Safety Harbor at the Weeden Island Site: Late Pre-Columbian Craft, Community, and Complexity on Florida's Gulf Coast

By

Christina Perry Sampson

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Anthropology)
in The University of Michigan
2019

Doctoral Committee:

Associate Professor Robin A. Beck, Chair
Professor Joyce Marcus
Assistant Professor Brian A. Stewart
Associate Professor Michael Witgen

Christina Perry Sampson

cper@umich.edu

ORCID iD: 0000-0002-0855-971X

DEDICATION

For William

ACKNOWLEDGMENTS

Thank you, first of all, to my dissertation committee for your support and guidance. Joyce Marcus has inspired me to succeed from the day we met; when I was a prospective graduate student, she welcomed me into the seminar room with a sleeve of cookies and a confident series of predictions about what I would achieve in the next several decades of my life. Brian Stewart offered valuable, specific advice at the very start of my dissertation research (scale back!), as well as reassurance years later when I realized I should have followed it; in the end, he helped me recognize the strengths of what I had accomplished. I also appreciate the contributions of my cognate committee member, Michael Witgen, whose research on historic Native North America helped me keep an eye on the big picture when I was up to my elbows in mollusk shells. My committee chair Rob Beck has been a mentor, a source of confidence and solid advice, and a model of enthusiasm for working out the events of the past. He was ready to plan the next move at each setback or unexpected turn and was already thinking three steps ahead at each success. Rob has also fostered the best tendencies of community and mutual support among his ever-growing assemblage of students, which is part of what made studying Southeastern archaeology at Michigan such a great experience.

This research emerged from my cumulative experiences at the University of Michigan Museum of Anthropological Archaeology. In my early coursework with faculty including Bob Whallon, John O'Shea, and Henry Wright, I learned how to struggle and to realize the depths of what I didn't know; I believe I learned some other useful things too. I gained valuable knowledge and perspective from coursework and interactions with Carla Sinopoli, John Speth, and Kent Flannery, in addition to my committee members. Lisa Young has been an endless source of goodwill and encouragement, not to mention mentorship on the art of teaching. I have appreciated the kindness and assistance of Amy Winchester, who as far as I can tell has the answer to every question. I am also thankful for the various policies, organizations, and individuals made it possible for me to navigate becoming a parent in graduate school.

I came to my dissertation research at Weeden Island in part because of two formative experiences, which shaped my geographic and theoretical interests. As an undergraduate student I began an internship in the North American Archaeology Lab of the Museum of Natural History, under the direction of David Hurst Thomas; as a result I participated in several seasons of fieldwork at Late Archaic shell ring sites on St. Catherines Island, Georgia. I showed up knowing basically nothing, and was given so many opportunities to learn by Dave, Lori Pendleton, and by AMNH staff including Matt Sanger, Ginessa Mahar, Matt Napolitano, Christina Friberg, and Rachel Cajigas. I have often thought that most of the archaeological opportunities that I have had since can be traced back to my experiences with AMNH.

Early in graduate school I was able to join the field crew of the Crystal River Early Village Project on the Gulf coast of Florida, and to work with Victor Thompson and Thomas Pluckhahn. I am grateful to Tom and Victor for providing me with guidance and opportunities, and for helping me find a place in Florida archaeology. In particular, I developed this dissertation project because Tom introduced me to Weeden Island and the members of AWIARE.

The Alliance for Weedon Island Archaeological Research and Education (AWIARE) has made this dissertation possible, including especially board members Robert Austin, Phyllis Kolianos, and Brent Weisman. AWIARE provided housing and lab space for my field research and tolerantly navigated around the endless boxes of shell midden samples and buckets full of buckets that I left at the research station between field seasons. Their collective knowledge of the Weedon Island Preserve and the archaeology of the Tampa Bay area provided a basis for me to begin my own work at the site. Bob Austin in particular was present throughout my research and helped with everything from coordinating local volunteer labor, to discerning pottery types and chert types, to understanding the scope of previous research in the region.

The survey, excavation, and analysis that comprised the University of Michigan Weeden Island Archaeology Project depended on the contributions of many people. Tim Horsley helped me start things off right by providing his expertise in archaeological geophysics and excellence in cat impressions to the early days of my field research at Weeden Island. I am grateful to the Florida Public Archaeology Network, especially Kassie Kemp, for coordinating volunteer outreach in the sorting of infinite shells and making a significant contribution to data collection for this project. Volunteers at the Weedon Island Preserve provided essentials like utility vehicles, the skilled use of chainsaws, and assistance in keeping things running smoothly on site. This project benefited from the hard work of many regular volunteer crew members, including Amanda Centeno, Kristin Hadley, Brad Lanning, Holly Neville, Paul Randell, Jess Smolen, Sierra Teegarden, Brittany Williams, Kristina Wood, and others. Several graduate student colleagues also joined me in the field, including Lacey Carpenter, Martin Menz, and Kimi Swisher. The process of sorting and cataloguing excavated materials back in Michigan was aided by many people, including especially Katie Steinke and students participating in the Michigan Undergraduate Research Opportunity Program. Martin Menz, thank goodness, took on the task of analyzing lithic artifacts from these excavations.

This project also received material support from several sources. The foresight and generosity of James B. Griffin supported the majority of my fieldwork, via two sources of funding managed by UMMAA. I also made use of a Radiocarbon Years Before Present grant from the museum for this project. The Rackham Graduate School supported my research and writing through the Rackham Humanities Research Fellowship and the One-Term Dissertation Fellowship. A National Science Foundation Grant (BCS-1639357) provided funds for zooarchaeological analysis, macrobotanical analysis, and most of this project's radiocarbon dates. A short-term visitor grant from the Smithsonian National Museum of Natural History supported my analysis of archived materials from the Weeden Island site at the start of my research.

I want to circle back to some of the people at Michigan who shaped and supported me the most, graduate students and alumni of UMMAA. When I arrived at Michigan, I was immediately welcomed into the warm and hilarious world of the North American Range by Casey Barrier, Ashley Schubert, and Alice Wright, and they have been a source of intellectual inspiration, camaraderie, and wonderful nonsense ever since. I have continued to benefit from friendship and conversation with each additional member of our Southeastern crew, including Travis Williams, Kimi Swisher, Tim Everhart, and Martin Menz. Discussions with fellow and former students, including Anna Antoniou, Chelsea Fisher, Jess Beck, and Rachel Lee have helped me think through all manner of things, archaeological and otherwise. Colin Quinn has been a huge help in the realm of radiocarbon dating and the devising of material correlates, plus a role model in conference leadership. My so-called baby sisters, Jordan Dalton, Bree Doering, and Elspeth

Geiger have turned out to be wise beyond their years, and they have shown up for me many times when I needed it. Nothing would be the same without my cohort-mate and amazing friend, Lacey Carpenter. Thank you for prelims, Florida, and everything before, between, and after (thank you for taking me to the pageant).

Finally, I owe my ability to pursue archaeology, attend graduate school, and do this research to the love and support of my family: beginning with my parents, Rick and Jennifer Perry, who have always believed me capable of anything. I am infinitely grateful to my husband Richard, a true partner and someone who sees the world clearly. Sharing a life with you and our son William has given me a necessary refuge and the motivation to complete this dissertation.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

This research explores how daily practices shape community organization and contribute to regional historical trajectories. I focus on a case study of the pre-Columbian Safety Harbor occupation (ca. AD 1000-1500) of the Weeden Island site, on the west central Gulf coast of Florida. Safety Harbor residents of Weeden Island occupied a coastal locale with access to estuarine resources, in a region neighboring powerful and increasingly complex groups, and within a settlement system and political environment that may have begun to adopt new ideologies and organizing principles. This project was designed to investigate a central research topic: During the Safety Harbor period, a time of regional changes in the settlement system and intensified interactions with powerful neighbors, what local opportunities to collaborate, coordinate labor, or compete for resources or authority emerged from the daily domestic practices at Weeden Island?

This case study is situated relative to two broad theoretical realms: the archaeological study of communities and ordinary domestic life, and anthropological approaches to long-term social change, including the development of complexity and inequality in hunter-gatherer societies. In addressing these bodies of literature, I aim to distinguish the local exercise of authority from power and influence at multi-community scales, and to emphasize the place of the local community in investigating broader historical trajectories.

The dissertation project focuses on original research at the Weeden Island site. This research included geophysical survey and excavations and the study of resulting materials,

including stylistic and formal analysis of artifacts (primarily pottery; shell, bone, and stone tools; and shell and bone ornaments and associated debitage), zooarchaeological identification and analysis, macrobotanical identification, and radiocarbon dates. I argue that while there were abundant opportunities for the local coordination of community labor in subsistence activities, the crafting of tradeable shell ornaments was a likely domain for differentiation at an intrasite level and potentially between residents of the residential community as well. This study also has methodological implications for the combined use of magnetic susceptibility and magnetometer in forested shell-bearing sites.

This study highlights that craft production and trade were likely venues for social change in Safety Harbor residential and regional communities. At the local scale, coastal Safety Harbor communities focused on the production of shell beads, and this may also have been an area of experimentation with new divisions of labor, or the development of new ideological or ceremonial concepts. By transitioning from peripheral participants in Weeden Island era ceremonial culture to purveyors of raw and crafted shell goods, Safety Harbor people created a new role for themselves on the regional landscape, with implications for local historical trajectories.

Chapter 1 - Safety Harbor at Weeden Island: A Case Study of Community Organization by Coastal Foragers

Community Organization and Everyday Practice

Archaeologists make regular references to *community* when they discuss an archaeological site with a residential component. The term lends a sense of humanity to the artifacts, deposits, and architecture that the researcher has encountered in some relatively discrete segment of space. When community is equated with the residential site, it functions as a unit of analysis that falls in scale above the household and the neighborhood, and below the region. Beyond this heuristic of scale, some archaeologists have also worked to build a more explicit theory and methodology of community in the past.

Kolb and Snead (1997) developed a definition of and approach to communities that foregrounds the goals and limitations of archaeological research. They define the community as "a minimal, spatially defined locus of human activity that incorporates social reproduction, subsistence production, and self-identification" or local identity (Kolb and Snead 1997:611-612). This definition has been critiqued for emphasizing what archaeologists are capable of identifying, rather than beginning with a more fundamental analysis of communities (Yaeger and Canuto 2000:5). But through their focus on methodology, Kolb and Snead are able to offer three specific analytical strategies for characterizing archaeological communities: investigating how labor is invested (i.e., in what scale and types of projects), how communities are organized spatially, and the extent to which a community maintains physical and symbolic boundaries between itself and other groups (Kolb and Snead 1997:613-615). These frameworks of analysis are designed to facilitate comparisons between instances of community.

Yaeger and Canuto (2000) have argued that community is a social process, rather than a material pattern. They do not consider co-residence a requirement for community, as members of a community may come into regular contact with each other for reasons other than living close by or in the same village. This view of community resonates with the patterns of ceremonial assembly that took place throughout the history of the Southeast U.S. (e.g., Barrier and Kassabaum 2018; Ortmann and Kidder 2013; Wright 2017:54-56), in which sustained interactions built communities were not just incidental to residential patterns, but a deliberate social practice. Yaeger and Canuto also emphasize that, while archaeologists study particular historical instances of community, living communities themselves are dynamic and "ever-emergent" (2000:5). The quality of emergence depends on repeated interactions over time (Yaeger and Canuto 2000:6); thus, members of a community must regularly be in one another's presence, whether or not they reside in the same location.

Harris (2014) has usefully drawn attention to the complicated circumstances of human social configurations by defining communities as assemblages of people, animals, objects, and places. Affective or emotional bonds among people and these other elements of the community assemblage play a role in creating the experience of community, or of belonging. Thus, objects (artifacts) that are used across different contexts and places provide a material and affective link for the people who use them (Harris 2014:91). This perspective expands on the notion of contact or regular co-presence that Yaeger and Cannuto see as essential to community. While communities have aspects that are imagined (*sensu* Anderson 1983) as well as practiced, the constraints and affordances of the material world were fundamental to the creation of specific communities. Harris writes, “The communities we study do not impose themselves on particular places; rather, they emerge through them” (2014:83).

Combined, these perspectives illuminate the role that cumulative, individual encounters and behaviors have in creating community as a lived experience. Practice theory, which focuses on the dialectic interplay between agency and structure, can therefore inform the study of these processes of community formation. Foundational texts of practice theory established that the human body internalizes structural constraints of the world as physical habits (Bourdieu 1977, 1998); that individuals both experience and create structure, in a recursive fashion (Giddens 1979, 1984); and that historical factors have a major effect on how agents’ actions reproduce, or alternatively, transform social structures (Ortner 1984). While ritual practice had traditionally been understood as the realm of social reproduction, adherents of practice theory emphasized the social work done by ordinary activities and routines (Ortner 1984:154).

Archaeological applications of practice theory emerged in the context of post-processualism, as an effort to reckon with human agency more fully (Robb 2010). Archaeologists who effectively use an agency framework acknowledge that human actions are informed by cultural knowledge, and that social structures are reproduced through individuals and their relationships with other elements of their world. In some iterations of this approach, agency is extended from individual people to objects or social collectives (e.g., Gell 1998; Strathern 1988). Dobres and Robb (2005) have observed that certain middle range methodologies, like *chaine operatoire* or the examination of life histories, are particularly well-suited to investigating the dynamics of agency and structure in the past (Dobres and Robb 2005). Some recent efforts in Southeastern archaeology to investigate the everyday lives of past peoples have likewise acknowledged that a great deal of cultural change is enacted through ordinary behaviors and tried to parse those everyday actions from the palimpsest of the archaeological record (Price and Carr 2018; Sassaman 2010).

In this study, I focus on the investigation of domestic activities, with the aim of assessing community organization and shared experiences. In a residential community, everyday activities are shaped by cultural knowledge and expectations, and the organization of community emerges from these behaviors. Community organization can be characterized by how neighbors share or compete, and by how individuals and households exert authority or maintain autonomy. At the scale of a residential community, these tensions may be revealed in decisions about how to collect food, who can learn to craft special goods, which projects merit the collaboration of the group, or where one's relatives are buried. Degrees of inequality or egalitarianism are expressed through these everyday interactions. While local differences in power and influence can be embedded in larger-scale relationships between communities and regions, for most people inequality would be experienced in practical and immediate ways, through daily interactions—within communities. These interactions between neighbors gain additional significance when examined in the context of broader anthropological questions about the nature and development of social complexity and institutional inequality.

Complexity, Inequality, and Trajectories of Social Change

Theories about the development of inequality are often subsumed within the study of social complexity, although the two concepts are not equivalent, and complexity is in some ways the muddier of the two terms. Complexity can be defined in minimal terms as the existence of many specialized, interrelated parts (Price 1981, 1995:143). In human terms, these parts could include roles and institutions in various spheres: economic (jobs, specialized production), social (ethnic identities, degree of prestige, class affiliations), or political (leadership roles, bureaucratic positions). More loosely, we often think of complexity as that quality of human societies that has increased over the whole of our history, and dramatically so worldwide in the past ten thousand years. From this conception, anthropological archaeologists derived the traditional attributes to be expected in complex societies: high population densities, occupational specialization, the production of surplus, social hierarchies, and institutionalized inequality. While agriculture was once considered a pre-requisite for complexity, archaeologists now recognize that hunter-gatherers can also be organized in ways that meet many of those traditional criteria for complexity and displayed other related traits (i.e., sedentism, territoriality, and long-distance exchange) (Keeley 1988; Kelly 1995; Koyama and Thomas 1981; Price 1981; Price and Brown 1985; Testart 1982).

While the "many parts" definition of complexity is process-oriented, traditional applications of the concept have often focused on traits and attributes, in effect conflating the development of distinct social institutions; that is, presuming that traits that are often found together must necessarily occur together. As Charles Cobb (2003:65) has observed for the archaeology of the Mississippian Southeast, research on "complexity" has typically translated to the study of power, authority, and political economy. While political integration can motivate other expressions of complexity—like specialized production or class structures—there may be varied paths to the development of complexity in economic and social spheres. As the study of social complexity becomes more nuanced and diverse, we find that the qualities expected from complex societies do not necessarily develop in concert or in uniform or predictable ways.

Hierarchical organization was once considered essential to the development of social complexity. However, societies may also exhibit complexity under leadership that is temporary and/or situational, as in a simultaneous hierarchy (Johnson 1982) or heterarchy (Crumley 1995). Crumley brought archaeologists' attention to the way they had often conflated order with hierarchy, when in fact societies could be structured so that their many elements were "unranked or . . . possess the potential for being ranked in a number of different ways" (1995:3). Those leaders or units that are powerful in one realm might have less influence in other realms, or at particular times. Heterarchy can work at different scales—individual leaders, kin groups, communities, or polities might relate to one another in heterarchical ways. Heterarchical relationships might be nested within a broader system of hierarchy (e.g., Mehrer 2000). Heterarchy has proven to be a flexible tool for examining how the different parts of a social system can relate to one another.

When societies are structured in complex ways, but without an explicit hierarchy, they might rely on cooperative ritual projects to provide community integration while mitigating the social effects of inequalities in some spheres of life. Behaviors like long-distance exchange of specialized goods, or the investment in labor-intensive projects like monument construction were once thought to require hierarchical complexity (Childe 1950; Renfrew 1973; Trigger 1990). However, such monuments and regional networks are now widely recognized to occur in various hunter-gatherer societies and in the absence of explicit hierarchies (Gibson 2001; Knight 2001; Ortmann and Kidder 2013; Sanger et al. 2018; Wright 2017). In the American Southeast, the construction of mounds and their use as gathering places have been interpreted as cooperative, integrative efforts (Adler and Wilshusen 1990; Knight 2001; Pluckhahn 2010a), often structured by ritual practice (Ortmann and Kidder 2013; Spielmann 2002). In some cases relationships between kin groups or villages involved in these constructions and ceremonies may have been negotiated through heterarchical leadership (Abrams and Le Rouge 2008; Henry 2013).

Seeking integration through cooperative projects can be one way that groups manage the challenges of living together in sedentary communities, especially when permanent sedentism is a relatively recent development. This is the case for early village societies, a category of social formation that emerges through regional changes in settlement and subsistence patterns (Bandy and Fox 2010). Newly sedentary villagers had to cope with the physical and social challenges that follow from living permanently among more people (Bandy 2004; Fletcher 1995; Johnson 1982; Goring-Morris and Belfer-Cohen 2010). On the Gulf coast of Florida, recent work at the Crystal River and Roberts Island sites has drawn attention to the way members of early village societies in the region cooperated and competed at varied scales and in different spheres (Pluckhahn and Thompson 2018). Cooperation in communal projects can take place alongside competition between segments of the community, or between villages. Early village societies were characterized by social innovation (Bandy and Fox 2010). Through this process, communities developed complex traditions and institutions, even in the absence of a politically complex or permanent administrative hierarchy.

While studies of social complexity have traditionally drawn on the terminology and logic of social evolution, it has also become clear that there is no simple trajectory in human history. Decades of anthropological attention to the development of social complexity have demonstrated that there are many ways to be and become complex. Similarly, the study of how and when inequality developed in human societies demands that we reckon with questions of history as well as the ways that human social organization is variable and flexible.

The study of the development of inequality has become somewhat decoupled from that of complexity, in the sense of specialized interrelated parts, but inequality remains a potent issue in its own right. Archaeologists have maintained an interest in tracing the development and persistence of imbalances in economic, social, and political power; indeed, in recent years archaeologists have recognized that the contemporary resonance of this topic has intensified (Flannery and Marcus 2014; Kohler and Smith 2018). Inequality can take different forms, depending on what attribute is unequally distributed (e.g., authority, prestige, material wealth), the scale at which social units are ranked (e.g., individuals, lineages, villages), and the relative permanence of those imbalances. Some interpersonal inequalities are to be expected in any human society, including small-scale hunter gatherers documented in ethnographic records (Flanagan 1989); divisions might fall along gender lines, derive from age and seniority, or depend on individual ability and achievement. Inequalities that become institutionalized through systems of hereditary authority and prestige, however, are not universal; it is this type of inequality whose origins and development we are typically seeking in the archaeological record. With respect to hunter-gatherers and inequality, egalitarian foragers are often contrasted with inegalitarian ones; this dichotomy is sometimes glossed as simple/complex or nonaffluent/affluent, although as Kelly (1995:242) argues, those terms obscure the specific issue of social inequality.

Upon the problem of origins, many have begun with the question of whether inequality or equality is the more natural state. With the most well-known early contribution to this debate, Jean-Jacques Rousseau argued strongly for the latter: that in a primitive state, people were independent and free, until the emergence of property and other aspects of civil society led a segment of the population to establish and maintain artificial differences in rank and wealth. Rousseau pointed to a connection between equality and autonomy that is still recognized as an essential component of egalitarian society (Gardner 1991; Kelly 1995:243-244). In other ways, however, much of the accepted knowledge about the development of inequality has since changed dramatically.

We know now that sociality and culture have long been important for hominin survival, and that early humans were not the loners of Rousseau's conception. Further, anthropologists know that hierarchies are common among those primates who are our closest living relatives, and so inequalities of status and authority would not have been inconceivable to early humans, either (Boehm 1999). Egalitarian societies are not effortlessly so—maintaining equality takes work, often expressed through an egalitarian ethic that uses humor, shaming, and expectations about sharing to prevent material or status inequalities (Boehm 1999; Lee 1988; Wiessner 2002). Having recognized the prevalence of an egalitarian ethic in small-scale, hunter-gatherer societies, most archaeological approaches to inequality anticipate that some social changes were required to spark the development of inequality. Alternatively, some archaeologists have suggested that inequality was more pervasive in early small-scale societies than is commonly acknowledged: Kenneth Ames (2010) has argued that formal egalitarianism—the deliberate maintenance of equality and mitigation of differences in wealth or prestige—was a specific evolutionary development, and therefore not the default mode of small-scale human societies. This framework posits a less linear story of inequality's development, premised on greater variability in the organization of small-scale societies, including hunter-gatherers (see also Sassaman 2004).

Still, the dominant expectation is that nonegalitarian societies developed from egalitarian ones (e.g., Kelly 1995:248), and that the preempting of the egalitarian ethic requires an explanation. Several theories have sought to identify the conditions that would allow a transition from egalitarianism to inequality: individual aggrandizement in the context of abundant resources that permit surplus accumulation (Hayden 1981, 2001); a managerial need for hierarchical leadership in a situation of increased information-processing stress (Ames 1985; Johnson 1982); or a demand for the coordination of labor once sedentism has been established and territorial circumscription has limited access to labor-intensive staple resources (Arnold 1992; Kelly 1995:252-267). In Chapter 4, I review in more detail the potential links between subsistence practices and the development of complexity in hunter-gatherer societies.

Just as there are varied paths to inequality, an uneven distribution of resources and authority can take place at different scales. Institutionalized inequality perpetuates differences between individuals and lineage groups. However, regional patterns of inequality begin to coincide with patterns of political power; for example, as revealed by the site hierarchies that characterize regional political systems like chiefdoms (Anderson 1994; Steponaitis 1978). The same groups or individuals might have access to material goods as well as the ability to exert political authority, but these are also distinct sets of privileges. That is, one can have nice things, especially when they are gained through personal achievement, without the ability to give orders or pass on hereditary status. Achievement-based leadership may have characterized many of the politically autonomous village societies of the past (Flannery and Marcus 2014:183). While material inequality between interacting groups and individuals is a matter of wealth, inequalities in political status and the extent of authority have more to do with political integration or complexity.

Confronting the "Complex Hunter-Gatherer"

The recognition of variability in trajectories of cultural change has had an especially profound impact on the archaeological study of hunter-gatherers. The case study I explore in this volume focuses on a nonagricultural group, but more broadly, investigating the anthropological conception of hunter-gatherers is essential to any reflection on the study of complexity in the past. Efforts to define "hunter-gatherer" as a meaningful analytic social type have been a feature of anthropological discourse since the 1960s; more recently, some researchers question or reject the category entirely. A generalized or stereotypical concept of the hunter-gatherer informed early models of social evolution, in which hunting and gathering was not only a mode of food procurement, but a way of life that interrelated with and determined political organization, settlement patterns, and even cultural values (e.g., Service 1962). Some contemporary examinations have theorized more nuanced links between hunter-gatherer economic structure and social relations on the basis of an ethic of sharing that extends from food to knowledge and authority (Ingold 1999). However, attempts to circumscribe the boundaries of who hunter-gatherers are and what they do also draws attention the exceptions.

Complex hunter-gatherers are a notable and well-recognized exception to the conception of hunter-gatherer societies as small-scale groups with decentralized power and egalitarian relationships. In the early days of the "complex hunter-gatherer" (Price 1981), the concept was still congruent with broader evolutionary models: complex hunter-gatherer societies emerged from simpler ones, potentially through processes of intensification and power negotiations that were analogous to what took place in early agricultural societies (e.g., Arnold 1996:84-85). And yet, there is great diversity in the economic and political structure of groups that we might call complex hunter-gatherers, enough so that general evolutionary models have not managed to explain the variation that has been documented empirically (Ames 2005; Grier 2017; Sassaman 2004:264-6).

The recognition of complex hunter-gatherers was primarily an acknowledgement that an economy based on foraging could support varied social and political configurations. But in other cases, there have been challenges to the idea of a dichotomy between foraging and agricultural production. Hunter-gatherers may manage resources through methods of active niche construction, like burning or deliberate hunting strategies (e.g., Rowley-Conwy and Layton 2011). The management of wild resources can constitute a form of low-level food production, a middle-ground between hunting and gathering and a fully agricultural economy (Smith 2001). In some cases, this kind of intensive management and niche construction was part of a historical trajectory eventually led to farming. Separately, some groups that are commonly considered "complex hunter-gatherers" and which never became agricultural—like the native communities of the Northwest Coast—nevertheless utilized food production, like cultivating non-domesticated crops and shellfish (Deur and Turner 2005; Lepofsky and Caldwell 2013).

At this point, the exceptions to the archetypical hunter-gatherer society are numerous enough that, for some, the utility of the category is in question. In archaeology, conversations about long-term trajectories and broad-scale trends necessarily engage with a central tension in the discipline, between the acknowledgment of diversity and the creation of categories, types, and overarching narratives. This tension pervades most levels of archaeological research, and it is probably unavoidable, even productive in its own right. Broadly, the most useful reflections on categorization engage with specific terms on their merits and shortcomings, acknowledging that variability and the utility of heuristic categories can coexist (e.g., Beck 2003; Fowles 2002). When it comes to so-called complex hunter-gatherers in North America, some archaeologists have discarded the label and its evolutionary baggage in favor of focusing on distinct regional histories of culture change (e.g., Moss 2011). Some have not rejected generalizable heuristic categories entirely, but have chosen to conceptualize the groups they study according to different rubrics, as Pluckhahn and Thompson (2018) have done by analyzing Crystal River as an early village society. These alternate frameworks can facilitate more detailed investigations of specific historical patterns of change. However, ongoing research should balance this specificity with a recognition of the value in comparative studies based on detailed regional histories.

Even if there are points of unity among groups who subsist on wild and not farmed foods, to what uses should archaeologists put the categories we have created? Epistemological debates about evolutionary versus historical analyses of the past are still potent in hunter-gatherer research (Sassaman 2004). That is, some researchers tend to seek generalized explanations for patterns of change, while others focus on examining specific trajectories as contingent on historical factors. To the extent that anthropologists include hunter-gatherers in broader discussions about complexity and long-term processes of change, a progressivist orientation is hard to avoid, despite evidence that there is no directional trend to the variability found among hunter-gatherers (Rowley-Conwy 2001). North American archaeologists have in recent years tried to reconcile specificity and human agency with the multi-scalar cultural processes through a framework of "historical processualism" (Pauketat 2001), and some archaeologists of hunter-gatherers have taken up this approach, which is grounded in theories of practice (e.g., Sassaman and Holly 2011). Through efforts to "historicize" the hunter-gatherer past (Sassaman 2010), archaeologists are placing renewed emphasis on the degree to which cultural developments are contingent on events of the past—and of a specific past, inhabited by specific communities. From this perspective, regions have become increasingly important as the scale at which we should expect to analyze processes of historical change.

