The Hopewellian Influence at Crystal River, Florida: Testing the Marine Shell Artifact Production Hypothesis

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The Hopewellian Influence at Crystal River, Florida:
Testing the Marine Shell Artifact Production Hypothesis

by

Beth Blankenship

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
Department of Anthropology
College of Arts and Sciences
University of South Florida

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ABSTRACT

The Crystal River site (8CI1) in west-central Florida is famous as the southernmost major participant in the Hopewell Interaction Sphere, and certainly has the most Hopewelian goods of any Woodland site in Florida. Sharon Goad (1978), among others, proposed that Crystal River secured this position by controlling the production and exchange of marine shell ornaments and cups. I test this hypothesis through the analysis of marine shell recovered from previous excavations, recent surface finds, and shell debris from 58 core samples extracted from the Crystal River mounds, plaza, middens, and surrounding marshland. The analysis reveals an abundance of shell ornaments in burials, but only a limited presence of marine shell used in ornament production around the site, which contradicts Goad’s original hypothesis. Therefore, I propose several alternative explanations for the disproportionate presence of Hopewelian items at Crystal River.
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CHAPTER 1

Introduction

Shell is commonly recovered from prehistoric sites in coastal areas as building materials, food refuse, ornaments, and tools. Florida archaeological sites have produced many shell artifacts, especially sites along the Gulf Coast where large conchs and whelks are naturally abundant. Many previous studies have examined utilitarian shell tools from Gulf Coast sites, documenting the immense variability of these assemblages (Dean et al. 2008; Dietler 2008; Eyles 2004; Luer et al. 1986; Marquardt 1992). However, comparatively little research has been conducted on the production of shell ornaments such as beads and gorgets at sites on the Gulf Coast.

There is abundant documentation that trade in such marine shell ornaments reached its zenith during two periods of prehistory; first during the Middle Woodland period (from around A.D. 1 – to 600) and later during the Mississippian period (at ca. A.D. 1050 to 1540) (Smith 1986; Steponaitis 1986). This study focuses on the former period, when marine shell from the Gulf Coast was traded far into the interior of the continent as part of a network of exchange that has been termed the Hopewellian Interaction Sphere (Caldwell 1964; Struever 1964).

Specifically, I focus on the Crystal River site (8CI1) on Florida’s west-central Gulf Coast, among the largest and most famous sites of the Middle Woodland period. Previous research, described in more detail below, has clearly demonstrated that Crystal
River was a central node in Hopewellian exchange. It has been assumed by some archaeologists that its centrality to this exchange was based on the production of marine shell ornaments (Goad 1978; Mills 1909; Winters 1968). However, this has never been empirically demonstrated. In this thesis, I test the hypothesis that Crystal River was a center of marine shell ornament production and trade.

*Research Design*

The Crystal River site, a large mound complex in west-central Florida, is recognized for its various mounded architecture and expansive artifact assemblage, which includes many items non-local to Florida such as copper, mica, quartz, and more. Similarities between these artifacts at Crystal River and those at sites in the Hopewell area of the Ohio River Valley were noted early in the twentieth century (Greenman 1938; Moore 1900, 1903, 1907, 1918). The term “Hopewell” is generally reserved for sites in the core area of the complex in the Ohio River Valley that evince a suite of similar architectural forms, burial practices, and artifact assemblages. Like others before me, I use the term “Hopewelian” to refer to artifact assemblages from farther afield that include ornaments of copper, shell, crystalline quartz, mica, meteoric iron, and other comparatively rare materials (Brose 1979; Caldwell 1958, 1964; Sears 1962). Thus defined, Crystal River can arguably be considered the southern-most major Hopewelian site in North America (Pluckhahn et al. 2010). The location of Crystal River makes it something of an anomaly. The site is seemingly isolated from other prominent Hopewell
centers and presumed major trade routes, yet no other site in the Deep South matches Crystal River for quantity of Hopewellian objects.

In her dissertation and subsequent publications, Sharon Goad (1978, 1979) noted the strong presence of non-local copper at Crystal River, as well as the presence of marine shell, such as lightning whelk (*Busycon contrarium*), thousands of miles into the interior on sites in Ohio and Illinois. She proposed that the inhabitants of Crystal River provided distinct and highly demanded items from the Gulf coast— principally cups and ornaments manufactured from large marine gastropods—in exchange for Hopewell items such as copper from elsewhere:

> It is suggested here that Crystal River supplied a number of raw materials unique to the southwestern Gulf coast; the desire for which forced the inclusion of the area within the network and funneled quantities of goods into the Crystal River site and complex (Goad 1978:178).

Hypothetically, by controlling the influx of unique coastal materials into the interior, Crystal River was able to compete for valued non-local products such as copper. Additionally, Goad suggests that Crystal River’s elaborate site layout and monumental constructions suggest a complex political organization, which may have been more developed than that of surrounding centers and permitted extensive elite control of high quantities of traded goods (Goad 1978:178).

Goad’s proposal that the inhabitants of Crystal River were the sole or even major producers of Hopewellian shell ornaments is based upon previous and contemporaneous research (Brose 1979; Caldwell 1958, 1964; Sears 1962), but has never been archaeologically tested. My research aims to investigate whether Crystal River inhabitants were controlling the production and distribution of shell artifacts for exchange, and if so how. First, since Goad and others believed that modified large
Busycons and possibly large bivalves, such as the quahog clam (*Mercenaria* sp.), were the scarce commodity exchanged by the people at Crystal River in return for non-local artifacts, my principal research must answer the following question: Were the inhabitants of Crystal River procuring and processing large gastropods into tools and ornaments for exchange? Evidence of manufacture is usually seen in unmodified whelks or “blanks,” manufacturing debris, and also manufacturing failures. Seeing these three major components in craft production would show a sustained industry of individuals creating products for exchange.

However, my research includes more than the simple presence or absence of evidence for shell ornament manufacturing at Crystal River. If evidence for such production is indeed suggested by my research, the next step is determining how such manufacturing was organized at the site, such as restricted manufacturing activities in designated “workshop” areas for shell production. If no archaeological evidence is found for extensive shell ornament manufacturing at Crystal River, then I will explore alternative explanations for the presence of so many exotic, Hopewellian objects at Crystal River. For example, manufacturing may have taken place exclusively at another location in the immediate area, or the inhabitants of Crystal River may have functioned as brokers in the movement of finished shell ornaments.

In Chapter 2, I describe the physical setting for my research, the Crystal River site, in greater detail. I also discuss the history of archaeological work at the site. Chapter 3 describes the theories that archaeologists have employed to describe the manufacture and exchange of craft items. I situate my own work in reference to recent theories on the role of exchange in small-scale societies. In Chapter 4, I discuss the methods used to
answer my research questions. Chapter 5 reveals the results of my work in great detail, and Chapter 6 discusses the results with some additional interpretations of these outcomes. Finally, Chapter 7 concludes with the benefits and limitations of this study, and discusses the potential for future research on this topic.
CHAPTER 2

The Crystal River Site

The Crystal River site is located in Citrus County, Florida, just 2.4 km (1.5 miles) northwest of the modern day city of Crystal River (Figure 1). The site became a state park in the 1960s, and was established as a National Historic Landmark in June 1990 (National Park Service 2009).

Crystal River lies in the Mid-Peninsular zone of Florida, situated along the intersection of the Coastal Swamps and Coastal Lowlands physiographic zones (Cooke 1945; White 1970). More specifically, it is located on the Pamlico terrace—the largest plain in Florida, which extends over most of the southern half of the state (Puri and Vernon 1964; White 1970). Like much of the region, this terrace consists of poorly drained sandy and clayey soils overtop a solid limestone layer (Pluckhahn et al. 2009). Topographically flat marine terraces encompass this entire region, and elevation ranges from sea level to 30 meters (Cooke 1945; White 1970).

The Crystal River archaeological site is made up largely of dense shell midden comprised of anthropogenic soils and the shells of Atlantic oyster (*Crassostrea virginica*). Eight soils units are mapped for the area of the site. Most have poor drainage qualities and many areas of the mound complex, particularly the north plaza, will flood during heavy rains. However, Quartzipsaments (0-5 percent slopes), is the only
Figure 1. Location of the Crystal River Archaeological Park along the Gulf Coast of Florida.
moderately drained soil which is also frequently associated with earth moving activities (Pliny et al. 1988; Pluckhahn et al. 2009). These activities originated with the construction of the mound complex by prehistoric peoples, and have continued into the modern day with archaeological activities, development of a mobile home center, and conversion of the area into a state park.

The Crystal River is a relatively short waterway that flows northwest for approximately 8 km (5 miles), connecting Kings Bay to the Gulf of Mexico by a series of spring heads. The estuarine system and surrounding marshland are home to many archaeological shell mound sites, the largest of which is Crystal River, acquiring its name from the river that creates the southern site border. The Crystal River archaeological site consists of nine mounds. Mound A, a large platform mound at the southwestern end of the site, was partially destroyed in the 1950s. Mounds K and H are smaller platform mounds, while Mound J is a low mound of uncertain purpose or function. Mound G, at the northern end of the site, is a burial mound. In addition, at the center of the site lies the Main Burial Complex (C-F) consisting of an earthen embankment (Feature C), two conical burial mounds (E and F), and a depressed area between the mounds and embankment (Area D). Midden B has a “fish-hook” shaped (Bullen 1966) that runs north of Mound A to Mounds J and K, and also east of Mound A along the river and ending at southeastern boundary of the park. A large plaza, prone to flooding in heavy rains, connects platform Mound H and burial Mound G along the northern border of the site. Finally, three limestone steles, presumably of native placement, are found along the middle of the site; one on either side of the burial complex and the third just south of the present day Crystal River Archaeological Museum (Pluckhahn et al. 2009; Weisman
1995) (Figure 2). Typical vegetation at Crystal River is comprised of cabbage palm, red cedar, oak, and various salt grasses and reeds, while fauna consist of squirrel, frogs, toads, fiddler and marsh crab, turtles, tortoises, deer, manatee, raccoon, and various fish, birds and snakes (Florida Natural Areas Inventory 1990).

Archaeological History

The first recorded fieldwork conducted at Crystal River was by archaeologist Clarence Bloomfield Moore, who was responsible for discovering, mapping and excavating numerous prehistoric mound sites of the southeastern United States in the early 1900s. Moore was an antiquarian from Philadelphia who made his discoveries by steamboat travel along riverine coastlines. This type of water transit made many sites more accessible than traveling by land on overgrown or uninhabited terrain. Moore came across Crystal River in 1903 when he was travelling along the Gulf Coast from Tampa to Mississippi (Moore 1903; Weisman 1995). The inhabitants of the town of Crystal River, including the owner of the site, R.J. Knight, were familiar with Mound A, or the “shell heap,” but knew almost nothing about the rest of the site nor the importance of the artifacts that would come from it (Moore 1903:382).

Despite the overgrown state of the site since its occupation, Moore mapped seven mounds, sketched the antiquities, and conducted excavations, particularly focusing on the burial complex, where he excavated numerous grave goods and at least 225 burials (Moore 1903). His original map of Crystal River designated mounds and major features
Figure 2. The Crystal River Site as it exists today. Contour intervals increase by 0.2 m from dark to light hues.
with letters A-F that are still used today. Later archaeologists continued this labeling system as more features and mounds were discovered.

The excavations in 1903 uncovered substantial quantities of non-local trade goods in the burial complex including copper earspools, panpipes, pendants, sheets, plummets and disks. Moore also recovered other Hopewellian artifacts made from materials such as shell, steatite, crystal, and hematite. Ceramics (including several whole pots), multiple shell tools from large gastropods, and lithic artifacts were also found during these initial excavations. Moore was so impressed with the quantity and variety of the artifact assemblage that he visited the site three times in fifteen years (Milanich 1999; Moore 1903, 1907, 1918).

While his first excavations at Crystal River focused on Mound F, in 1907 Moore and his team turned their attention to the remaining portions of Mound E where over 100 more burials were uncovered, and also areas in Feature C, the embankment which surrounds the central mound complex. The artifact assemblage here was still impressive, but did not include as many non-local materials as his earlier excavations in Mound F. However, these excavations produced numerous pendants, the majority of which were manufactured from large gastropod columellae (Moore 1907).

Moore’s (1918) last investigations at Crystal River uncovered another 24 burials in Feature C with most of the grave goods constructed from locally made materials, unlike those seen in Mounds E and F. He also noted construction differences between these two areas. White sand was found in the mounds, while Feature C was comprised mostly of midden. Moore suspected the difference in exotic goods was due to multiple
burial periods within the burial mound complex (Moore 1918). When Moore left Crystal River at the end of April 1918, excavations ceased on the site for some time.

For the time period, Moore was unusually competent in his archaeological techniques. Most of Moore’s peers did not publish or keep adequate notes about their excavations or findings, but Moore did both. He produced the first map of the Crystal River site as well as numerous sketches of recovered artifacts. These sketches were heavily studied by later archaeologists, and proved crucial for understanding Crystal River and its part in larger, inter-regional trade systems. However, while Moore is praised for his work relative to other archaeological investigations of today, his excavations essentially destroyed the burial complex. Moreover, he collected only the most interesting artifacts. Little information about stratigraphy or environmental deposits was recorded—only burials and their associated grave goods (Moore 1903, 1907, 1918).

E.F. Greenman (1938) used Moore’s pottery descriptions and illustrations to draw a parallel between various mound sites excavated by Moore, including Crystal River, and Hopewell sites in Ohio, Wisconsin and Illinois. Greenman’s sketches show side-by-side drawings of pottery sherds depicting similar motifs and shape designs between Crystal River and traditional Hopewell ceramics. Greenman was the first to observe the large abundance of Hopewell traits at Crystal River compared with other sites in Florida. Additionally, he noticed an abundance of copper at Crystal River, and how its uses at the site corresponded closely to those of the Hopewell complex (Greenman 1938: 332). It was these comparisons coupled with Crystal River’s diverse artifact assemblages that gained the site national recognition.
In the middle twentieth century, Gordon Willey and colleagues expanded upon the research of Moore and Greenman by scrutinizing ceramic assemblages from Crystal River. Willey was particularly concerned with anchoring the site in emerging cultural-historical sequences. Despite the Hopewellian connections earlier noted by Greenman, Willey and others assumed Crystal River dated to the Mississippian period because of the presence of flat-topped mounds. Thus, they looked to Mississippian sites elsewhere for possible connections. Willey and Phillips (1944) examined three negative-painted ceramics that had been excavated during Moore’s investigations. These specimens exhibited the same techniques—a dark design over a light surface—as seen on many Middle Mississippian ceramics in the interior of the United States, but with different vessel forms, construction, and style of painting. In 1949, Willey, A.J. Waring and Rufus Nightingale took a surface collection from Crystal River and identified the sherds as belonging to the Weeden Island series. This led Willey to suggest multiple occupations at the Crystal River site since ceramics uncovered during Moore’s excavations primarily reflected Swift Creek (Pluckhahn et al. 2009; Thompson and Pluckhahn 2012; Willey 1948, 1949a; Willey and Phillips 1944).

