical assemblage from the analysis of materials from Unit 3 is dominated by flatsedge and bindweed (*Convolvulus arvensis*). In addition, I recovered a few seeds identified as grape and prickly fanpetal. These suggest a moist- to wet environment, with moderate disturbance. The amount of microscopic charcoal from the upper levels of Unit 3 was less than the earlier samples from this unit (Cumming and Yost 2011:11), perhaps suggesting a decrease in burning at Fort Center.

Chapter 8: Habitat and use of plants at Fort Center

The plants remains recovered from excavations at Fort Center can provide information concerning the prehistoric cultural uses of plants, as well as help to reconstruct the past environment. Many of these plants are ruderals, i.e. they are species that colonize disturbed areas, and several plants indicate a wetland environment. Species such as bindweed, pokeberry, goosefoot, and prickly fanpetal particularly like open or disturbed areas. Other plants such as copperleaf, flatsedge, bulrush, knotweed all prefer edge areas, or moist-to-wet environments. Several of these ruderal species are edible, including chenopods, mallow, some sedges (*Cyperaceae*), and pokeberry (Perry 2011:69). However, most of the plants recovered from the macrobotanical analysis do not have significant dietary importance or were not found in sufficient quantities to indicate they were important food sources. Below, I discuss some of the possible uses of plants at Fort Center.

Economically important plants

There are several species of plants recovered from the excavations that could have been potential sources of food for the inhabitants of Fort Center. Macrobotanical remains (see Table 1) of bulrush, goosefoot, and grape were recovered. Bulrush can be found extensively around lakeshores and swamp like areas, and has a variety of uses. The plant is tall with a thin, leafless cylindrical stem. The young shoots, inner stems,

roots, and leaf bases of bulrush are all edible (see Curtis 1928; Jarvenpa 1979; Leighton 1985; Seigfried 1994; all in Marles, et al. 2000). Possible species include *Scirpus tabernaemontani*, *S. californicus*, and *S. pungens* (Wunderlin 1998:177).

Goosefoot (*Chenopodium*) has been extensively studied plants as a potential native seed crop of the Eastern United States. Goosefoot is only one of the Eastern Agricultural Complex, or EAC, crops. These native crops are predominantly found in the Mid-South, and to a lesser extent in the Deep South. These plants are recovered even less frequently from coastal areas (see Gremillion 2003). Research on goosefoot has focused on the use of the seeds and their storage potential. In addition, work has also aimed at documenting morphological change as a result of the domestication process (see Asch and Asch 1977; Gremillion 1993, 2002, 2003, 2004; Gremillion and Sobolik 1996; Scarry 1993; Yarnell 1993).

In addition to serving as a food source, ethnohistoric accounts also provide evidence that other parts of the plant were used, such as the leaves or greens (Erichsen-Brown 1979:415). The leaves can be eaten raw, or cooked as pot herbs. *Chenopodium* seeds were recovered during the macrobotanical analysis, but again, not in amounts that suggest it was a significant source of food. Unfortunately, it is difficult if not impossible to detect use of the greens and to estimate their contribution to prehistoric diet.

Grape (*Vitis*) remains were also recovered from Fort Center. Most people are familiar with the edible fruits of grapes. The young leaves and stems of grapes can also

be cooked and eaten as greens, while older stems can provide clean drinking water.

Ethnohistoric accounts describe the fruits eaten fresh, as well as being dried and stored (Austin 2006:1193-1194).

In addition to macrobotanical remains, there were numerous taxa recovered from the microbotanical analysis that could have been used as sources of food.

Palmettos are well represented in the microbotanical record. Saw palmettos (*Serenoa repens*) fruits were eaten, and were described in ethnohistoric accounts as bitter (Fontaneda 1944). The fruits of cabbage palms (*Sabal palmetto*) were also likely a food source for prehistoric groups. They were consumed by the Seminole in a variety of ways. They were eaten raw, dried and incorporated into bread, and processed into syrup (Austin 2006:991).

A significant amount of oak (*Quercus*) pollen was also identified from Fort Center. Oaks have a long history of use by prehistoric human groups. Acorns can be ground into flour, or processed into oil. The most common species in the area around Fort Center is laurel oak (*Quercus laurifolia*). It is possible that acorns were consumed at the site. In addition, arrowhead (*Sagittaria lancifolia*) and gopher apples (*Licania*) could have been food sources for the people of Fort Center. There are also several species within the mustard (Brassicaceae) family that could have been used as salad greens or pot herbs and provided important micronutrients (Austin 2006:211).

Medicinal and ritual use of plants

In addition to providing food, plants were an extremely important source of medicine for prehistoric people. There are numerous plants recovered from Fort Center that have significant medicinal properties, and whose use has been documented among a variety of groups in North America. These include copperleaf, flatsedge, knotweed, bulrush, grape, as well as microremains of *Alnus*, *Pinus*, Asteraceae, Lamiaceae, *Plantago*, Brassicaceae, Arecaceae, *Sagittaria*, and *Ilex*. Austin (2006) provides some examples of the use of some of these plants by groups in the southeastern United States; however, other examples come from more distant regions.