Domestic Practice and Patterns of Change at Weeden Island

This research aims to explore how the daily practices of neighbors shape community organization and contribute to regional historical trajectories. To this end, I focus on a case study of the pre-Columbian Safety Harbor occupation (ca. AD 1000-1500) of the Weeden Island site, on the west central Gulf coast of Florida. Safety Harbor residents of Weeden Island occupied a coastal locale with access to estuarine resources, in a region neighboring powerful and increasingly complex groups, and within a settlement system and political environment that may have begun to adopt new ideologies and organizing principles. This project was designed to investigate a central research topic: During the Safety Harbor period, a time of regional changes in the settlement system and intensified interactions with powerful neighbors, what opportunities to collaborate, coordinate labor, or compete for resources or authority emerged from the daily domestic practices at Weeden Island?

To this end, I have found some value in each of the synthetic approaches to the archaeology of community discussed at the start of this chapter. Harris' expansive notion of communities as assemblages has been useful for examining the various components of community manifest at the Weeden Island site: artifacts, the depositional remains of daily practice, the landscape and natural resources. Yaeger and Canuto's discussion of the way that shared premises and ongoing interactions reinforce one another provides a basis for investigating diverse domestic activities as practices that continually build community (Harris articulates a similar concept as "the ideological and spatial component[s]" [2011:80] of community). While the scope of this study is limited in time to the early Safety Harbor period, the deposits I study here nevertheless resulted from multiple centuries of human activity. The dynamic, ever-emergent (Yaeger and Canuto 2000:5) qualities of community are therefore important to consider in defining the social configurations examined here. Kolb and Snead's approach to analyzing specific archaeologically-visible elements of a community—labor investment, spatial relationships, and boundary maintenance—provided a model for characterizing the Safety Harbor Weeden Island community in terms of variables with comparative potential.

In this study, I am not seeking to confirm the presence or absence of complexity in a single community, but rather to document practices that had the potential to contribute to the processes of cultural change that characterized the Safety Harbor era. The study is necessarily limited by its focus on a single site, since many relevant influences take place at the inter-site or inter-community level, but this focus also facilitates an examination of socio-political complexity from the perspective of ordinary domestic life in a residential setting. This study is therefore one contribution to broader project of investigating pre-Columbian cultural change on the Gulf Coast of Florida.

Volume Overview

In this chapter, I presented the theoretical background and motivation for this research and introduced the case study of late pre-Columbian community at the Weeden Island site. In Chapter 2 and Chapter 3, I provide background relevant to this particular case study. Chapter 2 presents an overview of the regional and temporal context of Safety Harbor culture. I situate this relatively understudied archaeological culture with respect to the major changes that were happening in neighboring regions and the new opportunities and negotiations Safety Harbor people might have encountered in this social landscape. I also discuss the cultural traditions that were in place by this time and the aspects of life we believe were changing during the early Safety Harbor period. I aim to show how conditions existed for Safety Harbor people to enact dramatic changes at both local and regional scales, though perhaps in ways that differed from their neighbors. In Chapter 3, I focus on the landscape and history Weeden Island site, including early and recent archaeological research there. I provide an overview of the design and methods of field research conducted at Weeden Island for this project in 2013-2015.

In Chapter 4, I present my theoretical and analytical approach to the study of community organization. I focus on three domains of community practice: the spatial and social organization of domestic activities, the subsistence pursuit, and the production of everyday and extraordinary objects. The information in this chapter offers a bridge between the project's central questions about organizational variation by hunter-gatherers and the specific data sets provided by the Weeden Island case study. The material discussed in Chapter 4 also provides background to the research questions, data, and interpretations I present in Chapters 5-7.

The next three chapters present the results of new fieldwork and analysis at the Weeden Island site. Chapters 5, 6, and 7 each focus on a different set of related research questions. These correspond to an extent with different classes of material culture and lines of evidence, although there is some overlap with regard to the data relevant to each set of research questions. Chapter 5 provides important context for subsequent chapters by presenting information about site structure and chronology through an examination of deposits identified with geophysical survey and excavation, including results of radiocarbon dating. In Chapter 6, I focus on questions about how residents collected and processed plant and animal foods. I also address uses of plant and animal resources that seem to fall outside of the scope of typical subsistence. I draw on zooarchaeological and botanical data as well as material culture that relates to food collection, processing, or consumption. In Chapter 7, I address questions about crafting activities, including material procurement, the relationship between crafting and neighboring communities, and the local organization of crafting activities. I draw on data from several classes of material culture recovered at the site, including pottery, lithic artifacts, and modified shell and bone artifacts.

In Chapter 8, I synthesize the data and interpretations of Chapters 5-7 and address questions about the scale of social practice and tempo of site use that were introduced at the start of Chapter 5. I also begin to put the Weeden Island case study in comparative perspective. In Chapter 9, the conclusion to this volume, I return to the central questions of this study, regarding community organization by coastal foragers and the role of local practices in regional processes. I discuss how this case study informs our understanding of the historical trajectory of the Tampa Bay region, along with some limitations of the study, and I propose directions for future research in the region.

Chapter 2 - Situating Safety Harbor: Trade, Tradition, and Rivalry on the Gulf Coast of Florida

The Safety Harbor archaeological culture describes the occupation of the central peninsular Gulf Coast area of Florida during the Mississippi and Spanish contact periods (ca. AD 900-1725). I will concentrate on the pre-Columbian phases of Safety Harbor, i.e., the era before the arrival of the Spaniards. Prior research on the Safety Harbor culture has focused on the role of mound architecture, the extent of Mississippian influences and interactions, change and continuity in local ceramic practices, and the production and trade of marine shell goods. Expectations about the development of social complexity in the early Safety Harbor period have been an undercurrent to much of this work. Safety Harbor people maintained a mode of subsistence focused on wild and aquatic resources, like generations before them. They may also have adopted new ideologies and engaged in sociopolitical reorganization. Safety Harbor is a uniquely well situated test case for evaluating hunter-gatherer complexity because it is located between complex agricultural Mississippian groups to the north and complex fisher-hunter-gatherer Calusa polities to the south, and relations with each of these groups shaped the practices of Safety Harbor people.

Placing Safety Harbor in its Regional Context

When Spanish explorers arrived in the Americas in the 16th century, they initiated a new era of interaction, with catastrophic effects for native communities. But the world they entered was already variable and interconnected: In the centuries just prior to the Spanish arrival, native groups throughout the continent had been experimented with new forms of social organization, in some cases enacting dramatic changes in the ways people lived. Across the Eastern Woodlands, prominent Mississippian centers like Cahokia, Etowah, Moundville, and others hosted a confluence of ceremony, specialized craft and trade, and political maneuvering. Populations migrated, coalesced, and splintered again; meanwhile, communities adapted to the routines of intensive agriculture and to the demands and opportunities of emergent chiefly polities. The late prehistoric political landscape was dynamic, and in some ways uneven; not all communities were equally enthralled in the Mississippian project. Some resisted, some participated, and some were marginalized, and even strong leaders and lineages did not maintain unending power.

The Mississippian story provides an overarching structure to the ebb and flow of political and social complexity in these late prehistoric centuries across much of the Eastern Woodlands. But beyond the Mississippian maize fields, inhabitants of the Florida peninsula were constructing their own mounds and monuments, building cosmologies that drew on local circumstances of ecology and interaction, and competing for leadership and authority. Floridian histories intersected with those of the Mississippians, too. Recent work in late pre-Columbian Florida archaeology has highlighted the exchange of materials, goods, and ideas between Florida and the Mississippian world (Ashley and White 2012; Ashley and Rolland 2014; Ashley 2002, 2012; Luer 2014; Marquardt and Walker 2012; Mitchem 2012; White 2014). Yet while native Floridians certainly engaged with their northern neighbors and contributed to continental histories, most of Florida's inhabitants lived very different lives from Mississippian farmers. Ecology and environment throughout the peninsula limited the feasibility and value of maize agriculture; meanwhile, coastal environments in particular offered other, unique opportunities for innovation and complexity (Thompson and Worth 2011). People throughout Florida's coastal, riverine, and lacustrine environments harvested aquatic resources, traveled and fished by boat, and modified landscapes with the remains of extensive shellfish harvests. The interactions among the residents of Florida's Gulf Coast, and between Florida and the world of the Mississippians, established the setting for the development of Safety Harbor culture.

The Calusa of South Florida: Powerful Neighbors, Potent Rivals

The Calusa of South Florida exemplify the unique possibilities of Florida's ecology and the varied political formations that could develop in these environments (Marquardt and Walker 2013; Widmer 1988). Along with the Mississippians, they were important and influential neighbors to the inhabitants of the Tampa Bay area. The core of the Calusa heartland was located immediately south of Safety Harbor areas of settlement and influence, in the estuarine region around Charlotte Harbor, Pine Island Sound, San Carlos Bay, and Estero Bay (Marquardt and Walker 2012:29-31). A detailed chronicle of the history and ecology of the Pineland Complex in southwestern Florida, produced by William Marquardt and Karen Walker and colleagues, provides an enlightening account of how the Calusa made use of their landscape and resources to organize themselves and interact with their various neighbors (Marquardt and Walker 2013). In synthesizing environmental and cultural history at Pineland, Marquardt and Walker observe that the sub-tropical, estuarine environment in which the Calusa lived was heterogeneous and fluctuating; over time, geographic and ecological circumstances provided different opportunities for and challenges to both social complexity and hierarchical organization (2013:887-889). They propose that, for non-agrarian groups who depend primarily on fishing, heterarchical complex social formations may gain more traction than rigid hierarchy would in these conditions: the reciprocity, cooperation, and interdependence of decentralized complexity might bolster resilience to fluctuations in the abundance and availability of resources (Marquardt 2014; Marquardt and Walker 2013:888). A cooperative, heterarchical form of social complexity—characterized by regular, coordinated exchange of subsistence items—emerged among the Calusa during the period by about A.D. 800, the end of the Caloosahatchee IIA period (A.D. 500-800) (Marquardt 2014; Thompson and Worth 2011). This new level of coordination allowed Calusa groups to adapt to the resource depression (specifically fish) caused by the Vandal Minimum sea-level regression (Marquardt 2014; Marquardt and Walker 2013; Thompson et al. 2014).

In subsequent centuries, historical circumstances and cross-cultural interactions gave the Calusa reason to take advantage of the improved environmental conditions of the Medieval Warm Period (AD 850-1200) (Thompson et al. 2014). Certainly, the Calusa had previously connected with people outside of their immediate region, for instance with the importation of stone tools from the Tampa Bay area in previous centuries (Austin 2013). But the emergence of Missisippian polities brought a new dimension of competition to the relationship between the Calusa and residents of the Tampa Bay area. Safety Harbor communities probably have had earlier and easier access to Mississippian trade routes and exchange goods because of their geographic proximity. Perhaps this wealth emboldened Safety Harbor leaders to become more aggressive in their relations with the Calusa, initiating the sometimes violent rivalry that was evident in the early historic period (e.g., Worth 2014:32). Traders from the Safety Harbor culture areas may also have tried to establish relationships with groups in the interior of South Florida, who had traditionally been trading partners of the Calusa. It might have been in response to such efforts at expansion that the Calusa built the Pine Island Canal and attempted to exert greater control over trade relationships within South Florida (Marquardt and Walker 2012:55-56, 2013:889; Marquardt 2014:15). Following the shift to larger collective households during times of resource scarcity, communities could now put surplus labor towards such collective public works (Thompson et al. 2014; Thompson 2016). Trade and inter-regional competition were thus factors in the development of increasingly complex hierarchical systems among the Calusa after A.D. 1000 (Marquardt 2014).

The new goods, people, and ideas introduced by the arrival of the Spanish sparked the formation of a Calusa tributary state (Marquardt 1987, 2014; Thompson et al. 2018). Recent research at Mound Key, the sixteenth century capital of the Calusa kingdom, indicates that state formation in the region involved powerful house groups drawing on traditions of communal action at the local level, but in a way that disrupted patterns of regional-scale, inter-household cooperation (Thompson et al. 2018). The lineage group at Mound Key took control of Spanish goods and captives and was thus able to shift longstanding patterns of heterarchical relationships between communities. Competition and conflict with Tampa Bay groups probably contributed to the intensification of political consolidation during this era (Thompson et al. 2018:41).

Archaeologists seeking to define the boundaries between the Calusa and Tampa Bay area groups have struggled with the extent to which their material signatures overlap in parts of southwest Florida (Widmer 1988:86; Mitchem 1989:577-579, 596-600, 2012:175). For instance, Mitchem's initial 1989 definition of Safety Harbor culture included a Southwest Florida variant, in the vicinity of Charlotte Harbor. The ambiguous cultural affiliations of groups at the interface of Calusa and Safety Harbor territory might reflect intensive exchange, some sharing of ideas and practices related to pottery production, fluctuating territorial borders, or the presence of people who were unaffiliated with other group in terms of identity or political allegiance but who engaged in trade or other interactions (Mitchem 2012:175).

For residents of southwestern Florida and the Tampa Bay area, inter-group rivalry as well as cooperative actions like trade and exchange produced dynamic interactions over time. Relations between the Calusa and the residents of the Tampa Bay area were substantial and enduring, if not always easy.

Florida and the Mississippians: Trade, Influence, and Culture Contact

Investigating interactions between the Mississippian world and those at the periphery of it involves issues of subsistence, political economy, extra-local trade, ideology, and identity. While we know that Mississippians and coeval residents of Florida were connected, if indirectly in some cases, the effects of those interactions on local practices and social structures were varied. Trade and exchange of material goods, and perhaps also of cosmological and political ideas, tied native Floridians to Mississippian communities. But did these Floridians become more like the agricultural Mississippians in substantive ways, transforming political and economic institutions as they adopted elements of a new religion? Was the exchange of marine shell for exotica a catalyst for increased local inequality? Or were the effects of Mississippian contact more ephemeral, prompting some stylistic borrowing and the introduction of new trade goods without dramatically existing changing social structures? And to the extent that these interactions played out differently for different communities, what factors shaped those effects?

Early discussions of the development and spread of Mississippian practices beyond the central Mississippi River Valley focused on the diffusion of ideology, technology, and artifact style, in line with models of cultural change that were prevalent through the first half of the 20th century. Mississippian cultures were identified by traits like shell tempered pottery, earthen platform mounds, nucleated villages with wall-trench architecture, and a suite of imagery called the Southeastern Ceremonial Complex (Griffin 1952). Culture historical approaches focused on description still play a role in Mississippian studies today, but analytical approaches, especially those built on social evolutionary and materialist premises, are now more common (Blitz 2010:3-4). In this vein, Mississippianization is understood as a process of local adaptation, in which some combination of economic, political, and religious practices were incorporated in different ways by groups with varied histories and existing traditions (Anderson 1994; Pauketat 2002, 2004:119-120; Cobb and Garrow 1996; Blitz and Lorenz 2006). While the Mississippian landscape was thus culturally heterogeneous, most Mississippianization events took place within communities located on river floodplains, which could support maize agriculture and produce surpluses of the grain. Thus, a contemporary definition of Mississippian societies includes groups who practiced maize agriculture, were organized as chiefdoms, and constructed earthen platform mounds (King and Meyers 2002:113). However, the integration of Mississippian cultural practices was more uneven at frontier communities, where local ecology was less amenable to intensive maize agriculture (e.g., Kidder and Fritz 1993).

Most of Florida was beyond even the frontier of Mississippianization. The Fort Walton groups of northern Florida were arguably a truly Mississippian culture; Fort Walton people practiced maize agriculture, built earthen mounds, exhibited chiefly political organization, and used artifacts with Mississippian stylistic traits (Goggin 1949; Griffin 1949; Milanich and Fairbanks 1980:92; Milanich 1994). In peninsular Florida, however, maize was introduced relatively late, and even then its role was limited because of the lack of fertile floodplains in the region (Ashley and White 2012:14-17; Mitchem 2002, 2012). Thus, while groups like Safety

Harbor occupied Florida during the Mississippi *period* (i.e., the unit of time), they are not considered culturally Mississippian (Ashley and White 2012:8; Kidder 2007:196-97).

Although they did not become Mississippian themselves, native hunter-gatherer communities of Florida played a crucial role in the development of Mississippian politics and ideology through the marine shell trade. Marine shell was a symbolically important material for Mississippian crafted goods including beads and engraved gorgets (Brown et al. 1990; Phillips and Brown 1978; Prentice 1987). Using marine shell for these items allowed Mississippians to display the reach of their networks and to assert their legitimacy by making ancestral connections in inland regions of the Southeast where shell had a long history as a powerful material (Deter-Wolf and Peres 2014). Lightning whelk in particular had a special cosmological significance because of its leftward spiral (Marquardt and Kozuch 2016). Lightning whelk (*Busycon sinistrum*) from Spiro, Cahokia, and East St. Louis sites have been sourced to the Florida Gulf of Mexico coast (Kozuch et al. 2017; see also Bissett and Claassen 2016). The large, left-handed lightning whelk grew in demand over the course of the Mississippi period—particularly after about A.D. 1250—as the production of gorgets, masks, and cups increased (Ashley and White 2012:13-14). Prior to this, the demand for marine shell had focused on beads, which would have put less specific requirements on the type of shell used: beads can be made from fragments of columnella and whorls, and from shells like (the right-handed) knobbed whelk and olive shells, which are found on the Atlantic as well as the Gulf coasts (Ashley 2002:167). The shift towards artifacts made of lightning whelk would have affected the relevance of Florida communities that had less access to that species and perhaps increased the potential for Gulf coast residents to take a leading role in the shell trade.

Participating in the marine shell trade likely had economic and social effects on the Florida communities that were involved. In general, marine shell seems to have been exchanged for non-local goods like exotic materials like stone pendants, galena, and copper (Ashley 2002; Mitchem 2012, 183-184). The exact mechanism of these objects' movement could have been direct exchange in some cases, or in others, intermediate trading or down-the-line exchanges; gifting, marriage, and other alliances may also have facilitated these exchanges. Some have viewed this exchange as the basis for a prestige-goods economy, in which elites gain power and status through the display and circulation of valued, exotic items (Milanich 1994:269; Phillips and Brown 1978:207-8; see also Brown et al. 1990; Trubitt 2000). In this case, the presence of exotica would have facilitated competition locally, and the desire for non-local items could have motivated leaders to try to intensify and/or appropriate labor to procure or craft trade goods.

Alternatively, non-local goods and materials could have been put to use in an economy and social sphere that maintained a communal ethic. Keith Ashley (2002, 2012; Ashley et al. 2015) has argued that St. Johns II communities in northeastern Florida become involved in the Early Mississippi-period shell trade, leveraging existing relationships with Ocmulgee hunter-gatherers who could have helped to convey marine shell to the Macon Plateau and beyond. St. Johns II people received exotic materials and elaborate crafted goods, which they deposited in what appear to be communal burial grounds and sites of public ceremony (Ashley 2012). If exotic goods were owned and used in a collective manner, then the labor to collect, prepare, and transport trade goods may also have been communal.

In addition to economic impacts, researchers have considered how Mississippian religious and political ideologies may have influenced the Floridians with whom they interacted. Archaeologists have historically used "influence" in this sense to indicate everything from the presence of stylistic traits, to involvement in Mississippian trade networks, to the adoption of Mississippian cosmologies (Ashley and White 2012:7-8). The exchange of exotic goods, as I discussed above, could have been a mechanism for changing the local political economy. But we can also ask, to what extent were Mississippian notions of cosmology and political authority revealed to their trade partners in Florida, and how did those contacts shape local practices? For the Safety Harbor case, Jeffrey Mitchem has suggested that Mississippian traders may have introduced new religious beliefs to residents of the Tampa Bay area, accounting for changes in ceramic decorative styles at the start of the Englewood phase (2008, 2012:184-185). Mitchem also argues that this influence was ultimately limited because Safety Harbor groups never came to depend on maize agriculture, although he notes that "religious and political change" may have resulted from these contacts (2012:185). Given the diversity of social organization that is possible among non-agricultural groups, religious and political changes could arguably have had dramatic effects on the organization of local communities, even without major changes to the subsistence base (Sassaman 2004:253-264). By what social mechanisms might a new religion and even new institutions of leadership spread within communities that were not prompted by economic transformations? This issue echos tensions in the broader Mississippian scholarship about the relative importance of economic and ideological sources of power in Mississippian polities (Blitz 2010:4-6).

A theoretical framework of culture contact has been increasingly used to examine pre-Columbian interactions in North America (e.g., Bardolph 2014; Wright 2014). In culture contact scenarios, people encounter new materials as well as new ideas, and in many ways these introductions are worked out in the domain of daily life and through individual decisions (Cusick 1998; Lightfoot et al. 1998; Schortman 1989). These encounters can amount to events that facilitate the transformation of social structures, particularly when cross-cultural interactions cause disjunctions between existing cultural schemas and available resources (Beck et al. 2007; Sewell 2005). Encounters between Floridians and emergent leaders of the Mississippian world would have been dynamic, with either side drawing on their own traditions and motivations, and these contacts would have had both material and virtual dimensions. While acculturation and influence suggest a one-sided process, a culture contact framework acknowledges that adopting new resources and practices would have involved negotiation locally and between groups.

In summary, Florida's inhabitants were active participants in facilitating Mississippian political economy and leadership: they provided necessary materials for the production of goods that shaped ideology and the conception of authority in the Mississippian world. In return, they received exotic materials like galena and copper and other goods like stone pendants and pottery. Exchange may also have had more systemic economic consequences, by providing a new motivation to intensify the collection and production of trade goods and materials. Such economic shifts had the potential to reshape relationships and the ways that community members cooperated or competed with one another. Further, the economic opportunities of participating in trade with the Mississippians shaped relationships between groups, as with the Calusa and the Tocobaga. Culture contact between Mississippians and fisher-hunter-gatherers of the Florida Gulf Coast introduced new resources and ideas to a region with an existing history of interactions and traditions. The local effects of these interactions can be investigated by examining specific cultures and communities.

A History of Tampa Bay Communities, ca. 500 BC - 1763

The people in the Tampa Bay during the Safety Harbor era were situated in a place where the interests of multiple groups and emergent polities intersected, sometimes cascading into new opportunities for cooperation or competition. To the north, Mississippian leaders sought to establish their status and authority through prestigious goods crafted of marine materials; to the south, Calusa chiefs were striving to consolidate their power through the control of trade networks. These regional influences affected the development of new ways of organizing communities in the Tampa Bay area during late prehistory. Indeed, archaeologists have long acknowledged some shift in the organization of Tampa Bay communities at the start of the Safety Harbor period, though the timing and nature of these changes remain poorly understood. In the Woodland period, Tampa Bay was on the periphery of the new developments in craft, ceremony, and aggregation known as Weeden Island culture. In comparison, the residents of Tampa Bay in late pre-Columbian times appear more cosmopolitan, constructing mound-and-village complexes along the shores of Tampa Bay, and intensifying craft production and their involvement in regional trade networks.

During this time of new opportunities, did Safety Harbor people also begin to establish inequalities between neighbors and communities? Or did new practices continue to build on existing traditions of ceremonialism and a communal economy? Spanish explorers recorded accounts of feuding chiefdoms and strong leaders with special rank throughout the region—but how well would this picture of chiefly politics in the sixteenth century have characterized relationships within and between communities during the early Safety Harbor period? Situating the Safety Harbor culture in time reveals a rich history of interactions and gives context to the developments of the late prehistoric period.

Woodland Period: Mortuary Ceremonialism and Regional Connections (ca. 500 B.C. - A.D. 800)

Woodland-period traditions and developments offer a point of comparison for the changes that would occur during the Mississippi period in the Tampa Bay region. Between about 500 B.C. and A.D. 800, the area around Tampa Bay and down to the north of Charlotte Harbor was characterized by a way of life now called the Manasota archaeological culture. The Manasota designation has replaced Willey's prior categorization of prehistoric cultures in the area as "Perico Island," a complex thought to be related to the Glades culture of South Florida (Willey 1949:361). George Luer and Marion Almy defined the Manasota culture in 1979 on the basis of ecology, burial practices, pottery, and technological assemblages. Manasota people lived in an ecological context marked by salt marsh, barrier island estuary, and mangrove ecosystems; they had access to fish and shell fish, the remains of which were often deposited in shoreline middens; they buried their dead in these shell middens until about A.D. 300; and they crafted bone and shell tools and plain, sand-tempered ceramics (Luer and Almy 1982; Weisman et al 2005:28-29). At some Manasota sites there is evidence for villages with small circular dwellings (Austin 1995). Luer and Almy posited that smaller sites in the interior and coastal areas likely served as seasonal collection stations that supported larger midden and mound villages (Luer and Almy 1982), and a study testing seasonality at Manasota sites has identified both year-round villages and at least one seasonal shellfish collection site (Russo and Quitmyer 2008). The Manasota culture, especially its early period, have primarily been explained within a framework of adaptation to local ecology and environment.

In the latter half of the Manasota cultural period, there is increasing evidence of regional interconnectedness. Manasota people practiced a variant of Weeden Island mortuary ritual by

A.D. 300, marked by the presence of Weeden Island ceramics in burial contexts (Milanich 1994:221). Although the discovery of elaborate vessels at the the Weeden Island site in Pinellas County (8Pi1) made it the type site for this archaeological culture, the appearance of these vessels in the Tampa Bay area is now understood to represent the geographical fringe of Weeden Island culture. In an overview of archaeological cultures in Florida, Milanich identifies areas of the panhandle and north central Florida as the heartland of Weeden Island culture (Milanich et al. 1997), with groups living in peninsular Florida, including those in the Tampa Bay area, designated as "Weeden Island-related" regional variants (Milanich 1994:205-242).

The Weeden Island archaeological culture was recognized in the early 1900s, defined in detail by the middle of the century, and regularly redefined with new additions and caveats ever since. Markers of participation in Weeden Island culture include particular pottery, burial practices, and to an extent, community settlement patterns. Pottery designated as part of the Weeden Island Ceramic Complex (Willey 1949:406-448) includes stamped, incised, punctated, plain wares, and painted wares with a variety of forms, some of them shaped as effigies including human and animal forms. The vessels within the Weeden Island Series have carried the most weight in defining the culture: these include the elaborate Weeden Island effigy vessels that seem to have been manufactured exclusively for the purpose of interment in human graves (Milanich 1994; Sears 1973; Willey 1949:410). These burials are typically within mounds (e.g., Moore 1900, 1901, 1902, 1903, 1918) and could have been placed in the grave during funerals involving aggregated populations. At the McKeithen site (8Co17) in north central Florida, people participated in elaborate, ostentatious mortuary rituals, evidently with the guidance of a religious specialist (Milanich et al. 1997); however, a recent assessment of settlement patterns that suggests McKeithen was unique in its time, and mortuary ceremony on this scale may not have been widespread (Wallis 2014). Beyond the vessels marked for mortuary use, Weeden Island Series wares in this heartland area have been classed as "prestige" or "utilitarian" (e.g., Milanich et al. 1997), although both of these types sometimes also appeared in mortuary contexts (Pluckhahn and Cordell 2011:291-292). The production and use use of special classes of ceramics has been a central issue in archaeologists' attempts to understand Weeden Island traditions (e.g., Wallis et al. 2017). Weeden Island's signature traits of burial mounds and decorated/effigy vessels as burial goods appear at sites with diverse organization, ecological niches, and existing ritual traditions. Thus, the spread and regional variation in these traditions presents an additional series of questions about how and why Weeden Island ceremonial practices were adopted within and beyond the culture's heartland.

In the Tampa Bay area, and at the Weeden Island site, participation in Weeden Island ceremony included the creation of burial mounds in which a variety of vessels were interred. However, effigy vessels are rare within the Manasota culture area, and almost all Weeden Island Complex sherds of any series or variety appear exclusively in mortuary contexts. Some of these Weeden Island vessels—particularly those in the Weeden Island Series—were probably imported to the Manasota region. Weeden Island Series wares are finely made, relatively thin, sand-tempered, and often burnished. Other ceramics used in mortuary ritual may have been made locally, perhaps in imitation of the imported wares: The Papys Bayou Series pottery is superficially similar to Weeden Island Series vessels, for instance in the motifs incised or punctated on their surfaces, but these wares have a soft, chalky feel due to the inclusion of sponge spicule in the paste, and they may be thicker on average[1]. Manasota people knew of Weeden Island ceremonial ritual and practiced their own variant—the burial mound at the

[1] This pattern was observed in my unpublished 2014 analysis of Weeden Island pottery collections at the Smithsonian Institution.