Crystal River’s anomalous architecture created problems for early attempts to situate the site in southeastern prehistory. The Hopewellian artifacts and predominantly Woodland ceramic assemblages were seemingly inconsistent with the presence of three platform mounds (A, H, and K) at Crystal River—such mounds were thought to exist exclusively in Mississippian period societies with maize agriculture. Further, the site is situated in an environment poorly suited to the growing of domesticated plants (Willey 1949b:45). It was not until the 1980s that archaeologists commonly accepted pre-
Mississippian platform mound construction (Jefferies 1994; Milanich et al. 1984; Pluckhahn et al. 2009).

The first attempt to resolve discrepancies in cultural chronology was made in 1951 by Hale Smith and James B. Griffin, who conducted limited excavations at Crystal River. Smith opened 2-by-2 foot (0.6-by-0.6 m) tests in Feature B, Mound H, and Mound E, and also collected surface finds on and around Mound A. Pottery types recovered aided in chronology placement of Crystal River (Pluckhahn et al. 2009; Smith 1951; Weisman 1995).

Ripley Bullen visited the site in 1951 in an attempt to test his theory that at least certain areas of Crystal River had been occupied during the Mississippian period. He focused his excavations primarily in the burial complex and midden areas. Bullen discovered that the burial complex still contained rich information, despite Moore’s extensive and destructive digging fifty years prior. Bullen’s work here revealed three temporal components in the stratigraphy: Santa-Rosa Swift Creek in the lower levels of Mound F, Weeden Island in Mound C and along the Mound E platform, and finally late Weeden Island period in the upper layers of Mound F (Bullen 1951; Pluckhahn et al. 2009). Bullen’s research reinforced Willey’s conclusions about Crystal River belonging to the Middle Woodland period (Thompson and Pluckhahn 2010).

In addition to excavations in the burial complex, Bullen also created new topographic maps of the site, and discovered two new mounds (J and K) in the process (Weisman 1995). Mound K is a smaller flat-topped mound that has been called the “priest’s” or “chief’s mound” because of its proximity to Mound A (Weisman 1995:62). Bullen excavated units in Mounds J and K before turning his attention to Mound G,
where he uncovered 35 burials. Unfortunately, these excavations have never been fully reported (Bullen 1951, 1953; Pluckhahn et al. 2009; Smith 1951; Weisman 1995).

Bullen continued his investigations while working for the newly established Florida State Museum. One of his major accomplishments was setting up the Crystal River Historic Memorial, Florida’s first archaeological state park, in 1965. He was involved in planning, development, and interpretation. He also led the effort to reconstruct the burial complex (Weisman 1995).

During the clearing the site for the state park, two steles were uncovered on opposite sides of the park. To the southeast is Stele 1, with its incised depiction of a human figure—including a human face with flowing hair (Bullen 1966; Thompson and Pluckhahn 2010). Stele 2, which is undecorated, is presently located south of the park museum. The two steles, and the later discovery of a possible third stele, led some researchers to believe that Crystal River had ties to Mesoamerica (Bullen 1966; Ford 1966, 1969; Hardman 1971). While it remains a possibility (Zaragoza 2005), this idea was never widely accepted and is rejected today by most archaeologists.

The original archaeological state park did not encompass as much land as it does presently. The site stretched across several privately-owned parcels, most of whose owners donated their deeds to the creation of the state park (Bullen 1966; Weisman 1995). However, one of the property owners did not, and instead developed the land just east of Mound A into a trailer park. This development unfortunately included the leveling of land, the installation of a sea wall, and the demolition of approximately one-third of temple Mound A. The development existed until 1993 when the “No Name Storm” or “Storm of the Century” flooded the area, and ruined the trailer homes. The
homes were removed, and the land on which they formerly resided was absorbed into the Crystal River Archaeological State Park in 1995 (Bullen 1966; Weisman 1995).

Further research on Crystal River’s artifact assemblages was conducted by two archaeologists in the early 1960s. Both discovered parallels between Crystal River artifacts and others seen in Hopewell and Mexican sites, but arrived at different conclusions (McMichael 1964; Sears 1962). McMichael hypothesized that Hopewell culture was strongly influenced by Mexico, with Crystal River as the first major recipient of Mexican material culture traits that then spread northward into the present-day eastern United States (McMichael 1964).

Sears (1962) focused his research on mound complexes along the Gulf Coast that had all been excavated by Clarence Bloomfield Moore, and from these investigations defined two Middle Woodland complexes: Yent and Green Point. According to Sears, the main difference between the two complexes was time period with the Yent complex exhibiting earlier artifact traits than those of Green Point. Hopewellian traits and motifs such as copper artifacts, plummets, shell ornaments unique pottery, and continuous mound constructions were consistent in the Yent complex best expressed by Crystal River, Yent and Pierce Mounds. Fewer Hopewellian traits were seen in the Green Point complexes of Huckleberry Landing, Alligator Bayou, Andersons Bayou and Green Point mounds. These sites exhibited predominately complicated stamped pottery seen throughout the later Swift Creek assemblages. Sears believed that the Yent complex had personal interactions with interior, Midwestern Hopewell sites while the Green Point complexes focused on contacts in the Lower Mississippi Valley.
Further research at the site was conducted by Clark Hardman (1971) who suggested that Crystal River inhabitants constructed certain features of the site to predict astronomical events. After examining the layout of the mound complex as well as C.B. Moore’s original map and field notes, Hardman suggested that several site features, particularly both steles, the central burial complex, and Mound J, aligned with the solstices and equinoxes. Additionally, Hardman identified Stele 3, which was uncovered during the foundation laying for the Crystal River Archaeological Museum. Stele 3 is currently located to the west of the museum, but Hardman believed it originally resided atop Mound J to aid in celestial predictions (Hardman 1971:153).

While Crystal River has continued to intrigue archaeologists, few excavations have taken place at the site since Bullen in the 1960s. Most of the more recent field work has been to mitigate the effects of storm damage or purposeful park modifications (Ellis 1999, 2004; Ellis et al. 2003; Weisman et al. 2007).

When the Storm of the Century flooded the southern part of the site, destroying the original seawall from the 1960s, it washed a small portion of Mound A into the Crystal River. In 1998, this seawall was rebuilt and excavations were conducted on the area by Ellis (1999). In 2003, the boat slip was replaced on to the east end of the seawall. Ellis excavated some of the archaeological materials that had been dredged out from the old boat slip (Ellis 2003). The rest were set aside for the Park’s “Sifting for Technology” program that educates school groups and other interested parties about archaeology and the Crystal River site.

Brent Weisman (1987, 1995) compiled a history of Crystal River from multiple documents, research publications, and archaeological field notes. He also located as many
artifacts as possible from all previous work at the site. Today, most of Moore’s artifacts are located at the National Museum of the American Indian in Washington, D.C., while Bullen’s collections are curated at the Florida Museum of Natural History in Gainesville. Most of the collections from more recent work are curated at the Florida Bureau of Archaeological Research in Tallahassee.

In recent years, Thomas Pluckhahn, Victor Thompson, and Brent Weisman have revisited Crystal River, creating updated topographic maps, inventorying cultural resources, and conducting limited test excavations (Pluckhahn et al. 2009; Pluckhahn et al. 2010; Thompson and Pluckhahn 2012; Weisman 1987, 1995). This most recent field work was conducted under the auspices of the Crystal River Early Village Archaeology Project (CREVAP), a three year study funded by the National Science Foundation. The CREVAP fieldwork has conducted excavations at both Crystal River and Roberts Island, a nearby mound complex 500 meters west of Crystal River. The CREVAP research is the beginning of a comparative analysis of archaeological sites in the Crystal River area. Overall goals of the project are to examine the role of cooperation and competition in the growth of early village societies, using Crystal River as a case study (Pluckhahn et al. 2010).

This thesis, while addressing separate research questions, was completed as a component of CREVAP. I focus primarily on shell recovered from systematic coring of the Crystal River site completed in the first field season of CREVAP in 2011, as described in more detail in Chapter 4. I also describe shell recovered from systematic surface collections. Additionally, I have analyzed the underreported shell artifacts from Ripley Bullen’s mound excavations at Crystal River in the 1960s.
Specifically, this thesis addresses the abundance and distribution of large gastropod shells at Crystal River. These shells were a highly demanded commodity among Middle Woodland peoples not only at Crystal River, but also thousands of miles from the coast in the interior of the continent. The shells were used to make ornaments such as gorgets and beads, as well as ceremonial serving vessels and dippers. By examining the distribution of such shells, this thesis contributes to an enhanced understanding of their manufacture, trade, and use. In doing so, it makes a contribution to our knowledge of exchange at Crystal River and among Hopewellian societies more generally.
CHAPTER 3

Theoretical Context

Crystal River’s social, political and economical organizations have been debated by archaeologists almost since the site was discovered. The location and layout of the site as well as its various artifacts of non-local origin are unusual, and have confounded interpretation of the site over the past century.

The multitude of non-local artifacts uncovered at Crystal River clearly indicates interaction with other communities. Less clear is the specific character of this interaction. Should we understand the non-local goods as evidence of direct exchange with distant communities? Or, is it more likely that the inhabitants of Crystal River traded with communities less far removed, who in turn traded with others farther away, and so on into the interior of the continent where shell ornaments from the Gulf Coast are recovered? Was the interaction primarily economic in nature, or was it rooted in ceremony, as the form of many of the ornaments and their context in burial mounds might suggest? Did the residents of Crystal River produce objects for exchange, or did they instead import and redistribute materials that originated elsewhere?

This thesis lies at the intersection of exchange and production, and therefore requires theoretical concepts and models that account for both. This chapter summarizes several theoretical archaeological perspectives and exchange models pertinent to Crystal River in an attempt to situate my research findings within the current theoretical trends.
These models create a foundation on which to expand and explore new understandings of social, political, and economic organization at Crystal River as more recent research is conducted.

The first archaeological work at Crystal River by C.B. Moore was conducted under the umbrella of cultural historical thought. Although Moore was most interested in collecting rare artifacts from burials, he was at least nominally interested in the dating of the mounds he excavated and drawing connections between sites based on artifacts. For example, after noticing the artifact similarities between Crystal River and Midwestern sites, Moore contacted Charles Willoughby, an archaeologist working at the Hopewell site in Ohio, who confirmed his suspicions that certain copper ornaments in Florida resembled those in the Ohio Valley region (Moore 1903:422). These findings were later elaborated on by Greenman (1938). Still, in keeping with the dominant practice of artifact descriptions seen in most cultural historical work, neither Moore nor Greenman presented any theoretical concepts on how these objects arrived at Crystal River.

Cultural historical thinking persisted in regard to Crystal River for much of the twentieth century, with some archaeologists adopting explanations rooted in migration, an explanatory mechanism favored by many of the early and middle twentieth century (Trigger 1989). The platform mounds, negative-painted pottery, and possible stele at Crystal River led several researchers to believe that the site had connections with Mesoamerica (Bullen 1966; Caldwell 1958:62-64; Ford 1966, 1969, Hardman 1971), possibly serving as an entry for Mesoamerican influence extending from there to the Hopewell core (McMichael 1964). However, no clear ties to Mesoamerica have ever been demonstrated for Crystal River (Milanich 1999), and have rarely been definitely
identified anywhere in the Southeast (White and Weinstein 2008). Thus, such models, and explorations suggesting prehistoric migration in general, have fallen into disfavor.

In the 1960s and 1970s, archaeologists of what is now called the Processual school reached beyond cultural historians’ simplistic explanations and the tedious, but necessary, cataloguing of artifacts in order to address broader questions about cultural changes of past peoples (Binford 1962, 1971; White 1959; Willey and Phillips 1958). The Processual Period focused heavily on economics, particularly involving systems analysis of the manufacture and exchange of local and non-local goods as these related to sociopolitical organization.

Joseph Caldwell (1964) was the first to use the term “Hopewell Interaction Sphere” to explain the broad similarities in mortuary practices and burial goods in the Middle Woodland period while simultaneously identifying the secular differences between regions. He suggested that Hopewell was not a singular culture, despite the resemblances to other distant sites. Instead, the similarities resulted from the interactions of distinct societies among smaller spheres of exchange. The precise mechanism of interaction was not well articulated, but Caldwell suggested it was religious in nature. However, it was David Brose (1979) who first linked this sphere to Florida.

Seeman (1979) also studied the Hopewell Interaction Sphere under the Processual rubric and summarized Hopewell traits seen in the southeastern United States, including the Gulf Coast. He discussed the movement of 39 major artifact types constructed from 28 major raw materials seen consistently in Hopewell and Hopewellian sites around the eastern United States. Based on a comprehensive analysis of the distribution of these artifacts, Seeman noticed that three materials appeared throughout all regions of the
Hopewell Interaction Sphere: copper, shell and mica. These three materials entered the system from distinct source areas, and Seeman suggested that a shared ideology was the major reason behind the material movement of Hopewellian goods. However, he also argued that the rarity of these materials away from their source was not the sole reason for their accumulation. According to Seeman, exchanging rare objects and materials also doubled as a form of security in times of need. People would utilize their established trade networks in times of scarcity to acquire essentials such as food.

Through ceramic analysis, Donna Ruhl (1981) compared the Weeden Island-period cultures to midwestern Hopewell and Hopewellian archaeological sites. She uncovered various differences between the two cultures, including the fact that pottery dominated the Weeden Island mound assemblages compared to those of Hopewellian sites, which had ceramics, but also copper, shell, and stone artifacts. However, she concluded that the major consistent element between both was a form of ceremonialism associated with corn agriculture—a religious link to otherwise distinct societies. Ruhl’s focus on subsistence factors—in this example a corn based economy—paralleled with her systems analysis correlates with the Processual Period of thought then still dominant in American archaeology.

Also within the body of Processual thought, Sharon Goad (1978) evaluated several different exchange models relative to the distribution and sourcing of copper artifacts from sites in the southeastern U.S., including Crystal River. This thesis draws heavily on Goad’s work, and I therefore discuss her study and models in more detail.

One type of trade that Goad elaborated on is “hand-to-hand” exchange, more commonly known as “down-the-line” trade (Renfrew 1972:465). As described by Goad,
this type of exchange mainly consists of locally made artifacts, with few exotics entering
the system sporadically. Materials have a tendency to travel outwards from the source
equally in all directions, becoming scarcer the farther away from the source (Goad
1978:36). The longer the exchange system has been active, the farther away the artifacts
and/or raw materials have travelled. Goad and others suggest that “down-the-line”
exchange reflects a lack of hierarchy, since no site appears to control the flow of goods
from one area to another (Goad 1978:37; Sahlins 1972). Instead, in this type of exchange
model, artifact movement is assumed to be the results of gift-giving (Malinowski 1961;
Mauss 1990).

Goad also discussed the idea of Local Redistributive Exchange, which she
associates with ranked societies (either tribes or chiefdoms), and which involves a chief
or other leader who acquires goods and then distributes them locally to select people.
Those people then give certain objects to others, and so on (Fried 1967; Goad 1978:38-
39; Sahlins 1972). Goad hypothesizes that this model applies best to the Early Woodland
period, when individual status became increasingly relevant, as indicated and abetted by
the influx of exotic materials (Goad 1978:40).