Macrobotanical remains of copperleaf, flatsedge, bulrush, knotweed, and grape were recovered during my analysis. Copperleaf (*Acalypha*) was fairly common in the samples from Fort Center, and is a somewhat weedy plant. One species, *Acalypha rhomboidea*, is reported to have medicinal properties (see Hocking 1997 in Austin 2006).

There are four different species of flatsedge (*Cyperus*) found in Florida, including *Cyperus articulatus*, *C. erythrorhizos*, *C. odoratus*, and *C. squarrosus* (Austin 2006:72). Some species of sedge have been shown to have antitumor, antibacterial, and sedative effects (Farnsworth 1999 in Marles et. al. 2000). However, other sources report that ingestion of some species can cause intoxication (Hocking 1997 in Austin 2006).

I also recovered knotweed (*Polygonum*) seeds. Knotweed and other species in this genus prefer disturbed areas, and many grow well in wet, open places. The most likely species at Fort Center include *Polygonum convolvulus*, *P. aviculare*, or *P.*

pensylvanicum (see USDA 1971). Hogan (1978) found evidence of *Polygonum hydropiperoides* at the site.

There is considerable evidence of prehistoric medicinal use of various species of this plant. In general, the juice, roots, and other parts of the plant seem to be common in folk medicine, especially in the form of teas (Hartwell 1970:373 in Erichsen-Brown 1979). In addition, species such as *Polygonum hydropiperoides* have been utilized as a stimulant, to treat strangury, and to stop internal hemorrhaging (see Austin 2006).

In addition, I recovered remains of bulrush (*Scirpus*) and grape (*Vitis*), both of which can be used to treat coughs. The stems of bulrush can be used medicinally to treat fevers and coughs (see Curtis 1928, Jarvenpa 1979, Leighton 1985, Siegfried 1994 all in Marles et. al. 2000). There are also accounts of certain *Vitis* species being used to treat coughs and other maladies by the Seminole (Austin 2006:1194).

One of the more common plants at Fort Center, the saw palmetto (*Serenoa repens*), was possibly utilized for medicinal purposes as well. Saw palmetto has been used by native groups to treat colds and respiratory conditions, diarrhea, asthma, and headaches. It was also used as a diuretic, sedative, and anti-inflammatory agent (Austin 2006:1043-1045).

Yaupon holly, or *Ilex vomitoria*, has several medicinal properties. It has been used to treat 'sore eyes', upset stomach, and diarrhea. In addition, it is an important component of "black drink", a tea that was ritually consumed by groups in the Southeast. Black drink was made and consumed by high-status adult males in ritual and

social contexts (it is also often drunk from whelk shell dippers). These rituals sometimes ended with self-induced vomiting, which is where the plant gets its name (Hudson 1979).

Other uses of plants

Plants are also important sources of material for a variety of tools, structures, fuel, etc. Trees would have been important for a variety of reasons, for construction purposes, as well as for building canoes. Evidence from Newnan's Lake, an Archaic period site in northern Florida indicates that canoes were built out of pine and cypress (Wheeler, et al. 2003). Newsom and Purdy (2000) suggest that pine was a more popular choice during prehistoric times, and cypress was used more often during the historic period in Florida. In addition, Austin (2006) posits that some oak species could have been used to make canoes.

Palmettos are another group of plants that would have had several important uses. Both saw palmetto (*Serenoa repens*) and cabbage palm (*Sabal palmetto*) can be important sources of fiber for cordage and baskets, thatch, mats, etc. Fontaneda describes men and women making breech-cloths and other types of clothing out of palm leaves (Austin 2006; Fontaneda 1944).

Chapter 9: Discussion

The botanical remains recovered from Fort Center not only shed light on the subsistence practices and use of plants by the prehistoric inhabitants of Fort Center, but they can also provide information that contributes to many larger theoretical issues and questions within southeastern archaeology. Below, I first provide an outline of prehistoric diet in southern Florida and address how Fort Center compares to other sites in the region. Next, I describe some of the characteristics of the botanical assemblage from Fort Center, including the presence of uncarbonized seeds and the generally low frequency of plant remains. Then, I discuss how the analysis of materials from the 2010 excavations contributes to the debate over the presence of maize cultivation at Fort Center (at 450 B.C.). Finally, I address the way in which the data from Fort Center may help us refine conceptual models of hunter gatherer behaviors.

Prehistoric diet in south Florida

The prehistoric peoples of southern Florida consumed a variety of plant and animal resources. There are several sources of information concerning prehistoric diet in this region; however, much of this information comes from investigations in the Charlotte Harbor area, and at coastal islands such as Useppa and Pineland (see Newsom and Scarry 2000; Scarry 1999; Scarry and Newsom 1992). There were also limited

analyses of fauna material done on remains from Fort Center and Tony's Mound in the 1980's (see Hale 1984).

While plant resources were an important part of the diet, especially in terms of providing micronutrients and vitamins, the people of Fort Center also relied on animal resources. The lake itself, and the surrounding freshwater wetlands, provided a wide variety of plant and animal resources for prehistoric inhabitants.