Weeden Island site provides a record of how interment practices changed with the adoption of these new traditions (Fewkes 1924; Willey 1949:106-108). The ceramic assemblages give the impression that residents of Tampa Bay were not fully enmeshed in the relationships that guided Weeden Island culture in its heartland; they apparently had limited access to effigy vessels and may have crafted their own version of Weeden Island style incised and punctated pottery, rather than obtaining vessels from northern specialists. And yet, these interactions provided a foundation for the increasing interconnectedness that would characterize the region in the centuries ahead.

Mississippi Period: Pre-Columbian Safety Harbor (ca. A.D. 900-1500)

The early phases of the Safety Harbor archaeological culture took place in the Tampa Bay area during the Mississippi period. Safety Harbor culture developed in place from Manasota-Weeden Island populations and traditions: The Safety Harbor culture area largely overlaps with the Manasota culture area, and individual sites commonly include components of each, while the pottery also speaks to a gradual transition (Luer and Almy 1982:52-53; Mitchem 2012:176; Milanich 1994:226). This cultural period is the focus of this dissertation. Here I review major characteristics of and ongoing questions about the pre-contact Safety Harbor archaeological culture to establish the context of the Weeden Island site case study.

Safety Harbor Chronology and Geography

Jeffrey Mitchem (1989) refined the definition of the Safety Harbor archaeological culture in his dissertation, building on the work of researchers including Stirling (1936), Willey and Woodbury (1942:245), Goggin (1949), and Griffin (1949). His research included a revised chronology for the Safety Harbor culture, divided into four chronological phases (1989:557-67): Englewood (ca. A.D. 900-1000), Pinellas (ca. A.D. 1000-1500), Tatham (A.D. 1500-1567), and Bayview (A.D. 1567-1725).

Archaeologists now recognize four regional variants of Safety Harbor culture: Northern, Circum-Tampa Bay, South-Central, and Inland (Mitchem 1989; Milanich 1994:391-401; Mitchem 2012:174-176). Although there are some inland sites with Safety Harbor style artifacts, the culture is best represented along the Gulf Coast and around Tampa Bay (Mitchem 2012:175-176). At these coastal sites, there is evidence for nucleated village sites with mounds and potentially plazas (Luer and Almy 1981), whereas to the north, east, and south of Tampa Bay, smaller settlements are more common (Mitchem 1989:583-86).

Englewood was initially proposed as a transitional phase (Willey 1949:471), which would include incised Englewood series pottery (Mitchem 1989:557-561). Recent research indicates that middens from this period actually contain a combination of Weeden Island and Safety Harbor pottery types, and Englewood incised varieties may have been restricted to mortuary contexts (Austin et al. 2014:108). Many Safety Harbor sites lack Englewood pottery entirely and/or include material culture typical of the Manasota archaeological culture during the time period assigned to this phase, so it is also possible that the Englewood phase only occurred at a limited number of sites (Austin et al. 2008:167-168; Austin and Mitchem 2014: 83-84).

The Pinellas phase encompasses most of the pre-Columbian Safety Harbor culture. Pinellas Plain utilitarian pottery is common, and incised forms are typically present in mortuary contexts (Mitchem 1989:561-562; 2012:176-178). The relative uniformity of the pottery that can be found in domestic contexts has been a challenge to further refining the chronology of this phase, although there are likely some time-sensitive variations in attributes like lip notching or the inclusion of sand in the ceramic paste. The form and decoration of decorated types of Safety Harbor pottery show similarities to Mississippian pottery; overall, an examination of common traits between Safety Harbor and Mississippian pottery suggests that the Mississippian influence on pottery crafting in the region was strongest during the Early to Middle Mississippi period (A.D. 1000-1350), and that influences came primarily from western Georgia and eastern Alabama rather than as far west as the Mississippi Valley (Mitchem 2012:178-180).

The Tatham phase marks the period of early Spanish contact in the region, including the Narvaez and de Soto expeditions, in 1528 and 1539 respectively (Mitchem 1989:563-564). The Bayview phase was a period of increasing disintegration of local indigenous communities, eventually leading to the replacement of Safety Harbor people in the region with Seminole groups by A.D. 1725. Both of these contact-era periods have archaeological signatures including European artifacts and increased evidence of disease, warfare, and abandonment (Mitchem 1989:563-566).

Safety Harbor Archaeological Sites

This dissertation builds on previous archaeological research at Safety Harbor sites. This record includes investigations of a number of mounds or mound centers, and fewer extensive excavations at residential sites. There have been a few prominent reviews and syntheses of Safety Harbor sites and regional patterns that have shaped archaeologists' understanding of this cultural period. Willey (1949:475-488) reviewed 25 Safety Harbor sites that had been studied by the 1940s, though of these, only a few involved excavations in middens; most were of moudns. Willey pointed to a settlement system consisting of small, relatively independent villages, and fewer large sites with temple or platform mounds, though the potential political relationships among these were only vaguely addressed. Mitchem's 1989 dissertation reviewed all Safety

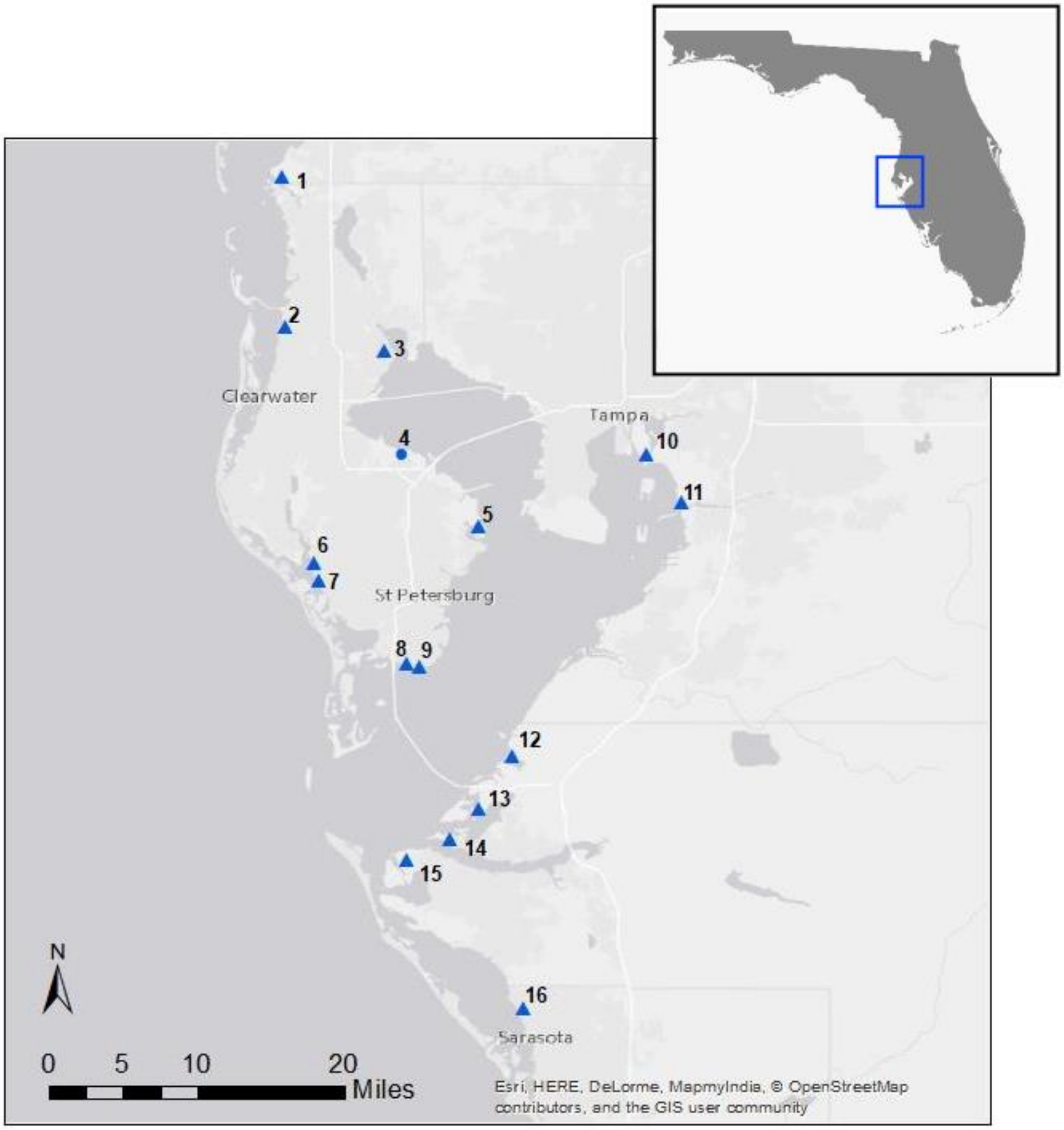

Figure 2.1 - Archaeological Sites in the Tampa Bay area, including locations of extant and destroyed Safety Harbor platform mounds (as triangles; based on Luer and Almy 1981). Key: 1. Anclote, 2. Dunedin, 3. Safety Harbor, 4. Yat Kitischee, 5. Weeden Island, 6. Bayshore Homes, 7. Narvaez/Anderson, 8. Maximo Point, 9. Pinellas Point, 10. Ft. Brooke, 11. Mill Point, 12. Harbor Key, 13. Bickel Mound, 14. Snead Island, 15. Pillsbury, 16. Whitaker. Base map source: ESRI ArcGIS Online.

Harbor sites known at that time, including many that had not yet been studied when Willey addressed the topic, and he drew on this data to establish the phase sequence and regional variants presented in the previous section. However, by the 1980s the record of habitation sites or middens was still sparse compared to the work done at mounds, so the picture of regional settlement had not changed much: archaeologists recognized that there were large, nucleated villages often with mounds in the Tampa Bay region, with smaller sites found inland, north, and south of the bay (Mitchem 1989:583-686). Kozuch (1986) summarized species lists from several sites where midden components had been studied, though the data were limited by field collection methods, Kozuch's synthesis pointed generally to the use of terrestrial and marine resources: deer, turkey, freshwater and sea birds, alligator, rays, sharks, turtles, and various marine mollusks and fish. There have been no new major syntheses of Safety Harbor sites in the intervening decades, probably because there is still much less information about Safety Harbor habitation sites than burial mounds (Mitchem 2012:176). Drawing on this record of mound sites, Hutchinson (2006) compiled information on mortuary practices and bioarchaeological reconstructions of diet and health. He notes that burials in the Circum-Tampa Bay region occurred in middens as well as in mounds, with secondary burial practiced commonly, and occasionally cremation (Hutchinson 2006:21-25).

In addition to these syntheses, reports on individual sites and assemblages from the Circum-Tampa Bay region provide background relevant to the present case study (Figure 2.1). As defined by Mitchem (1989:573), this region includes sites in modern-day Pinellas and Hillsborough County, southern Pasco County, and northern Manatee County. There are a limited number of sites that provide detailed information about residential life in the pre-contact Safety Harbor phases. The Narvaez/Anderson Site (8Pi54) has been the most thoroughly investigated and reported single-component Safety Harbor site (Austin 2000; Bushnell 1966; Simpson 1998; Tykot et al. 1998). There is also data available from controlled excavations at Bayshore Homes (8Pi41) and the related sites at the complex, Abercrombie Park (8Pi58) and the Kuttler Mound

(8Pi10650) (Austin et al. 2008; Austin and Mitchem 2014). There were two separate occupations at Bayshore Homes, an earlier occupation during the Woodland period and a later occupation during the Mississippi period (early Safety Harbor) (Austin and Mitchem 2014). Yat Kitischee (8Pi1753) is primarily a Manasota/Weeden Island (i.e., Woodland-period), although the occupation continued until about AD 1200, so it also encompasses the early Safety Harbor period (Austin 1995). Excavations and collections at Maximo Point (8Pi19, 8Pi30) produced examples of artifacts and a record of the site plan and midden-mound stratigraphy, but no detailed information about subsistence remains (Bushnell 1962; Knight 1976; Williams 1979). In the following sections, I draw on details from work at these sites in the following section to discuss Safety Harbor subsistence, pottery and other crafts, and the use and significance of mounds.

Safety Harbor Patterns of Change and Continuity

The Safety Harbor culture may have emerged through transformations of the sociopolitical organization in the Tampa Bay region. Archaeological patterns of change in the Safety Harbor period and documentary records from the early historic period both point to ways that the lives of Safety Harbor people differed from their Woodland-period ancestors. These documented patterns have provided a basis for further inferences about the sociopolitical organization of Safety Harbor people, often using contemporaneous developments in the Mississippian world as a point of comparison. Milanich describes Safety Harbor settlement in terms of small, governing polities with distinct territories (Milanich 1994:398, 412), comparable to yet distinct from analogous political formations of the Mississippian southeast. This tentative characterization of Safety Harbor political structure underlies most discussions of settlement, subsistence, craft, and trade at this time. However, it has not been established that Safety Harbor people were organized into chiefly polities that involved tribute collection (whether compelled or voluntary), hierarchical systems of authority, or institutionalized material inequality. As discussed in the introduction to this volume, the use of heuristic categories like chiefdom should be balanced with attention to the organizational variation possible for groups living in diverse circumstances. Here I review the evidence for change and continuity in different domains of the Safety Harbor culture, including patterns that relate to sociopolitical organizations. These topics will be revisited over the course of this work as I incorporate new data from the Weeden Island case study.

Subsistence. First, the mode of subsistence seems to be one element of life that did not change dramatically with the development of Safety Harbor culture. Unlike the Mississippians, for whom maize helped to finance elite leadership and specialization, Safety Harbor people did not practice intensive agriculture; instead, fishing, hunting, and gathering wild foods remained the mode of subsistence, with an emphasis on aquatic resources (Hutchinson and Norr 1994; Hutchinson et al. 1998; Kozuch 1986; Vojnovski 1998). Documentary evidence from the Spanish contact period indicates some limited cultivation of maize in the area (Milanich and Hudson 1993:126), or perhaps maize was obtained by trade (Milanich 1995:75). This continued reliance on the collection of coastal resources has been interpreted as evidence of overall stability of the regional culture or way of life (e.g., Mitchem 2012). Indeed, the particular qualities of maize agriculture arguably had a transformative effect on Southeastern societies that made Mississippian religious practices feasible (Beck and Brown 2002). While it is clear that the accumulation of agricultural surpluses was not a factor in Safety Harbor development, foragers can nevertheless undergo major changes in social or political organization. Economic transformations can take place in hunter-gatherer societies through processes like intensification (e.g., Ames 1994:211-215; Matson 1992; Moss et al. 1990) and in some cases sociopolitical changes may be precipitated by non-economic factors (Sassaman 2004:253).

Research at Safety Harbor residential sites suggests ways in which the subsistence economy may have been changing at the start of and during the Mississippi period. At Yat Kitischee, researchers documented a gradual increase through time in species diversity, which could be interpreted as a form of intensification to cope with population increases and/or a political demand for surplus (Austin 1995:227-228; Vojnovski 1995). Despite potential changes in subsistence strategies and focus, aquatic resources remained essential. Zooarchaeological assemblages from Yat Kitischee and Anderson typically comprised 50-90% invertebrate (mollusk) species by MNI, though biomass weights indicated that vertebrate species, especially fish, contributed the majority of meat in the diet (Vojnovski 1995, 1998). At Bayshore Homes, analysis of a limited sample of vertebrate faunal data showed that fish (especially Actinopterygii or ray-finned fishes) were the most common taxa by MNI and estimated meat weight (Fradkin 2008). There is some available information about fishing techniques at Safety Harbor sites. Vojnovski's analysis at both the Anderson site and Yat Kitischee found high proportions of bottom-feeder fish (e.g., catfish, drums, sheepshead, and rays), which are susceptible to being caught in stationery gill nets, along with schooling species like mullet (Vojnovski 1995:67-68; 1998:258). Shark remains at Anderson and Yat Kitischee may indicate some use of hook-and-line capture (Vojnovski 1998:260). Data about plant resources has been limited at Safety Harbor residential sites, perhaps because of preservation issues (Ruhl 1995).

Pottery. Pottery has had an enduring role in efforts to define the Safety Harbor archaeological culture in a typological sense, and also to discern the historical significance of the time period. The earliest trait-based approaches to detecting influence in artifacts like pottery demonstrated that some members of Florida communities probably came in contact with Mississippian pots or potters (Goggin 1949; Griffin 1949). Similarities in pottery (along with the presence of platform mounds) were understood as evidence that contact with Mississippian people (perhaps Fort Walton groups) helped stimulate the development of Safety Harbor culture (Luer and Almy 1981:147-8; Mitchem 1989:586; Milanich and Fairbanks 1980:210). Certain Safety Harbor vessels occur in forms like those found in the Mississippian southeast (e.g., jars and bottles), and the decoration of Safety Harbor Incised pottery includes designs (e.g., guilloche loops and human hands) that have also been interpreted as influenced by Mississippian pottery, or perhaps Mississippian imagery more broadly (Luer 2014:86-88; Mitchem 2012). Safety Harbor pottery appears to share traits primarily with pottery from the Early to Middle Mississippi period (A.D. 1000-1350), providing a clue to when these influences were initially introduced, and to when they had the most effect on pottery production (Mitchem 2012:179).

The incorporation of Mississippian motifs, imagery, and even vessel forms might point to the adoption of new cosmological or religious concepts during the Safety Harbor period. Some mortuary ritual from the period builds on Manasota-Weeden Island traditions, including a multi-step treatment of perforating or removing base of ceramic vessels, storing them, and then further breaking the vessels before interment (Luer 2014:87, 2002). But these practices may have taken on a new or altered cosmological significance, particularly as those Mississippian pottery traits have been identified in what seem to be special purpose mortuary vessels rather than everyday wares (Mitchem 2012:179); this indicates that the ideas conveyed by these images were understood to be religious or at least pertaining to death. Safety Harbor pottery has also been contrasted with the pottery of the preceding Weeden Island-Manasota period. Safety Harbor Incised vessels demonstrate continuity with the forms and decorations of Weeden Island vessels, though a difference in quality has been observed:

> Safety Harbor pottery is generally poorly made, fired, and decorated. Shapes tend to be badly formed and designs vaguely conceived and executed with carelessness. Although there is quite a range of excellence or lack of excellence in Safety Harbor types, the best are usually below Weeden Island, Fort Walton, or Englewood standards and the worst are absurdly handled. The total feeling is one of break-down in the ceramic art, carrying with it the implications of an impoverishment of the cultural forces and traditions that served as an incentive and guide to the aboriginal pottery maker. (Willey 1949:478-9).

More contemporary analysis has generally moved away from aesthetic judgments but still recognizes that the Safety Harbor decorated pottery does not match the quality of Manasota/Weeden Island types (e.g., Mitchem 2012:184). Some of these changes might relate to the provenience of wares; for instance, if Weeden Island series pottery were made by northern specialists and imported to the Tampa Bay area, perhaps Safety Harbor series decorated wares were made locally by potters without the same training or resources.

Utilitarian wares of the types recovered from village contexts also underwent some changes at the start of and during the Mississippi period. At Yat Kitischee, there was increasing diversification of vessel form for sand-tempered plain pottery in the later phases of the occupation, which could reflect other changes in settlement and culture, such as a more sedentary lifestyle (Austin 1995:224; White 1995). Beyond this, domestic wares have primarily been analyzed in terms of stylistic change over time (e.g., Mitchem 1998).

Craft production and trade. The production and trade of shell goods may have been a domain for the emergence of a new political economy in Safety Harbor communities. Researchers have questioned whether Safety Harbor communities had artisans who specialized in the production of shell beads, and whether the labor of craft production was controlled at levels above the household (e.g., Austin 2000). Evidence about Safety Harbor shell bead production and trade primarily comes from mounds and burials where finished interred beads were recovered (e.g., Bullen 1952; Luer 1992:271-274; Mitchem 1989). There are some limited examples of shell bead production areas from residential sites. At the Anderson site, a spatially-restricted assemblage of microlithic tools might represent a workshop for the production of shell beads and/or shark-tooth tools (Austin 2000). At the Kuttler Mound, deposits that date to the late Weeden Island/Manasota or early/transitional Safety Harbor phases included large quantities of beads and bead blanks throughout the mound, as well as several microlithic tools that could have been used for drilling (Austin 2008:24-31). These examples point to some spatial restriction of shell bead production activities, although it is unclear whether this reflects a division of labor within the communities.

Beads produced in the Tampa Bay region were traded locally, perhaps to interior Safety Harbor sites to which coastal communities were linked by family and alliances, whereas marine shell destined for the Mississippian world was probably traded largely unmodified as a raw material. Participating in this more geographically expansive trade of marine shell may have led Safety Harbor people to establish connections with Mississippian traders and others. Mitchem (2008) has suggested the Safety Harbor people could actually have obtained Busycon whelk from Calusa communities to the south, although it also seems likely that they were able to trade the larger shells that are sometimes found closer to Tampa Bay. Northern Safety Harbor groups were more likely to obtain exotic goods, especially copper objects (Mitchem 2008a), suggesting further the importance of geographic proximity to participation in the trade with Mississippians. As with other Florida communities who traded with the Mississippians, exotica could have been put to use in a prestige goods economy.

Mounds and settlement patterns. A notable marker of change during this time is the series of platform mounds that were constructed along the shores of Tampa Bay and nearby portions of the west-central Gulf Coast of Florida (Luer and Almy 1981). Luer and Almy's synthesis of previous work identified 15 such mounds in the region, although only five of these were still extant at the time of that article's writing (Figure 2.1). They noted similarities in the mounds' shape and construction (typically rectangular, 4-6 meters tall, flat-topped, and with a ramp), while also identifying some variation and sorting the mounds into three classes according to size characteristics (Luer and Almy 1981:138-9). They proposed that different categories of mounds may have had different functions as well, with some supporting houses and some hosting ritual structures and other ceremonies; additionally some mounds included burials (Luer and Almy 1981:144-145).

The appearance of platform mounds during this period has invited comparisons with mounds built in the context of Mississippian polities. Flat-topped mounds in Florida were once considered a product of cultural diffusion, indicating Mississippian influences, or perhaps even the spread of practices from Mesoamerica (e.g., Pluckhahn et al. 2010:164). In more recent decades, however, there has been less emphasis on where the idea to build mounds came from, especially as much earlier instances of such monumental construction are recognized in the Southeast (Gibson 2001; Gibson and Carr 2004; Kidder 2010, 2011; Saunders and Russo 2011).

Thus, the mere presence of platform mounds does not say much about whether Floridians were adopting Mississippian practices and forms of organization.

Still, archaeologists have considered that Safety Harbor platform mounds may have had purposes analogous to those of flat-topped mounds at Mississippian centers, if on a smaller scale; that is, as platforms for chiefs' houses, within large nucleated villages, which were in a position of relative authority over a small territory of a few outlying smaller settlements (Luer and Almy 1981:143-145; Mitchem 1989:585-586; Milanich 1994:398). The degree of centralization and intensity of settlement is acknowledged to be less than that of Mississippian chiefdoms, so the comparison is an approximate one (Milanich 1994:398).

In the Mississippian case, archaeologists have used mound sites and their characteristics as correlates of political units. In these models, mound sites functioned as civic-ceremonial centers where chiefly leaders resided and accumulated tribute. In complex chiefdoms (Anderson 1996; Wright 1984), multiple-mound centers hosted chiefly elites at the top of the administrative hierarchy, while leaders lower in the command structure resided at single-mound centers (Steponaitis 1986).These expectations about mound centers have guided studies of the rise and fall of chiefdoms (Anderson 1994), the aggregation and dissolution of Mississippian communities (Blitz 1999), the relationships of authority between central and subsidiary centers (Steponaitis 1978), and the distances over which authority can reasonably be exercised (Hally 1993). In the archaeological landscape of Mississippian chiefdoms, mounds serve as a visible marker of centralized political power, and the regional patterning of mounds is tracked closely for evidence of political change.

In the Safety Harbor case, there are some challenges to transplanting expectations developed about Mississippian mound centers. The 15 known Safety Harbor mound sites are situated near shorelines and typically by rivers or streams (Milanich 1994:396). The probable ease of water travel at these sites means that spatial models designed for the Mississippian world cannot be applied directly, without taking into account travel by waterways (e.g., Schwadron 2010:118-121). That is, some of these centers may in effect be closer to each other than they seem. The chronology of these Safety Harbor mound centers is not well-established, and extensive urban development and the destruction of the majority of the mounds will be an ongoing challenge to understanding any cycling among centers. Further, maize agriculture played a crucial role in supporting Mississippian chiefdoms, with farmers in outlying hamlets provisioning elites like those who controlled mound centers (Welch and Scarry 1995). While the mechanisms by which provisions might collected probably varied (e.g as tribute or by more voluntary means), most models of Mississippian economy rely on the presence of the maize crop, which can be farmed intensively and stored as surplus. This major difference between subsistence in the Mississippian and Safety Harbor worlds should also challenge our comparison of mound centers in the two regions. Provisioning can occur in non-agrarian contexts (e.g., Luer 2007), but the dynamics of collecting, transporting, and storing resources like fish or shellfish differ from the logistics of maize provisioning.

These caveats point to the deeper question about whether Safety Harbor mound sites are substantially analogous to Mississippian mound centers, or if they represent a different phenomenon of aggregation and collective action in the absence of institutionalized, hierarchical chiefly authority. For an alternative model of platform mound use, we can look to the Middle Woodland Southeast. Middle Woodland platform mounds in the Southeast tended to lack evidence for structures on their summits, instead showing evidence of isolated scaffolding poles, hearths and burned areas, and special or exotic artifacts; these sites have been interpreted as hosting communal ceremonies focused on feasting, gift-giving, and world-renewal (Knight 2001; Lindauer and Blitz 1997). Admittedly, even these models of mound use continue to raise questions about how such practices were financed and organized (Wright 2017:53), and ritual-focused models of mound use do not preclude some form of social complexity and exercise of authority.

The ambiguity surrounding mound use highlights the importance of examining the record of residential contexts to better understand how authority and status played out in Safety Harbor communities.

Spanish Contact Era: The Tocobaga Chiefdoms (ca. 1513-1763)

Beyond the prehistoric archaeological record, documentary accounts from the early historic period have also contributed to archaeologists' expectations about late prehistoric developments. The writings of Spanish explorers provide enticing details about indigenous communities around Tampa Bay; at the same time, the turbulence brought on by European contact complicates our understanding of late prehistory in this region. The relationship between the organization of late prehistoric societies and those affected by early Spanish contact is itself a topic of broader concern, and identifying continuities and breaks between these periods has implications for understanding the effects of Spanish encounters.

The people who lived around Tampa Bay at the time of European contact are considered the historic descendants of the prehistoric Safety Harbor people; collectively, these historic groups are often called the Tocobaga (Bullen 1978). This usage perhaps overstates the unity of these people, who were evidently organized into a number of small, feuding chiefdoms. The term Tocobaga also refers to one of these chiefdoms, perhaps the most prominent at the time of contact, which was centered politically at the town of Tocobaga—this town was at the archaeological mound and village site called Safety Harbor (8PI2) (Bullen 1978). Other groups or small polities of the time were the Pojoy, Mocozo, and Uzita (Bullen 1978; Milanich 1995:71-77; Worth 2014:2-6). Different towns are mentioned from one ethnohistoric account to the next, suggesting the rise and fall of centers' importance, perhaps influenced by Spanish diseases or new opportunities for some towns like Tocobaga to consolidate political power (Milanich and Hudson 1993:125-128). Additionally, Tampa Bay area chiefs were in conflict with the Calusa, building on centuries of contentious relationships (Marquardt and Walker 2012:55-56); for instance, the Calusa attempted to persuade the Spanish under Ménendez join them in war against the Tocobaga (Worth 2014:260-261).

The documentary record of the Tocobaga, Pojoy, Mocozo, and Uzita includes accounts by Hernando de Escalante Fontenada and members of the Narváez and de Soto expeditions. In addition to the relationships between groups, these records provide information about the social and political workings of the region's chiefdoms and villages. In particular, they recorded that chiefly leaders organized warfare and had other unique privileges (Milanich and Hudson 1993:122-123). Escalante Fontenada wrote that chiefs (”principle caciques”) were subject to special mortuary practices, including processing of their bones and burying the rearticulated skeletons after a period of fasting and a town gathering (Worth 2014:217).