The Inter-Regional Exchange model, as discussed by Goad, goes one step further
than Local Redistributive Exchange, and includes larger centers and directional exchange
to areas distant to that of the source. Goods pass through the center, which in turn
distributes the materials to smaller, surrounding sites for local goods in return (Goad
1978: 41-2). According the Goad, the development of regional centers seems most
closely associated with the Middle Woodland period, when sites begin to change
construction methods, and status differentiation is viewed in burial goods and contexts.
The idea of Regional Center development can be applied to Seeman’s description of ‘central-place theory,’ which developed in geography and was later applied to anthropology (Smith 1974; Struever and Houart 1972). Central-place theory assumes that most communities produce services and goods available to most people, such as food and locally-made items, but only a few communities produced exotic artifacts or medical services because of the rarity of materials or skill level required (Seeman 1979:211). This disparity generated a hierarchy, or pyramidal structure, among communities participating in exchange, resulting in the development of Regional Centers (Seeman 1979; Struever and Houart 1972).

The fourth and final exchange model presented by Goad is the Regional Redistributive Exchange model, and occurs when the type and variety of raw materials for artifact production decrease as they become more controlled and less available in the inter-regional exchange network. Therefore, these once more abundant, but now limited materials are retained and manufactured into elaborate ornaments. The elaboration changes the style and design patterns of the artifacts, and new exotic materials become present as the exchange networks expand outside of the region (Goad 1978:42-43). Goad explains that this type of model depends upon a defined hierarchy in a society where regional centers control the influx and export of goods for long periods of time, such as in the Mississippian period of prehistory (Goad 1978:43).

Goad’s models provide representative information for various periods of prehistory in the southeastern United States, but I will focus mostly on the Inter-Regional Exchange model since this is how Goad characterized Crystal River and Woodland societies. Additionally, Crystal River, with its large quantities of non-local artifacts, may
have been a prominent regional center in the Southeast, providing surrounding areas with goods and/or services.

Processual archaeology is still practiced throughout the world, and much of archaeology still lends itself to Processual thought. However, in the 1980s, archaeological theory moved increasingly toward Post-Processualism, which shifted the focus from environment and economics to ceremony and symbolism (Hodder 1986; Watson 1991). In some respects this was not a new direction in Hopewell studies; Caldwell (1958) and others (Goggin 1949; Willey 1949a) had speculated on the religious implications of regional and interregional exchange networks during the cultural historical and Processual periods, but failed to explain the mechanisms fueling religious exchange. Instead, they relied on more dominant theories of the time period revolving around economic and subsistence patterns (Bolnik 2007; Braun 1986; Fie 2006). During the shift to Post-Processualism, religion became more important in theoretical thought with more emphasis on symbolism, status, and agency. Hopewellian groups and sites were interpreted as areas where people gathered occasionally for ritual or ceremonial interactions, bringing with them ideological practices and symbols portrayed in material culture seen throughout several sites (Bolnik 2007; Byers 2004; Carr 2006; Charles 1995; Pacheco and Dancey 2006).

Where Post-Processual archaeologists continue to use the concepts of trade and exchange, they do so with the understanding that these terms describe processes that are much more nuanced than was imagined by cultural historians and Processual archaeologists. Indeed, Robin Skeates (2009) states that the terms ‘trade’ and ‘exchange’ are overused and misrepresent the multifaceted and complex practices for obtaining
exotic or desired goods, which either then fall into the equally oversimplified categories of ‘utilitarian’ or ‘luxury’ items (Skeates 2009:565). These terms and ideas are general and do not fully interpret how “exchanges of gifts can reflect, maintain, and transform the degree of personal relations wished for by the participants, which are tied to status, prestige, power, diplomacy, etiquette, and morality” (Skeates 2009:568). Additionally, exchange patterns are assumed to begin with people who live at one source and then exploit and move their resources outward by person-to-person exchange. Skeates warns that these patterns are too simple and often inadequate upon closer examination of the material record (Skeates 2009). In short, Skeates recognizes that exchange is multifaceted and can exist in economical, ceremonial, and gift-giving forms simultaneously, all of which were favorable explanations during the Post-Processual period of archaeology.

Exchange does not always involve material goods. Penney (1989) analyzed Hopewellian artifacts and their raw materials from sites in the Eastern Woodlands, focusing on stylistic details. His data show that objects of similar style did not necessarily reflect interregional exchange, but instead the spread of ideas and styles across the region. Additional research (Breton Giles, personal communication) has revealed stylistic differences in shell gorgets found in southeastern sites compared to those uncovered in the northern interior. Stylistic variety between sites may support a shared belief system instead of identical artifacts entering the system from distinct locations.

After artifacts are produced and exchanged, they can become valuable if they are constructed from a non-local material rare to a region, becoming the property of powerful
individuals, or by being used in ceremonial contexts (Davis-Salazar 2007; Helms 1988). As Davis-Salazar writes, “[…] Ritual provided a means for ambitious individuals to manipulate certain social situations to their advantage, thus enabling them to accumulate ritual objects, which eventually became the symbolic and economic foundation of hereditary social inequality” (Davis-Salazar 2007:198). The ritualistic behaviors are linked to the artifacts in a way that neither words nor gestures can communicate, and the significance they hold either “dies” with the high status individual (Helms 1988) or continues being passed down through bloodlines or other relationships in order to keep power and status within a family (Davis-Salazar 2007:201, Rappaport 1999). In a later article, Helms (1992) further discusses powerful possessions stating:

Ownership of such goods in life directly related the individual acquiring them to the supernatural potencies and qualities such goods are believed to possess…Burial of wealth becomes a way of empowering the now deceased accumulator with the qualities and energies he or she will require in order to continue to serve the living as a beneficent ancestor (Helms 1992:187).

When possessions are purposefully broken and buried, they are forever removed from public circulation and eternally authenticate the status of a buried individual (Helms 1992, 1988).

Archaeologists interested in the use life of objects are frequently attracted to their creation—another topic expanded upon by the Post-Processualists. Post-Processual archaeologists endeavored to deconstruct and contextualize craft production. Cathy Costin (2001) has argued that craft production is almost always correlated with social practices since humans are not self-sufficient beings—one person is not responsible for creating everything. Craft production places social meaning into objects by transforming “ideas into physical objects that can be experienced by others” (Costin 2001:274).
Created objects have imbedded meanings that can reflect ideational, political, or ritual values to other members in a society. According to Costin, craft production is as much a social activity as it is technological one because it promotes participation, establishes relationships, and differentiates status (Costin 2001:274).

Christopher Carr (2006) has recently rethought Hopewell and Hopewelian exchange from a Post-Processual perspective where he attempted to both personalize and contextualize similarities in prehistoric life ways at the local level and relate findings interregionally. Simply put, Carr explores how people in smaller, local settings connected with other outside societies to create the multi-regional system known to archaeologists as the Hopewellian Interaction Sphere. Prehistoric participants are viewed as both exchangers in this larger economic/religious network as well as individuals in a separate local culture. In a very Post-Processual fashion, Carr singles out smaller communities, which make up the vast Hopewellian exchange complex.

Most pertinent to this thesis is Carr’s exploration of raw material and artifact movement through economic and religious models of exchange. Avenues explored include: pilgrimages to sacred areas or to ceremonial centers, travels of medicinal shamans to the sick, sick individuals travelling to the healer, and the transport of goods between elites to build regional and inter-regional alliances (Carr 2006:581). I elaborate further upon Carr’s theories for Hopewell and Hopewelian interactions in Chapter 6, including their implications for Crystal River shell production, exchange and distribution.

Since the Crystal River artifact assemblage was tied to interior Hopewell sites almost a century ago (Greenman 1938; Moore 1903, 1918; Willey 1948; Willey and Phillips 1944), researchers have attempted to explain why and how Crystal River was
included into distant exchange networks, resulting in multiple theories across several periods of archaeological thought. The theoretical perspectives discussed in this chapter have implications for understanding how Crystal River was involved in Hopewellian exchange patterns. For this thesis, I take Goad’s models as a point of departure, because they are 1) specific to Crystal River and 2) have testable implications. However, true to much of the theory that has developed since Goad presented her models, I am aware that there are limitations in taking a strictly economic approach to exchange, and in the final analysis I consider alternative interpretations that incorporate some of the ideas raised by Post-Processual archaeologists. First, however, in the following chapter I explain the methods employed to analyze Crystal River shell.
CHAPTER 4

Methods

Various authors have developed methods for identifying shell tool manufacture in archaeological contexts (Dean et al. 2008; Dietler 2008; Eyles 2004; Luer et al. 1986; Marquardt 1992; Pearson and Cook 2012). These studies have guided this research by providing descriptions of shell reduction sequences, typologies of common forms of shell tools, and archaeological correlates of workshops. I briefly summarize the previous shell artifact studies pertinent to the Southeast, particularly Florida, before describing the methods used for this project.

Previous Studies of Shell Artifacts

Marquardt (1992) devised a shell artifact typology based on his research in the Caloosahatchee area in southwestern Florida. His typology described various types of hammers, cutting-edge tools, pounders, grinders and sinkers manufactured from whole gastropod shells, as well as gastropod shell fragments (especially columellae). His typology also addresses bivalve shell tools. Additionally, Marquardt used standardized maximum measurements for length, width, thickness, etc. that have been replicated in later studies. Marquardt’s shell tool typology has provided a baseline for more recent
shell tool studies in Florida, including my own; I discuss this classification system in greater detail below.

Eyles (2004) analyzed a shell tool collection from 27 sites in the Apalachicola River Valley in Northwest Florida. He catalogued the specific *Busycon* tools and ornaments in the assemblage, including hammers, spoons, beads, adzes, etc., and based his descriptive analysis on Marquardt’s (1992) shell typology. However, Eyles simplified Marquardt’s categories. For example, Eyles condensed Marquardt’s seven different gastropod hammers (Types A-G) into one category: “shell hammer.” Conversely, Eyles created his own tool classifications as he encountered them in the collections. Overall, there were 22 tool types in the final assemblage: 15 borrowed from Marquardt, and seven new categories. New classifications included: scraper/spatula, awl, indeterminate tool, probable tool, spire-apex, worked shell, and fragment (Eyles 2004:50). Eyles concluded that the coastal prehistoric peoples of the Apalachicola River area used shell as a raw material due to abundance and ease in collection. However, there are less shell tools in northern Florida because more stone was available. Additionally, Eyles argued that the majority of tool types he encountered were being produced and used throughout prehistory since they are seen in sites from every cultural period.

Luer et al. (1986) analyzed shell tool blanks from Big Mound Key in Charlotte County, Florida. They argued that a certain amount of skill was required to fashion these blanks as well as the knowledge required to select shells ideal for manufacture. An abundance of shell debitage—pieces of robust whelk shell body whorls—indicate manufacturing evidence of these tools. These researchers define shell tool blanks as having:
1) a perforation in the spire’s ultimate whorl situated opposite the aperture and the midway between the suture and the nodules, 2) a shortened siphonal canal from which the natural columella tip and adjoining lip was removed, 3) a thick-walled modified outer lip from which almost the entire length of the natural, thin outer lip was removed, and 4) a very rough bevel on the basal end of the shortened columella (Luer et al. 1986:92).

These attributes were found on nearly all of the 19 specimens they analyzed, which were also extremely similar in size. Radiocarbon dates confirmed their contemporaneity with one another and with the site in general. Other shell tools found on the site suggested that these tool blanks were continuously reshaped and reused into hammers or cutting edge tools to fulfill other purposes, but this “continuum of modification” is not applicable to all cultures using conch and whelk shells. This system at Big Mound Key suggests a standardized production for large gastropod tools.

Dietler (2008) explored the regional organization of shell cutting-edged tool production through analysis of curated artifacts found throughout Florida. He assessed the usage and importance of these tools in the Caloosahatchee chiefdoms, specifically at the Buck Key and Useppa Island sites, by using several methods such as shell radiocarbon dates, source analysis, and residue analysis. However, most pertinent to this research was his investigation of the shell tool assemblage. Dietler analyzed 441 whole shell cutting-edged tools from 93 archaeological sites—nearly the entire collected sample in Florida with the exception of those donated to out-of-state museums. Like Marquardt (1992), Dietler collected measurements such as maximum length, width, and lip thickness as well as weight in grams. He also classified the cutting edge tools according to Marquardt’s (1992) typology, but added and subdivided several categories to include the diversity seen in his own collection. In his initial assessment, Dietler even identified several shells exhibiting a “tool-in-production” stage of manufacture (Dietler 2008:173).
Additionally, he investigated shell production through experimental archaeology by recreating many tools classified by Marquardt and seen in the cutting-edged collections.

From the data, Dietler concluded that cutting-edge shell tools were mainly produced for woodworkers in the Okeechobee Basin area. Manufacture increased after A.D. 800 when archaeological evidence for chiefdoms appears in the region, and valuable crafted shell tools became associated with elites. According to Dietler:

Elites apparently used shell tools to supply woodworkers who provided them with large canoes, powerful religious items, and monumental buildings. This patronage was likely one of several strategies designed to establish and maintain elite wealth and power (Dietler 2008:xviii).

Dietler’s work provides insight into the relationship between social complexity and craft production, particularly focusing on how possession of shell tools might have elevated the status of an individual at both the macro and micro levels (Dietler 2008).

Menz (2012) analyzed the large gastropod surface finds at the Roberts Island Shell Mound Complex, located just 500 m west of the Crystal River site. He catalogued the collection of more than 200 shells by species and tool type, took measurements, and noted the presence of perforations, notches and/or any other unusual characteristics. Based on Marquardt’s typology, Menz identified numerous Type G Hammers in the collection. Interested in the use wear on the columella ends, Menz created functional replicas of hafted Type G Hammers, since those were the most common shell tool collected at Roberts Island, and tested them on different materials such as bone, shell, wood, and nut. Menz found that the wear on the archaeological Type G Hammers best represented the replica’s use wear on shell, and concluded that the prehistoric inhabitants
may have been using these tools for breaking up clusters of oyster before consuming them or manufacturing the oyster shells into other shell tools or ornaments.

The previous studies in this chapter highlight shell tools, which are seen in abundance at Crystal River, but shell ornaments such as beads, plummets and gorgets are just as prominent. Pearson and Cook (2012) uncovered evidence for shell bead manufacture at the Bead Maker’s Midden (9CH199) on Ossabaw Island, Georgia. Their findings included microdrills, large quantities of knobbed whelk shell, and shell beads in various stages of production. Since shell beads are found in burial contexts throughout eastern North America, they are thought to be one of the most highly demanded prehistoric trade items (Ottesen 1979). Shell beads were also uncovered at Crystal River, and appear to have been manufactured from the columellas or outer whorls of larger whelks. Several shells collected during surface finds at Crystal River exhibit rectangular, punctured holes similar to the shell debitage described by Pearson and Cook at the Bead Maker’s Midden Site. While shell beads are not as abundant at Crystal River, there is evidence to suggest that some bead manufacture occurred on site, as I discuss further below (Moore 1903, 1907; Pearson and Cook 2012).

Methods for Shell Artifact Collection and Analysis Employed on this Study

The rest of this chapter describes the methods and procedures undertaken for this research project, including field collection methods, laboratory analyses, and data collection of new and previously excavated materials from Crystal River. This project
began in June 2011 with the initial CREVAP season, during which two types of sampling were employed: surface and subsurface.