Faunal analysis of excavated remains from Fort Center, and other archaeological sites in the region, provides detailed information concerning exactly what type of animals contributed to prehistoric diet. Aquatic resources, unsurprisingly, usually predominate over terrestrial resources. Reptiles, particularly turtles, were also important resources. More than 17 species of terrestrial and aquatic turtles, snakes, and other reptiles were recovered from Fort Center (Hale 1984). Alligators were also hunted and consumed by groups in south Florida (Marquardt 1992). There is also evidence of use of aquatic mammals, such as otter and muskrat (Hale 1984).

Bowfin, gar, chubsucker, catfish, pike, bass, crappie, and bluegill were all identified during Hale's (1984) analysis of material from Fort Center. One thing to note concerning Hale's analysis is that it is probably biased towards recovering and identifying remains from large fish. Smaller fish could have been important resources if nets were being used (a common practice in southern Florida). However, recovery methods, in particular the size of screen mesh, can bias the zooarchaeological assemblage. In addition, small fish can also be consumed whole (Widmer 1988). Based

on information from other archaeological sites in the region, and ethnohistoric accounts, it is likely that fishes were an important contribution to the prehistoric diet.

Terrestrial animals, such as lynx, opossum, deer, raccoon, rabbit, fox, and bear were also contributors to prehistoric diet. In addition, a wide variety of birds were captured and eaten. These included migrating birds, such as ducks and coots; wading birds such as limpkins, egrets, and herons, and numerous other birds such as ahningas, cranes, and turkeys (Hale 1984). In coastal regions of south Florida, shellfish, such as oysters and clams, were also a very important dietary resource.

Animal use in general at Fort Center seems similar to other sites in southern Florida, such as Tony's Mound, and it is also similar to ethnohistoric accounts of Calusa subsistence (see Fontaneda 1944). However, there are some differences in the botanical remains from Fort Center and assemblages from other sites. This could be due to a number of factors, one of which may be the small sample size from Fort Center. In addition, the inland location of the site means the plant assemblage can be expected to differ from the coastal sites. Almost all of the fruit plants found at southwestern Florida coastal sites, such as cocoplum, hog plum, seagrape, mastic, and prickly pear, are either not present or not as common in the interior of the state. This is related to the presence of areas of hardwood hammocks. None of the above mentioned plants were identified during the macrobotanical or microbotanical analysis of samples from Fort Center. However, Fort Center and these coastal archaeological sites (where much of the paleoethnobotanical work in south Florida has been done) also feature some of the

same plants. In particular, the assemblages from both regions include several ruderal species (see Newsom and Scarry 2000).

Characteristics of the botanical assemblage

The results of my analysis of botanical remains from the 2010 OSU excavations at Fort Center are presented above. Several characteristics of this assemblage deserve comment. First, many of the taxa recovered from Fort Center prefer disturbed habitats. This is not surprising, considering the amount of construction activity taking place at the site. Unfortunately, with such a small sample size, it is difficult to see a significant correlation between certain taxa and particular periods of activity at Fort Center.

The second characteristic that deserves mention is the low frequency of plant remains. There are several possibilities for the paucity of carbonized botanical remains at Fort Center, including poor preservation or the relatively small sample size. In addition, this low frequency could be indicative of a subsistence economy that was not heavily focused on plant resources- in other words, the people of Fort Center were eating a lot of fish and not a lot of plants. These possibilities will be addressed in turn below.

Preservation

The botanical assemblage recovered from Fort Center raises some interesting questions concerning the preservation environment of this site. Uncarbonized remains,

particularly from subtropical or humid temperate zones, are usually considered to be modern contaminants (VanDerwarker and Peres 2010). Excavation of Unit 2 produced carbonized as well as uncarbonized botanical remains. These uncarbonized remains were generally in good condition (undistorted, and only occasionally fragmented). Unit 3 produced mainly uncarbonized botanical remains, with some charcoal and a few carbonized seeds.

There are several scenarios which could result in this type of assemblage. One possibility is that the preservation of plant materials in these contexts at Fort Center is quite good, resulting in an abundance of uncarbonized, prehistoric material throughout Column Units 2 and 3. Other materials from these two units, such as bone, do seem to be well-preserved. However, the midden deposit where Unit 2 was located also contained shell refuse. Shell can make soils more alkaline and increase the preservation quality for remains such as bone, while decreasing the preservation quality of botanical remains (Sobolik 2003). I consistently found small pieces of bone (vertebrae, rib, etc., probably from fishes) at the 2 and even 1 mm fraction of column samples. However, as Johnson (1990) pointed out, the soils at Fort Center are fairly acidic, which can also decrease the preservation quality of plant material. Without more exact information on the properties of the soils at the site, the possibility of preservation for uncarbonized botanical material is unknown.

Another possibility is that the uncarbonized botanical remains recovered from Units 2 and 3 are not prehistoric. They could be modern seeds that have migrated down

into the soil through bioturbation or other taphonomic processes. While this is possible, it seems unlikely for several reasons. The uncarbonized seeds recovered do not appear have the same appearance as fresh seeds of the same type (admittedly, a fairly subjective judgment). There is also no evidence for disturbance in these two units. In addition, the majority of the taxa that I recovered from macrobotanical remains were also identified in the microbotanical analysis.