Archaeologists have struggled to reconcile the political situation depicted in these accounts with the material record of pre-contact Safety Harbor. Early Safety Harbor communities displayed some traits that might be interpreted as the result of chiefly organization, like platform mound sites and some degree of craft specialization, but ultimately the evidence for regional integration is limited and ambiguous. The historic and earlier archaeological records of nearby other regions can be even more incongruous. In the Suwannee Valley, early historic records provide detail about the organization and financing of hierarchically organized, multi-community chiefdoms, whose leaders displayed elevated rank and managed trade with the Spanish—and yet, the pre-Columbian archaeological record of the region lacks platform mounds, site-size hierarchies, or evidence for craft specialization (Worth 2012:169-171). Perhaps late prehistoric residents of the Suwannee Valley deliberately shunned the trappings of Mississippian politics and culture, with elites instead expressing and accumulating prestige through gatherings focused on ritual feasts (Wallis 2014:253-258). Unexpected aspects of the historic record can also reflect the effects of European contact itself: For example, late sixteenth century Spanish accounts that characterize the Calusa as a tributary state (Marquardt 1988:176-185) might describe a political system that was responding to the disruptions of European contact (Marquardt and Walker 2013:886). Given the early arrival of the Spanish in the Tampa Bay region, these records might be less distorted by contact-period upheaval, but historic records are nevertheless necessarily removed from the circumstances of pre-Columbian life.

Chapter Summary

Safety Harbor people lived in a dynamic time, and on the cusp of an even greater period of change. Early Safety Harbor communities likely disputed and formed alliances among themselves, although the degree of political integration within larger villages and outlying settlements requires more study. They built on traditions of earlier times including the utilization of rich but variable coastal resources, the ongoing alteration of the landscape through mound building and the deposits that created shoreline middens, and the exchange of local materials with surrounding regions. Sometime between the Woodland period and the arrival of Spanish explorers, people living in this region began to centralize decision making in the hands of leaders who sometimes exercised authority over neighboring communities—but the timing and degree of this change is unclear. Regional interactions intensified, as Safety Harbor people traded shell beads inland, sent marine shell north to Mississippian communities, and found their relationships with the Calusa becoming more tense and competitive.

Safety Harbor culture is a useful context for studying the development of social complexity in a non-agricultural setting. To date, characterizations of Safety Harbor organization have relied on regional patterns of settlement, the identification of mounds, and data from a limited number of residential sites. Detailed studies of Safety Harbor domestic contexts are therefore increasingly important for investigating the interplay of local traditions, regional pressures, and ecological variation in the historical trajectory of this region.

Chapter 3 - Background and Archaeological Investigations of the Weeden Island Site (8Pi1)

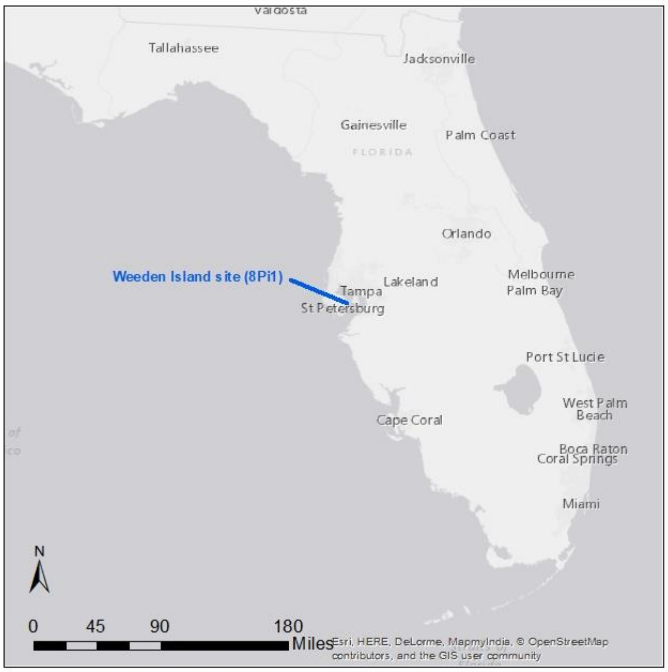

Figure 3.1 - Location of the Weeden Island Site. Base map source: ESRI ArcGIS Online.

The Weeden Island site is located on a small peninsula in Pinellas County, Florida. Most of this peninsula is currently managed as the Weedon[2] Island Preserve, an area of relative wilderness amid an otherwise highly urbanized landscape (Figure 3.1). Weedon Island Preserve is located on the eastern side of the Pinellas Peninsula, which forms the western boundary of Tampa Bay. St. Petersburg, Clearwater, and other cities of Pinellas County are also located on

[2] The Preserve is named for its former owner Leslie Weedon, but Smithsonian archaeologists recorded the archaeological site with the Weeden spelling.

the Pinellas Peninsula. Between Weedon Island Preserve and St. Petersburg is Riviera Bay (formerly Papys Bayou). This location puts the Weeden Island site within the heart of the Safety Harbor culture area and within close proximity to local estuary environments where they could harvest aquatic and terrestrial resources. The Weeden Island site (8Pi1) covers a substantial portion of the terrestrial upland area of the Weedon Island Preserve, with different parts of it variably affected by historic and modern development (Figure 3.2).

The present landscape of the Preserve includes a variety of environments that would also have existed for early inhabitants of the area. A substantial portion of the Preserve consists of tidal swamps, where mangrove trees are abundant and many fish, shellfish, and birds breed and forage in a low energy environment. Behind some of these tidal swamp areas are tidal marshes, which are home to animals including snails, wading birds, and terrapin. Seagrass beds harbor shellfish like clams and scallops and provide vegetation for fish, turtles, and manatees, while nearby mollusk reefs host beds of oysters along with mussels, clams, and lightning whelk, as well as birds and mammals who come to feed in these locations. On land, there are presently pine and scrubby flatwood uplands, maritime hammocks, and xeric hammocks; the vegetation across these includes oak trees, cabbage palms and saw palmetto, and pine trees (The Weedon Island Story 2005).

The archaeological deposits that have been the focus of research are primarily located on the crescent of terrestrial upland at the center of the Preserve, although some archaeological sites and remains have been found on the outlying islands. The terrestrial uplands of the Weedon Island Preserve include wind-deposited sand dunes. These contribute visible topographic variation across the landscape of the peninsulas. A report on the comprehensive cultural resource survey conducted on the Preserve provides a detailed overview of its geomorphology and soils

(Weisman et al. 2005:10-19). Most relevant to the discussion here is the stratigraphy of these aeolian deposits, in which most of the archaeological deposits encountered for this project appeared. The area's dunes include several meters of yellow aeolian sand, probably deposited between 6,000-5,000 years ago, coinciding with the Middle Archaic period in the region. These are topped by white aeolian sands that vary in depth (thinner atop dune ridges, thicker at lower elevations) and may contain Late Archaic artifacts. Anthropogenic sediments dating to the Weeden Island and Safety Harbor occupations are found on top of white sand deposits (Weisman et al. 2005:12).

As I discuss in this chapter, the Weeden Island site has a long but uneven history of archaeological research: after a gap in systematic investigations following early work by the Smithsonian, research at the site has been reinvigorated in recent years. Early work by the Smithsonian and William Sears documented domestic and mortuary components of the Woodland-period Manasota-Weeden Island occupation of the site. Later investigations have surveyed the area more fully and examined deposits from the Safety Harbor cultural period.

Landholding History and Modern Impacts

The historical background of the land now managed as the Weedon Island Preserve provides context to previous and recent research and helps to explain the extent of disturbance to archaeological deposits.

Between the Civil War and the late 19th century, the land passed hands between several families (Weisman et al. 2005: 32). The land was eventually named for Blanche and Leslie Weedon, who received it in 1898 as a wedding gift from Blanche's father, Captain W.B. Henderson. It was a weekend vacation spot for the couple, who would stay in a house that Leslie built on top of a shell mound just south of the burial mound that would be excavated in the 1920s (The Weedon Island Story 2005: 16-19).

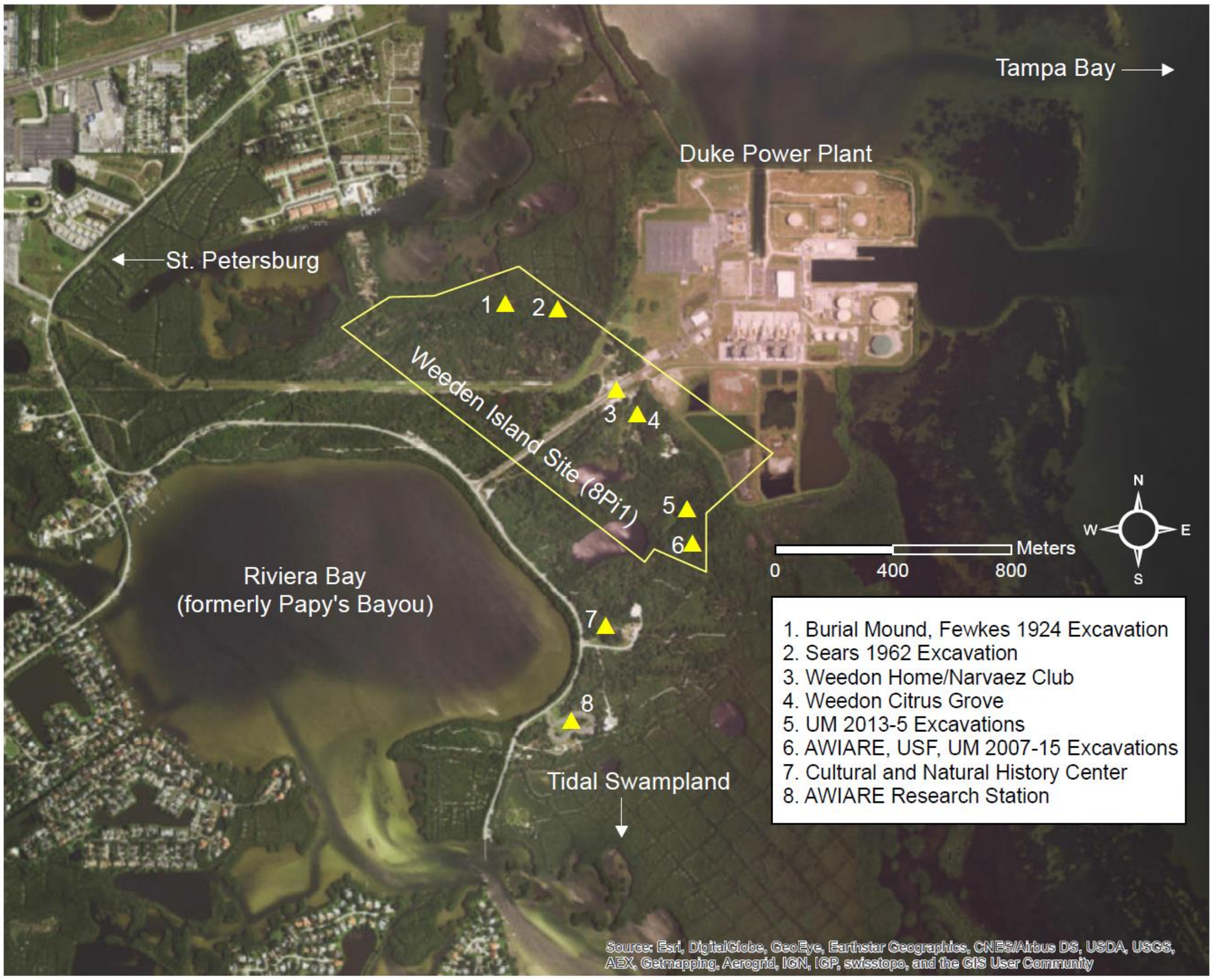

Figure 3.2 - Points of interest on the Weedon Island Preserve. Base map source: ESRI ArcGIS Online.

Most of the island was purchased in 1923 by a land developer, Eugene Elliott, who attempted to turn it into a resort. He envisioned the archaeological remains as part of the location's appeal, and so he planted artifacts in order to catch the attention of Smithsonian archaeologists. Jesse Fewkes recognized the ploy but also saw the real potential of the site and commenced excavations there. In the meantime, Elliott invested in a speakeasy (known as

Narvaez Club and later San Remo Club). Elliott eventually lost the property to foreclosure in 1926, at which point the First National Bank took possession (The Weedon Island Story 2005: 20-30).

In the 1930s, Weedon Island was the site of the Grand Central Airport, which offered flights between Tampa and St. Petersburg; by the 1950s they flew as far as New York City. A movie studio was established at the former site of Elliott's speakeasy and club, and several moveies were filmed there before the studio was shut down for back taxes (The Weedon Island Story 2005:33-36).

The Florida Power Corporation (later called Progress Energy) bought part of the island in 1955 and built Bartow Power Plant in 1958 (The Weedon Island Story 2005:39-49) (that plant is now owned by Duke Energy). The rest of the land was purchased by the State of Florida in 1974, and the Preserve is now managed by Pinellas County in cooperation with Duke Energy (Weisman et al. 2005:34).

Unfortunately, there was also a tradition of undocumented excavations of the site's archaeological deposits. When Sears came to excavate in 1962, he noted that the burial mound at the site was covered in looters' pits, and that families would come to the site to have picnics and hunt for artifacts (Sears 1971:51). Much of the burial mound was eventually destroyed in this way. At other parts of the site, looters' trenches are still visible; two of these were the focus of recent controlled excavations, described below.

The construction of the nightclub/movie studio, the airport, the power plant, a gas pipeline, and Weedon Island Drive, as well as agricultural activity and mosquito ditching had significant effects on the archaeological deposits in parts of the Preserve. Leslie Weedon's house (later the site of Elliott's nightclub) and citrus groves were established atop middens at the northeastern part of the site, south of the burial mound (Figure 3.2); these substantially disturbed the midden deposits. The construction of the Power Plant in that area caused further damage to any nearby deposits. Mosquito ditching former mud flats and upland dunes destroyed archaeological sites and created an environment for mangroves and the invasive Brazilian Pepper. The road at the entrance to the Preserve, Weedon Island Drive, cut through a midden-topped dune and led to disturbance of those deposits. A gas pipeline similarly bisected a dune ridge with archaeological deposits on top. (Weisman et al. 2005:19-21). The area of the Preserve that has been least affected is the southeastern portion of the Preserve's terrestrial upland, including the southern half of 8Pi1, the Weeden Island site.

Explorations by S.T. Walker, 1879

The earliest record of archaeological research at the Weeden Island site is by S.T. Walker was a writer and editor of newspapers who also had a passion for archaeology and nature. Although he was an amateur archaeologist and collector, he took particularly careful notes, maps, and sketches, and he donated his collections to the Smithsonian (Mitchem 2008b).

In 1880, Walker published a report that documented a low "temple" mound with a ramp at the Weeden Island site (Walker 1880; Figure 3.3); this observation was included in a seminal synthesis of Safety Harbor period mounds in the Tampa Bay area (Luer and Almy 1981). However, recent survey at the Preserve did not detect any extant platform mounds (Weisman et al. 2005), nor did Fewkes identify any in the 1920 (Fewkes 1924:1-3). It is presently unclear whether development since the turn of the twentieth century may have destroyed such a construction; whether Walker's observation misrepresents the burial mound (discussed below), a ridge of shell midden, or some natural feature; or whether the mound he describes was actually located elsewhere.

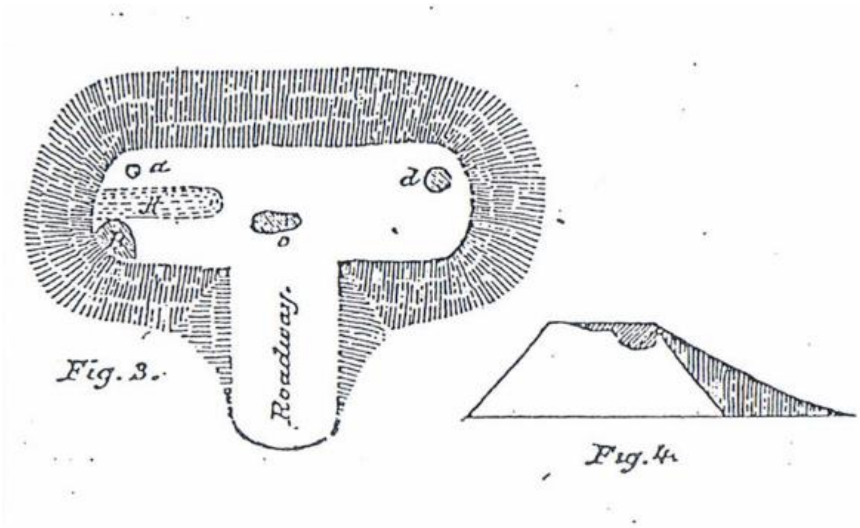

Figure 3.3 - S.T. Walker's Depiction of a Platform Mound at the Weeden Island Site. Image source: Walker 1880:408.

The Burial Mound and Smithsonian Institution Excavations, 1923-1924

The first major excavations at the Weeden Island site were led by Jesse Walter Fewkes 1923-1924, with the support of the Smithsonian Institution (Figure 3.4). In pursuit of collections for the museum, they conducted limited excavations in shell midden contexts before identifying the burial mound and its wealth of artifacts. Within this low sand mound, excavators found decorated ceramic vessels that would become the basis for defining the Weeden Island ceramic complex (Willey 1949). Fewkes' 1924 report provides an illustrated account of these excavations, but Willey's 1949 publication adds many important details garnered from field notes and discussions with Matthew Stirling. The Smithsonian archives house additional relevant but unpublished materials, including a partial log of recovered human remains.

The team’s investigations of the site’s shell middens and the probable domestic occupation areas were limited. Fewkes categorizes some of these shell mounds as trash dumps and others as house mounds (Fewkes 1924:7-10), although it is unclear if he found these to differ in composition from each other. His typology of the shell mounds may have been based largely on inferences from other sites (Willey 1949:106) and perhaps the topography of the shell mounds, with locations with greater variation in height interpreted as clusters of small house mounds (Fewkes 1924:9).

Figure 3.4 - Fewkes oversees excavations of shell midden at Weeden Island. From the National Anthropological Archives, Smithsonian Institution: Photo Lot 24 SPC BAE 4321 Florida SW Coast 01364700.

A low sand burial mound was the focus of excavations. The mound provided evidence for change in the mortuary program during its use. According to the field log of human burials of about one third of the entire burial mound uncovered 465 human burials (National Anthropological Archives, Washington, D.C., 1923-1924, D.L. Reichard field journal, Jesse Walter Fewkes Papers, box 9), and at least two different stratified patterns of interment were identified. The lowermost burials, beneath the mound, included primary, flexed interments in small shell-lined pits with artifacts like shell tools and plainware ceramics that the excavators identified as "Glades," but which archaeologists would now consider to be typical of the material culture created by local, coastal Manasota groups (Luer and Almy 1980, 1982). (Additionally, Sears later noted that these pits were probably dug into the thin midden layer his trench identified below the burial mound [Sears 1971:54], consistent with early Manasota patterns of midden burials [Luer and Almy 1982]). Within the mound itself, Willey's describes primary, extended burials in the lower zone of the mound, and an upper zone with secondary vertical bundles, some single skulls or long bones.

Notably, it was within these upper two levels of the mound that excavators recovered Weeden Island Complex pottery with the bodies. The Weeden Island ceramics recovered from the mound include sherds and complete vessels of the Weeden Island Complex and a limited number of Englewood and Safety Harbor sherds, thought to be incidentally deposited later (Willey 1949:108-110). The Weeden Island types represented include vessels with incised and punctated surface decorations, some with human heads in low relief, and Weeden Island plain forms as well; however, Fewkes did not report recovering any full effigy forms (Fewkes 1924:15). Fewkes notes that most of the vessels he recovered were ritually "killed," either by holes punctured in the base or by smashing the entire vessel, although none of them apparently included holes created during the manufacture of the pot (Fewkes 1924:14-16). My analysis of this collection, now housed at the Smithsonian, identified a pattern of mending (via mend holes drilled into sherds) that was exclusive to Weeden Island series ceramics—those which were most likely to have been imported to the area. I suggest that this pattern indicates either a particular form of valuing these types of ceramics, such that they were worth restoring when cracked; or alternatively, that the mending reflects a prior history of use before interment (Sampson 2015).

The burials themselves were analyzed primarily by Hrdlicka (1940), although available documentation suggests that he only determined the sex of the skeletons, and the specific provenience of the skulls analyzed within the mound/submound is not known (Willey 1949:108). A recent study of Hrdlicka's collection attempted to date the Weedon Island samples, but could not because of the poor quality of collagen and contamination with root fragments (Stojanowski and Johnson 2011). My review and synthesis of the archived burial records indicates that children and adults were both buried throughout the mound, although not necessarily in the sub-mound burials of the Manasota period; and that the majority of pottery and other artifacts interred within the mound were cached such that excavators did not identify them as accompanying particular individuals (Sampson 2015). These details and the number of interred individuals suggest this was a cemetery for the community rather than a specialized burial location.

In sum, then, the appearance of Weeden Island series ceramics at this site coincides with new mortuary practices: a burial mound, extended burials, secondary interment of bones, and the destruction or puncture of interred vessels, at least some of which were likely in communities north of the Tampa Bay area. As discussed in the previous chapter, Woodland-period residents of the Weeden Island site may not have had full access to the specialized effigy vessels produced farther north, in the heartland of the Weeden Island culture, but they were motivated to adopt the mortuary rituals of those groups.

William Sears' Salvage Work on Domestic Midden, 1962

William Sears' midcentury excavations provided the first detailed documentation of the site beyond its burial mound. Sears excavated a limited area of midden close to the burial mound as part of a salvage project before the construction of a pipeline. He observed in his report that looting had destroyed much of the burial mound by that time, but that much of the adjacent shell midden was still intact.

The location where Sears excavated evidently dates to the Woodland-period Manasota-Weeden Island occupation, like the nearby mound. His excavation produced one radiocarbon date from the lowest level of his Test Pit A, at A.D. 400 +/- 130 (Sears 1971; Milanich et al. 1997:13). Sears identified sherds of plain pottery, with the only decorated pieces evidently spilling in from the burial mound adjacent to his trench. These sherds were mostly sand tempered, along with a few St. Johns or Pasco sherds and Belle Glade plain sherds that may be from southern Florida (Sears 1971:54). Based on attributes including the contortion and lamination of the paste, Sears identifies Pinellas Plain (i.e., Safety Harbor period) sherds in the upper levels of some of his units, indicating at least some presence of Safety Harbor people in this part of the site, though the majority of the deposits contained sand tempered sherds typical of Woodland-period Manasota occupation. Additionally, Sears concurred with Willey that there was little basis to categorize the shell midden deposits into different functional types as Fewkes had attempted to do (Sears 1971:52).

Sears' work here and at other sites would contribute to his articulation of a dichotomy between sacred and secular ceramics (Sears 1967, 1973). Sears recognized that in both Weeden Island and Safety Harbor cultural contexts, specialized ceremonial vessels were crafted in a style and tradition that was distinct from that of plain, utilitarian wares. He saw this dichotomy as evidence of a "priest state" with stratification based on religious specialization (Sears 1968). Recent interpretations of the sacred/secular pattern argue that it reflects a broader effort to maintain boundaries between ceremonial and secular spheres of life, so that those who earned status because of their importance to community rituals would not gain undue authority in other areas (Pluckhahn 2010).

At the Weeden Island site, Sears referenced this sacred/secular dichotomy in his interpretation of the midden and burial mound. He suggests that the burial mound and underlying midden were built in relatively quick succession and that there was not a change in mortuary ritual. Fewkes' evidence for two stages of mortuary ritual included the discovery of burials under the mound associated with plain pottery, and burials associated with Weeden Island Complex decorated ceramics in the mound itself. Sears argues that the ceramics in lower levels are plain because they are from the domestic context of midden deposited by "the mound builders a day or so before they built the mound" (Sears 1971: 54). However, given the additional differences between sub-mound and mound burials (position, non-ceramic artifacts) and evidence from other sites about the adoption of Weeden Island mortuary ceremony, the original interpretation of a change in practice with the establishment of the mound still seems likely.

University of South Florida Systematic Survey, 2004-2005

The first systematic survey of the Weedon Island Preserve was conducted by the University of South Florida under the direction of Brent Weisman (Weisman et al. 2005). This project assessed most of the peninsula with the aim of studying the settlement patterns and geology of the area and initiating a longer-term program of research on the Preserve. The survey identified 17 new prehistoric archaeological sites around the Preserve in addition to documenting the 8Pi1 site. The newly documented sites are mostly smaller or less complex than 8Pi1, although the authors did recommend further research on several of them (Weisman et al. 2005:400). These sites point to the intensive use and occupation of the landscape over centuries.

The survey also identified four categories of deposits representing late pre-Columbian occupation of the site: (1) shell mounds, where shell-bearing deposits are most substantial in volume above the surface; (2) dark earth middens lacking shell; (3) shell-bearing midden that was not mounded to any notable height; and (4) more ephemeral shell scatters (Weisman et al. 2005:377-390).

The USF project's report revised and expanded the official extent of the 8Pi1 site: the site boundaries now extend from the burial mound and its adjacent shell mounds down the eastern side of the main dry area of the preserve, along what would have been the coastline and where midden was formed atop sand dunes (Figure 3.2). While the burial mound at the north end is characterized by Manasota-Weeden Island material culture, the survey indicated that the site as a whole is dominated by very Late Manasota through Safety Harbor materials (Weisman et al. 2005:390).

The USF survey project also involved study of recovered material culture including pottery, chipped stone artifacts, and shell tools. Findings on those topics are discussed further in Chapter 6, in the context of this project's research questions about craft production and trade.

University of South Florida, St. Petersburg, Midden-Mound Trench, 2007-2013

John Arthur of the University of South Florida, St. Petersburg directed excavations at the Jeanne Mound Complex portion of the site in 2007, 2009, 2011, and 2013, primarily with undergraduate students from the University. These excavations produced a detailed record of subsistence remains and other artifacts and revealed features including isolated postholes and a pit feature. Projects related to these excavations have identified preliminary evidence for year-round occupation of the site, compared the results of archaeobotanical recovery methods, and conducted an allometric study of crown conch (*Melongena corona*) shells from the Preserve (Arthur et al. 2016; Jackson et al. 2018),

Sharlene O'Donnell (who also conducted the zooarchaeological analysis of vertebrate bone for this project) analyzed subsistence remains from these excavations for her master's thesis. She examined zooarchaeological data in the context of the Weeden Island seascape—the varied range of aquatic environments that residents of the site could access and harvest. O'Donnell identified habitats adjacent to and south of the Weeden Island site as locations where inhabitants focused their subsistence efforts (O'Donnell 2015). Her results also complement the zooarchaeological data produced by this project (see Chapter 5).

Dugout Canoe Recovery, 2011

In 2011, a 40-foot pine dugout canoe was recovered from a northern island of the Weedon Island Preserve. The canoe was radiocarbon dated to 1120 +/- 40 BP (2 sigma cal A.D. 777-1013), which corresponds to the late Manasota-Weeden Island or early Safety Harbor period (Kolianos and Austin 2012). The use of boats during this time is not surprising, but the canoe does have some unusual characteristics that might provide clues about how it was used. The canoe is particularly long and narrow with a raised bow, suggesting use in the open waters of Tampa Bay or along the Gulf of Mexico (Kolianos and Austin 2012; Arthur et al. 2016).

AWIARE Midden-Mound Trenches, 2013-2015

The Alliance for Weeden Island Research and Education (AWIARE) conducted excavations in a prominent ridge of shell mound at the site (the Jeanne Mound Complex) in 2013-2015 (Figure 3.2). These excavations cleaned and profiled two looters' trenches to document the midden stratigraphy, in addition to recovering artifacts and dateable material from stratified contexts. Excavations took place in nine 1 x 1 meter units over the two areas. The midden exposed in this area was about 50 cm thick, and deposited atop white and yellow aeolian sands. Excavations uncovered shell-filled pits and post holes, as well as some large deposits of raw clay, suggesting an area for clay processing (Arthur et al. 2016). A number of shell disk beads were recovered from these excavations. AWIARE has also directed test excavations over a small lithic scatter that occurs within white sand layers and probably dates to the Archaic period (Arthur et al. 2016).