Collection Methods: Surface and Sub-Surface

Crystal River is a shell midden site, and many shell materials indicative of cultural disturbance remain visible on the surface. Therefore, a systematic surface collection of non-oyster mollusk remains was conducted in order to later analyze these materials. A team of surveyors walked the site at approximate 5 m intervals. All shells other than oyster were collected from the surface and the locations were plotted with a GPS. More than one artifact was bagged as a single piece plot if found together within a ca. 2 m wide radius. In total, there were 39 piece plots and 95 shell artifacts collected on the surface survey.

To sample subsurface deposits, core samples were extracted using a GeoProbe Model 54LT, which collected 116 cm long plastic tube sections with a diameter of 4.3 cm (Figure 3). The GeoProbe was chosen for its ability to penetrate the deep and dense shell midden with minimal disturbance. While the goals of the GeoProbe sampling were multiple, I use the sampling data as a means of testing presence and distribution of shell tool and ornament production at Crystal River, especially as evidenced by the presence of large gastropods and clams.

It should be noted that the GeoProbe uses a hydraulic hammer to “push” the core, and thus has a tendency to pulverize larger objects, including whole shells. Further, the diameter of the core sections was much too small to collect any whole gastropod
specimens. Thus my analysis of the coring data focuses on the distribution of shellfish fragments, rather than whole ornaments or tools. Fortunately, my review of the descriptions of the shell artifacts recovered by Moore (1903, 1907, 1918) and Bullen (1951, 1953, 1966) reveals that the mollusk species that were most commonly employed for ornaments and tools—lightning whelks and other large gastropods—are not often represented as food remains in the midden. Thus, the presence of these species can reasonably be interpreted as a possible indication of tool or ornament production.

Cores were collected in 20 m intervals across the site, with the exception of several of the mounds (Figure 4). Single cores were extracted from Mounds A, H, K, and J. To avoid disturbing human remains, no cores were taken in the two burial mounds—
Figure 4. Location of each core sample extracted from the Crystal River Archaeological Park in 2011.
Mound G and the Main Burial Complex (Mounds C through F). Fifty-eight cores were extracted from the site using the GeoProbe, exclusive of a few cores used to collect samples for OSL dating, which are not considered in this thesis. I also omit several vibracore samples taken from the adjacent marsh as these were intended for soil sample data instead of artifact analysis.

Core sampling did not continue if clay, limestone or muck were encountered in the bottom stratum; these mineral deposits are indicative of non-cultural layers from a time before human activity and mound construction at the site. An average of three sections was required to reach these bottom soils. Some areas, such as the low-lying plaza and adjacent marsh, required only one core section because clay or limestone was encountered at shallow depths. Conversely, the 9 m tall Mound A required nine sections to reach sterile layers.

The cores were brought back to the University of South Florida (USF), and USF graduate student, Sean Norman, opened the sections, documented and bagged soil screening samples by core section, stratum and level. For each soil sample set aside for screening I recorded weight to the nearest tenth of a gram, and volume to the nearest milliliter. Weight and volume reveal the size, density, and quantity of each stratum throughout the cores. The samples were then wet-screened through a 1/8 inch (0.32 cm) mesh to maximize the recovery of small artifacts. Artifacts were sorted by type, genus and species where possible, and element or section. Additionally, quantity and weight (grams) were recorded for each analytical category. Figure 5 displays the core screening form used for this process. All artifact information was recorded in a Microsoft Access database. The entire surface and subsurface artifact assemblages from this study are
CORE SCREENING FORM

Project: 
CREVAP  
FS#: 

Site #: 8CI1  
Site Name: Crystal River  

Location: E: N: 

Recorder(s): BB  
Date: 

Core#:  
Section:  
Stratum:  
Depth:  
Mesh Size: 1/8"

Bag Weight  
(g): 
Bag Volume  
(ml): 

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<th>Artifact(s)</th>
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Additional Notes: 

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Figure 5. Form used to collect data from core samples.
currently curated at the University of South Florida while awaiting final curation at the Florida Bureau of Archaeological Research in Tallahassee.

While excavations have been conducted at Crystal River during the 2012 field season under Thomas Pluckhahn and Victor Thompson, these are still in process because of the sheer quantity of materials that require sorting after being collected with a 1/8 inch mesh. Therefore, this project focuses only on the available, processed materials (i.e. core samples, surface finds, and previous excavated shell items).

Collection Methods: Previously Excavated Materials

A major component of this research involved analyzing Moore’s and mainly Bullen’s previously excavated, but underreported materials from Crystal River. Not only do these shell artifacts aid in understanding Crystal River manufacturing techniques and abilities, but they provide a baseline for raw material availability in the area as well as how the inhabitants were using shell. Bullen’s excavated shell materials are described in detail below.

Literature Used in Method Analysis

This thesis focuses on the marine shell ornaments and tools from Crystal River in order to uncover evidence of shell artifact production, which may explain shell objects found on other Hopewellian archaeological sites in the Midwestern and southeastern United States. In sites further removed from the coast, marine shell occurs mainly in the
form of finished ornaments and cups, and is found mainly in burial and other ritual contexts. In contrast, at Crystal River, shell was fashioned into both decorative ornaments and tools, occurring commonly in both ritual contexts and middens. Therefore, Crystal River shell exists in both whole and fragmented forms. With the variability seen in the Crystal River assemblages, my work was guided by two previous shell tool studies: one that focused on finished shell tools and ornaments (Marquardt 1992), and another that discussed common shell reduction techniques and corresponding debitage categories (Dean et al. 2008).

**Whole Shell Specimens: Marquardt’s Typology**

This research classified whole or nearly whole gastropods displaying concrete evidence of tool use according to Marquardt’s (1992) typology. Marquardt (1992) focused specifically on the form and function of completed shell tools and ornaments seen in the Caloosahatchee Area, developing classifications that are widely employed in Florida, as seen in previously discussed research. Marquardt’s typology generally assumes that completed utilitarian shell artifacts take the form and function of stone tools. Examples include chisels, hammers, picks, knives, and blades. All of these are created using different portions of the shell. Additionally, large gastropods are also used as vessels including spoons, cups, bowls, and dippers. The most common of his typological categories observed at Crystal River is the Type G Hammer constructed from crown conch (*Melongena corona*), typically characterized as a comparatively smaller and lighter hammer with at least one perforation across from the aperture, and a flattened columella.
Due to their small size, Marquardt hypothesized that these tools were created for expedient use as opposed to the more massive gastropods intended as long-term, formal tools (Marquardt 1992:201). Whole, or nearly whole, shells from Crystal River were collected in the recent surface finds and were also present in Bullen’s previous collections from the 1960s.

Bullen’s collections are curated at the Florida Museum of Natural History in Gainesville, but many are on loan to other facilities for display or research purposes. As stated previously, Bullen minimally published his Crystal River findings, and a goal of this thesis was to shed new light on old collections. While Bullen’s investigations produced a variety of artifacts, I focus specifically on the shell artifacts, most applicable to this study.

Bullen (1951, 1953, 1966) excavated primarily in the Main Burial Complex (Mounds E and F), the circular embankment (Mound C), Burial Mound G, and Midden B, but also dedicated some of his time to Mound H, Mound K, and the Double Sand Mound—a mound located just north of the designated park land. Analyzing Bullen’s collections from these areas provided a glimpse into public space, such as the midden, and the more restricted, ritual spaces at Crystal River.

In addition to classifying each artifact, I also employed the measurement criteria defined by Marquardt (1992). Specifically, maximum length was defined as the distance between the apex of the spire to the base of the columella, maximum width as the distance between the outer lip of the shoulder to the opposite point of the shell, and maximum thickness as the point at which the body whorl connects to the columella. All measurements were taken with digital calipers to the nearest hundredth cm. The working
face, or the location where tool use and wear exist on the shell, was measured and the wear type along the worked surface noted. Species and tool type were noted along with all tool features such as wear location, wear patterns, perforations, notches, or other unique shell characteristics.

Ornaments found in Bullen’s collections were categorized according to previous classifications of Hopewell shell gorgets, dippers, drilled ornaments, plummets and pendants (Bullen 1951, 1953, 1966; Carr 2006; Goad 1978; Moore 1903, 1907, 1918; Seeman 1979; Willey 1949a). If ornaments or tools were not whole, they were measured according to their proper orientation and noted for which part of the original shell they were constructed (i.e. columella, body whorl, etc.).

Bullen’s collections revealed mostly large gastropods, but also bivalves such as oysters, clams and others. Maximum length of bivalves was measured from the umbo or hinge directly across the mantle to the outermost edge of the valve. Maximum width was measured directly perpendicular to maximum length, and maximum thickness was taken from either the left or right side of the bivalve’s hinge.

Whole shells exhibiting no tool characteristics were labeled as unmodified and recorded for species count and weight. Any additional measurements on non-tool shells would add little significance to this study, as the focus of this research is on manufactured and produced goods. Smaller gastropods and bivalves uncommonly used in shell tool manufacture were disregarded, as many occur naturally and are typically unassociated with cultural practices. The small size in conjunction with the lack of wear or modification on smaller gastropods reinforced this decision.
Crystal River Shell Form: Bullen's Assemblages

Provenience information:______________________________________________
______________________________________________
______________________________________________

Site #: ___8C1___  Shell Tool #:____________________

Genus & Species:________________________________________

Tool/Ornament Type: ___________________________

Observer:__Beth Blankenship__  Date:_________________________

Measurements for whole specimens

Max. Length (mm):____________________
Max. Width (mm):_____________________
Max. Thickness (mm):__________________
Weight (g):___________________________
# of Notches:_________________________
Working Face Width:___________________

Fragment/Debitage

Type:________________________________________________________
Part of shell:________________________________________________
Max. Length (mm):___________________________________________
Max. Width (mm):___________________________________________
Max. Thickness (mm):________________________________________
Weight (g):________________________________________________
Presence of wear:____________________________________________

Additional Notes:______________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Figure 6. Form used to collect data from Ripley Bullen’s shell assemblage
Weight was taken using a digital scale, to the nearest tenth of a gram. Weight reflects not only the size of shells, but also the density of a raw shell material—important when multiple shell species are weighed. Figure 6 displays the paper form used to collect information from Ripley Bullen’s shell assemblage at the Florida Museum of Natural History in Gainesville.

*Fragmented Shell Specimens: Dean et al. Typology*

In the subsurface collections, several shell species were identified, including those typically seen in tool and ornament production. However, due to the necessary pulverization techniques used in core sampling, these shells were small in size (none exceeding 4 cm), difficult to orient, and too crushed to determine tool or ornament use. Because of this, Marquardt’s typology was insufficient for categorization. Instead, I used the work of Jonathon Dean and colleagues (2008) who studied shell manufacture at the Weeden Island site to the south of Crystal River near St. Petersburg. From shell debris and breakage patterns observed on partially reduced shells, Dean and colleagues identified reduction sequences for the manufacture of various types of tools and ornaments of several species, but particularly lightning whelk. They also identified the types of debris that can be expected in assemblages where such activities are represented. Dean et al.’s study identified more than 20 categories of debris, some overlapping; for simplicity of analysis, I condensed their typology into the categories seen in Table 1 and applied them to the shell debris seen in the core samples at Crystal River.
Due to the heavy pulverization, collecting counts and weights was most appropriate for core shell debris, since measurements would provide little additional information without more of the shell present. All subsurface data was recorded in a Microsoft Access Database and utilized for tables and figures seen in the Results chapter of this thesis.

For shell fragments from Bullen’s assemblage, weight in grams and maximum measurements were still taken with digital calipers to the nearest hundredth cm according to their orientation to the parent shell. If shell could not be oriented due to heavy fragmentation or alteration for tool or ornament use, maximum measurements were taken arbitrarily and noted for their heavy modification. An example of this is shell plummets made from the columella of larger gastropods, which can be so heavily altered that the original proximal and distal ends cannot be distinguished. In this case, plummets were always measured from tip to tip (one end of the columella to the other) as maximum length, maximum width was perpendicular to maximum length measuring from side to side, and maximum thickness reflected the measurement taken from maximum width.

Clarence Bloomfield Moore’s Shell Ornaments and Tools

C. B. Moore (1903, 1907, 1918) focused mainly on excavating elaborate or interesting grave goods out of the Main Burial Complex (Mounds C-F). Many of these artifacts are housed at the Smithsonian in Washington, D.C. Since Moore’s collections were less than systematic, and since they are heavily biased to the sort of finished tools and ornaments found in burial contexts, they shed relatively little light on the shell
Table 1. Categories Used to Describe Different Shell Debitage Seen Throughout the Core Samples

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole</td>
<td>Entire shell present</td>
</tr>
<tr>
<td>Mostly whole with part of body and spire removed</td>
<td>Most of shell is present, but common breakage patterns seen.</td>
</tr>
<tr>
<td>Cross section spire</td>
<td>Half of spire removed through the middle. Shell essentially cut in half lengthwise</td>
</tr>
<tr>
<td>Columella and body whorl with spire removed</td>
<td>Connected columella and outer body whorl. No spire present</td>
</tr>
<tr>
<td>Spire and columella with body whorl removed</td>
<td>Outside body whorls completely removed from shell</td>
</tr>
<tr>
<td>Spire and body whorl connected</td>
<td>No columella. Only top of the shell present.</td>
</tr>
<tr>
<td>Spire fragments</td>
<td>Spire only</td>
</tr>
<tr>
<td>Body whorl fragments</td>
<td>Outer body whorls</td>
</tr>
<tr>
<td>Columella fragments</td>
<td>All outside whorls and spire removed</td>
</tr>
<tr>
<td>Unidentified fragments of large gastropod</td>
<td>No identifying species features</td>
</tr>
</tbody>
</table>

production at Crystal River. Still, to discuss issues of exchange, it is useful to have some understanding of the number and types of shell artifacts that were recovered by Moore.

Visiting the Smithsonian was outside the scope of this research, but the museum staff provided catalogue information and photographs for several shell artifacts excavated by Moore. This analysis is obviously extremely preliminary as it is often difficult to determine the species based on photographs, and precise measurements are impossible. Nevertheless, to the best of my abilities given the constraints, I catalogued the tool or ornament type, the part of the shell it was constructed from, and the suspected shell species. The following chapter discusses the results of the employed methods.
CHAPTER 5

Results

In this chapter I present the results of the analyses described previously. The results are divided into three sections to better organize the data from each research area: collections from Moore and Bullen, the recent surface collections of shell artifacts, and the latest core sample data. Previous collections confirm which shell species were sought after for manufacture, and reveal the range of tools and ornaments created from each species. However, neither of these early archaeologists paid attention to shell debitage during excavations. Therefore, previous assemblages provide a baseline for whole shell artifacts while the recent surface and subsurface data present shell fragments and debris possibly indicative of a reduction sequence used for producing such artifacts. By analyzing the entire shell assemblage, excluding the most recent collections that are still in process, this research can suggest if shell production occurred on-site.