It also seems reasonable, with the large amount of uncarbonized remains present, to expect that they would have intruded into older contexts in a random manner. However, uncarbonized remains are fairly consistently associated with carbonized remains; meaning there are very few samples that contain solely uncarbonized remains. Only 3 samples from Column Unit 2 contained only uncarbonized botanical remains. There were also 3 samples from Column Unit 3 with uncarbonized remains exclusively. However, it should be noted that Column Unit 3 produced fewer carbonized or cultural prehistoric remains in general.

If the preservation conditions of these contexts at Fort Center are good enough to preserve uncarbonized, prehistoric seeds, this still leads us back to questions concerning the overall low frequency of plant remains recovered and low diversity of species. If the uncarbonized remains are not prehistoric, but rather intrusive modern seeds, we are simply left with an even smaller botanical assemblage. Regardless of the exact preservation environment, the fact remains that we are probably only getting a

small window into the plants that were utilized by the prehistoric inhabitants of Fort Center.

From a variety of sources, including archaeological investigations, ethnohistoric and historic accounts, we could conservatively estimate that the people of Southwestern Florida were using *at least* 34 different taxa of plants for food/medicinal purposes alone. Table 3 presents a list of food and medicinal plants compiled from these sources. In contrast, the macrobotanical analysis of material from Fort Center produced evidence of approximately 10 taxa, of which perhaps half are food plants (see Table 1). The archaeological record, of course, is not perfect, nor should we expect to see the exact same plant assemblage for prehistoric and historic groups. However, such a large disparity does raise questions concerning the preservation conditions and/or sampling strategy at the site.

One of the most famous sources of information concerning prehistoric subsistence in this region is Hernando D'Escalante Fontaneda's memoir of the 17 years he spent living with the Calusa Indians (roughly 1549 to 1566). Fontaneda mentions a bread made by the Indians, saying,

"They have bread of roots, which is their common food the greater part of the time; and because of the lake, which rises in some seasons so high that the roots cannot be reached in consequence of the water, they are for some time without eating this bread" (Fontaneda 1944).

There are two plants that have been commonly proposed as the source of this root bread: *Zamia* and *Smilax*. Unfortunately, neither of these plants was identified in the macrobotanical or microbotanical analysis. However, in more tropical areas, many types of plants, including roots and tubers, can be extremely difficult to detect in the archaeological record through traditional macrobotanical analysis (Wright 2010:40). This factor could certainly affect the frequency and amount of botanical material recovered from Fort Center.

Sample size

The sample size of this assemblage is relatively small. In total, 52 samples were analyzed. Thirty-seven column samples from Column Unit 2 were analyzed, as well as 8 column samples from Column Unit 3. These column samples were 1 liter in size (except a few samples, where two levels were combined to form a 2 liter sample). In addition, 7 unit/level samples from Test Unit 2 were analyzed. These samples were 2 liters in size.

Therefore, in total, approximately 59 liters of sediment were analyzed from Fort Center. In comparison, previous paleoethnobotanical studies in south Florida have samples sizes ranging from 200-300 liters to 700 liters (see Newsom & Scarry 2000; Scarry 1999; Scarry & Newsom 1992). In addition to the rather small sample size, it is important to keep in mind that botanical remains from only 2 contexts at Fort Center were analyzed. Originally, more samples from Column Unit 3 and all of the samples from

Column Unit 4 were slated to be analyzed. However, as previously noted, Column Unit 3 produced very few botanical remains and Unit 4 was shown to have undergone considerable disturbance. These factors, unfortunately, severely restricted the sample size of this project.

The dietary importance of plant resources

While the importance of plant resources is hard to determine precisely, my analysis did not provide evidence of the use of any one particular plant as a dietary staple. Ethnohistoric accounts do mention plant ‘tribute’ that moves from the inland region to the Calusa capital (i.e., Fontaneda 1944). Some researchers suggest that this is more of a symbolic tribute rather than a substantive movement of foodstuffs (see Hale 1984). However, in contexts other than tribute, this plant resource (the mysterious root-bread) is mentioned as being commonly consumed. Perhaps future research will conclusively identify the plant that was used to make this bread, and clarify the nature of this tribute.

The lack of evidence for the use of any one plant as a dietary staple could possibly be explained as a result of the ecological setting of Fort Center. As detailed above, this region is particularly rich in lacustrine and wetland resources that were utilized by the prehistoric inhabitants. In addition, the upland savannas provided habitat for deer and other terrestrial animals (Sears 1982).

Within the study of hunter gatherers, research has recently focused on wetland environments and how they were inhabited and utilized by prehistoric people (e.g., Bernick 1998; Menotti 2012). Wetlands are not simply areas of transition between dry land and bodies of water, but are distinct environments with their own ecological processes. Generally speaking, wetlands are highly productive environments with a diverse, reliable suite of resources. There can be significant variation depending on the size and exact type of wetland (bog, marsh, swamp, etc.). The larger the wetland, the more likely it is to be biologically heterogeneous. In addition to providing many different types of resources, they contribute to the overall ecology of a place by storing and purifying water (Nicholas 1998).