University of Michigan Weeden Island Field Research, 2013-2015

This section presents an overview of the methods of shallow geophysical survey and excavations conducted on the Weedon Island Preserve between 2013-2015 under the direction of the author. This research built on earlier investigations of the Weeden Island site and the Weedon Island Preserve. The work of Fewkes and Sears at the northern part of the site established a Manasota-Weeden Island cultural occupation in that area, with some limited evidence of Safety Harbor period pottery; compared with initial work to the south, it seems that the later Safety Harbor occupation occurred south of the Manasota-Weeden Island burial mound and occupation. The USF survey also helped to establish the location of field research for this project. The survey identified that the Location 5, Operation 6 survey area was a portion of the Preserve least disturbed by historic and modern development (Weisman et al 2005: 141). The survey crew also recorded two mound complexes (i.e., shell-bearing midden mounded atop dune ridges) in this area, within the revised boundaries of the 8Pi1 site. These were designated 5-6-SF15, the Jeanne Mound Complex, and 5-6-SF17, the Three Ogres Mound Complex; a dark earth midden was identified surrounding each of them (Weisman et al. 2005:143-150). Geophysical survey and excavation for the University of Michigan project took place over and in the vicinity of these mounds and midden areas, with the goal of sampling Safety Harbor domestic contexts.

Geophysical Survey Methods and Results

Geophysical survey at relatively large scales can provide valuable information about the patterns and relationships of archaeological features at a site (Gaffney and Gater 2003; Thompson et al. 2014). At Weeden Island, magnetic susceptibility and magnetometer survey were used to survey an area of approximately 180 x 270 meters despite conditions of extremely dense vegetation (Figure 3.5). Dr. Timothy Horsley and I conducted the survey, and Dr. Horsley processed the resulting data. The area surveyed covers most of the Location 5, Operation 6 portion of the site (Weisman et al. 2005), which was the area we were authorized to investigate by the land owner, Duke Energy, as well as the portion of the site that has been subject to the least amount of modern development. The survey area was focused around two prominent ridges of midden mounded atop natural dune formations, designated the Jeanne Mound Complex and the Three Ogres Mound by Weisman and colleagues (2005). We suspected that buried deposits representing domestic activity areas might be found on the flatter locations adjacent to these midden ridges. In these locations, prior survey of the Preserve had identified "dark earth middens"—presumably residential activity areas that encompassed a mix of organic soil, shell, and household refuse over an area of at least an acre (Weisman et al. 2005:362-390).

Topsoil Magnetic Susceptibility Survey

Magnetic susceptibility survey can identify areas where naturally occurring iron oxides in the soil have been converted to more magnetic forms through human occupational activities such as burning and the decay of concentrated organic midden material (Dalan 2006; Dearing 1999).

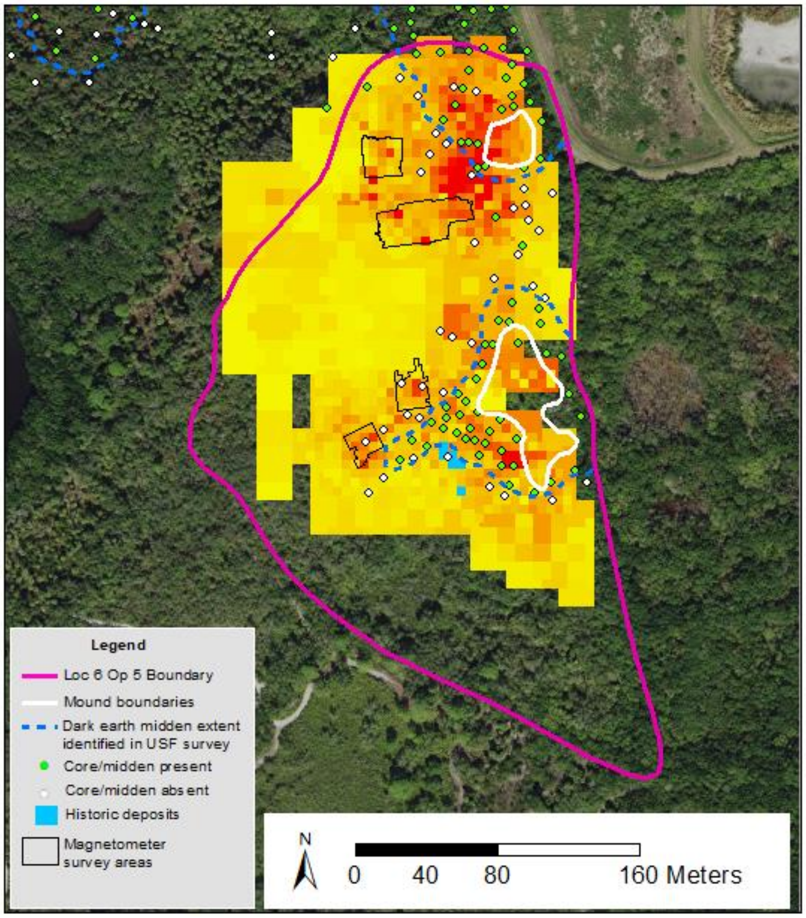

Figure 3.5 - Magnetic susceptibility survey data (plotted from 1 SI to 20 SI, yellow to red) within the boundaries of Operation 6, Location 5 compared to the findings of previous archaeological survey of the Preserve (based on Weisman et al. 2005 Figure 11.2). Base map source: ESRI ArcGIS Online.

Using a Bartington MS2B meter with a MS2D field coil, we conducted a magnetic susceptibility survey at a resolution of one reading per 5 x 5 meter square for most of the survey area, and at a resolution of one reading per 10 x 10 meter or 20 x 20 meter square in areas with consistently low and unvarying readings. During survey, the field coil is zeroed in the air then placed directly onto the ground surface. The depth of measurements is shallow and only effectively measures the magnetic properties of the topsoil, although bioturbation means that the topsoil usually reflects the properties of the underlying soils and sediments. The 18.5 cm diameter of the coil measures approximately the top 10 cm of the ground, with 50% of the signal coming from the upper 15 mm (Dearing 1999, Table 1.7; Gaffney and Gater 2003:44-45). Magnetic susceptibility survey is very effective for rapidly assessing the archaeological potential of an area by identifying areas where the topsoil exhibits magnetic enhancement. It is therefore useful for defining site extent and locating areas worthy of further investigation (Dalan 2006:161-203; Dearing 1999; Gaffney and Gater 2003:44-46). For our purposes, magnetic susceptibility survey could also be conducted relatively rapidly in the densely wooded terrain of the Weedon Island Preserve, without the need for clearing beyond removing leaf litter at each reading location to ensure the field coil was placed directly on the ground surface (Figure 3.6).

Figure 3.6 - Zeroing the susceptibility meter between readings under typical ground-cover conditions (left); conducting magnetometer survey in a cleared location (right)

The magnetic susceptibility survey results show that there is a general trend of increased human occupational activity on areas of higher topography, on and around the two previously identified midden mounds and within the previously established dark earth midden areas (Figure 3.5). However, there are also several well-defined areas of increased magnetic susceptibility to the west of each the Jeanne Mound Complex and the Three Ogres Mound. Adjacent to Jeanne

Mound Complex in the southern portion of the survey are two roughly discrete areas of increased magnetic susceptibility, each containing high readings with mid- to low-level readings around them. Adjacent to Three Ogres Mound at the north of the survey area, there is an even more striking pattern of five discrete high readings (at a resolution of one reading per 5 x 5 meter square) that approximately follow the edge of the mound. We investigated five of these high-reading areas further with magnetometer survey.

Magnetometer Survey

Magnetometer survey measures slight variations in the Earth's magnetic field caused by variations in the magnetic properties of the ground, which allows the detection of buried features that resulted from burning and/or organic decay (Aspinall et al. 2008; Gaffney and Gater 2003; Kvamme 2006). This can include discrete features like pits, burnt remains, or larger postholes, as well as more diffuse areas of occupation that have an increased level of magnetic "noise." Our magnetometer survey was focused on four areas with high magnetic susceptibility readings, but without marked topographic variation (i.e., locations expected to be adjacent to, rather than on top of, the midden-mound ridges), taking into account vegetation and which locations could feasibly be cleared for survey (Figure 3.6).

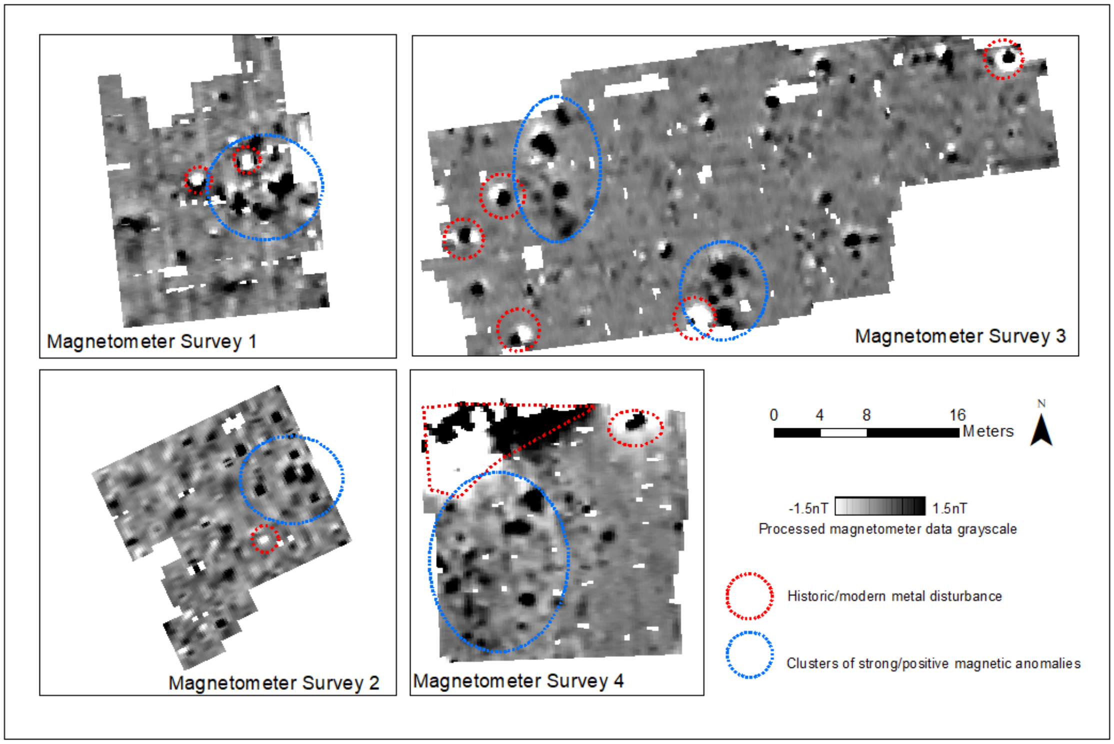

Figure 3.7 - Results of magnetometer survey in four locations, plotted from -1.5nT (white) to +1.5nT (black).

The results of the magnetic susceptibility survey provided the basis for selecting areas for magnetometer survey, which was conducted with a Bartington *Grad601-2* dual fluxgate gradiometer. We conducted magnetometer survey in four areas, two with approximate areas of 15 x 15 m, one of 30 x 20 m, and the last of 20 x 20 m. These magnetometer survey results demonstrated that the high readings in the magnetic susceptibility results corresponded with clusters of strong positive magnetic anomalies (Figure 3.7). We detected five such clusters of anomalies in the magnetometer survey; in subsequent investigations these were designated Areas 1-5. (Anomalies encompassing paired strong positive/negative values and/or very intense values result from historic or modern buried iron objects and have been excluded from the interpretation of archaeological features). These results also suggest that those areas of high magnetic susceptibility that we did not survey with the magnetometer (i.e., two such high readings between magnetometer grids 3 and 4) likely represent two additional, similar clusters of anomalies.

The anomalies detected through geophysical survey revealed a spatial structure to those areas of occupation adjacent to the midden ridges. What remained to be determined through further excavation and analysis was whether these clusters represented household or communal activity areas, and to what extent these areas were used all contemporaneously and/or sequentially. This evaluation of site use and group mobility was designated as “Stage 1” of a two-part research design, and would rely on radiocarbon dating of activity areas and features, indicators of seasonality of site use, and evidence for the range of activities undertaken in each cluster of deposits—these results are presented primarily in Chapter 4.

Building on this framework of community structure, “Stage 2” of the project research design focuses on characterizing the social organization of the group(s) occupying the site during the Safety Harbor period, with an emphasis on regional interactions, food collection strategies, and the coordination of crafting activities. The results of this stage of research are presented primarily in Chapters 5 and 6.

To these ends, excavations and subsequent analyses were planned to document and characterize cultural deposits and the relationships among them, and to collect samples of material culture, food remains, dateable material, and potential seasonality indicators from each of the areas of activity indicated by the geophysical survey.

Excavation Methods

Excavations included 1 x 1 m and 2 x 1 m test units, as well as block excavations encompassing multiple units. These excavations were intended to ground-truth magnetic anomalies and collect samples from specific features and areas of the site. The two excavation blocks of approximately 31 and 20 square meters, respectively, were located over areas of concentrated, large magnetic anomalies and were designed to reveal relationships between features through horizontal exposure and longer profiles.

Figure 3.8 - Field crews excavated units and screened sediments

In all of these excavations, the crew excavated in arbitrary 10 cm levels within observable natural or cultural strata, to the extent that it was possible to identify stratigraphy during excavation. Features like intrusive pits or areas of burning were excavated separately where possible. All sediment was dry screened through 1/8 inch mesh (Figure 3.8). Artifacts (including bone) were collected from these screens in the field; additionally, in excavated levels including shell midden deposits, all whole and fragmented shell recovered by the 1/8 inch screen was collected, so that a subset of these samples could be sorted and analyzed with greater precision in the lab. Each provenience was assigned a unique field specimen number (FS#) during excavation. Excavators collected one 10 liter sample of matrix from each feature (or the entire feature, if less than 10L), as well as 10L samples from selected midden contexts, for the recovery of botanical and zooarchaeological remains through flotation (during which the heavy fraction is collected in 1/16 inch mesh). During excavation, the crew recorded information about elevations, artifacts, soil/sediment characteristics, and other relevant variables. Digital photographs and maps were produced throughout excavation.

The fourteen test unit excavations were located over a variety of magnetic anomalies (small and large, weak and strong, positive and negative) and recovered material from different types of deposits (small mounds of dense shell midden, features occurring within such middens, features occurring in non-midden contexts). As a whole, the excavation of these units demonstrated the utility of following the geophysical survey results for identifying cultural deposits and discrete features. In general, excavations encountered topsoil deposits ("Zone I") of 10-20 cm at the surface, under which could be found midden deposits ("Zone II"), typically shell-bearing, of depths ranging from about 10-60 cm. Features like burning loci or small pits were sometimes identified within midden strata, or occasionally apart from more extensive midden deposits. The subsoil sands underlying midden deposits ("Zone III") typically included greater quantities of chipped stone artifacts and may reflect occupation of the site from the early to middle Woodland period or older. Chapter 5 presents the results of these excavations in detail.

Chapter Summary

The Weeden Island site appears to be similar to other residential communities within the heart of the Safety Harbor culture area. Domestic deposits include ridges of shell-bearing midden adjacent to the bay shorelines. Like Bayshore Homes, the Safety Harbor period occupation is south of the Weeden Island period occupation and burial mound. If S.T. Walker's records of a platform mound in the vicinity of this occupation are accurate, then the Weeden Island site would also have been among the sites of this time that participated in the social and political practices associated with mound architecture. These qualities make the site an appropriate location for investigating some of the major ongoing questions about Safety Harbor social organization.

Recent research at the site builds on previous investigations by focusing in on the intra-site settlement patterns and community organization of the Safety Harbor period occupation. Excavation was conducted at each of the five areas where clusters of strong, positive magnetic anomalies were recorded in the magnetometer survey. Comparing information within and across these areas provides a basis for characterizing the social scale and tempo of occupation at these locations. In Chapter 5, I review the results of these excavations and discuss the chronology of the Safety Harbor occupation in the study area. First, I review some of the theoretical and analytical approaches that inform this study.

Chapter 4 - Theoretical and Analytical Approaches to Community Organization

In the introduction to this volume, I presented a view of archaeological communities and the study of domestic practices that articulated with macro-scale questions about complexity, inequality, and long-term trajectories of change. In this chapter, I delve further into three related domains of community practices by coastal foragers: (1) the spatial and social organization of domestic activities, (2) the subsistence pursuit, and (3) the production of everyday and extraordinary objects. Each of these aspects of community practice would have provided venues for collaboration and competition at different scales. I discuss theoretical and analytical approaches that have informed my study of intra-site patterns in residential contexts at the Weeden Island site. The following discussion provides a background to the research questions presented in Chapters 5-7.

Domestic Activity Areas and Scales of Social Practice

Households are social units that share tasks including production and consumption, and the term is not always synonymous with domestic structures (Blanton 1994; Wilk and Rathje 1982). A residential community (i.e., a village or town) would typically comprise multiple households, although a very broad definition of households might apply to any social group that operates as an economic unit. In some cases that group might be isomorphic with the residential community itself. Household archaeology provides a framework for studying variation and change in production, consumption, and other daily activities when these tasks are shared cooperatively by multiple separate social units within a community (i.e., households) (Blanton 1994; Flannery 1976; Hirth 1993; Nash 2009; Thompson et al. 2014; Wilk and Rathje 1982). Although households are not necessarily equivalent with dwellings, the household framework is most prevalent in archaeological contexts where structural remains are recovered. Some archaeologists have consciously identified households with co-residential dwellings for the purposes of analysis, as with Nash's (2009:224) "archaeological household." Houses that span multiple buildings might be identified through the arrangement of structures and their relationship to features like plazas or courtyards, while households that share a single dwelling might be recognized through the presence of multiple cooking or storage areas.

But structural remains are not always recoverable, for instance when people use building materials and forms of architecture that perish easily, or when environmental conditions are not suitable for preservation. These issues have historically been challenges to household archaeology in the Southeastern United States (Pluckhahn 2010b:333-334). However, a flexible approach to identifying households can be useful in contexts where social and economic groupings are not necessarily reflected in architecture (Pluckhahn 2010b:334, 345-346). In the absence of recoverable structural remains, archaeologists might use clusters of features or arrangements of features to infer discrete areas of activity attributable to social units like households. A version of this approach is utilized even in cases where structures are available, since important household activities regularly take place outdoors in some contexts (e.g.,Flannery and Winter 1976). In this study, I attempt to identify and characterize domestic economic units by blending approaches from household archaeology with an activity areas framework. As I detail below, pursuing the research interests of household archaeology in the absence of houses also facilitates the study of communities that share production and consumption tasks at higher levels of integration than the extended family.

The concept of *activity areas* has provided a rationale for interpreting the spatial patterning of artifacts in terms of the functions that different site locations served (Binford 1983; Kroll and Price 1991). The interpretation of spatial patterns has built on ethnographic and experimental research into how human behavior can create artifact distributions (Binford 1978; Gould 1968; Schiffer 1972; Yellen 1977). Archaeologists have used both quantitative and qualitative methods to recognize patterns between and within artifact categories (e.g., Whallon 1973). Identifying activity areas can elucidate *site structure*: the spatial distribution of artifacts, features, and fauna on archaeological sites (Binford 1983:144). There are of course caveats to inferring human behavior from archaeological deposits: the areas where activities were conducted do not necessarily map with the discard of the tools used (Rigaud and Simek 1991), and some strategies of excavation may systematically overlook some areas of activity, for instance those that are regularly located much farther from domestic structures than the archaeologist expects (Kent 1987:11). Even so, efforts to identify the spatial and social organization of behavior from material remains is foundational to analyzing higher-level aspects of community organization like the authority of leaders or dynamics of coordination and competition.

Because of the focus on everyday behavior and the accumulation of individual actions, the study of activity areas can have some unexpected points of articulation with archaeological approaches informed by practice theory and the routine performance of repetitive actions (Bourdieu 1977; Giddens 1984; Sewell 2005). For instance, Binford (1983) pointed to how body mechanics can result in patterned archaeological records; in a campsite context, for instance, drop zones and toss zones reflect the configuration of bodies around a central feature and habits of discard. The material patterning that constitutes archaeological activity areas results from the embodied habits of cultural knowledge and expectations. Examining the archaeological record in this way is consistent with the orientation towards the everyday that I discussed in the introduction to this volume.

Beyond the challenge of preservation in the recovery of structures, a household archaeology framework needs to be modified in cases where communities are not made up of distinct, independent social-economic units. In some contexts, production and consumption tasks were not necessarily organized within household units; instead, these activities might be conducted at larger, more communal scales. For instance, in a small-scale, highly mobile society, the group of people who camp and travel together (i.e., what might be called a "band") would operate in most respects as a coherent economic unit. Members of such a group would typically be kin, lacking further subdivisions like lineages or clans, and enforce an egalitarian ethic of generosity and cooperation (Kelly 2000; Flannery and Marcus 2012:15-39). The scale of economic units and degree of cooperation also varies in sedentary villages. Flannery (1972, 2002) has pointed to differences in the house architecture and settlement plans of communities where lineages are the basic economic unit, compared to those in which smaller family units operate as households. For instance, the Late Woodland and Emergent Mississippian nucleated villages of the American Bottom typically display a ring of huts around a central courtyard with shared storage pits, so that each community operated as a minimal economic unit, following a pattern that has been observed ethnographically around the world (Kelly 1990; Mehrer 2000:46-47). In the American Bottom generally, the emergence of discrete households units may not have occurred until late in prehistory; this change appears to have followed previous stages in which families cooperated together, and then were more formally organized as a joint, hierarchical lineage group (Peregrine 1992:139-142). Across the Southeast, there appear to have been occasional, perhaps temporary or partial instances of co-residential house groups operating as production/consumption units prior to the Mississippian period, when household organization became better established across the region (Pluckhahn 2010b:345-347). Even though communities structured by household units may still come together for communal activities or obligations, the presence of distinct households has important implications. The shift to more autonomous household units could have facilitated economic competition within Mississippian communities (Flannery 1972; Peregrine 1992:141-142; see also Wiessner 1982). Alternatively, shifting household configurations can be a basis for different trajectories of social change: In the fisher-hunter-gatherer context of South Florida, Thompson and colleagues (2014:71) have suggested that co-residential, multi-family households may have emerged as early as A.D. 500 as an adaptive strategy to better coordinate labor for subsistence projects like fish weirs; these groups might have continued to maintain heterarchical relationships with each other as the community went on to establish itself politically in the region. Flannery (2002) similarly points to the development of extended households in the Near East and Mesoamerica as a means of increasing production or risk buffering. The social scale at which risk is shared and domestic labor is coordinated can play a major role in socio-political trajectories.

The establishment of nuclear family households as the basic economic unit of society was a crucial development of the Mississippian period in much of the Southeast, corresponding to changes in social, economic, and political organization. As for Safety Harbor communities, it is not yet clear when, how, or how consistently economic activity shifted from the community to a household scale. Therefore, identifying the *social scale of domestic practices*, including subsistence and crafting activities, is essential to determining how and whether autonomy and competition may have emerged within residential communities during the early Safety Harbor period.

In this case study, I found little evident of structures and insufficient remains to define the locations or boundaries of dwellings. Nevertheless, I begin with the principle that archaeologically-identified activity areas are analytically similar to the remains of household residences, though activity areas may also have been used by families, extended families, or other subsets of a village (e.g., groups of women). I establish a framework for the structure of the Safety Harbor occupation at Weeden Island through the results of geophysical survey, targeted excavation, and radiocarbon dating (Chapter 5). I then seek to define scale and nature of activities at each of the five areas seen in the magnetometer survey (Table 5.1). However, I do not assume that these areas are isomorphic with individual households; I also consider that they may be the remains of activities undertaken communally. To get to these interpretations, I draw on data about subsistence and material culture (Chapters 6 and 7). As I have alluded to in this section, craft and subsistence pursuits contribute to the configuration of domestic activities at the smallest scale, and at higher levels, the interplay between local resource availability and community social structure can shape long-term historical trajectories.

Coastal Forager Subsistence: Choice, Technology, and Labor Coordination

In the grand picture of subsistence, analysts typically draw the boldest line between collecting food—that is, hunting, gathering, and fishing—and producing food through agriculture. Of course these practices are not mutually exclusive: many societies have supplemented domesticated products with wild foods, or practiced horticulture alongside foraging, or intensively managed wild resources. A reliance on farming over foraging can certainly have major social implications; for instance, attachments to immovable agricultural property can motivate inter-generation accumulation (Earle 2000), while variation in land quality and the relative predictability of produced surplus can sustain inequalities (Beck and Brown 2012:74-75). But while mode of production at this resolution—foraging versus farming—can provide a framework for explaining certain differences between societies, it does not, on its own, consistently predict the organization of political and economic institutions. Even among those societies whose diets come exclusively from wild foods, subsistence strategies are diverse (in terms of technology, scheduling, land use and access, and labor coordination), with attendant consequences for social organization.

There have been numerous efforts to describe, classify, and model variation in forager subsistence practices (e.g., Kelly 2013). The approaches relevant to this study are circumscribed by the characteristics of the late prehistoric residents of Weeden Island, and by the focus of my research questions. The coastal villages of the Safety Harbor heartland were probably inhabited on a permanent or semi-permanent basis, and Weeden Island residents had access to estuarine environments and associated terrestrial uplands, which would have provided a particular suite of edible resources and foraging conditions. Following Thomas' investigation of foraging in the estuarine landscapes of St Catherines Island, Georgia, these can usefully be categorized as collecting shellfish, saltwater fishing, hunting and small turtle harvesting, sea turtle harvesting, harvesting mast, and harvesting other wild plants (Thomas 2008:71-72). Acknowledging the diverse "hunt types" (Smith 1991) that would have been available to Weeden Island residents sets the stage for investigating their foraging choices.

Optimal foraging theory, which emerged from human behavioral ecology, has been among the most prominent frameworks for analyzing hunter-gatherer subsistence behaviors (Bettinger 1980, 1987; O'Connell and Hawkes 1981; Smith and Winterhalder 1981; Winterhalder 1981; Kelly 2013:40-76). Optimal foraging theory models assume that foragers will attempt to maximize their energetic return; beyond this shared assumption, models vary in their constraints and other variables. Testing the hypotheses generated through use of these models can sometimes reveal specific instances of unexpected behavior. While this study does not explicitly test hypotheses derived from an optimal foraging theory model, I reference expectations about resource use that are based on the ranking of resources that could be encountered in particular types of foraging excursions. I use those expectations as a baseline to identify instances of resource use that are unexpected according to a diet-breadth model, which predicts whether foragers will choose to pursue certain resources, taking into account their overall return rate (Bird and O'Connell 2006; Kelly 2013:46-52). I draw on data about methods of resource collection and energy return rates developed by Thomas and colleagues (2008) on St Catherines Island because they provide a thorough review of species and environments that are similar to those of the Weeden Island locale. The resources available on Tampa Bay are not identical (for instance, marine gastropods are much more abundant), but many aspects of the environmental patterning and resource availability are similar.

Gender likely played a role in the organization of subsistence activities, in ways that should affect our expectations about the types of hunt or foraging an individual could choose to engage in. In many ethnographic accounts, shellfish are collected primarily by women and children (Claassen 1991; Moss 1993; Waselkov 1987:96-99). The collection of many edible shellfish taxa is similar to the gathering of plant resources in terms of predictability and accessibility. Shellfish can provide a high return for female foragers who are accompanied by children (Thomas 2008:981-982; Meehan 1982:159) and children can participate in collecting some shellfish. Shellfish gathering is also often a social activity, which can shape the decisions made in foraging as much as issues of caloric return (Claassen 1991).

—

Beyond choices about where and when to collect food, the technologies and infrastructure used to procure aquatic resources can have dramatic effects on labor and returns. Weeden Island residents depended on aquatic resources, and the fishing technologies they may have used can be categorized as individual or mass capture, with mass capture techniques further divided into those that are active or passive. Fishing techniques vary with regard to how well and in what manner they can be reconstructed from the archaeological record of artifacts and zooarchaeological remains, and there are many methodological challenges to such reconstructions (Colley 1987). The following background on fishing techniques informs the analysis of subsistence remains and material culture from the study area and demonstrates some of the opportunities for cooperation and competition that would have been available to residents of the site.