Results: Shell Assemblages of Moore and Bullen

The majority of Crystal River knowledge is derived from artifacts excavated by Moore and Bullen, but their early archaeological techniques did not make use of screens—let alone the 1/8 inch mesh used in more recent research to maximize artifact recovery. Both Moore and Bullen collected larger and more grandiose artifacts
associated with burials. Therefore, trying to find evidence for an onsite shell workshop is an improbable research approach with these data. Instead, the relevance of this assemblage lies in other possible indicators of craft production, such as finding large quantities of unmodified shells (especially of similar size) representing tool or ornament ‘blanks,’ and, more relevant to the data explored in this thesis, recognizing debitage from species used in shell production. A final goal of analyzing these materials was to compare the burial goods recovered by Moore and Bullen to the recovered artifacts found in the recent surface and subsurface collections to explore possible differences in on-mound versus off-mound areas. Shell ornaments and other ritual objects, such as dippers, may be limited to mound activities or used throughout the site. The distribution of these materials can indicate restriction of certain materials for use or production. If no restriction is seen between the mounds and midden areas, then the data would suggest that shell materials were used commonly and publically instead of ceremonially used by select individuals.

I began with Moore’s artifact assemblage. While I could not visit the NMAI where Moore’s assemblage is currently curated, the museum staff provided photographs depicting 130 shell artifacts excavated by Moore. This is not the entire collection, but still provided a reasonably representative sample of the assemblage. Unfortunately, due to both the heavy modification from manufacturing the items, and the inability to see the artifacts first hand, only some of the shell could be identified for species. However, the artifacts were successfully classified by tool or ornament type, providing quantities of goods uncovered from the Main Burial Complex.
As seen in Table 2, Moore’s assemblage consists mainly of shell ornaments, especially shell plummets and gorgets, which make up 68 percent of the entire photographed collection. Other shell ornaments include beads, pendants and discs. Only 22 percent of Moore’s shell assemblage consists of shell tools—a striking difference from Bullen’s collections, which uncovered abundant utilitarian shell artifacts and fewer ornaments. The most commonly identifiable species in Moore’s assemblage was lightning whelk (19 percent), particularly modified for use as shell drinking cups, gorgets, and several of the celts (Table 3). The majority of shell species in this assemblage remained unknown since the most common items—plummets and gorgets—were heavily modified during production (70 percent).

While excavating the Main Burial Complex, Moore provided several accounts of shell associated with burials. Just as ornate or religious grave goods may reflect status or

<table>
<thead>
<tr>
<th>Shell Tool/Ornament</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bead</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>Celt</td>
<td>7</td>
<td>5%</td>
</tr>
<tr>
<td>Chisel</td>
<td>14</td>
<td>11%</td>
</tr>
<tr>
<td>Disc</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Cup</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Cup (killed)</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Gorget</td>
<td>36</td>
<td>28%</td>
</tr>
<tr>
<td>Pendent</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>Plummet</td>
<td>53</td>
<td>41%</td>
</tr>
<tr>
<td>Spoon</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table 3. Number and Percentage of Identified Shell Species in Moore's Assemblage

<table>
<thead>
<tr>
<th>Suspected Shell Species</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Busycon contrarium</em></td>
<td>25</td>
<td>19%</td>
</tr>
<tr>
<td><em>Triplofusus gigantea</em></td>
<td>6</td>
<td>5%</td>
</tr>
<tr>
<td><em>Macrocystis nimbosa</em></td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td><em>Mercenaria mercenaria</em></td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td><em>Fasciolaria tulipa</em></td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Unknown</td>
<td>91</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>130</td>
<td>100%</td>
</tr>
</tbody>
</table>

Profession of a buried individual, abundant shell artifacts in graves may indicate shell tool manufacturers. Evidence for this at Crystal River could suggest specialized producers of shell artifacts for local and non-local circulation. However, Moore focused primarily on describing artifacts in great detail while discussing associated burials as an afterthought and sometimes not at all. For instance he mentioned a “series of two and of three gorgets were found, usually with burials, and in one instance four gorgets lay together” (Moore 1907:416). In this example, he failed to mention which burial or burials contained these gorgets, and simply mentioned their association without detail. However, in other instances, his publications discuss several specific individuals uncovered with shell, such as two shells with drilled suspension holes found alongside a child’s skull (Moore 1903:397). Most Crystal River burials contained ornate pieces such as gorgets, plummets and pendants as well as artifacts of copper, mica, and stone. Yet, multitudes of materials and goods together probably indicated a high-status individual and not strictly a shell manufacturer.
Two burials described in Moore’s publications were worth mentioning for this research. He catalogued two skeletons with their associated materials:

A skeleton lying as full length on its back had a shell drinking cup near the pelvis, and under the right knee nine marine shells [with] the valves tightly closed, and pierced for suspension at points below the muscular attachment. A skeleton partly flexed on the left side had on the thorax eight chisels and gouges, three made from the axis of the conch and five from its body-whorl (Moore 1907:424).

While the reason behind these individuals’ internment with these artifacts can only be speculated, it is interesting that both contained abundant shell and no other mentioned artifacts made from different raw materials, when the majority of burials contained more than just shell. The first individual found with a drinking cup and nine whole shells found in a cache-like deposit may indicate personal possessions, wealth, or even a manufacturer of suspension artifacts. Moore mentions the ‘tightly closed valves’ of these items indicating they are bivalves. As discussed below, bivalves were frequently used as pendants at Crystal River, and these may indicate ornamental items.

The second skeleton mentioned is the only individual in Moore’s publications possessing only shell tools—no ornaments and no additional goods manufactured from other raw materials. Compared to surrounding burials, this individual differed greatly. Shell gouges and chisels may designate a skilled user with these particular tools or even a producer of utilitarian shell goods—a multitude of which were uncovered in Bullen’s later excavations into Midden B. While shell debitage failed to impress Moore enough to collect or even mention, one can only speculate on the nature of whole shell artifacts and their association to buried individuals. However, if abundance of shell in graves may allude to manufacturers, the above mentioned burials present the two best cases for shell artifact producers.
Bullen’s shell collection revealed 149 shell artifacts, the bulk of which were shell tools—a major difference when compared to Moore’s assemblage. However, Moore worked only within the burial complex—a sacred ceremonial location, while Bullen excavated heavily into Midden B—an area more reflective of daily life activities. Therefore, artifact disparities exist between ceremonial and domestic locations at the site. Additionally, tool types varied between assemblages. Moore’s collections produced mainly columella chisels, while Bullen uncovered an overwhelming quantity of shell hammers. Table 4 displays Bullen’s shell assemblage including each artifact type, the locations where they were uncovered, the totals for each classification, and the sum of shell artifacts from each area. The largest quantity of artifacts consisted of unmodified shells, gouges, dippers, columella hammers, and plummets. Unmodified artifacts, possibly indicative of caching for later modification purposes, are displayed Table 5 by species and location.

Hammers and pounding tools were the most abundant artifact type in Bullen’s assemblage, with the majority found in Midden B. However, every mound except for Mound G contained at least one hammer, showing the site-wide importance of these tools. However, there are differences in size between worked and unmodified crown conch shells. As noted in Table 6, unmodified conchs were typically smaller in weight, thickness and width, while maximum lengths between the two conch categories appeared most similar—particularly if the shells’ distal end (present in the unmodified conchs, but missing in the hammers due to pounding) is approximated for in pounding tools. Presumably, crown conchs were selected for use based on desired size, while unmodified shells were stored around the site until needed or buried in mounds for other purposes.
Table 4. Artifact Type, Location and Total Count from Crystal River

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Mound G</th>
<th>Mounds E&amp;F</th>
<th>Mound C</th>
<th>Midden B</th>
<th>Mound K</th>
<th>Mound A</th>
<th>Mound H</th>
<th>Near CR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body whorl fragment</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Celt</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Columella cutting edged tool</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Columella fragment</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Columella hammer</td>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Cutting edged tool</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Dipper</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Dipper fragment</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Gouge</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Hammer/pounder</td>
<td>1</td>
<td>1</td>
<td>42</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Incised fragment</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Shoulder fragment</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Worked shell</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Pendant</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Plummet</td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Possible Ornament</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Spire fragment</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Spoon</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Unmodified</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>27</td>
<td>21</td>
<td>75</td>
<td>3</td>
<td>1</td>
<td>11</td>
<td>1</td>
<td>149</td>
</tr>
</tbody>
</table>
Table 5. Unmodified Shell Artifact Totals and Location from Bullen’s Assemblage

<table>
<thead>
<tr>
<th>Species</th>
<th>Mound G</th>
<th>Mounds E&amp;F</th>
<th>Mound C</th>
<th>Midden B</th>
<th>Mound K</th>
<th>Mound H</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arca ventricosa</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cassiduloida</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Polymesoda carolina</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Crassostrea virginica</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Melonea corona</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Triplofusus gigante</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mercenaria mercenaria</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Busycon contrarium</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Table 6. Statistics of Crown Conch Hammers and Unmodified Crown Conchs

Crown Conch Hammers: N=49

<table>
<thead>
<tr>
<th>Max. length (mm)</th>
<th>Max. width (mm)</th>
<th>Max. thickness (mm)</th>
<th>Working face width (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>70.8</td>
<td>57.6</td>
<td>3.6</td>
<td>17.4</td>
</tr>
<tr>
<td>Median</td>
<td>67.9</td>
<td>56.4</td>
<td>3.7</td>
<td>17.9</td>
</tr>
<tr>
<td>Range</td>
<td>51.1-164</td>
<td>36.1-107</td>
<td>1.3-5.1</td>
<td>5.7-29.4</td>
</tr>
</tbody>
</table>

Unmodified Crown Conchs: N=6

<table>
<thead>
<tr>
<th>Max. length (mm)</th>
<th>Max. width (mm)</th>
<th>Max. thickness (mm)</th>
<th>Working face width (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>71.2</td>
<td>40.4</td>
<td>3.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Median</td>
<td>71.0</td>
<td>38.2</td>
<td>3.0</td>
<td>N/A</td>
</tr>
<tr>
<td>Range</td>
<td>63-81.7</td>
<td>27.1-53.9</td>
<td>1.3-4.3</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Midden B revealed the majority of crown conch hammers, revealing how essential these tools were for utilitarian life ways. However, not a single unmodified crown conch was uncovered in this location. Crown conchs appear to have been discarded only after ending their use lives as tools. Unmodified crown conchs appeared in Mound H and Mound G, suggesting possible cache locations for tool resources. The Main Burial Complex revealed only two hammers—one constructed from lightning whelk, a known valuable material to the prehistoric inhabitants, and the other of crown conch. So few of these tools uncovered in an area abundant with shell artifacts indicates that utilitarian shell hammers made for inadequate grave goods at Crystal River.

Other abundant tools in Bullen’s collections—gouges, dippers, and columella hammers—all revealed surprisingly similar measurement characteristics as seen in Table 7, further suggesting an ideal designated size for each tool type. The majority of these tools—particularly the columella hammers, and the majority of the gouges—came from Midden B, while dippers were excavated from the Main Burial Complex, Mound G, and one with provenience information reading “near a mound at Crystal River.” Dippers function as utilitarian artifacts, but were probably associated with ceremonial tasks thus leading to their importance and value. The only tool that failed to reveal similar characteristics including measurements and specific species use was the beveled cutting edged tools (Table 8). These were constructed from lightning whelk, horse conch \((Triplofusus gigantea)\) and crown conch. Only the working face width of these tools appears similar, but weight, length and width vary between specimens, possibly due to the multiple species used or because they were used for different tasks or even because they were utilized to varying extents. Additionally, at least one columella revealed
composite characteristics, exhibiting both a cutting distal edge and a flattened plane for grinding or crushing tasks, indicating the multifaceted use of shell tools at Crystal River (Figure 7).

Ornaments such as pendants, plummets, an incised fragment, and other possible ornaments were found almost entirely in the burial mounds (C, E, F, and G). These decorative items were associated with non-utilitarian functions and held more significance to the inhabitants as seen in their modification and presence in mounds. This distribution throughout the site supports the notion of a separation between sacred and

Table 7. Statistics on Other Common Tools Revealing Similar Size Characteristics

<table>
<thead>
<tr>
<th>Columella Hammers N=12</th>
<th>Max. length (mm)</th>
<th>Max. width (mm)</th>
<th>Max. thickness (mm)</th>
<th>Working face width (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>95.4</td>
<td>25.5</td>
<td>4.3</td>
<td>13.4</td>
<td>47.8</td>
</tr>
<tr>
<td>Median</td>
<td>78.7</td>
<td>28.5</td>
<td>4.7</td>
<td>13.5</td>
<td>40.2</td>
</tr>
<tr>
<td>Range</td>
<td>64-153.2</td>
<td>17.7-34.3</td>
<td>2.9-5.4</td>
<td>8.7-18.6</td>
<td>21-101.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gouges N=10</th>
<th>Max. length (mm)</th>
<th>Max. width (mm)</th>
<th>Max. thickness (mm)</th>
<th>Working face width (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>78</td>
<td>53.46</td>
<td>7.38</td>
<td>N/A</td>
<td>45.36</td>
</tr>
<tr>
<td>Median</td>
<td>81.45</td>
<td>52.6</td>
<td>7.38</td>
<td>N/A</td>
<td>42.05</td>
</tr>
<tr>
<td>Range</td>
<td>32.5-108.4</td>
<td>42.7-63.7</td>
<td>4.5-11.7</td>
<td>N/A</td>
<td>22.8-77.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dippers N=9</th>
<th>Max. length (mm)</th>
<th>Max. width (mm)</th>
<th>Max. thickness (mm)</th>
<th>Working face width (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>157.4</td>
<td>102.9</td>
<td>5.2</td>
<td>N/A</td>
<td>146.6</td>
</tr>
<tr>
<td>Median</td>
<td>172.3</td>
<td>102.4</td>
<td>5.4</td>
<td>N/A</td>
<td>146.5</td>
</tr>
<tr>
<td>Range</td>
<td>110-209.6</td>
<td>81.6-125.6</td>
<td>2.8-8.1</td>
<td>N/A</td>
<td>36.3-277.6</td>
</tr>
</tbody>
</table>
only four artifacts out of 75 uncovered from Midden B were ornaments, suggesting that 1) decorative shells were kept with the owner or within a family or group, and were not disposed of in the midden, 2) ornaments were stored in locations away from the midden or, 3) they were prestigious items reserved primarily for burial. Regardless of the reason, the lack of ornaments and ornamental debris uncovered from Midden B further indicates the value of these artifacts to the Crystal River inhabitants compared to utilitarian goods.

Gorgets, plummets and pendants appear heavily in burials in Moore’s assemblage, and this pattern is reflected later in Bullen’s. Items classified as plummets were constructed from large gastropod columellas, smoothed and sometimes grooved at one end for suspension (Figure 8). Pendants were similar to gorgets, but lacked heavy modification, decoration, and the typical circular shape seen in Crystal River gorget ornaments. Additionally, many pendants uncovered between Bullen and Moore consisted of drilled bivalves, and not the body whorls of large gastropods, as is typical for gorget ornaments. Figure 9, displays three Atlantic oyster pendants from Bullen’s assemblage—an item usually reserved as a building material. Further, six pendants were present in

<table>
<thead>
<tr>
<th>Table 8. Cutting Edged Shell Tool Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting Edged Shell Tools N=6</td>
</tr>
<tr>
<td>Max. length (mm)</td>
</tr>
<tr>
<td>Average</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Range</td>
</tr>
</tbody>
</table>
Figure 7. Composite columella tool from Bullen’s assemblage exhibiting a cutting edge and a flat grinding plane. Curated at the FMNH.

Figure 8. Three examples of shell plummets uncovered by Bullen and curated at the FMNH.
Moore’s assemblage—four from Macrocallista nimbosa, and two constructed from large gastropod body whorls.