As Nicholas (1998:720) notes, it is not unreasonable to suggest that unusually productive environments will perhaps provide more opportunities for certain aspects of social complexity to develop, such as sedentism or territoriality. Phenomena such as higher population densities, increased sedentism/ reduced mobility, and social stratification are also found in areas in North and Central America where wetlands are common (Nicholas 1998:725). While research at Fort Center is still in the early stages, it seems obvious now that they represent another case of complex hunter-gatherers.

Fort Center and complex hunter-gatherers

The data from Fort Center provide another strong and convincing demonstration of the range of subsistence methods, social structures, and activities of complex hunter-

gatherers. As discussed above, there is no unequivocal evidence at Fort Center of domesticated plants until the historic occupation of the site, when maize was cultivated in the vicinity of the historic Seminole fort (see Thompson, et al. in press for a thorough treatment of the evidence for maize at Fort Center). The results of the macrobotanical analysis I have undertaken fully supports this conclusion. In addition, there is very little evidence of exploitation of any of the native seed crops (goosefoot, sunflower, sumpweed, maygrass, little barley, etc.) found extensively in the Mid-south and to a lesser extent in the Deep South (see Asch and Asch 1977; Gremillion 1993, 1996, 2003, 2004; Gremillion and Sobolik 1996; Scarry 1993; Yarnell 1993 for a more in-depth discussion of this topic).

I also note that evidence of the use of mast resources is conspicuously absent in the sampled contexts at Fort Center. While the wetland habitat (including savannahs, the meander valleys, and upland hammocks) is not ideal for nut producing trees, there are pockets of oaks in the area. *Quercus* pollen was identified in all of the samples submitted for microbotanical analysis (although it is wind-dispersed) (Cummings and Yost 2011). When comparing Fort Center to other contemporaneous sites in the Southeast with monumental architecture, such as Kolomoki (A.D. 350-750), there are significant differences in subsistence. The people of Kolomoki did rely on mast resources, such as hickories, acorns, and hazelnuts, as well as domesticated corn and sunflower (Pluckhahn 2003:164). Again, the evidence from sites such as Fort Center must be taken into account when we are trying to tease apart the relationship between

subsistence method (specific resources, storage, etc.) and complexity among hunter-gatherers during this time period.

The picture, then, we have of subsistence at Fort Center is of a relatively sedentary group of people who relied on lacustrine/wetland resources, such as fishes, birds, and reptiles, and a variety of wild plants. However, at present, there is little evidence for an emphasis on any one plant resource (such as nuts, or seed crops). There is also no current evidence for the storage of resources, plant or otherwise.

And yet, contrary to neolutionary expectations and models of cultural development, these hunter-gatherers left several indications of complex lifeways. They successfully exploited their local environment, perhaps through cooperative endeavors like net-fishing, in a way that allowed them to build numerous earthworks, have a rich ritual life, and intensively modify their local environment.

For now, there are still many questions concerning the details of these lifeways, particularly during the early occupation of Fort Center. Efforts to describe the amount and organization of labor needed to construct earthworks have produced varying estimates. In addition, there are issues with attempting to correlate the size of monumental constructions with a particular level of social complexity or population size (see Milner 2004:302). However, we can take a different approach. Rather than attempting to equate the size of the mounds with a particular population size or configuration of control of labor, we can view the earthworks at Fort Center as evidence for a continued, sustained construction effort over the course of at least 1500 years (see

Thompson and Pluckhahn 2012 for a more detailed discussion of Fort Center as a 'monumental persistent place'). This implies that there was some social force that was unifying people in a sustained effort, across space and time, to create these monumental earthworks for social or religious reasons. This force seems to operate at a regional level in this area of Florida; Fort Center is not a unique site in the Lake Okeechobee region. These sites can help us better understand these aspects of social complexity.

In addition, the inhabitants of Fort Center also significantly modified their environment. I have outlined the botanical evidence for the possible use of fire during the prehistoric occupation, and this activity (in addition to the construction activities) implies some level of organization and cooperation above the household level. Ethnohistoric accounts can provide some information as to the possible socio-political configurations present at contact, but there are still many questions concerning the development and nature of social complexity at Fort Center.

Chapter 10: Conclusion

Recent archaeological investigations at Fort Center, Florida have provided insight into the plants that were utilized by the site's prehistoric inhabitants. Although based on a relatively small sample of macrobotanical remains, this analysis has provided some important information. I identified several plants that could have been used for medicinal purposes, or for food. These analyses have also helped resolve the debate surrounding prehistoric maize cultivation at Fort Center. In addition, this project has provided an example of how macrobotanical and microbotanical information can be combined to provide a more complete picture of the vegetation and plant use at archaeological sites.

The recent research done at Fort Center adds to a growing body of information that refutes traditional progressive models of cultural evolution. The evidence of plant use at the site indicates that the prehistoric inhabitants of this region were hunter-gatherers who constructed large earthworks, modified their environment in numerous ways, had a complex and rich ritual life, and (by the contact period) were part of the Calusa polity. The knowledge we have gained, in terms of the subsistence methods and lifeways of the people who lived at Fort Center, make it clear that agriculture is not necessary for the emergence and development of socio-political complexity.