Individual capture techniques collect one fish at a time. These include spearing fish or catching them with a hook on a line (although spears can also be used in conjunction with mass capture techniques, as described below). There are limited ethnohistoric accounts of Southeastern Indians fishing with a hook-and-line, and many are skeptical that this technique was used much or at all (Thomas 2008:129-131; Larson 1980:117). While J-shaped fishing hooks are a rarely found, the much more common bone point was probably used to construct composite fishhooks (Larson 1980:117; Walker 2000). Hooks like these are suited to catching fish that strike at their prey. Walker (2000) argues that such tools were likely used for trolling, wherein a composite hook is pulled through the water, attached to a boat or paddle. Another individual capture technique, spearing fish, was documented ethnohistorically throughout southeastern coastal areas, particularly on the Atlantic (Larson 1980:121-2). This method is most appropriate for larger fish, the remains of which might be found in archaeological assemblages that reflect individual capture techniques. Spears, leisters, and harpoons could all be used to spear fish in this way. Spears could be simply sharpened sticks or canes, while leisters included barbed prongs, perhaps employing bone points (Thomas 2008:127; Larson 1980:117). Barbed harpoons are more commonly used for spearing fish in deep, offshore waters (Walker 2000).

Mass capture techniques collect many fish at once and were probably employed by most coastal groups who caught any fish at all. These techniques can be active or passive. Passive techniques, like traps and weirs, require a significant investment in infrastructure construction and maintenance, and thus labor coordination in advance. Weirs obstruct the movement of fish in some manner, and traps prevent them from escaping; the two techniques are sometimes combined (Rostlund 1952). A weir might use poles or fences to direct the flow of fish to a point where they are trapped (Moss et al. 1990). Tidal weirs allow fish to swim in at high tide, but trap fish at low tide (at least, those that cannot fit through the stakes and/or netting), while longshore weirs, set up farther from the shore, trap fish within a series of increasingly restricted enclosures. Both can be labor intensive, though longshore weirs somewhat more so (Connaway 2007). Weirs and traps tend to catch fish of all sizes, so archaeological assemblages captured in this manner might be similar to natural size distributions of those populations; however, if netted traps are employed along with weirs, their mesh may limit the size of fish able to be captured or escape the trap (Colaninno 2011:340). Gill nets are also set up in place, and they catch fish which swim into them and become trapped in the mesh. These usually capture medium-sized fish, which are too big to pass through the net and too small to effectively avoid it (Colaninno 2011:340). While nets and cords are rarely preserved, the plummets or net weights used to keep gill weights in place are more commonly recovered archaeologically.

Seine and dip netting are active forms of mass capture fishing—that is, the gear must be manipulated to catch fish rather than left in place. Seine nets hang vertically in the water and, like gill nets, are held down on the bottom edge by weights; they require two or more people to operate them. The size of the net mesh still determines the size of fish that can be caught; additionally, large fish cannot flee from active nets as well as they can from stationary gill nets, expanding the range of fish sizes that can be captured by this technique (Colaninno 2011:340). Dip nets and baskets tend to capture smaller fish who are not scared off by the presence and motion of the fisher standing to hold the net or basket (Colaninno 2011:340). These nets would be used close enough to the shore for fishers to wade through the water.

—

The choices that foragers make, then, are entangled with social values as well as local ecologies. These choices can also have cumulative effects on long-term socio-political development. As I discussed in Chapter 1, the development of complexity in nonagricultural societies has typically been understood as an exception to political egalitarianism among foragers. Many anthropologists agree that the control of locations that are agriculturally or pastorally productive was a precipitating factor for the establishment of social inequality (Smith et al. 2010). Theories of how inequality originated and was maintained in hunter-gatherer contexts similarly must take into account how particular environmental and historical configurations might have made different forms of socio-political organization possible.

Robert Kelly's "patron-client" model of how nonegalitarian behavior emerges through subsistence-related behaviors builds on the expectations and assumptions of optimal foraging theory: when sedentary foragers in densely populated areas need to cooperate as a group (for instance, to engage in a difficult hunt or access defensible resources), they may cede some autonomy to a leader. Leaders tend to benefit from larger groups and may encourage admitting new members to foraging groups, even if some of those members will need to be accorded second-class status (Kelly 2013:254-256). Subsistence practices that demand group coordination for procuring or processing foods can be an important condition for the development of inequality, along with sedentism. As an example, the St. Catherines Island, Georgia case points to the development of hierarchical foragers with heritable social inequity in a context of local population aggregation, economic intensification, and territorial conscription; this would have taken place in an environment where low residential mobility made sense and foragers could still effectively make use of a variety of closely spaced habitats (Thomas 2008:1090-3). The patron-client model includes elements from other explanations for emergent inequality. Potential leaders are sometimes conceived of as aggrandizing individuals, who are eager to compete for prestige and material resources given the chance (Hayden 1995). When resource abundance makes sedentism possible, Hayden argued, aggrandizers can accumulate surplus food and goods and attract followers through competitive feasting events. Alternatively, hierarchies have been proposed as an information-processing solution to the scalar stress created by high-density sedentary populations (Johnson 1982). These circumstances might arise when sedentary communities need to extract and process seasonally abundant resources (Ames 1985). Kelly's model maintains the emphasis on increased sedentism as a catalyst for inequality among foragers, alongside population densities that make it worth focusing on and protecting specific productive locations (Kelly 2010). The leaders he imagines taking control of labor coordination would serve a valuable role for the community when large groups need to cooperate together; however, they would also act in their own interests in ways that would have the long-term effect of creating status divisions and requiring group members to cede some autonomy (Kelly 2013:254-256).

Recognizing the potential roles of *leaders* also offers a connection between issues of inequality and of political complexity. As I argued in the introduction to this volume, inequality of resources or status between neighbors is not directly equivalent to political complexity at scales above the residential community. Developing local institutions of authority, however, could provide a new social framework for both competition and cooperation between communities.

Economic intensification can shape the social landscape in ways that demand new forms of cooperation, and potentially, new forms of leadership. Intensification can be achieved by different strategies, including specialization (narrowing of diet breadth), diversification (broadening of diet breadth), or investment (increasing the labor devoted to technologies, architecture, or landscape modification) (Betts and Friesen 2004; Morrison 1994).Technologies like fishing traps and weirs represent investment in technology and in the landscape, but they can also be methods of specialization, or alternatively diversification, depending on the species they targeted (Moss 2012:4). Explanations of the development of complexity and inequality among the fisher-hunter-gatherers of the Pacific Coast commonly invoke processes of economic intensification (e.g., Matson and Coupland 1995). However, several Southeastern archaeologists have argued that complexity can also emerge from social and historical processes, with shifts in economic strategies following from that sociopolitical change (Sassaman 2004:253; Thomas 2008:1107-110).

In this case study, I seek to characterize the Safety Harbor residential community at Weeden Island; however, I also want to situate this case of community organization in a broader historical trajectory for the region. Therefore, I begin by investigating the record of subsistence practices for evidence of cooperation, competition, and/or the coordination of labor within the local residential community. This includes identifying evidence for specific subsistence strategies and technologies, like mass-capture fishing, as well as analyzing the distribution of discarded food remains among contemporaneous deposits. More broadly, I consider whether the social and ecological landscape might have supported heritable social inequality and the establishment of leaders to whom community members ceded some autonomy.

Subsistence efforts related to food extraction are also intertwined with other forms of production, like the crafting of utilitarian and special purpose artifacts. For a fuller picture of the socio-political organization of Safety Harbor communities, I turn to questions of craft production and the role of ritual economies in shaping domestic practices.

Craft Production, Specialization, and Ritual Objects

Craft production interests many archaeologists because of its connections to social complexity: the organization of production can depend on and facilitate unequal distributions of resources, status, and power across segments of society. This is particularly true when the labor of production is divided and specialized among individuals or groups (Durkheim 1997 [1893]; Marx 1977). In circumstances of high economic complexity, specialists may focus on a single domain of production. *Craft specialists* in the strictest definition work full time at their trade, as the basis for their living and instead of devoting their time to subsistence; this is sometimes called "producer specialization" (Arnold and Munns 1994; Evans 1978; Flad and Hruby 2007:3-4; Muller 1984). This type of craft specialization is traditionally considered to be trait of state societies, and to be qualitatively different from other types of labor organization (Muller 1984, 1986).

Some archaeologists use a more flexible definition of specialization, emphasizing production for exchange without necessitating that individual specialists devote themselves to their craft full-time. Specialists in this sense might be highly skilled or have special access to resources as the basis for their differential participation in economic activities. This production of objects that will be used by others has been called "product specialization," sometimes construed as a more general category that also subsumes "producer specialization" as described above (Clark and Parry 1990; Clark 1995; Flad and Hruby 2007:3-4). In these cases, archaeologically, researchers might look for evidence that particular households or regions participated in certain production activities that were absent at other contemporary living spaces or sites (e.g., Flannery and Winter 1976; Yerkes 1989). Along these lines, Costin has proposed that craft specialization exists in any situation where there are more people consuming a good than are producing it (1991:43; see also Tosi 1984). Within these looser constraints, the organization of specialized production can vary according to variables like the degree of elite control of labor and goods (Earle 1981; Sinopoli 1988) or the scale and intensity of production (Van der Leeuw 1977; Peacock 1982). Flexible criteria for assessing variation in production may be used to identify the relative degree of specialization for particular products or to characterize an economic system.

A commonly used set of criteria address Costin's (1991) four parameters of craft production variability—context, concentration, scale, and intensity—around which she developed an eight-part typology of craft production. Context, or degree of elite sponsorship, describes whether artisans are economically independent, producing for a general market, or are sponsored and managed by elite individuals or institutions. Costin notes that independent specialists usually produce utilitarian goods, in contrast to the luxury items produced by attached specialists (Costin 1991:11; but see also Spielmann 2002). The concentration of production can be nucleated or dispersed, depending on the spatial locations of specialists and their distribution relative to consumers. Greater nucleation can require more exchange and transportation. The scale of production describes the number of individuals who produce together, and the way in which their labor is recruited: this ranges from individual or household-based production units to factories at the other extreme. Finally, intensity of production describes the amount of time producers spend to make goods, which constrains the degree to which they engage in basic domestic subsistence activities. Independent specialists are more likely to produce crafts on a part-time basis (Costin 1991:18). These parameters can be used to characterize systems of production, but each parameter also necessarily intersects with other economic, social, and political spheres.

As debates about the boundaries of specialized production have developed, others have questioned the usefulness of the concept of specialization. Cobb emphasizes the interconnectedness of all elements of the economy, including the meanings of crafted objects and the specific means by which leaders are able to mobilize labor; from this perspective, a focus on specialization can be too narrow to be informative (2000:35-46). Cobb also observes that the symbolic meanings and social roles of desired goods mediate the relationship between wealth and power, undercutting the power of purely materialist explanations (Cobb 2000:34-35). John Clark (2007) has recently argued that most approaches to craft specialization are obsolete because they fundamentally neglect human agents. He argues that craft specialization studies assume too much about the objective value of certain artifacts, and that they therefore miss the mark of their supposed goal of illuminating social relationships (Clark 2007:27). Cobb seeks to resolve his concerns about overly static or simplified models of production by delving into specific historical cases, with attention to relations at different scales and to the ways symbolic dimensions of identity shaped economic practices (Cobb 2000:45-46). Clark expresses similar concerns about efforts to analyze specialization in relative isolation from other forms of crafting and from the production of objects' meanings; however, he seems to put greater faith in a deeper theorizing of persons, things, and actions as a way to move forward (Clark 2007:32).

I contend that ongoing debates about the definition and boundaries of specialized production as a type of manufacture emerge in part from a concern that archaeologists pay attention to the many artifacts, tools, and production practices that are "special" but perhaps not the exclusive product of full-time specialist manufacture. These are objects and circumstances that we encounter in the study of most small-scale societies. Reckoning with the social import of these items, and of their production, may require engaging with their meanings, or at least the work that they do in the social world.

In non-state societies and particularly those organized around kin relations (i.e., including chiefdoms), analysis of political economy often focuses on the power derived from *exchange* rather than production. This builds on the expectation that in these contexts, the producers of goods also have full control over the means of production, which can thwart the efforts of aspiring leaders to appropriate labor and goods (Wolf 1982). Further, basic subsistence products like food may be difficult to marshal as "staple finance" (Earle 1987) in small-scale societies because of inadequate demand and the independence of farming communities within a polity (Muller 1987). Rather than appropriate wealth from local producers, aspiring leaders may seek to build status by acquiring goods from afar, which may take on special significance because they are perceived as exotic (Helms 1993). These items can be put to use in what has been called a "prestige goods economy" (Brown et al. 1990; Blitz 1993; Hayden 1998; Trubitt 2000) Prestige goods are made from nonlocal materials and/or with a high degree of skill and labor, though they are also accessible enough to circulate among non-elite individuals. In a prestige goods economy, leaders can distribute such valuables and receive labor or goods in return. In these circumstances, trade relationships with nonlocal actors are essential, which can put elites in a tenuous position because they have no control over the production of those objects in distant places (Cobb 2000:32-33).

Despite the prominence of discussions about exchange, production also matters in small-scale societies. Craft production that was part-time, but nevertheless highly skilled, kept sacred, or otherwise restricted took place in many small-scale societies, including among forager groups in the Southeast. When ceremonial or prestige goods are produced, and this production requires some degree of special skill or ritual knowledge, it should be expected that only a segment of the population is engaged in this production. The intensified demand for these goods can be driven by their social importance, rather than more direct forms of elite control: as Spielmann observes, "Ritual does not simply regulate work; it demands work" (2002:197). This is the case particularly for goods that circulate widely in the community, as with prestige goods that are socially necessary for various ceremonies and activities: shell beads, for instance.

Small-scale societies often employ specialization at the community level to meet this demand for socially valued goods (*sensu* Spielmann 2002), especially when goods produced are traded between communities that produce different speciality items. Specialization at the community level has been posited for or identified in Southeastern groups of the Mississippi period and earlier. Early in the specialization debate, Muller (1984) suggested that chiefdoms in the Southeastern U.S. may have utilized regional specialization to take advantage of locally available resources, but that this would not require particularly complex organization compared to producer specialization. Within the Weeden Island culture of Woodland-period Florida and Georgia, mortuary rituals involved the interment of effigy pots and other specially decorated ceramic vessels, and the production of this pottery was almost certainly restricted to some degree. Pluckhahn and Cordell have found evidence that a high proportion of vessels interred in burial mounds along the Gulf Coast were produced at the Kolomoki site in southwestern Georgia, although other communities in the region, like the McKeithen site in north Florida, were also manufacturing these vessels (see also Milanich et al. 1997; Rice 1980). Pluckhahn and Cordell characterize this production as community-level specialization, but with some degree of producer specialization; that is, artisans in the community who had access to esoteric knowledge relevant to the vessels' ceremonial uses.

Alternatively, ritual objects are sometimes produced in ordinary domestic settings, as documented for certain classes of artifacts at the Woodland period occupations of the Kolomoki and Crystal River sites (e.g., Pluckhahn et al. 2018). These insights come from examining craft production with a focus on the producers' networks of relationships, rather than beginning with the ritual specialists or other elites who might sometimes drive production. Although some objects were destined for ceremonial purposes, artisans may have drawn on skills and techniques used in more utilitarian domains, and crafting special objects could in some cases have been an everyday, domestic activity, not necessarily subject to special oversight or control.

—

In the Safety Harbor context, inferences about social organization and interaction have sometimes made reference to special, ceremonial or prestige objects, but the context of production has remained mostly ambiguous. Safety Harbor people were also located between the domains of Mississippian polities to the north and the Calusa to the south, a position that would have meant opportunities for trade and competition with neighbors eager for authority and prestige. Crafting and particularly shell-working was one potential basis for connections between coastal and interior communities, and between residents of the Tampa Bay area and northern neighbors like the Mississippians. Safety Harbor people regularly made hammers and other implements out of shell, but it was the production of more "special" objects like beads and shell cups (commonly used as burial items) that had the potential to shape local and inter-regional relationships.

Shell beads and sometimes other crafted shell artifacts were deposited in Safety Harbor burials (e.g., Luer 1992; Mitchem 1989, 1996). Many shell bead burials in Florida occur at interior sites, indicating that either marine shell or finished beads were imported from the coast (Austin 2000:309). The availability of marine shell for coastal residents would have made it possible for them to produce these beads locally and thus participate in and encourage the exchange of prestige goods throughout the Safety Harbor culture area.

Access to marine shell also meant opportunities to trade with Mississippian groups north of Florida. In many cases, Mississippians may have preferred to craft the final goods themselves, especially in the case of items that displayed culturally specific imagery—so raw material rather than finished goods would likely been traded. Marine shell beads were produced throughout the Mississippian Southeast and Midwest (e.g., Meyers 2014; Trubitt 2003, 2005; Yerkes 1989). Although successful sourcing studies have been limited, there is evidence that whelk artifacts from Spiro, East St. Louis, and Cahokia were crafted on shells from the eastern Gulf of Mexico (Kozuch et al. 2017). Certain sites may have served as hubs for the transportation and distribution of marine shell, like the Mt. Royal site in northeastern Florida, although Safety Harbor people likely used coastal and river routes to ship shell (Ashley 2012; Mitchem 2012:182; Moore 1894).

There are thus two dimensions to the use of marine shell—the organization of local shell bead production and trade in the Tampa Bay region, and the collection, preparation, and trade of marine shell as a raw material for the Mississippian world. Each aspect has implications for the development of Safety Harbor social organization, and each is rooted in domestic practices. However, the organization of crafting, in terms of division of labor and control of production, is still unclear, in part because there have been relatively limited investigations of Safety Harbor residential sites, and even fewer instances of production activity areas identified.

—

The recognition of ritually-driven production acknowledges the social and economic importance of part-time specialization, while demonstrating that economic practices cannot be understood apart from the social roles of the objects produced. However, observing that ritual or ceremonial objects were produced at a site does not in itself explain the organization of production. The production of special objects does not necessarily entail craft specialization. In this case study, I assess the organization of production (*sensu* Costin 1991) of different classes of artifacts, while also incorporating evidence about how specific crafted objects were valued and used.

Chapter Summary

As a study of community organization among coastal foragers, this work draws on diverse and intersecting theoretical and analytical approaches to assess various aspects of the residential community. In the chapters that follow, I pose specific research questions about the deposition of archaeological features, radiocarbon dates, zooarchaeological and macrobotanical remains, and various classes of artifacts including finished goods and production debris. Those research questions are informed by the approaches presented in this chapter, as I marshal that data to discuss intra-site organization, subsistence practices, and craft production in small scale societies. I use an approach informed by both household archaeology and the interpretation of activity areas to reconstruct the spatial structure and intrasite organization of the Safety Harbor residential community at Weeden Island. I investigate the record of animal and plant resource with a focus on potential opportunities for the coordination of labor and emergent leadership. Turning to other domains of material culture, I assess craft production activities by examining the varied economic and social motivations for creating different classes of artifacts, ranging from subsistence tools to trade goods to potential ceremonial objects.

Chapter 5 – Site Structure and Chronology of the Safety Harbor Occupation

In this chapter, I detail the results of my excavations and build a chronology of occupation in the study area. This information provides a spatial and temporal framework for interpreting the data about food remains and material culture presented in Chapters 5 and 6. A synthesis of these data, along with a site chronology based on radiocarbon dating, provide a basis for the assessment of scenarios of site use and community organization (Chapter 8). Here, I first present a detailed overview of the results of excavations, which ground-truthed geophysical survey results and provided information about the form and content of Safety Harbor era deposits. Then, I present and evaluate new radiocarbon dates on materials obtained from these excavations. Finally, I discuss the picture of site structure and chronology that emerges from these data and provides a framework for interpreting food remains (Chapter 6) and material culture (Chapter 7).

The results of excavation and dating in this chapter are the first steps to addressing two related research questions about the site structure and organization of activities within the Safety Harbor period occupation of the study area. These are questions I return to in Chapter 8, when I synthesize the spatial and temporal framework presented here with the data in subsequent chapters: (1) What was the tempo of occupation of Weeden Island by Safety Harbor people, in terms of seasonal practices and continuity of occupation over time? (2) What was the social scale (communal and/or household) at which Safety Harbor period residents of Weeden Island conducted typical domestic activities? In synthesizing data from this study, I will examine four potential scenarios for site use and associated material expectations, based on the intersections of those two research questions: that the site was occupied by (1) communities comprising long-term, sedentary, household groups; (2) sedentary communities with a low degree of social segmentation; (3) smaller communities of short-term, mobile household groups; or (4) seasonally mobile low-segmentation communities (Table 5.1).

		SOCIAL SCALE OF PRACTICE	
		Household	**Communal**
TEMPO OF OCCUPATION	**Sustained Long-term**	**a. <u>Sedentary high-segmentation groups</u>** **AMS RADIOCARBON DATING** • *Within area*: Long-term • *Across areas*: Contemporaneous (does not fit sequential phase models) **SEASONALITY INDICATORS** • *Within area*: All represented • *Across areas*: All represented **RANGE OF ACTIVITIES** • *Within area*: Many represented • *Across areas*: Many represented	**b. <u>Sedentary low-segmentation group</u>** **AMS RADIOCARBON DATING** • *Within area*: Long-term • *Across areas*: Contemporaneous (does not fit sequential phase models) **SEASONALITY INDICATORS** • *Within area*: Few or all represented • *Across areas*: All represented **RANGE OF ACTIVITIES** • *Within area*: Few represented • *Across areas*: Many represented; evidence for larger-scale consumption activities also present
	Sequential Short-term	**c. <u>Mobile high-segmentation groups</u>** **AMS RADIOCARBON DATING** • *Within area*: Short-term • *Across areas*: Sequential **SEASONALITY INDICATORS** • *Within area*: Few to all represented • *Across areas*: Few to all represented **RANGE OF ACTIVITIES** • *Within area*: Many represented • *Across areas*: Many represented	**d. <u>Mobile low-segmentation group</u>** **AMS RADIOCARBON DATING** • *Within area*: Short-term • *Across areas*: Sequential **SEASONALITY INDICATORS** • *Within area*: Few represented • *Across areas*: Few represented **RANGE OF ACTIVITIES** • *Within area*: Few represented • *Across areas*: Few represented

Table 5.1 - Proposed scenarios for site use practices and associated material expectations

Overview of Excavations

In Chapter 3, I presented the basic research design and methods of recent field work at the Weeden Island site, including geophysical survey and excavations. Geophysical survey identified several concentrated areas of human activity; I excavated at five of those for which we were able to collect magnetometer data (Figure 3.7). Here, I present an overview of the results of excavation in each of those five areas of interest. “Area” here refers to one of the five locales where geophysical survey revealed a concentration of strong magnetic anomalies, and where Safety Harbor cultural affiliation was indicated.

These distinct areas provide a heuristic framework for interpreting site structure in the study area, which covers approximately 180 by 270 meters. I also discuss the results of excavations in test units in the location of some anomalies adjacent to the Area 1 concentration, and the results of a test of a “quiet” or background spot adjacent to Area 3 in the magnetometer survey results. The excavated context of any specimens that were selected for radiocarbon dating are presented in this overview, along with calibrated dates; additional details about dates and samples are provided in Table 5.3.

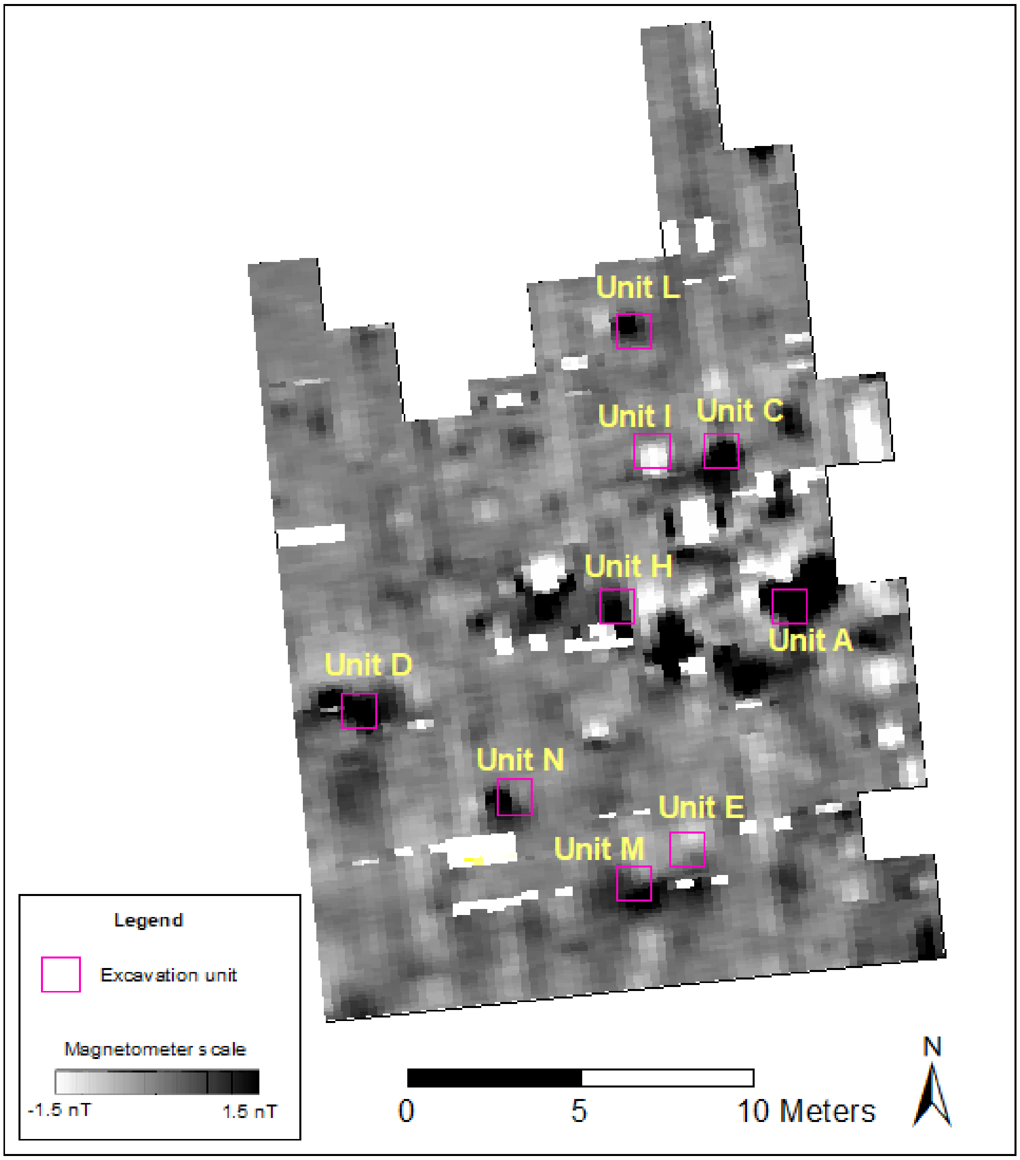

Figure 5.1 - Locations of excavation in magnetometer survey area #1

<u>Area 1</u>

Area 1 is located to the west of the northern part of the Jeanne Mound Complex. It is represented in magnetometer survey area #1 by several irregularly-shaped strong positive and negative magnetic anomalies (Figure 3.7). There are some other scattered strong positive anomalies in the vicinity of this concentrated area. On the ground, there is a slight topographic rise in this location, although it is not continuous with the Jeanne Mound Complex midden mound. Area 1 and Area 2 are just beyond the extent of the “Broken Foot” dark earth midden identified by the USF survey of the Preserve (Weisman 2005:113, 143-150) (Figure 3.5).

Nine 1 x 1 m units were excavated in the vicinity of Area 1 as part of a program of ground-truthing different types of magnetic signals: four of these units were considered part of the Area 1 concentration of activity (Units A, C, H, and I), two identified deposits adjacent to Area 1 (Units D and N), and three units discussed later in this chapter (Units E, L, and M) were used to ground-truth types of geophysical anomalies but did not identify relevant deposits (Figure 5.1).