As stated previously, the majority of Moore’s photographed shell collection composed of plummets manufactured from large gastropod columellas. Only 11 plummets (7 percent) were uncovered during Bullen’s excavations. Throughout both Moore and Bullen’s excavations, plummets typically came from burial contexts. Only three plummets were found during Bullen’s investigations into Midden B. However, only one remained whole while the other two were fragmented specimens, which may have resulted in their discardment.

Several large gastropods displayed what appeared to be drilled holes for suspension. Upon closer inspection these holes may have resulted from parasitic activity.
Figure 10. Possible suspension hole at distal end of the shell.

Figure 11. Large whelk exhibiting four holes either for suspension or from parasitic activity.
such as algae or sponges that can eat away at shells and create the appearance of intentional drilled holes (Figures 10 and 11). However, while parasitic activity is certainly present, especially as shown on Figure 11, it remained difficult to declare whether these shells were culturally modified for ornamental purposes, such as before parasitic activity or if these were the sole result of parasites. Therefore, these shells remain classified as “possible ornaments” in Bullen’s assemblage.

Mounds E and F delivered the only possibly decorated shell artifact in Bullen’s assemblage—a rectangular fragment with three incised lines running parallel to each other and the natural shell striations (Figure 12). Initially this shell fragment was believed by some to be a large bay scallop. After several varying opinions, Roger Portell, an invertebrate paleontologist, found irregularities in the thickness and structure of this fragment to exclude it from being classified as a bivalve. He agreed that this was a worked outer body whorl of a large gastropod, possibly from a queen conch (Strombus gigas), in imitation of a bay scallop (Roger Portell, personal communication; Donna Ruhl, personal communication). Imitations of scallops have been found elsewhere, such as the Key Marco scallop effigy created from the outer body whorl of a large gastropod (Karen Walker, personal communication). The fact that scallops appear so rarely at the Crystal River site may signify the importance of this material and species, not only because of the decoration, but also because of its location in the Main Burial Complex.

Ten larger shell fragments unassociated with tool or ornament use were among Bullen’s collection including: body whorl, columella, shoulder, and spire shell debris (Table 9). Many of these fragments reflected those from Dean and colleagues’ (2008)
study, suggesting a possible shell reduction sequence for manufacturing ornaments and tools. Most interesting is that over half of the shell debris came from the Main Burial Complex, with one fragment from Mound H, and three from Midden B. Additionally, eight of these specimens consisted of lightning whelk, including all three from the midden. Therefore, while Bullen’s collections do not represent a complete sample of the Crystal River shell debris, lightning whelk remained present throughout the site, though heaviest in burials.

The most common type of debris encountered in this assemblage was spire fragments, usually along the upper shoulder just before the apex (Figure 13), or, in one particular case, the whole spire had been detached from the rest of the shell (Figure 14) resulting in the entire proximal end of the shell separated from the body whorl and
Table 9. Shell fragments uncovered by Bullen

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Tool/ornament type</th>
<th>Max Length (mm)</th>
<th>Max. Width (mm)</th>
<th>Max. Thickness (mm)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main burial complex (E &amp; F)</td>
<td>Lightning Whelk</td>
<td>Spire frag</td>
<td>35.2</td>
<td>132.4</td>
<td>5.3</td>
<td>98.1</td>
</tr>
<tr>
<td>Main burial complex (E &amp; F)</td>
<td>Lightning Whelk</td>
<td>Spire frag.</td>
<td>20.9</td>
<td>97.8</td>
<td>5.2</td>
<td>46.7</td>
</tr>
<tr>
<td>Main burial complex, circular embankment</td>
<td>Lightning Whelk</td>
<td>Columella frag.</td>
<td>101.2</td>
<td>50</td>
<td>3.4</td>
<td>21.2</td>
</tr>
<tr>
<td>Main burial complex, circular embankment</td>
<td>Lightning Whelk</td>
<td>Shoulder Frag.</td>
<td>122.1</td>
<td>105.8</td>
<td>4.8</td>
<td>184.1</td>
</tr>
<tr>
<td>Main burial complex, circular embankment</td>
<td>Horse Conch</td>
<td>Spire Frag</td>
<td>74.1</td>
<td>56.2</td>
<td>2.2</td>
<td>30.8</td>
</tr>
<tr>
<td>Main burial complex, circular embankment</td>
<td>Lightning Whelk</td>
<td>Spire frag.</td>
<td>7.3</td>
<td>66.5</td>
<td>2.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Midden B</td>
<td>Lightning Whelk</td>
<td>Body Whorl</td>
<td>93.7</td>
<td>113.6</td>
<td>5.3</td>
<td>161.1</td>
</tr>
<tr>
<td>Midden B</td>
<td>Lightning Whelk</td>
<td>Body Whorl</td>
<td>173</td>
<td>88.3</td>
<td>7.3</td>
<td>196.6</td>
</tr>
<tr>
<td>Midden B</td>
<td>Lightning Whelk</td>
<td>Spire frag.</td>
<td>80.2</td>
<td>82.7</td>
<td>5.7</td>
<td>123.3</td>
</tr>
<tr>
<td>Mound H</td>
<td>Crown Conch</td>
<td>Columella frag.</td>
<td>62.2</td>
<td>21.2</td>
<td>1.8</td>
<td>8.8</td>
</tr>
</tbody>
</table>
columella. Spires appear unused in the majority of the shell assemblage as seen in the amount of spire debris. Additionally, other shell tools, such as crown conch hammers (discussed later in this chapter) were commonly found without intact spires, perhaps indicating the weakest point of the shell, or, more intriguing to this research, intentionally removed as part of a common reduction sequence. Other debris such as columella and body whorl fragments, could have resulted from exhausted tools, broken ornaments, or were interred valuable materials used for grave goods, such as lightning whelk—the major raw material identified in Bullen’s shell fragments.

However, with only ten fragments present in this sample, it remains difficult to support or refute mass production of shell ornaments and tools at Crystal River. Uncovering the necessary evidence to support or refute large scale shell manufacture required additional testing, particularly through collection of surface and subsurface collections in off mound areas—locations largely ignored by the major archaeologists and their excavations at Crystal River.

Results: Surface Finds

A total of 95 shells were collected from the surface during fieldwork. The locations of each surface piece plot were entered into a GIS in order to display spatial distributions. As indicated in Figure 15, surface finds clearly cluster along the southwestern border of the site, particularly in the area near Mounds J and K. This pattern reflects differential surface visibility, but also corresponds with the better preserved portion of Midden B, an area still dense with shell at the surface. While this
Figure 13. Example of a common spire fragment seen in Bullen’s Crystal River assemblage, and curated at the FMNH.

Figure 14. Intentionally removed spire of a lightning whelk from Bullen’s collections and curated at the FMNH.
Figure 15. Location of surface finds at the Crystal River Archaeological Park.
may not be a representative sample of the entire site, it nonetheless reveals raw material usage during later phases of occupation in a portion of the principal domestic area. The concentration of shell here may indicate more intensive use of these tools in this location or their discardment into the midden, but also reflects how this area of the site has had comparatively little disturbance from excavation or grounds maintenance over time. While these shells may not be located where they were originally deposited, they aid in displaying how dense other areas of the site may have been with discarded shell during the time of occupation.

Aside from two rosy wolfsnails (*Euglandina rosea*), which are very small and were not likely used as either tools or ornaments, the remaining 93 shells in the surface assemblage consisted of crown conch. Of these 93 crown conch shells, 16 show evidence of use as tools—mainly perforated shell hammers. A few crown conch shells, including some unmodified and a few exhausted hammers, have rectangular-shaped perforations missing from the outer whorl. This could be a breakage pattern along the growth lines of the shell, but may also indicate shell bead manufacture (Pearson and Cook 2012). Regardless, the surface finds reveal that crown conchs are mainly unused or, when used, modified almost entirely for utilitarian purposes. No evidence for production of larger ornaments such as gorgets or plummets has been found on the surface, which supported in the analysis of the subsurface samples described below.

Table 10 reveals the attributes collected from the crown conchs with tool evidence, particularly the tool type, wear type, number of notches and perforations, and maximum measurements. Not only were the overwhelming majority of the surface finds crown conch, but they were also all hammer/pounder tools, or hafted to suggest eventual
use as hammering tools. Therefore, between the assemblages of Moore, Bullen and the surface finds, crown conchs appear to have had a single designated utilitarian function at Crystal River. Only four crown conchs out of the three assemblages displayed evidence of cutting edged tools.

Cronch conch surface tools are nearly identical in size, as seen in the measurements (Table 11). This further supports size selection of these materials for tools. However, the sizes of the surface tools vary when compared to Bullen’s assemblage. While the two collections match closely in thickness, the surface conchs appear overall larger in length and width, yet lighter in weight and with smaller working face widths. Conversely, when the surface finds were compared to Menz’s (2012) statistics of crown conch hammers and pounders from Roberts Island—a mound complex just 500 m west of Crystal River—the two assemblages appear more similar. The Roberts Island complex dates to a later occupational period than the pinnacle of Crystal River habitation. Therefore, the surface finds may allude to a later period of occupation in the area, as opposed to those beneath the surface.

The remaining 77 surface finds consisted of unmodified crown conchs, both whole and fragmented. Table 12 displays the count and weight data of shells classified by debitage or whole shell. The majority of non-tool surface finds existed in a whole or mostly whole and unmodified state. Only seven surface found crown conchs existed as debitage, and were classified using Dean and colleagues’ (2008) study. The common forms of debitage at the surface consisted of connected columella and body whorl fragments with missing spires, and spire fragments. As mentioned previously, Bullen uncovered several spire fragments in burials, mostly from larger gastropods such
Table 10. Crystal River Surface Finds: Shell Tools

<table>
<thead>
<tr>
<th>Shell Species</th>
<th>Tool Type</th>
<th>Wear Type</th>
<th>Notches</th>
<th># of Holes</th>
<th>Working Face Width (mm)</th>
<th>Max. Length (mm)</th>
<th>Max. Width (mm)</th>
<th>Max. Thickness (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt</td>
<td>Yes</td>
<td>2</td>
<td>8.88</td>
<td>56.88</td>
<td>57.68</td>
<td>4.64</td>
<td>54.4</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt</td>
<td>Yes</td>
<td>1</td>
<td>5.73</td>
<td>75.81</td>
<td>59.58</td>
<td>3.81</td>
<td>50.3</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1</td>
<td>14.53</td>
<td>69.59</td>
<td>70.23</td>
<td>5.69</td>
<td>71.6</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>2</td>
<td>10.9</td>
<td>58.88</td>
<td>60.31</td>
<td>4.1</td>
<td>59.2</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1 (2 poss)</td>
<td>7.07</td>
<td>59.88</td>
<td>48.55</td>
<td>2.89</td>
<td>37.7</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, ind. hafting</td>
<td>Blunt and Spalling</td>
<td>poss.</td>
<td>1 poss.</td>
<td>11.15</td>
<td>67.31</td>
<td>55.51</td>
<td>4.64</td>
<td>53.1</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1</td>
<td>9.62</td>
<td>58.01</td>
<td>62.3</td>
<td>4.66</td>
<td>54.4</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1</td>
<td>14.42</td>
<td>53.34</td>
<td>61.96</td>
<td>3.84</td>
<td>58</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>2</td>
<td>14.64</td>
<td>59.06</td>
<td>53.28</td>
<td>5.04</td>
<td>50.8</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1 (2 poss)</td>
<td>11.04</td>
<td>61.99</td>
<td>61.46</td>
<td>4.05</td>
<td>84.4</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Blunt and Spalling</td>
<td>Yes</td>
<td>1</td>
<td>13.26</td>
<td>65.28</td>
<td>68.02</td>
<td>3.4</td>
<td>63.2</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Tool, ind. function or hafting</td>
<td>Little/no wear</td>
<td>Yes</td>
<td>2</td>
<td>ind.</td>
<td>77.26</td>
<td>58.79</td>
<td>2.01</td>
<td>56.4</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Tool, ind. function or hafting</td>
<td>Little/no wear</td>
<td>poss.</td>
<td>2</td>
<td>ind.</td>
<td>80.67</td>
<td>61.75</td>
<td>3.22</td>
<td>71.1</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Tool, ind. function or hafting</td>
<td>Little/no wear</td>
<td>poss.</td>
<td>2 poss.</td>
<td>ind.</td>
<td>90.29</td>
<td>65.47</td>
<td>3.11</td>
<td>78.1</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Tool, ind. function or hafting</td>
<td>Little/no wear</td>
<td>Yes</td>
<td>1</td>
<td>ind.</td>
<td>74.34</td>
<td>59.85</td>
<td>2.57</td>
<td>60.1</td>
</tr>
<tr>
<td>Crown Conch</td>
<td>Hammer/Pounder, hafted</td>
<td>Spalling</td>
<td>poss.</td>
<td>2 poss.</td>
<td>9.54</td>
<td>42.36</td>
<td>60.32</td>
<td>3.25</td>
<td>42.7</td>
</tr>
</tbody>
</table>
as lightning whelks. However, as lightning whelks, these spires were most likely interred due to the valued shell species instead of the fragmented debitage. Yet it is interesting that missing spires are consistent in the crown conchs as well, even though they were used for utilitarian purposes. In fact, almost half of the unmodified surface finds are classified as mostly whole conchs with missing spires. Spire fragments seen in previous assemblages of Moore and Bullen in addition to consistent missing spires uncovered in

Table 11. Shell Tool Statistics: Surface Finds

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Working Face (mm)</th>
<th>Max length (mm)</th>
<th>Max width (mm)</th>
<th>Max Thickness (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>10.9</td>
<td>65.7</td>
<td>60.3</td>
<td>3.8</td>
<td>59.1</td>
</tr>
<tr>
<td>Median</td>
<td>9.6</td>
<td>63.6</td>
<td>60.3</td>
<td>3.8</td>
<td>57.2</td>
</tr>
<tr>
<td>Range</td>
<td>5.7-14.6</td>
<td>42.3-90.3</td>
<td>48.5-70.2</td>
<td>2.0-5.7</td>
<td>37.7-84.4</td>
</tr>
</tbody>
</table>

Table 12. Crystal River Surface Finds: Non-Tools

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Total Count (N)</th>
<th>Total Weight (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole/Unmodified</td>
<td>35</td>
<td>1876.5</td>
</tr>
<tr>
<td>Most Whole with Body Whorl/Spire Removed</td>
<td>35</td>
<td>1378.4</td>
</tr>
<tr>
<td>Columella and Body Whorl w/ Spire Removed</td>
<td>2</td>
<td>87.6</td>
</tr>
<tr>
<td>Spire and Columella w/ Body Whorl Removed</td>
<td>1</td>
<td>23.1</td>
</tr>
<tr>
<td>Spire and Body Whorl (connected) Fragments</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Spire Fragments</td>
<td>2</td>
<td>19.2</td>
</tr>
<tr>
<td>Columella Fragments</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>3396.8</strong></td>
</tr>
</tbody>
</table>
recent surface finds further indicates either a weak point in the shell or a commonly used reduction sequence for intentionally removing the spire.