Fort Center cannot be neatly categorized, nor do the data lend themselves to drawing these familiar or easy correlations between subsistence methods and social

complexity. Increasing interest in the archaeology of complex hunter-gatherers has aimed at questioning, reconfiguring, and/or dissolving these correlations. That they were drawn in the first place stems from an underlying assumption of a dichotomy between foragers and farmers. In reality, there is a continuous spectrum of variation, in terms of subsistence methods (foragers, fishermen, horticulturalists, etc.), mobility, degree and type of management of the physical environment, social and political structure, etc. Southern Florida, and the site of Fort Center in particular, provide an excellent avenue for further investigating the relationship between subsistence and complexity.

Appendix A: Tables and Figures

Species	Unit 2 carbonized seeds	Unit 2 uncarbonized seeds	Unit 3 carbonized seeds	Unit 3 uncarbonized seeds
<i>Chenopodium</i> (goosefoot)	6			
<i>Vitis</i> (grape)	5	8		4
<i>Phytolacca</i> (pokeberry)	2			
<i>Cyperus</i> (flatsedge)	1	18		5
<i>Acalypha</i> (copperleaf)	10	30		
<i>Scirpus</i> (bulrush)		4		
<i>Sida spinosa</i> (prickly fanpetal)		4		3
<i>Polygonum</i> (knotweed)		1		
<i>Convolvulus arvensis</i> (bindweed)				27
UID	1	4	1	

Table 1. Macrobotanical plant remains recovered from Fort Center

Common name	Scientific name
Alder	<i>Alnus</i>
Arrowhead	<i>Sagittaria lancifolia</i>
Ash	<i>Fraxinus</i>
Aster family	<i>Asteraceae</i>
Bay	<i>Persea</i>
Bindweed	<i>Convolvulus arvensis</i>
Bulrush	<i>Scirpus</i>
Cabbage palm	<i>Sabal palmetto</i>
Cattail	<i>Typha</i>
Copperleaf	<i>Acalypha</i>
Cypress	<i>Taxodium</i>
Flatsedge	<i>Cyperus</i>
Goosefoot	<i>Chenopodium</i>
Grape	<i>Vitis</i>
Holly	<i>Ilex</i>
Knotweed	<i>Polygonum</i>
Laurel oak	<i>Quercus laurifolia</i>
Maize	<i>Zea mays</i>
Marsh elder	<i>Iva</i>
Mint family	<i>Lamiaceae</i>
Mustard family	<i>Brassicaceae</i>
Palm family	<i>Arecaceae</i>
Palmetto	<i>Sabal, Serenoa</i>
Plantain	<i>Plantago</i>
Pine	<i>Pinus</i>
Pokeberry	<i>Phytolacca</i>
Prickly fanpetal	<i>Sida spinosa</i>
River cane	<i>Arundinaria</i>
Sand pine	<i>Pinus clausa</i>
Saw palmetto	<i>Serenoa repens</i>
Slash pine	<i>Pinus elliotii</i>
Sunflower	<i>Helianthus</i>
Oak	<i>Quercus</i>
Water oak	<i>Quercus nigra</i>
Yaupon holly	<i>Ilex vomitoria</i>

Table 2. Plants mentioned in the text

Common name	Scientific name	Descriptor
Hackberry	<i>Celtis laevigata</i>	Fruit
Cocoplum	<i>Chrysobalanus icaco</i>	Fruit
Seagrape	<i>Coccoloba uvifera</i>	Fruit
Mastic	<i>Mastichodendron</i>	Fruit
Prickly pear	<i>Opuntia sp.</i>	Fruit
Cabbage palm	<i>Sabal palmetto</i>	Fruit
Saw palmetto	<i>Serenoa repens</i>	Fruit
Hog plum	<i>Ximenia Americana</i>	Fruit
Chenopod	<i>Chenopodiaceae</i>	Seeds, leaves
Sedge	<i>Cyperaceae</i>	Tubers
Mallow	<i>Malvaceae</i>	Ruderal
Grass	<i>Poaceae</i>	various uses
Purslane	<i>Portulaca sp.</i>	Leaves
Poke	<i>Phytolaccaceae</i>	Ruderal
Oak	<i>Quercus sp.</i>	Nuts
Gourd	<i>Cucurbita sp.</i>	Fruit
Arrowhead	<i>Sagittaria</i>	Root
Cattail	<i>Typha</i>	Root
Catbrier	<i>Smilax</i>	Root
Grape	<i>Vitis</i>	Fruit
Coontie	<i>Zamia floridana</i>	Root
Water-lily	<i>Nymphaeaceae</i>	Root
Gopher apple	<i>Licania micbauxii</i>	Fruit
Cocoplum	<i>Chrysobalanus icaco</i>	Fruit
Yaupon holly	<i>Ilex</i>	Leaves
Sea purslane	<i>Trianthemia</i>	Stems, leaves
Wild rice	<i>Zizania</i>	Seeds
Pine	<i>Pinus</i>	Shoots, strobili
Smartweed	<i>Polygonum</i>	Seeds, leaves
Red bay	<i>Persea</i>	Leaves
Bulrush	<i>Scirpus</i>	Shoots, tubers
Nightshade	<i>Solanum</i>	Fruit
River cane	<i>Arundinaria</i>	Seeds, shoots