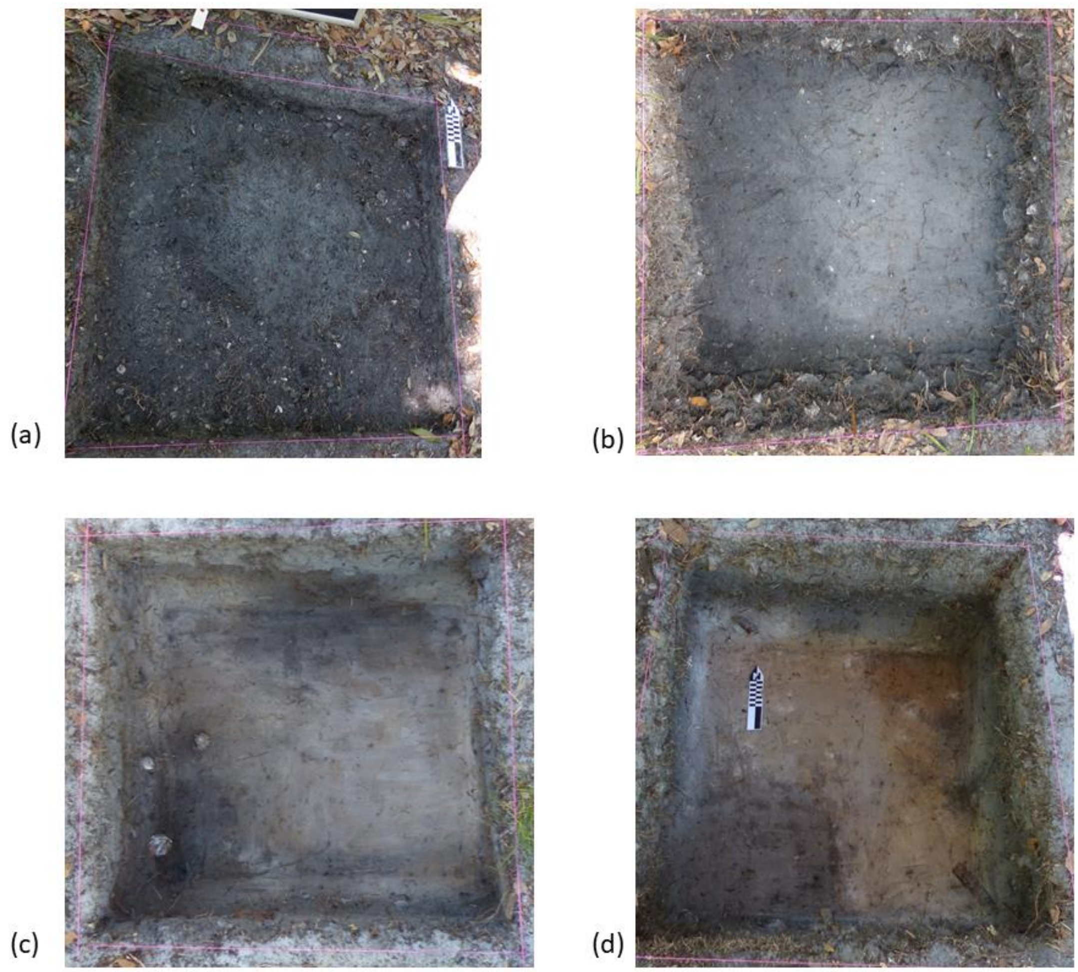

Figure 5.2 - Features excavated in and around Area 1: (a) Top of Feature 1 pit in center of Unit A, (b) Color variation and Feature 4 area in SW of Unit H, (c) Lower levels of Feature 3 pit in SW and unnamed feature at north of Unit N, and (d) Lower level of Feature 2 pit in SW corner of Unit D. All images oriented with north at top of photo.

Unit A. Unit A was a 1 x 1 meter excavation over a portion of a strong positive anomaly identified in the magnetometer survey (Figure 5.1). The 1 x 1 meter unit was positioned on the edge of a small mounded area of shell, with the north side of the unit at a higher elevation than its south side.

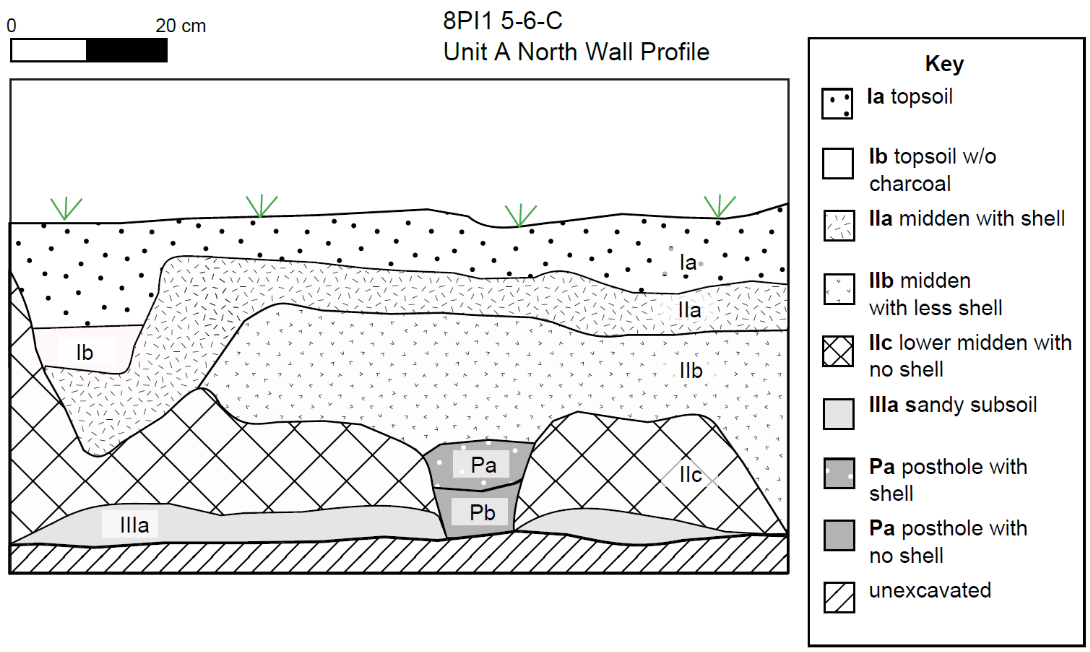

Figure 5.3 - Schematic drawing of Unit A profile and posthole feature

Excavation revealed shell-bearing midden deposits throughout the unit, and a central pit feature (Feature #1) that appeared to be lined with shell and filled with looser gray sandy sediments (Figure 5.2a). A sample of charcoal was recovered just below the excavated feature and used for AMS radiocarbon dating (cal AD 1021-1154, 2σ [Sample No. UM-FS11.1/UGAMS-18448]). A possible shell-filled post hole was also identified in the northern profile wall (Figure 5.3).

This unit is interpreted as encompassing domestic refuse associated with the mounded shell to the west and NW of the unit, as well as one discrete pit feature. The contrast between the darker sediment and shell lining the pit and its relatively-shell free central sediment suggest this may have been a cooking feature with secondary fill.

Unit C. Unit C was a 1 x 1 meter excavation located over a large positive magnetic anomaly (Figure 5.1). The deposits in this unit were apparently disturbed to some degree by the root growth of a nearby live oak tree, seen in the southern parts of the excavated unit.

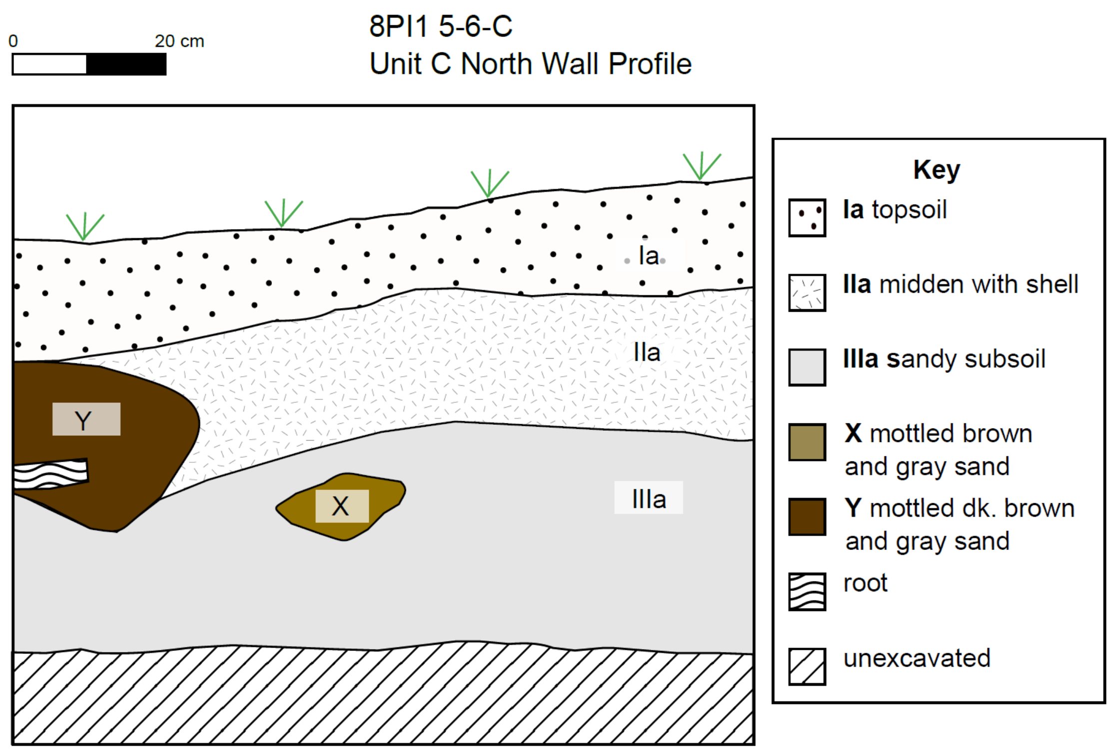

Figure 5.4 - Schematic drawing of Unit C profile

Shell midden appeared primarily on the western half of this unit within 5 cm of the ground surface. During excavation this was thought to be due to a sloping midden deposit that likely corresponded with the slope of the ground surface (i.e., higher on the west side of the unit). Profile views of the north wall of the fully excavated unit, however, revealed a dip in the shell midden in at least the NW corner of the unit, with a thicker deposit of shell here in darker soil than the surrounding midden (Figure 5.4). This may be a feature of some kind but excavation was not extensive enough in this area to describe it more fully.

Unit H. Unit H was a 1 x 1 meter excavation located over a relatively small, strong positive magnetic anomaly (Figure 5.1) at the top of a mounded area of shell midden.

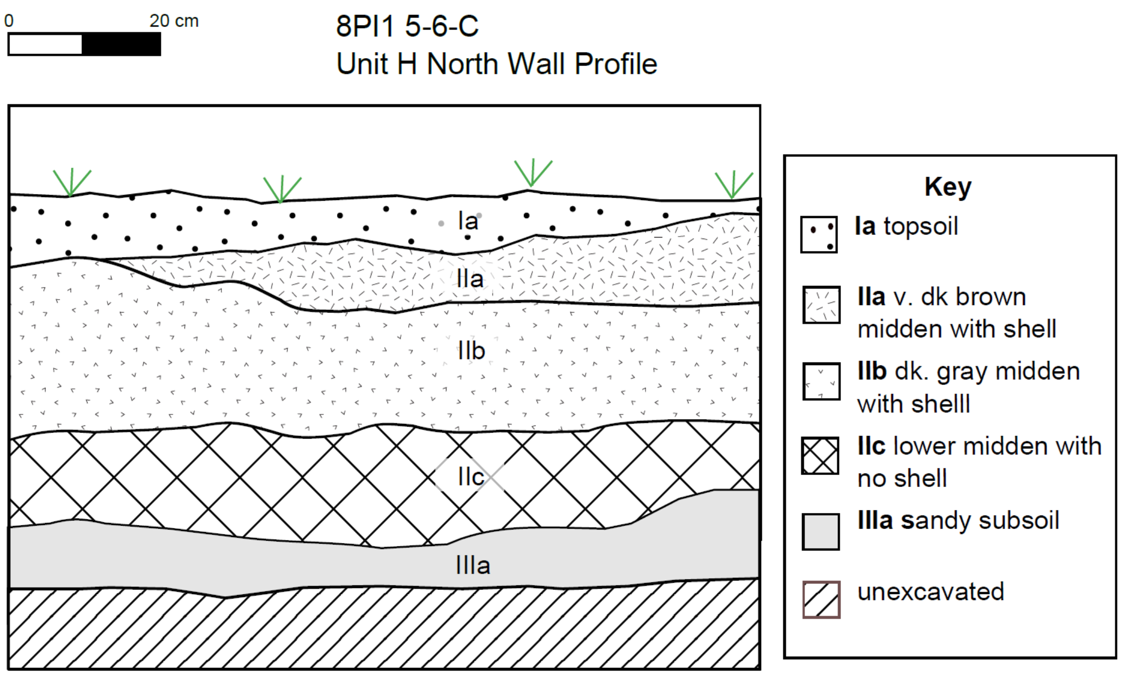

Figure 5.5 - Schematic drawing of Unit H profile

Dense shell-bearing midden was identified across the unit within the first level of excavation. The layers of whole- and crushed-shell midden within this unit were approximately 40 cm thick in total, with some variation in the surrounding matrix and shell density (Figure 5.5). Three samples of wood charcoal from this unit were radiocarbon dated, each collected from different arbitrary excavation levels that corresponded with changes in stratigraphy from Zone IIa (cal AD 1160-1220, 2σ [Sample No. UM-FS117.1/OS-135381]) to Zone IIb (cal AD 1043-1241, 2σ [Sample No. UM-FS123.1/OS-135382]) to the transition to midden leachate deposits in

Zone IIc (cal AD 1042-1212, 2σ [Sample No. UM-FS136.1/OS-135383]). Some atypical artifacts were recovered from this unit, including fragments of probable bone points and a large vessel fragment with arches cut or ground from its edge (see Chapter 7). An area of shell midden in the southwest corner of this unit was designated as Feature 4 due to its notably darker color, potentially related to a concentration of burned material (Figure 5.2b). Clear borders to this feature could not, however, be defined, and it was ultimately excavated as the SW quadrant of the unit, which had been left pedestaled through the excavation of the main unit. After this pedestaled area was removed, a round dark stain, potentially representing the base of an isolated posthole, was observed.

In sum, this unit represents a stratified sample of a domestic activity area. The feature identified within this unit is relatively small compared to the magnetic anomaly, suggesting that the magnetic signature here relates to the general density of organic/burned material in this location rather than to a discrete event/feature.

Unit I. Unit I is a 1 x 1 meter excavation located over a strong negative magnetic anomaly (Figure 5.1). At the start of excavation, gastropod shells were already visible on the surface. Many whole shells were recovered throughout the first two levels (approximately 20 cm) of excavation. About 20 cm below the surface, it was observed that this shell deposit was concentrated in the southeastern area of the unit, which corresponds with the placement of the excavation unit relative to the magnetic anomaly. This strong, negative anomaly could therefore point to a concentrated deposit of whole shell, which produced a more negative magnetic signal relative to midden deposits with a greater proportion of soil, which also tends to be more densely packed around crushed shell deposits.

There was a tree growing near the southern edge of this unit and its roots cut across the unit starting at the end of level 2. This ultimately made excavation challenging and probably disturbed deposits and sediments in the lower levels. Some darker mottling or stains were observed in Levels 5-7 but this may have been due to bioturbation rather than cultural activity, as they tended to be root-like in shape and direction.

The following units were tested anomalies in magnetometer survey area #1, close to those that fell within the cluster of anomalies identified as Area 1. They are described here as they include features and dated material relevant to the broader interpretation of site use.

Unit D. Unit D was a 1 x 1 meter excavation located over a strong, positive magnetic anomaly, possibly comprising two overlapping strong magnetic signatures (Figure 5.1). Early in the excavation of this unit, heavy masses of palm root were noted, and several larger tree roots were found growing through lower levels of the unit. These may have disturbed deposits and/or grown through in situ deposits because of their relatively rich and moist content compared to the surrounding sands.

A pit feature containing shell and evidence of burning (Feature #2) was identified in the southwest corner of the unit (Figure 5.2d). Whole and crushed shell were seen in this area during excavation, and burned bone and shell were also noted during screening in of lower levels. In particular, excavators noted columnella and other fragments of gastropod that appeared burned in a way that left them both particularly shiny and sharply fractured, perhaps due to high temperatures; several examples of these were saved. Bisecting a portion of the feature in lower levels showed it to have a rounded, narrowing shape. The feature was also visible in the western and southern wall profiles of this unit, with a darker stain continuing below the level of shell-bearing midden. A sample of charcoal collected from this feature close to its base was AMS radiocarbon dated (cal AD 1158-1247, 2σ [Sample No. UM-FS82.1/UGAMS-18449]). A possible, isolated posthole was also identified in the eastern wall of this unit; it contained a darker fill and some shell, with a wider, somewhat rounded base (Figure 5.6).

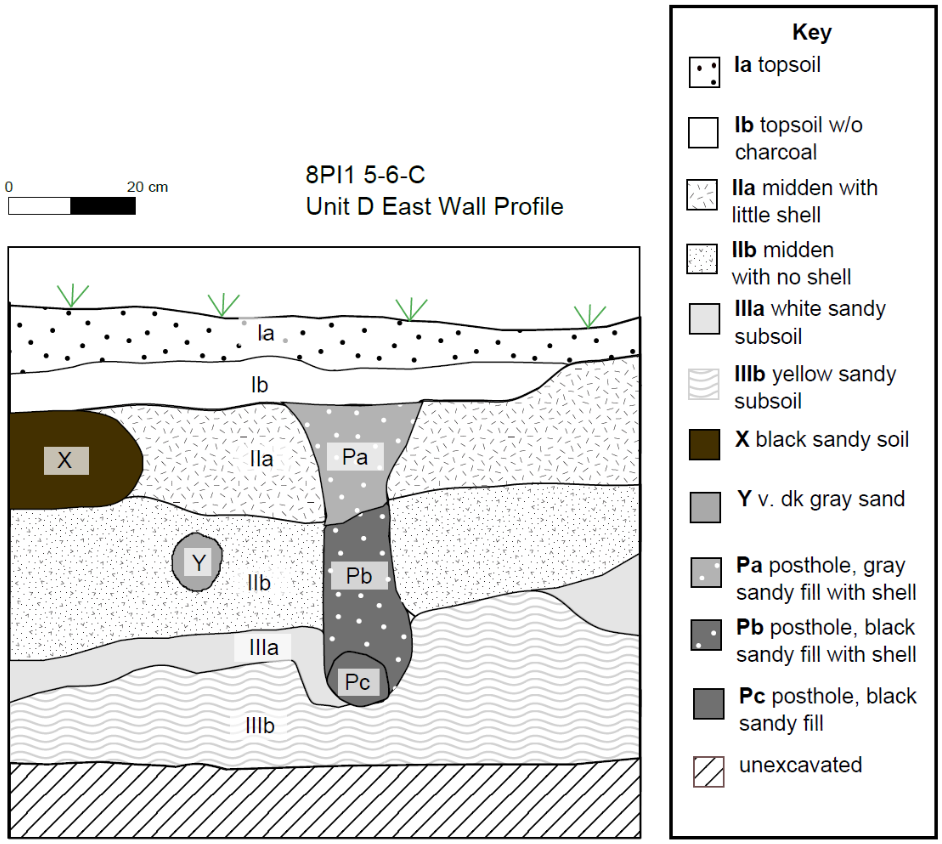

Figure 5.6 - Schematic drawing of Unit D profile

While this unit did reveal a feature with levels of burned and organic material that could have contributed to a stronger magnetic signal, the location of the pit feature within the unit did not closely match the shape or location of the magnetic anomaly identified in the geophysical survey. The profile view of this feature show that it is fairly continuous with the shell-bearing midden that appears throughout the unit (this turned out to be true of many small pit features at the site in general). The feature also appears just below an area of heavy palm root matting, also visible in the profile view of the south wall. Perhaps the depressed, pit shape of the feature, then, was due in part to post-depositional biological disturbance. The quantity of burned material and associated strong magnetic signature, however, suggest that this may still have been a location of increased activity—for instance, cooking. The dispersal of burned material throughout the general area might have contributed to the relatively large magnetic anomaly, which as noted above, was not fully centered on the feature itself.

Unit N. Unit N was a 1 x 1 meter excavation over a strong magnetic anomaly (Figure 5.1). This excavation revealed two shell-bearing features within a surrounding context of sand; this contrasts with most of the test units in this area, in which features tended appear within a surrounding context of shell midden.

The feature in the southwest area of the unit (Feature #3) contained a large sandstone and a few smaller sandstones, in addition to the large whelk mentioned above (Figure 5.2c). Although the sandstone had a flattened area, neither it nor the smaller stones showed clear evidence of abrasion or being used for grinding. This portion of the unit was excavated separately. Additional whole and broken shells were found in this feature, including a large lightning whelk, as well as vertebrate bone, lithic debitage, and charcoal.

A possible feature at the northern edge of the unit contained charcoal, darker soil, and crushed shell. It was bisected to examine the shape, which appeared as a rounded pit in the section visible on the north profile wall of the unit, but had a more diffuse stain as visible on the floor of the unit during excavation. A sample of charcoal was recovered from within this deposit (cal AD 995-1149, 2σ [Sample No. UM-FS97.1/UGAMS-18450]).

Feature 3 corresponds with the location of the strong positive anomaly that the unit was placed to target. The correlation between the anomaly and feature locations suggests that features in sandy contexts like this one might have a clearer signal than those in shell midden because the signature of the feature has a greater contrast with the surrounding sediment. The content and relationship of these two features suggests that the northern pit may be a cooking feature, the contents of which were cleared out and deposited in the feature that appeared in the magnetometer survey results.

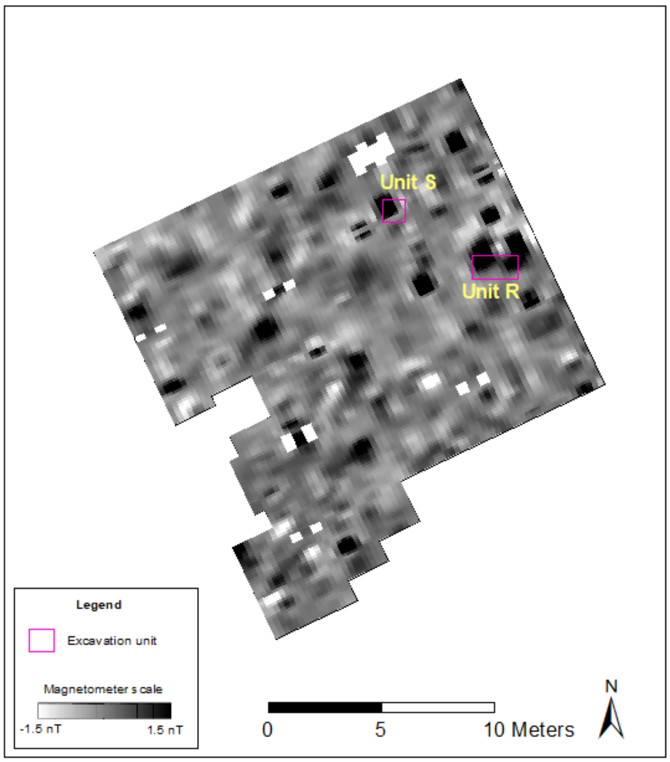

Figure 5.7 - Locations of excavation in magnetometer survey area #2

<u>Area 2</u>

Area 2 is located to the west of the Jeanne Mound Complex. It is represented in magnetometer survey area #2 by two kidney-shaped strong positive magnetic anomalies and several nearby smaller positive magnetic anomalies (Figure 3.7). Other strong positive magnetic anomalies are scattered around this concentrated area as well. The two larger magnetic anomalies are on a small topographic rise or mounded area visible on the ground surface.

Two adjacent 1 x 1m units (Unit R5-R6) were excavated over the large magnetic anomalies, and another 1 x 1 m unit (Unit S) was excavated over a nearby smaller anomaly.

Unit R. This excavation encompasses two adjacent 1 x 1 m units. These units were placed over a pair of strong positive magnetic anomalies; they were also located on the edge of a low mounded area of midden (Figure 5.7). Shell-bearing midden was encountered across both of these excavation units. Variation in the color and content of the midden appeared to vary with the slope of the ground surface topography, with thicker deposits and dark gray soils evident on the eastern (upslope) side of the excavation unit. An AMS radiocarbon date was run on a sample of wood charcoal collected from the interface of IIa/IIb midden sediments (cal AD 1052-1215, 2σ [Sample No. UM-FS368.1/OS-135116]). A second AMS radiocarbon date was run on deer tooth collected from excavation level 4 of the same 1 x 1 m unit, within the IIb midden strata, and surprisingly produced a later radiocarbon date of cal AD 1224-1289, 2σ [Sample No. UM-FS388.1/D-AMS-031057]). The profile view on the eastern side of this unit shows a thick deposit of shell midden sitting flat on the underlying sands (Figure 5.8). During excavation it was observed that a high proportion of ceramic sherds were recovered for the area excavated; the same was noted during the excavation of unit R6. Deer bone including teeth were recovered from this unit as well. There was a single isolated posthole recorded towards the base of the final level excavated.

Like some other units located over relatively substantial deposits of shell midden (e.g., Unit H), it seems that the geophysical anomaly identified in the magnetometer survey here references some variation in the content (intensity of burned materials, density of artifacts and/or organic materials) of the deposit rather than a discrete feature. The high density of ceramic artifacts could have contributed to the magnetic signal in this location. The deposit itself seems to represent domestic refuse, plausibly accumulated through the activities of a household/residential group, given the configuration of midden in a small mound.

Figure 5.8 - Midden deposits in Unit R; west-facing profile view from surface to 68 cm below surface level.

Unit S. Unit S was a 1 x 1 excavation over a strong positive magnetic anomaly (Figure 5.10). Some variation was identified in this unit which might correspond with the magnetic anomaly targeted, although the deposit was ultimately difficult to characterize.

The north western portion of the unit (the area corresponding with the magnetic anomaly) revealed an area of brown soil in the first level of excavation; this was excavated separately from areas of the unit containing gray sand. However, these differences did not stay consistent as the unit was excavated further. Areas of brown versus gray were noted and drawn but they did not have clear shapes or locations in plan or profile views. Two potential post holes, each with some charcoal, were identified and excavated separately.

<u>Area 3</u>

Area 3 is located to the west of the southern part of the Three Ogres Mound. It is represented in magnetometer survey area #3 as a series of positive magnetic anomalies of various shapes (irregular, round) and intensities (stronger or weaker) (Figure 3.7). Some small anomalies appear in the magnetometer grid beyond what is defined as Area 3, but much of the off-mound portions of the grid are magnetically "quiet" (except for the separate Area 4 concentration of anomalies). Areas 3, 4, and 5 are located just beyond the extent of the "Whelk Hollow" dark earth midden identified in the USF survey (Weisman 2005:113, 143-150) (Figure 3.5).

One anomaly in this location was targeted with the excavation of a 1 x 1 m test pit (Unit T) and the rest was sampled in block excavations (Block D) (Figure 5.9).

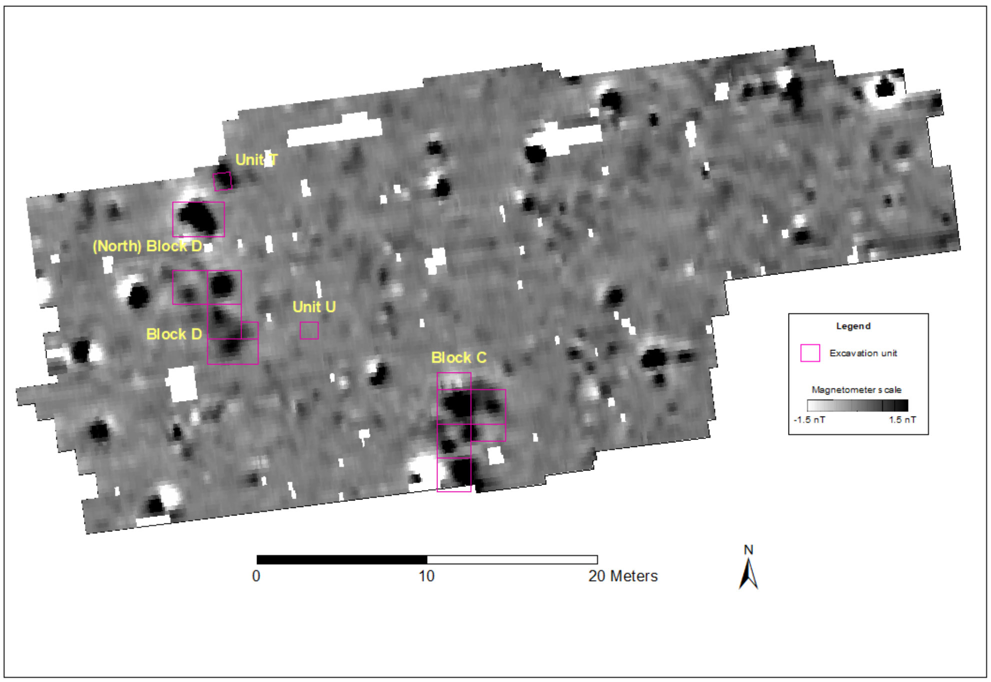

Figure 5.9 - Locations of excavation in magnetometer survey area #3

Unit T. Unit T was a 1 x 1 meter excavation intersecting a strong positive anomaly in magnetometer grid 3 (Figure 5.9) (This unit is oriented to the magnetometer survey grid rather than to cardinal directions because it was plotted and excavated during a shorter visit when the total station was not available.)