Results: Subsurface Finds

The next step in this research was determining if the materials used in shell production—lightning whelk, crown conch, quahog, etc.—were found throughout the Crystal River site, and not just in burials or the midden. As stated previously, core samples collected site-wide data, both on and off mound areas, with minimally destructive techniques. Once the materials were processed, I used graduated symbols with weight in grams, and created maps of each shell species typically used for shell tool and/or ornament production. By visually displaying these data the concentrations and distributions were revealed. Below are the descriptions and maps of each shell species.

Although oyster was not commonly used for shell tools or ornaments, it is instructive to examine the distribution of this shellfish taxon before proceeding to others of greater potential significance in shell ornament manufacture. Examining distributions and densities of this species reveals concentrated locations of shell around the site—including areas of interest in regards to other shell material. As seen in Figure 16, the distribution of oyster throughout the Crystal River site largely follows the “fishhook shaped” (Bullen 1966), which runs along the southern portion of the site. Dark blue circles represent the presence of oyster seen in the core samples—the larger the symbol, the more oyster collected. The absence of oyster in a core sample is designated by a
Figure 16. Location of subsurface Atlantic oyster from the Crystal River Archaeological Park.
small gray circle. “Empty areas,” or areas without oyster, are located mainly in the northern plaza—a location most likely kept clean and clear of garbage or other debris. Oyster totals from all core samples are displayed in Table 13.

Quahog clam shells are typically used for utilitarian purposes, rather than as ornaments, since their thickness is ideal for celts, adzes, and other cutting edge tools. Still, quahog appeared in burial contexts in Bullen’s collections so it is worth examining...
the distribution of these species for possible evidence of manufacture. As seen in Figure 17, quahog was present in relatively small quantities and localized areas in the cores. Amounts are seen in Table 14. No quahogs were recovered from cores in the northern areas of the site, including the more northern mounds. However, quahog was recovered from cores at the southern end of the site near Mound A, Midden B, and along the edge of the river. This is consistent with the findings of Ellis (2006), who noted an abundance of quahog in his excavations for the construction of a new boat slip in this area. The presence of quahog in these areas of the site could indicate limited production of ornaments. However, I assume that the bulk of quahog simply represents food refuse, with some of the shells re-used as utilitarian tools. Consistent with this, quahogs recovered by Ellis were generally either unused or showed use as anvils or other scraping, cutting, or shaping tools.

Florida crown conchs are not well represented as ornaments at Crystal River, but it is possible that some of the heavily modified, smaller plummets were manufactured from this species. Regardless, crown conch is by far the most frequent species of large gastropod encountered at Crystal River in both Bullen’s assemblage and the surface and subsurface collections (Figure 18). While this species remains the most abundant large gastropod in the subsurface collections, only nine specimens were recovered by the subsurface samples—a striking difference compared to previous assemblages (Table 15). The core samples reveal that crown conchs are found mostly in the midden area, but also in Mound K and along the river. The presence of crown conch in the midden could be indicative of ornament production, but there is good reason to doubt this is the case.
Figure 17. Location of subsurface quahog clam from the Crystal River Archaeological Park.
Table 14. Subsurface Collections: Quahog

<table>
<thead>
<tr>
<th>Core #</th>
<th>Fragments (N)</th>
<th>Weight (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>2.13</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>7.48</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>0.56</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>2.69</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>0.96</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>12.3</td>
</tr>
<tr>
<td>36</td>
<td>26</td>
<td>24.05</td>
</tr>
<tr>
<td>39</td>
<td>6</td>
<td>0.92</td>
</tr>
<tr>
<td>44</td>
<td>4</td>
<td>13.04</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>64.13</td>
</tr>
</tbody>
</table>

As noted above, the assemblage of whole and larger shells from controlled surface collections revealed that most crown conchs are either unworked or used as hafted hammers/pounders; only a few show breakage patterns possibly indicative of reduction for shell bead production. I assume the same to be true of smaller fragments recovered from cores. Crown conchs from the cores were classified by debitage characteristics (Dean et al. 2008), but since the GeoProbe pushed through cultural deposits, and may have punctured or pulverized whole shells, it is impossible to determine tool type or a reduction sequence. Still, body whorls, columellas, and body whorl/spire fragments were the most abundant common debitage.

Lightning whelk appears to have held a higher value than other large gastropods for the inhabitants of Crystal River and Hopewellian sites more generally, as evidenced by its abundance in burials as gorgets, cups, dippers, spoons, and more. Given this, the paucity of lightning whelks in off-mound areas at Crystal River is surprising (Figure 19). Further, lightning whelks were found in only two cores—one on Mound A, and the other in the midden. Both consisted of small shoulder fragments, as consistent with Dean et al. (2008) (Table 16). Because lightning whelk shells are large and relatively thick, it seems
Figure 18. Location of subsurface crown conch from the Crystal River Archaeological Park.
likely that this species would be recognized in the core samples, particularly if present in significant quantities. The fact that whelk is rare in off-mound contexts indicates that there was little, if any, reduction of these shells on site. In fact, there is little evidence for production of any shells artifacts on site at Crystal River—a topic that is discussed in the next chapter.

This chapter has displayed the results of Crystal River shell data both numerically and visually. Shell appears in abundance in past excavations, but the recent investigations uncovered few raw shell materials used for creating ornaments and tools. Chapter 6 explores additional hypotheses for potential manufacture at Crystal River.

Table 15. Subsurface Collections: Crown Conch

<table>
<thead>
<tr>
<th>Core #</th>
<th>Fragments (N)</th>
<th>Weight (G)</th>
<th>Debitage Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>4.4</td>
<td>Columella frag.</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>0.1</td>
<td>Columella frag.</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1.42</td>
<td>Body whorl frag.</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>3.32</td>
<td>Columella frag.</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>0.06</td>
<td>UID conch frag.</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>4.18</td>
<td>Spire/body whorl frag.</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>3.37</td>
<td>Body whorl frag.</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>1.82</td>
<td>Spire/Body whorl frag.</td>
</tr>
<tr>
<td>44</td>
<td>1</td>
<td>20.34</td>
<td>Columella/body whorl frag.</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>39.01</td>
<td></td>
</tr>
</tbody>
</table>
Figure 19. Location of subsurface lightning whelk from the Crystal River Archaeological Park.
Table 16. Subsurface Collections: Lightning Whelk

<table>
<thead>
<tr>
<th>Core #</th>
<th>Fragments (N)</th>
<th>Weight (G)</th>
<th>Debitage Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
<td>4.6</td>
<td>Spire/body whorl frag.</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>6</td>
<td>Spire/body whorl frag.</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>5.2</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 6

Discussion

In this chapter I interpret the results of my analysis including the spatial distributions of ornamental and utilitarian shell materials seen in the surface and subsurface collections, as well as the findings from my inventory of the assemblages previously excavated by Moore and Bullen. Several hypotheses and alternative concepts are proposed in order to better explain the disproportionate presence of Hopewellian items at Crystal River, while still assuming that shell was in high demand and at the center of the Crystal River’s exchange network. As a corollary, I consider several nearby sites and regions that may be key to understanding Crystal River’s unusual Hopewellian artifact assemblage.

Manufacturing Evidence or Lack Thereof

Several previous researchers (Goad 1979; Mills 1909; Winters 1968) interpreted Crystal River as a provider of large gastropod ornaments and tools to interior sites based on the large quantities of modified shell uncovered in burials in conjunction with non-local materials such as copper from the Midwest. However, while Crystal River was located close to natural shell resources found in the river and the Gulf of Mexico, larger gastropods, such as lightning whelks, are not abundant of this section of the coast, as
evidenced by their absence in the Crystal River midden. Further, this thesis data does not support the notion that Crystal River inhabitants were producers of shell goods.

If shell was the major item of export at Crystal River, as Goad suggested, one would expect to see shell caches, large quantities of debris, and/or tool or ornament “blanks” at the site (Luer et al. 1986). Only minimal evidence was uncovered to support small scale production of certain items such as conch hammers and possibly shell bead manufacture. However, the previous collections do reveal an obvious distinction between shell items from on-and-off mound areas, separating ceremonial from domestic space. Interestingly, the materials seem separated not only by function, but also by raw material. Moore found abundant lightning whelk ornaments in the Main Burial Complex while Bullen uncovered predominantly crown conch hammers and pounders in the midden. The surface collections and coring data support these findings. Therefore, unless interred, shell ornaments, as well as the common raw materials used in ornament production (i.e. lightning whelk), were scarce throughout the site.

Even larger lightning whelk fragments were found in the Main Burial Complex indicating that this specific raw material was valued prior to modification—a value that persisted throughout the Woodland and Mississippian Periods. Some researchers (Kozuch 2013) have suggested that Southeastern peoples correlated the unique counter clockwise spiral of lightning whelk shells to the path of the sun, black drink rituals, and death and purification, based on ethnohistorical accounts of the Creek people, who stressed the importance of circular directionality throughout life. The value of the lightning whelk is seen throughout the Eastern United States as many appear as ornaments or are imitated by ceramic spiral effigies of lightning whelk cups uncovered in
interior sites where whelk does not naturally reside. Consistent with this hypothesis is that most of the lightning whelk fragments uncovered in the Main Burial Complex were spires. Displayed in the previous chapters were two examples of spire fragments excavated by Bullen, including one of a complete intact lightning whelk spire exhibiting the spiral with the distal end of the shell removed. Lightning whelks, particularly spires which display the circular motif, would have made fitting grave goods—especially if correlated with death.

Similar circular motifs are also seen on gorget ornaments uncovered by Moore at Crystal River. Many of these items are what George Luer refers to as “tabbed circle artifacts,” and consist of a circular gorget design, commonly with incised concentric circles, a circular hole in the center, and a tab, or protrusion, on one end of the shell item for suspension purposes (George Luer, personal communication). This motif is similar to the lightning whelk spirals, and may have invoked the circular directionally that these individuals found important. TCAs, as Luer abbreviates them, are found throughout Florida, though are not abundant—only fourteen total across the state with 7 unearthed at Crystal River. Luer concluded that these items revealed both the status of certain individuals and emerging social complexity in various sites during the Middle Woodland Period. The quantity of these items found at Crystal River further reveals the importance of this site to Florida and surrounding regions.

The Crystal River surface collections were dominated by crown conch shells that remained unworked or had minor alterations for use as hammers. However, minimal evidence for shell bead manufacture was found on the crown conch surface finds as a few shells revealed missing rectangular sections of body whorl of the sort identified by
Pearson and Cook (2012) as indicative of bead manufacture. Yet, the lack of bead caches or more shells displaying similar missing sections of body whorl argues against production of these artifacts at the site.

Crown conchs were likely too small for shell gorget manufacture, and while several of the columella plummets uncovered during Bullen and Moore’s excavations exhibit characteristics of right-handed spiraling gastropods, the lack of crown conch evidence in burials strongly suggests that these shells were rarely used as grave goods. The right handed gastropods were most likely horse conch. However, the consistent size seen in the shell hammer assemblage suggests that the Crystal River inhabitants were selective and skilled in creating these items, and the shear abundance of crown conchs indicates their constant use. However, outside of crown conch hammers there is an overall lack of raw materials at the site to indicate large scale shell ornament or tool manufacturing of any other item. In other words, there is no evidence for onsite mass shell production in any of the shell assemblages, and while the individuals at Crystal River appear skilled with shell, they may not have created the ornamental assemblages uncovered in the Crystal River burials. Therefore, additional sites must be analyzed for potential involvement in shell production and exchange.

Goad (1979) interpreted Crystal River as a distributing regional center for sites in Florida. Other major sites she mentioned included the Cedar Key Mound, the Safford Mound, and the Sarasota Mound, all of which are located linearly along the Gulf Coast. Goad hypothesized that these larger mound sites were key components in a trade route that connected Crystal River to southern areas of Florida as well as to the northwestern Santa-Rosa Swift Creek region—a region which potentially provided a gateway for
accumulating artifacts, such as copper, from the Cartersville and Copena regions (Goad 1979:243), and an area known for producing large quantities of goods, including shell (Harke 2012). Goad states:

Southeastern Middle Woodland exchange may have operated in the following manner: copper, galena, and other exchange items from the Middle West and Great Lakes entered the Southeast through the northern complexes such as the Copena regional centers, Wright and Roden, or through the Tunacunnhee site. The mechanism of exchange responsible for the transport of goods was probably reciprocity between groups, populations or individuals (Goad 1979:245).

Goad’s work revolved around the sourcing of copper, which traced back to Midwestern regions, leading her to believe that items ‘pooled’ into regional centers for a reciprocal exchange of goods. The most obvious reciprocal exchange at Crystal River would be large *Busycon*, and while archaeological evidence has supported their trade, as per Goad’s hypothesis, the results for this study do not support the notion that Crystal River inhabitants were manufacturing shell ornaments for exchange, at least in the sort of quantities Goad implies. Assuming that Goad is correct in her suggestion that shell was a major export, albeit not in her assertion that Crystal River was a center of shell ornament production, I propose several hypotheses to help explain the immense quantities of non-local materials at Crystal River. Future research may consider these hypotheses for additional testing.

*Raw Material Supplier Hypothesis*

The inhabitants of Crystal River may have procured large gastropods and other raw materials for shell ornaments and traded them whole and unworked to other communities in exchange for copper and other exotics. Consumers would have
manufactured the shells into their own desired shapes and designs. Consistent with this, some researchers (Breton Giles, personal communication) have found Crystal River shell gorgets to be unlike any seen in the Midwest, which supports the possibility that large whelks were exported unworked and later modified after travel.

The absence of lightning whelks seen in the Crystal River area provides additional support for this hypothesis. Lightning whelks need salt water to survive instead of the fresh or brackish water in the Crystal River. These gastropods were out in the Gulf area, which is relatively close by, but perhaps not close enough to provide the site with abundant shell for mass production of these materials. With copious lightning whelk artifacts in burials, but little to no evidence of these shells in the core samples and surface finds, the inhabitants may have modified only few whelks for ceremonial purposes while trading the majority of this species out whole and unmodified in exchange for Hopewellian goods.

Other archaeologists (White 2012) have suggested that large gastropods were transported whole with yaupon holly leaves—a plant used to make the “black drink” for purification rituals during the Middle Woodland period. This type of holly is a drug native only to the southeastern United States coastlines, and early explorers noted that “Men often drank these beverages from cups made of marine shells” (Crown et al. 2012:13944). Dippers are found in abundance at Crystal River and other Gulf Coast sites (Moore 1903, 1907) as well as in northern interior sites (Goad 1978; Seeman 1979). Recent evidence has uncovered traces of yaupon holly on Cahokian ceramic containers (Crown et al. 2012). While this site is later in prehistory than Crystal River habitation, it indicates a trade network that may have been established much earlier for this perishable
raw material. Raw materials have only so much value by themselves and this value varies from society to society. However, even today people will go to great lengths to acquire drugs. The yaupon holly leaves were presumably used in religious or ceremonial contexts, and perhaps it was rare Gulf Coast shells in conjunctions with native Gulf Coast drugs that thrust Crystal River into Middle Woodland exchange networks, which continued sporadically into later periods of prehistory.

*The Satellite Workshop Hypothesis.*

The limited evidence for whelks in the core samples and surface finds strongly suggests that very little or no manufacturing of shell ornaments was occurring on site. One alternative option is that the inhabitants of Crystal River produced shell ornaments at workshops in the surrounding area, perhaps closer to whelk habitat. Ornaments arrived after production, fully or nearly completely finished. Once on-site, they were distributed among the community, some ending their use-lives in burials and others traded out for items such as copper (Figure 20).