Table 3. Common plants from archaeological sites in south Florida Compiled from (Fontaneda 1944; Hogan 1978; Marquardt 1992; Scarry and Newsom 1992; Tuross, et al. 1994; Austin 1997

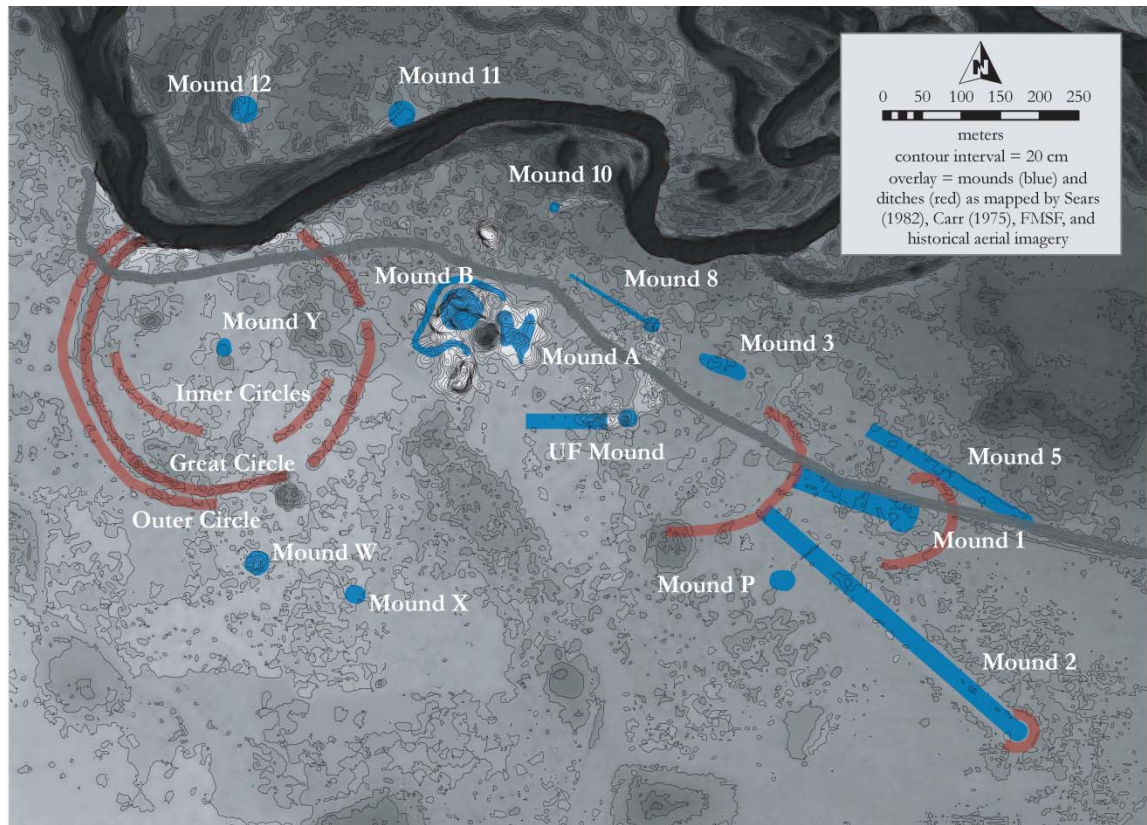


Figure 1. Updated map of Fort Center (Thompson and Pluckhan 2012).

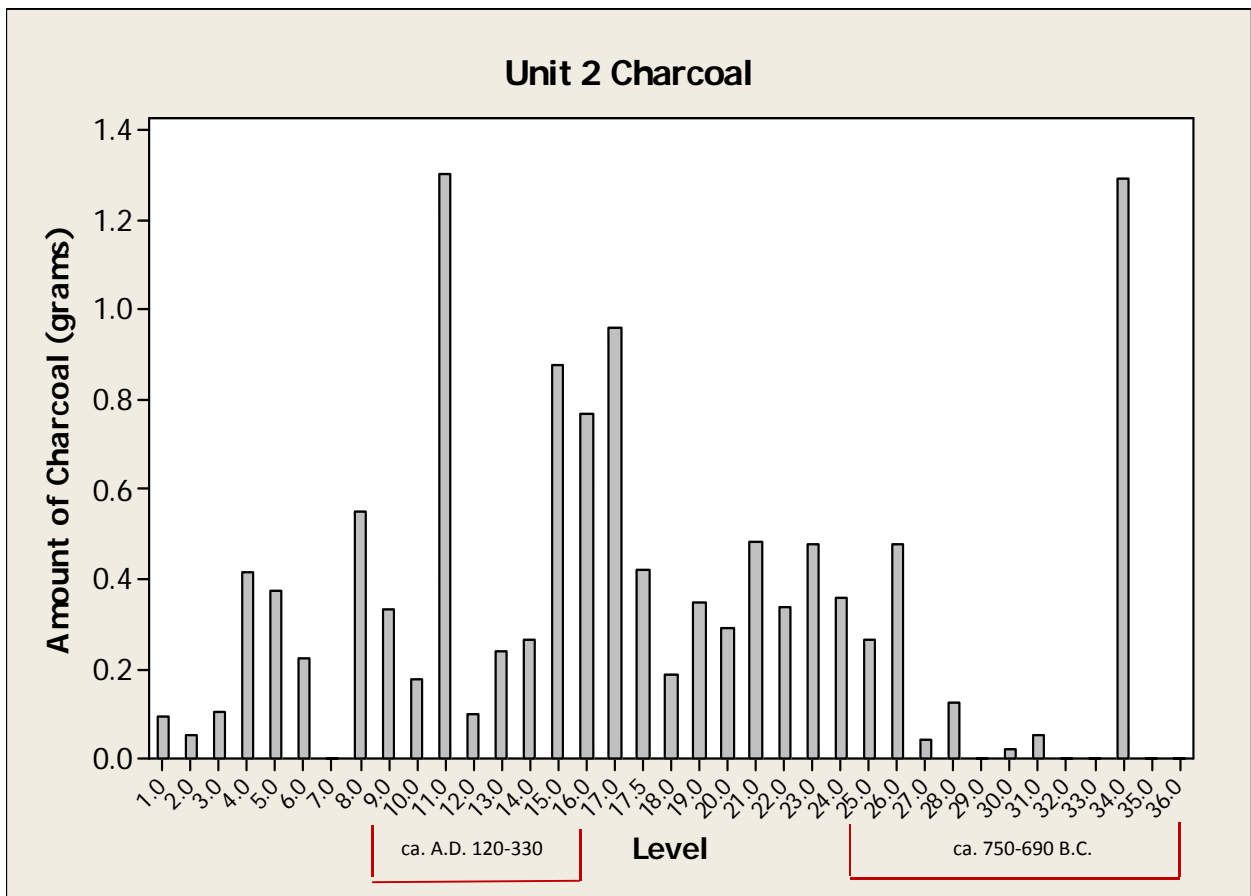


Figure 2. Unit 2 charcoal per level. Each level of Column Unit 2 is 2 cm deep and provided 1 liter samples. Radiocarbon dates in Thompson & Puckhahn (2012) provided contextual dates.

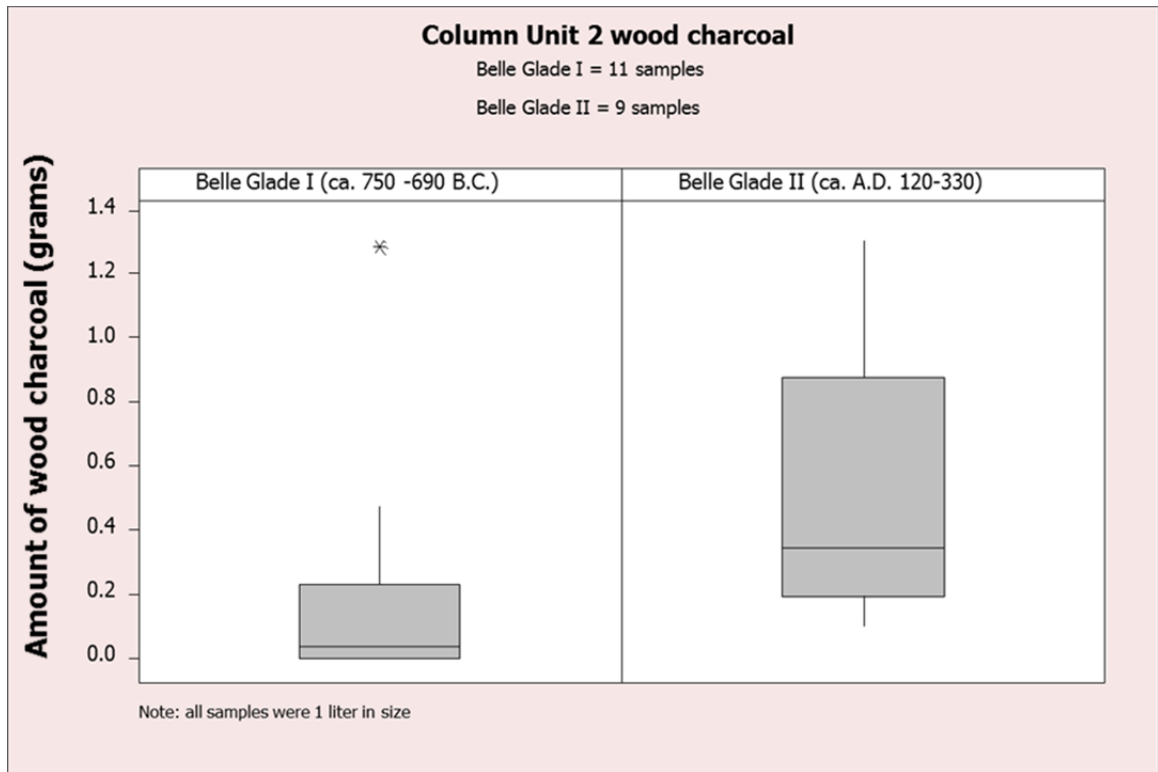


Figure 3. Boxplot of column unit 2 wood charcoal, by time period.

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