Discussed previously in the Methods chapter, Luer et al. (1986) encountered shell tool blanks at Big Mound Key. Accumulating valuable items shows how materials, “…could be controlled and exchanged to members of a community, who then shaped them into finished tools [or ornaments as needed]” (Luer 2013:14). Previous research along the lower Myakka River has found evidence for shell tool blanks and other marine goods acquired through trade, as many are not native to this area (Luer 2013). Off-site
caches, or caches from another site involved in exchange with Crystal River, are both possibilities that should be explored.

Today, the Crystal River mound complex is only partially preserved. Many off-site, non-mound areas, extending into the adjacent residential homes are thought by some to have been used for habitation and other activities at Crystal River (Gary Ellis, personal communication). In fact, Midden B extends into the residential area along the river at the southeastern end of the site (Pluckhahn et al. 2010). The potential for an off-site shell workshop is certainly possible, but no archaeological work has ever been conducted on these privately-owned portions of the site. If permitted, future research should
investigate the surrounding site areas and determine if workshops were present in locations not included in the modern day park lands.

*The Shell Broker Hypothesis*

This alternative suggests that Crystal River functioned as a type of intermediary trade center; items such as whelks entered Crystal River from other sites, probably to the south where these are more abundant, and were traded out of Crystal River for non-local Hopewellian items such as copper (Figure 21). The inhabitants of Crystal River then traded some Hopewellian goods back to the shell suppliers for more worked shell. More distant mound complexes to the south where large whelks are more abundant would be of particular interest, especially since Hopewellian materials appear at sites south of Crystal River in small amounts (Bullen 1951, 1953, 1966; Ruhl 1981; Seeman 1979; Thompson and Pluckhahn 2012). Others have noted the presence of both *Busycon* gorgets and Hopewellian-attributed materials from St. Johns sites (Brent Weisman, personal communication). Perhaps these sites were participating in this pattern of exchange, and their artifacts were filtered through Crystal River before shipping out to the Midwest.

Carr (2006) discussed long-distance exchange of valuables among elites, who saw both a value and need for objects associated with powerful places or events to maintain elite status. One model reveals elite individuals hoarding objects of ritualistic and powerful value to visually reinforce their power over others though material accumulation. Non-elites viewed these items as powerful and spiritual, which then transferred to the owner, or in this case, the elite member who, through amassing rare and
sacred objects, embodied the revered objects’ sanctity (Carr 2006; Earle 1997; Helms 1976; Renfrew 1986). Alternatively, elites may have also amassed valuables to distribute to non-elites, who needed to make some form of social payment. The non-elite individual, along with many others, then became indebted to the elite and was expected to repay the debt through some other means (Carr 2006; Brown et al. 1990; Earle 1982; Feinman 1995). While it would be difficult to distinguish between the two models archaeologically, the common denominator resides with elite individuals fueling the movement of goods and raw materials into their communities for personal gain and
wealth of the society. Burials uncovered at Crystal River containing elaborate non-local, Hopewelian materials and artifacts suggest elite influence over the accumulation of these items, and this topic should be further explored in order to understand not only exchange patterns, but also social structures at Crystal River.

Goad mentioned that linear exchange may have existed between Cedar Key, Crystal River, Sarasota, and the Safford mounds. All sites have revealed evidence of copper, shell, stone, and other exotics, but, as previously mentioned, Crystal River holds the highest quantities of these artifacts in its assemblage. Copper was found in sheets at Safford Mound, as a bead in Sarasota, and as a pendant at Cedar Key (Goad 1978:176), while Crystal River contained copper earspools, beads, pendants, breastplates and panpipes. Stone plummets—another traded item—were also found at all four sites, with Sarasota containing the most. While shell is a local and easily accessible material in Florida, shell artifacts, particularly ornaments, are scarce at Safford, Sarasota, and Cedar Key. In fact, Cedar Key revealed no shell pendants, cups, beads, or gorgets, and Safford and Sarasota contained only few shell cups (Goad 1978:177)—a striking difference when compared to the Crystal River shell assemblage. Linear exchange most likely continued northward into the panhandle where some archaeologists (Nancy White, personal communication) have found shell ornaments and other Hopewelian goods similar to those at Crystal River. Like artifacts are indicative of exchange and may support Goad’s hypothesis that the northwestern areas of Florida acted as a gatekeeper, filtering goods in and out of the region (Goad 1978; Nancy White, personal communication).

The Safford Mound is located south of Crystal River in the Tampa Bay area, and was first excavated by Frank Cushing in the late 1800s. While shell artifacts were less
abundant at Safford when compared to Crystal River, Safford is located in a more ideal location for retrieving large gastropods. Additionally, several excavated shell artifacts from Safford included “Busycon ladles” (Bullen et al. 1970:104), and tools such as adzes. Many of these were associated with burials (Bullen et al. 1970; Kolianos and Weisman 2005). The Safford mound also revealed plummets of stone and copper—similar to those at Crystal River, and also had similar burial practices such as bundling (Bullen et al. 1970; Kolianos and Weisman 2005). While no archaeological testing has been conducted, Safford inhabitants may have transported shell to Crystal River in exchange for non-local raw materials. While there is no way to directly test relations between these two sites, there are enough artifact similarities to presume interactions.

Another site located in the Lake Okeechobee Basin in southern Florida is Fort Center site, which has been connected to Crystal River by several researchers based on similar artifact assemblages and a circular embankment surrounding the burial mounds at both sites (George Luer, personal communication; Thomas Pluckhahn, personal communication). While Fort Center lacks the quantity of non-local goods compared to Crystal River, galena, copper, and stone items were uncovered (Sears et al. 1994). Of even greater interest, over 400 shells, shell tools and fragments from conchs, *Busycons*, and more were recovered from the Fort Center site. According to Sears et al. (1994), the tools were created from either whole shells or just the lip of the conch for a smaller cutting blade (Sears et al. 1994:84). Celts, adzes, picks, gouges, dippers, and cups were created from modified *Busycon perversum*, *Triplofusus gigantea*, and possibly *Marginella* and *Strombus gigas* (Sears et al. 1994:84). However, while Fort Center shares similarities with Crystal River, it is located inland. Therefore, this site was most
likely acquiring shells through trade instead of providing large gastropods to northern sites. Yet, the similarities in artifacts and mound structure suggest enough evidence to connect Crystal River with Fort Center, even if shell ornament donations were not the primary association (Thompson and Pluckhahn 2012).

North of Crystal River lies the Santa Rosa-Swift Creek region, first defined by Gordon Willey (1949a) during his work on the Florida Gulf coast. The region shares a lot of artifact similarities with Crystal River including: elaborate pottery, copper, stone and shell items. Willey hypothesized that the Santa Rosa-Swift Creek region imported copper in finished form, and may have created several stone artifacts based on found stone chippings. However, shell carving, he mentioned, was “local and well adapted” (Willey 1949a:394), and artifacts such as effigy gorgets, *Busycon* hammers, *Strombus* celts, beads, and plummets were unearthed in the excavations.

As state previously, Goad proposed that the Swift Creek region acted as a middleman between interior sites and Florida regional centers. Particularly she mentioned two major Santa Rosa-Swift Creek centers—the Yent and Pierce mounds—which she believed were responsible for cycling local and non-local materials into and out of the region. Stone, mica, copper, and galena entered the network in exchange for barracuda jaws, shark and alligator teeth, and marine shell (Goad 1978:174-5). Crystal River most likely participated in exchange with the Santa Rosa-Swift Creek region in order to acquire non-local goods from the interior.

In her dissertation, Kozuch (1998) analyzed marine shells from the Mississippian Period. While her focus is much later than the pinnacle of Crystal River habitation, she nevertheless examines Florida marine shell exchange, and her work is thus relevant here.
Kozuch suggests that the Calusa region in southwestern Florida may have provided large gastropods to the interior. Kozuch states, “It is on the southwest coast of Florida that the most lightning whelk shells are found in archaeological middens, as well as from modern collections” (Kozuch 1998:139-140). Crystal River has scarce evidence of lightning whelk in the midden, indicating no shell manufacture on site. However, sites located further south of Crystal River have revealed a strong presence of lightning whelks in midden areas. Southern sites may have been the suppliers for Crystal River shell ornaments and tools found in the Main Burial Complex. Kozuch believes that whelk shells were traded for animal hides or willow bark—two materials that would not have preserved in Florida soils and be difficult to prove archaeologically. Further, while these may have been highly demanded during the Mississippian Period, previous Woodland sites involved in shell production may have sought items like copper, mica and galena, like the Crystal River inhabitants.

The Shell Broker hypothesis suggests that multiple sites were involved in exchanging large gastropods and/or bivalves across modern day Florida, through Crystal River, and into the interior of the United States. Several sites with similar non-local artifacts present a starting point for investigating possible exchange routes and interaction for both economic and religious purposes, as stated below in The Pilgrimage Hypotheses.

*The Pilgrimage Hypothesis*

This is a variation on the Shell Broker Hypothesis, but focuses less on economy and more on ceremony as the primary mechanism for the movement of goods. Prehistoric
peoples gathered at Crystal River for ceremonial purposes; sometimes leaving and other times taking tokens of their experience home with them. Ultimately, the net result is the same—some goods remain with the inhabitants at Crystal River and others are offered out to other people to take with them when they leave (Figure 22).

Carr (2006) describes the movement of artifacts and raw materials from a pilgrimage context to a sacred space, stating that power enveloped specific areas based on a location’s history or natural qualities which, most often, differed from the traveler’s homeland (Carr 2006:582). Pilgrimage involved one, several, or a large group of people who travelled together for days, weeks or months at a time, and returned home with raw materials.
materials and/or finished products as evidence of their journey (Carr 2006:583). These objects represented the sacred pilgrimage location, and, as ornaments, publically display the expedition and experience to others in their own communities (Carr 2006).

Sacred locations in nature are not the only hot-spot destinations worth a lengthy journey. Pilgrimages to ceremonial centers—most often built in revered locations—offered specialists such as healers and crafters as well as ceremonial performances (Carr 2006). Ceremonial centers were locations of immense exchange where local and non-local goods circulated from the influx of travelers bringing in and taking away raw materials and artifacts (Carr 2006:590). Crystal River may have acted as such a center, resulting in the abundant quantities of both local and non-local items compared to any other site in over a 100 mile radius (Goad 1978). If so, it would also explain the prevalence of shell goods, which may have been imported, I believe, based on the lack of manufacturing evidence described in this thesis. This hypothesis holds intuitive appeal for explaining the presence of the symbolically-charged lightning whelks revered by the inhabitants and placed in graves.

While lightning whelks were obviously sacred and meaningful to past people, other symbols also surfaced across the eastern United States. Penney (1989) examined similar effigies and symbols found across numerous regions, and argued against the economic value of these goods. Instead, he saw them as religious objects, in which the ideas and symbols were spread as ceremonial rites were learned, such as an apprentice learning ritualistic services and offering them in new locations (Penney 1989). Carr highlights the importance of Penney’s study by explaining how this model provided a means for mortuary practices, religious and other cult-like activities to spread from one
area to another. As stated in Chapter 2, mortuary and religious behavior originally aided in connecting Hopewellian sites to one another, spurring ideas of cults, interaction spheres, and long distance trade of crafts (Caldwell 1964; Carr 2006; Prufer 1964; Struever 1964).

This chapter has explained the Crystal River shell assemblages and the lack of manufacturing data collected thus far. The Crystal River inhabitants appear to have been using shell mainly for utilitarian purposes and not for mass production of shell ornaments for export. Several hypotheses were proposed to explain other avenues of exchange as well as sites possibly involved in shell production and trade. These models may aid in investigating future research on Florida shell exchange—particularly in reference to Crystal River and the Hopewellian Interaction Sphere.
CHAPTER 7

Conclusions

The results of the archaeological analysis of this paper suggests that, while the Crystal River inhabitants may still have been involved in shell exchange as Goad and others hypothesize, there was no evidence for manufacture of shell tools or ornaments for exchange on site. However, the Crystal River inhabitants still accumulated non-local artifacts and materials in significant quantities, which strongly implies that goods and/or services were coming out of, or passing through the site. The most appropriate sociopolitical model for Crystal River remains an anomaly.

Limitations and Future Research

The lack of both finished shell ornaments and raw materials used in shell ornament manufacture in the surface and core samples suggests that other theoretical avenues must be explored, especially since these items were abundant in burials. Several alternative hypotheses are outlined in this thesis, but it was outside the scope of this research to ground truth these theories adequately. More work is needed in the surrounding areas of both the Crystal River Archaeological State Park and in the smaller, locals sites situated in the modern day wildlife preserve to determine if shell artifact manufacture or production was performed off site. Additionally, more distant mound
complexes in Florida, such as Cedar Key, Safford, Fort Center and others that contain evidence of Hopewellian materials, should be analyzed for shell production or shell workshop locations. It may have been these societies that provided shell materials to Crystal River, either for economic or ceremonial purposes, in exchange for non-local goods such as in the Shell Broker and Pilgrimage Hypotheses.

Further, if Crystal River was connected to other inland sites through Hopewellian Interaction Sphere, then large gastropod shells recovered from the Midwest require attention. Shell sourcing has been the topic of more recent research (Bissett 2011; Classen and Sigmann 1993), and may be useful for future research pertaining to Crystal River for determining trade routes, and movement of artifacts and raw materials across the prehistoric southeast.

**Benefits**

While many excavations have been conducted at Crystal River, only few have been conducted since the 1960s, and the site, like many other prehistoric locations along the Gulf Coast, remains insufficiently reported (Pluckhahn et al. 2010). A major goal of this thesis was to bring forth new information not previously observed, with the intention of re-introducing Crystal River to the public as a site that has much to offer about past peoples in Florida. This research successfully applied modern techniques and theories to the Crystal River site and inventoried former underreported shell assemblages from past excavations. This research is one step closer to a more solid understanding of Crystal
River and other Woodland period cultures both on and off the Gulf Coast, and their relationship with the Hopewellian Exchange (Pluckhahn et al. 2010).

Additionally, this research can be applied to interpretive materials at the Crystal River Archaeological Museum. While the museum mentions shell production and possible exchange at the site, most of the exhibits are overwhelmingly full of stone tools, ceramics, and the mentioning of non-local copper goods. This thesis research will aid in highlighting the importance of these materials for utilitarian and ornamental purposes, especially since shell was incorporated into daily life activities just as much as stone and pottery. Additionally, exhibits could also feature the previously-mentioned alternative hypotheses in order to shed light on future work that needs addressing both within and outside of the community. If local residents are aware that a core sample or two in their backyard could aid in understanding Crystal River—such as searching for satellite workshops—they may be willing and excited to participate in future archaeological investigations.

This paper has explored the significance of shell at Crystal River in relation to the Hopewell Interaction Sphere. While shell was valued by the inhabitants, Sharon Goad’s hypothesis, which stated that shell was at the pinnacle of trade, is not fully supported by the evidence in this study. The absence of shell production at Crystal River is surprising, and simple models of supply and demand do not adequately explain the role of shell in exchange patterns, making Crystal River more complex and more interesting than originally anticipated.
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