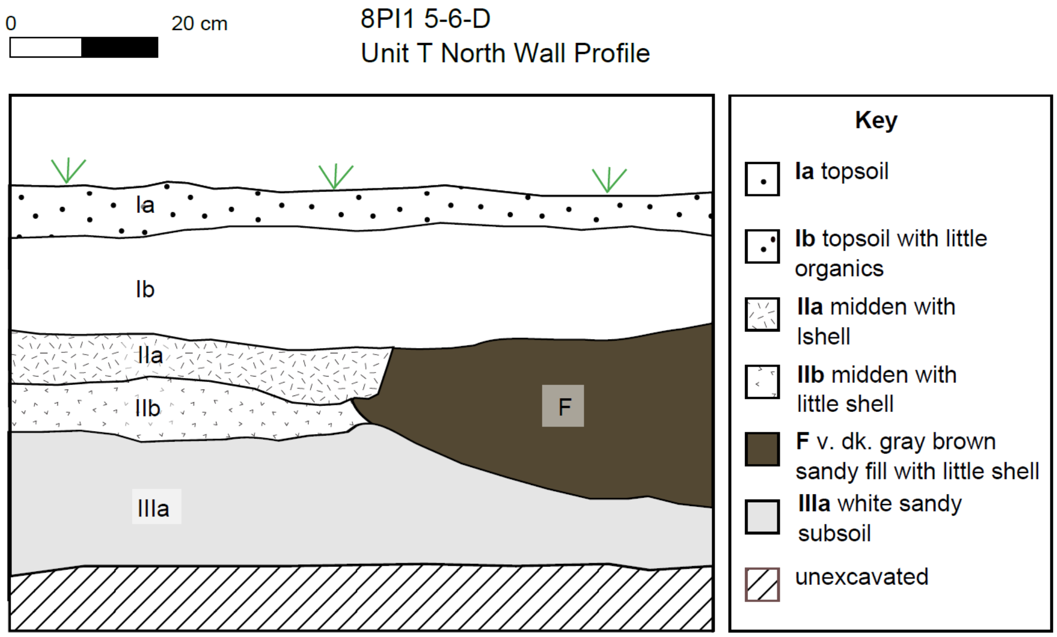

Figure 5.10 - Schematic drawing of Unit T and Feature 7 profile

A pit feature (Feature #7) was identified in the northeastern corner of the unit. The feature contained more dark soil fill (with shell and other materials) compared to the thinner spread of shell midden identified throughout the rest of the unit. An AMS radiocarbon date run on a sample of charcoal from the upper levels of midden fill in the area of the feature produced a date of cal AD 1482-1624, 2σ (Sample No. UM-FS169.1/D-AMS-030675). The profile view of the unit shows Feature #7 to be a small pit/depression in the approximate location of the magnetometer anomaly (Figure 5.10). A potential isolated posthole was identified in the southwestern corner in a lower level of the unit: This circle had a darker fill with some shell, and pockets of charcoal were also noted slightly to the west of this spot.

Subsequent excavations across the magnetometer survey area #3 showed that a thin layer of shell midden appears across most of this area, which is just downslope from the Three Ogres Midden ridge. In light of this, it seems likely that the shell midden in the southern and northwestern portions of the unit continuous with this general spread of midden across the area. Because this thinner layer of midden does not appear on top of Feature #7, the feature may be intrusive to the midden layer.

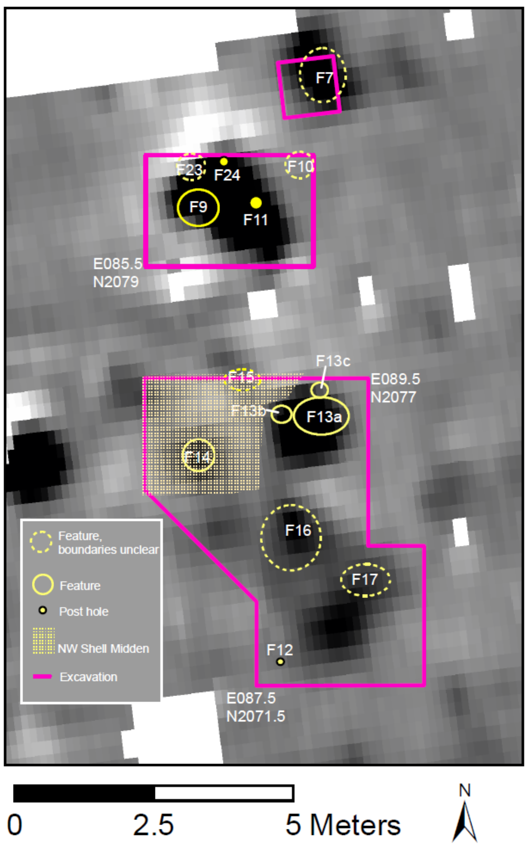

Figure 5.11 - Overview of deposits and features in Block D over magnetic anomalies

Block D. The Block D excavations comprise two separate locations—a 3 x 2 m series of units over a large positive anomaly ("Block D North") and an approximately 19 square meter configuration of units over at least five overlapping magnetic anomalies (Figure 5.9). These two areas of excavation were not joined as a single block because of large trees located between them. Excavations in all areas of Block D began with relatively large units (typically 2 x 2 meters) in an effort to reveal plan views of features corresponding with magnetic anomalies. Smaller units of 1 x 1 m or in the size and shape of identified features were then used to sample specific areas.

This excavation block was located in a relatively flat, low-lying area compared to both the nearby Block C and the Three Ogres midden ridge to the east. Across the eastern portion of the main block—the area to the east of the E087.5 line, characterized geophysically by three large, positive anomalies—the pattern of deposits and stratigraphy was similar. This area of the block had minimal humic layer or soil development and a relatively thick deposit of gray sand (approximately 20 cm) overlying any notable archaeological features or deposits. Throughout these upper levels, isolated artifacts and shell were recovered. These sometimes were found within small pockets of browner soil, consistent with the recovery of artifacts and shell in lower-lying areas at other parts of the site, which are interpreted to have moved short distances through natural site formation processes related to rain and flooding.

In the deposits targeted in Block D North and in the northwestern 2 x 2 m portion of the main Block D, in contrast, dense shell-bearing midden was encountered at shallower depths, very close to the surface. The 2 x 2 m Block D North was primarily excavated in individual 1 x 1 meter units, designed to sample any variation within this deposit and produce some central profile views. A similar approach was taken in the northwestern midden of the main D block, although part of the entire deposit was left unexcavated.

There were several identifiable deposits and features observed during excavation and a review of excavation records. In general, the magnetic anomalies targeted by this excavation block were found to have corresponding deposits of varying types and forms (Figure 5.11).

These can be grouped into four sets of related deposits: (1) “North Central Features,” a series of features associated with a strong positive magnetic anomaly in the north-central portion of the block; (2) “Brown Soil Midden,” deposits and features in the central and southeastern portions of the block that are associated with a thin spread of probable occupational midden; (3) “Northwest Midden,” a low buried mounded midden in the northwest corner of the main Block D; and (4) “North Midden,” the large deposit encountered in the 3 x 2 m Block D North excavation.

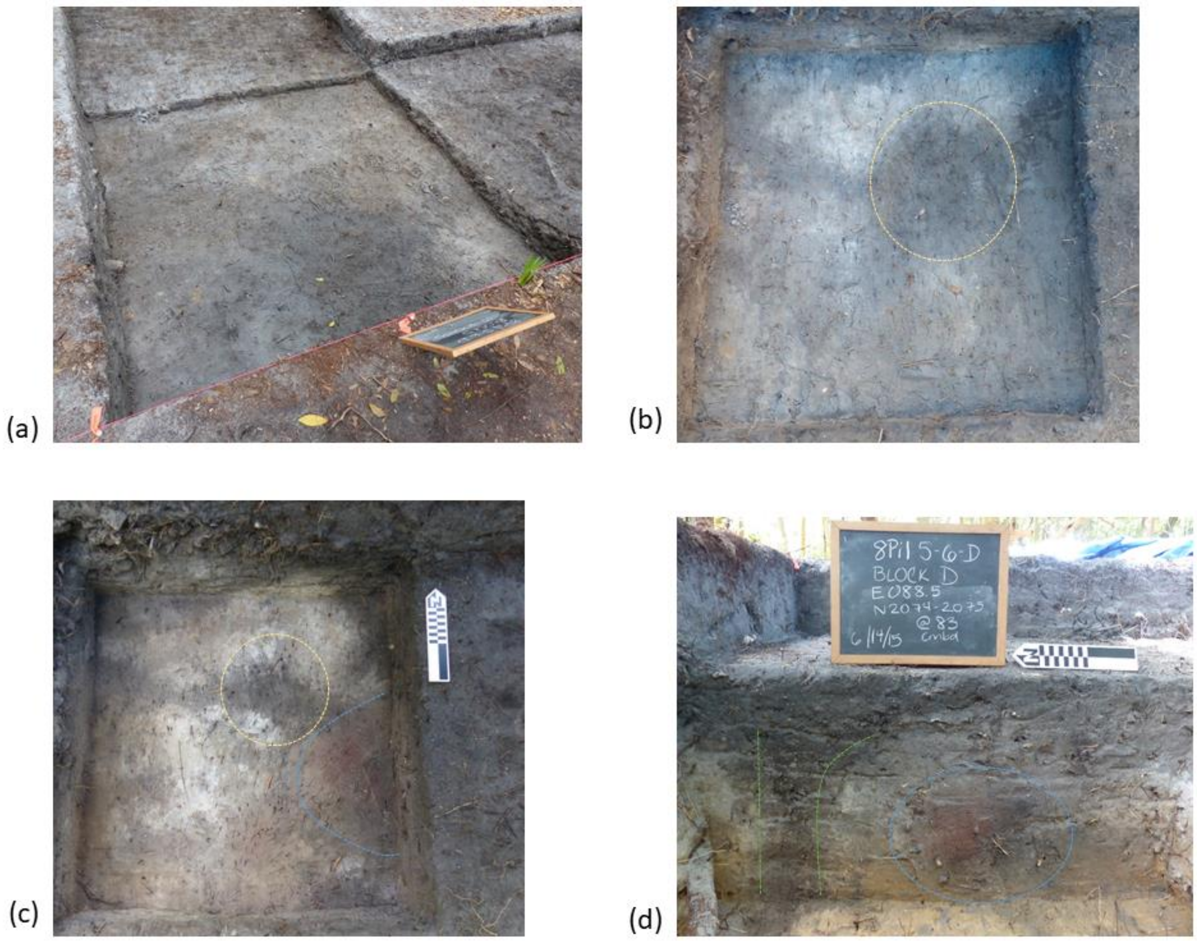

Figure 5.12– Features #13 a-c in north-central portion of Block D: (a) South-facing view of black stain at top of Features #13 a-c in E087.5 N2075 2 x 2 m unit, (b) Plan view Feature #13b pit (yellow outline) in E087.5 N2076 1 x 1 m unit, (c) Plan view of Feature #13b pit (yellow outline) and Feature #13a pit (blue outline) in E087.5 N2076 1 x 1 m unit, and (d) West-facing profile view of Feature #13c posthole (green outline) and portion of Feature #13b red oxidized sediment (blue outline).

North Central Features

Features 13a-c. To the immediate east of the northwest midden deposit are a series of features that correspond with a large, strong positive magnetic anomaly (Figure 5.11). These features were initially identified as an area of black staining below about 20 cm of overlying gray sands (Figure 5.12a). Through additional excavation to expose and bisect this deposit, it was revealed to encompass three overlapping features. Feature 13a, the largest of these, was a pit feature with dark midden fill including some shell and red oxidized iron sediment near the base of the feature (Figure 5.12c). A piece of wood charcoal from this fill was AMS radiocarbon dated (cal AD 1211-1270, 2σ [Sample No. UM-FS287.1/UGAMS-21781]). Feature 13b was a pit with dark fill including charred wood/wood charcoal, and Feature 13c appears to be an isolated posthole, though if so it would be large enough to be a freestanding post rather than something structural (Figures 5.12b-d). An AMS radiocarbon date run on charcoal in this location that may be associated with F13c fill (but was collected before the posthole shape was recognized in profile view) produced a relatively late date of cal AD 1482-1624, 2σ (Sample No. UM-FS341.1/D-AMS-030673).

Brown Soil Midden and Associated Features

A midden deposit characterized by brown soil, whole and fragmented shell, and some artifacts and bone was uncovered in the central and southeastern portions of excavation Block D. These deposits correspond with an area of positive magnetic anomalies that overlap and have signals of varying strength (Figure 5.11).

The deposit was first identified within a 2 x 2 meter unit at SW corner E087.5 N2073 (Figure 5.13). Excavation of the 2 x 1.5 m area to the immediate south initially revealed additional deposits of a similar character at a slightly higher elevation than these deposits were encountered in the rest of the block (i.e., at about 15 cm below the surface in this southern part vs 25cm below the surface in the central part of the block). However, when this southern portion was brought level with the rest of the block, the brown midden spread was now absent in the southeastern portion of the block (which at this point had also been expanded an additional meter to the east). The midden deposits were present at this depth in the southwest corner of the excavation block, although this portion of the midden turned out to be more ephemeral and thin than those in the center of the block (as described below, under the Feature 12 heading).

Figure 5.13 - Northeast-facing plan view of "brown soil midden" area in Block D, E087.5 N2073 2 x 2 m and E087.5 N2075 2 x 2 m units.

Taking into account observations of Feature 16 (described below), it seems that there was a wide, relatively shallow depression across the center of this portion of the excavation block prior to its fill with midden deposits. The portion of midden that appeared at a slightly higher depth may have been at the upward sloping edge of this depression. Although these deposits do not clearly correspond with structural remains, they appear to represent occupational midden created through daily activities rather than a specific discard location.

Two AMS radiocarbon dates run on charcoal collected towards the base of the brown soil midden in two different 1 x 1 m locations in Block D produced distinct date ranges of cal AD 1059-1624, 2σ (Sample No. UM-FS309.1/D-AMS-030672) and cal AD 1224-1287, 2σ (Sample No. UM-FS322.1/D-AMS-030674).

Figure 5.14 - Feature #16 plan view in E087.5 N2074 1 x 1 m unit

Feature 16. This feature was located in the center of Block D, where a small, strong positive magnetic anomaly appears in the magnetometer survey map. The feature was identified relatively late in the excavation of this block, when exposed areas of midden and features were being documented and removed in June 2015. It was identified and documented in plan and profile views as a fairly wide and shallow deposit of shell midden, not necessarily a pit (Figure 5.14). The deposit designated as Feature 16 is not clearly distinct in fill from the spread of brown midden; the deposits might be basically continuous. At the point where Feature 16 was identified and defined, the deposit was slightly darker in patches, but the fill was not obviously distinct from the overlying midden.

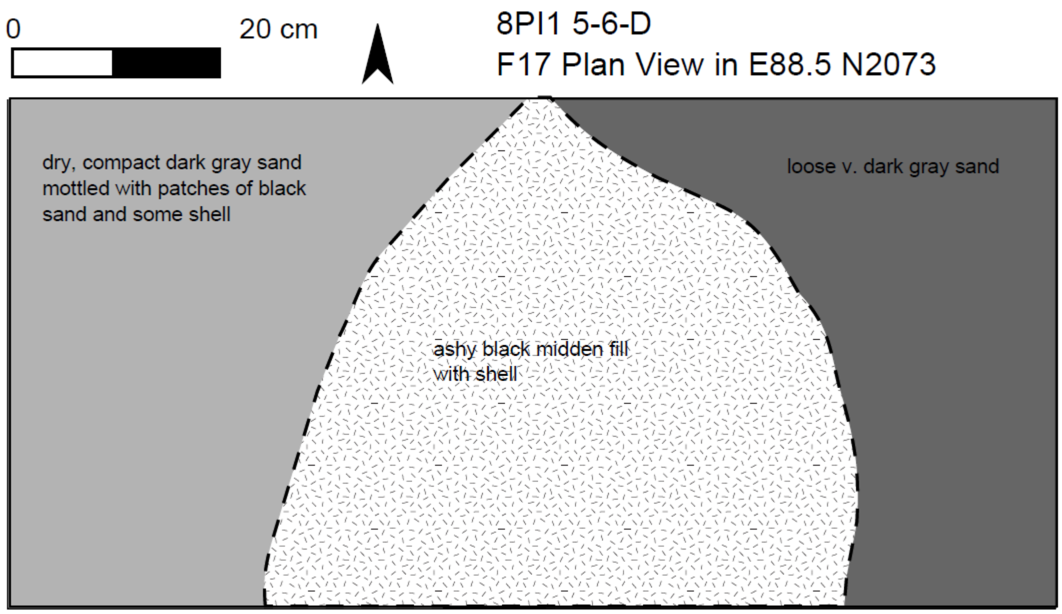

Figure 5.15 - Plan view of top of Feature #17 pit

Feature 17. This pit feature was observed to contain a high proportion of oysters in a sandy fill with a blueish gray color and ashy quality (Figure 5.15). A sample of wood charcoal from this feature was radiocarbon dated to cal AD 1046-1208, 2σ (Sample No. UM-FS351.1/OS-135168). With regards to the magnetometer survey, the feature occurs within the area of a weak positive magnetic anomaly, at a point where readings were slightly higher. The anomaly in that location probably results from the presence of this deposit.

Feature 12. Feature 12 was a posthole encountered in the southern part of the Block D excavation. Initially, excavation of a 1 x 1.5 m unit was designed to sample the spread of brown midden within this location and determine its vertical extent. The midden deposits here turned out to be thinner than those to the north and were quickly removed, as the unit transitioned to IIIa gray sands. However, during this excavation, a black stain was identified in the southwest of the unit. The area was cleaned off to better expose the feature, which was then bisected within a circular area. This appeared to be the base of a post feature, with some disturbance of the underlying sand evident in a small pocket of yellow IIIb sand, and some shell and midden fill from the overlying deposits.

Figure 5.16 - View of exposed "northwest midden" in Block D

Northwest Midden and Associated Features

This midden deposit was encountered primarily in a 2 x 2 meter excavation unit at the northwestern corner of the Block D excavation (Figure 5.16). The deposit exposed appeared to be the edge of a larger low, buried mound of shell midden that likely extended further than the excavation block and potentially connected with the North Midden in North Block D (see below). This midden deposited was determined to be distinct from the Brown Soil Midden as a strip of gray sand without substantial midden content separated the black, shell-bearing midden in the northwest from the mottled brown midden in the south-central portion of the block. The relationship of this northwestern midden deposit to the magnetometer survey results is influenced by a pit feature at its edge, which was designated as Feature 14.

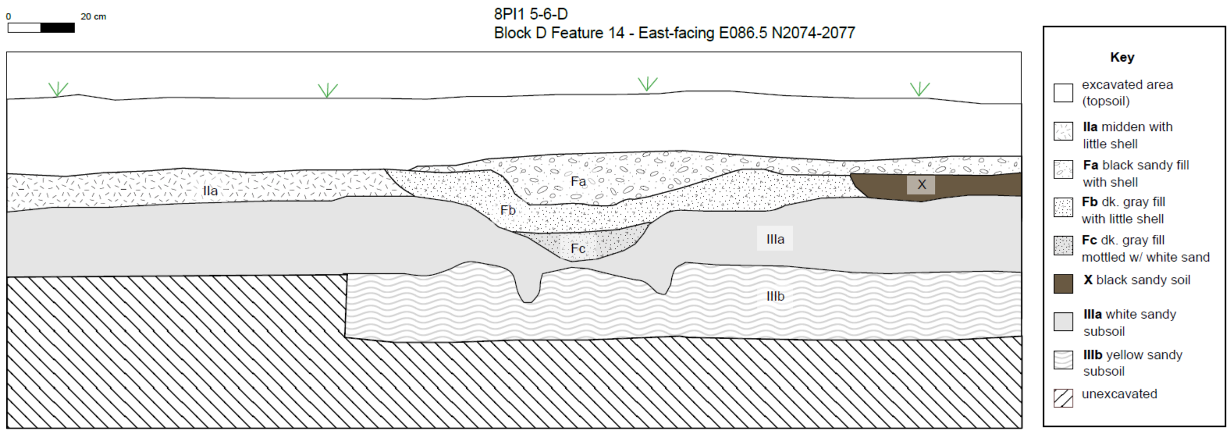

Figure 5.17 - Schematic drawing of Feature #14 in profile view

Feature 14. This is a pit-shaped feature with stratified fill that was identified only in profile view, though it may have been visible in plan view as a darker spot at the top of the exposed northwest midden and as an area of staining at the feature's base in a 1 x 1 m excavation. This feature appears to correspond with a relatively small, strong positive magnetic anomaly (Figure 5.11).

Documentation of the feature in profile view indicate that the fill of this small pit included three layers of midden fill (Figure 5.17). The uppermost level of IIa shell midden may be continuous with the adjacent deposit of shell to the north. The second layer of fill (IIb midden, i.e, lighter in color and with somewhat less shell content) seems more restricted to the area of the feature, abutting a deposit of silty sand without shell content to the north. The final layer of fill narrows into the shape of a pit base and includes IIb midden fill mottled with IIIa white sands. The IIIa sands underneath this feature also appear slightly disturbed although without evidence of artifacts or shell at that depth.

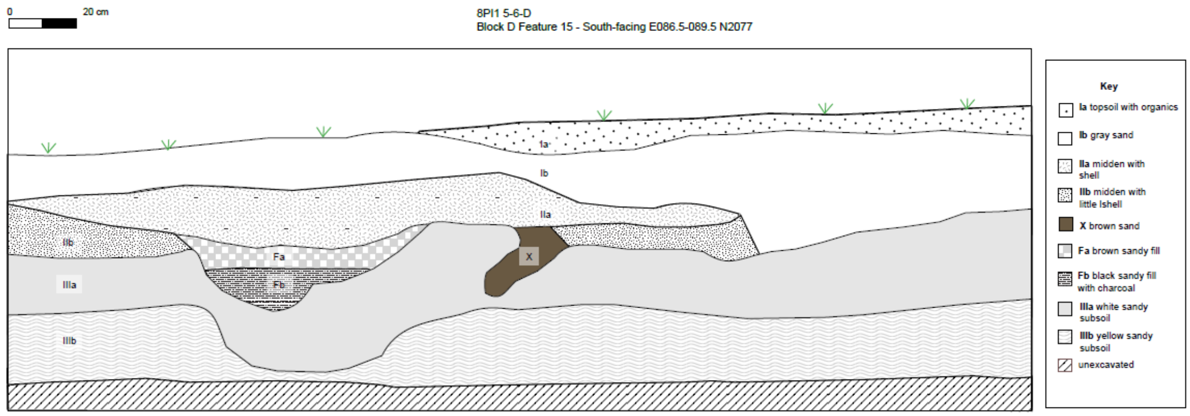

Figure 5.18 - Schematic drawing of Feature #15 in profile view

Feature 15. This feature was a pit revealed during excavation and visible in the profile view of the north wall of the Block D excavation. Midden in a 1 x 1 m excavation unit at this location was initially interpreted as the edge of the NW midden deposit, but a change in soil color along with an increase in larger mammal bones in this location led to its recognition as a feature. An AMS radiocarbon date was run on deer bone collected from this unit (cal AD 1220-1280, 2σ [Sample No. UM-FS333.1/D-AMS-031058]).

This feature can be seen in profile view at the northern edge of the D block. Although a tree is growing near this deposit, the midden fill within the pit location is noticeably thicker, not just depressed, as might happen through bioturbation (Figure 5.18).

Block D North Midden

A 3 x 2 m excavation targeted a large, irregularly shaped strong positive magnetic anomaly in the location designated "North Block D" (Figure 5.11). Shell was encountered across this entire excavation area by about 10 cm below the ground surface. There was some variation in the surface of this shell deposit, which was slightly higher in the north/northeastern areas of the unit, though some natural sloping of the underlying ground/sands may have contributed to this. At this point, excavation of this area was conducted in 1 x 1 meter units by trowel, with potential features excavated and screened separately when identified. During excavation of units in this area, the content of the midden in was observed to include a high proportion of oyster and a relatively lower proportion of fish bone and of pottery sherds than other midden deposits at the site. Two samples of wood charcoal were AMS radiocarbon dated from shell midden (non-feature) contexts, one dated to cal AD 1039-1118, 2σ [Sample No. UM-FS233.1/OS-135115]) and the other to 1158-1247, 2σ [Sample No. UM-FS253.1/UGAMS-21780]).

Ultimately, excavation and profiles of this unit revealed the shell midden deposit to be fairly shallow: the IIa strata of midden was generally about 10 cm in thickness, with the IIb strata sometimes extending another 10 cm (Figure 5.19). To some extent this deposit might be continuous with the thin sheet of midden found across much of this area, particularly as the elevation here is slightly higher than in the rest of the main Block D (i.e., more likely to be continuous with shell deposits flanking the adjacent Three Ogres midden mound). However, the observed features and occasional unusual finds within this location suggest that the positive geophysical signal does result from the archaeological remains of specific behaviors that stand out from the background of shell deposits across this area. The magnetic anomaly as it appears on the survey map might reference a combination of somewhat overlapping elements, including the small pits, post feature, and a generally greater disturbance resulting from more in situ domestic behavior relatively to the scattered shell that is consistent around the area.

Figure 5.19 – North-facing profile view of the thin strata of shell-bearing midden present throughout the North Block D 3 x 2 m excavation

Feature 9. Feature 9 is a small pit, apparently continuous with the overlying shell midden. It includes both shell-bearing midden (IIa) and an underlying IIb strata with have less shell. It is unclear whether this is a deliberate pit or a variation resulting from midden fill deposited on an uneven surface (Figure 5.20a). During excavation several fragments of larger mammal bone were observed to come from the location excavated as a feature pit. A sample of wood charcoal from the base of this pit was dated to cal AD 1044-1189, 2σ [Sample No. UM-FS278.1/OS-135114]). This feature could have contributed to the large positive geophysical anomaly in this location though it does not have its own distinct magnetic signal in the survey results.

(a) 

(b) 

Figure 5.20 - – Examples of pit features in North Block D: (a) North-facing profile view showing a portion of Feature #9 pit with midden fill, and (b) South-facing profile view of Feature #23 pit at the northern edge of the North Block D excavation.

Feature 10. Feature 10 is a small pit of indeterminate shape and size identified during the excavation of a 1 x 1 meter unit within the North D block (Figure 5.27). It was visible in plan view just below the shell midden as a darker area of midden in the northeastern corner of the 3-x-2 meter excavation area. Compared with Feature 9, this feature seems even more likely to be due to some variation in the depth of the midden rather than an intentional pit. It does not correspond with any portion of the strong magnetic anomaly in the geophysical survey map; instead, it is in a relatively quiet area more consistent with the background signal of this area (Figure 5.11). In plan view the color variation in this area does not look particularly discrete, and there is a palm tree growing near the edge of the unit that may have disturbed midden deposits.

Feature 11. Feature 11 is a post feature first identified as a darker stain with some shell content just below the main layer of shell midden. The feature was 20 cm in diameter at the widest point that it was documented. The darker fill of the feature narrowed towards its base, with some disturbance of the underlying sands evident, including a spot of white IIIa sand that had perhaps been driven into the underlying IIIb yellow sands with the post’s insertion. Shell, lithic debitage, and a small quantity of charcoal were recovered from the fill of this feature.

Feature 23. Feature 23 is a small pit that was identified in unit profiles but not excavated separately. It was visible in the south facing profile recorded after the entire 3 x 2 m area was excavated (Figure 5.21). It is similar to Features 9 and 10: a pit-shaped depression with a fill that appears continuous with the surrounding and overlying midden (Figure 5.20b). With respect to the geophysical survey map, this feature is located at the edge of the strong positive anomaly, near an area with a strong negative signal (Figure 5.11). Its presence might contribute to the large positive anomaly targeted by excavation in this area.

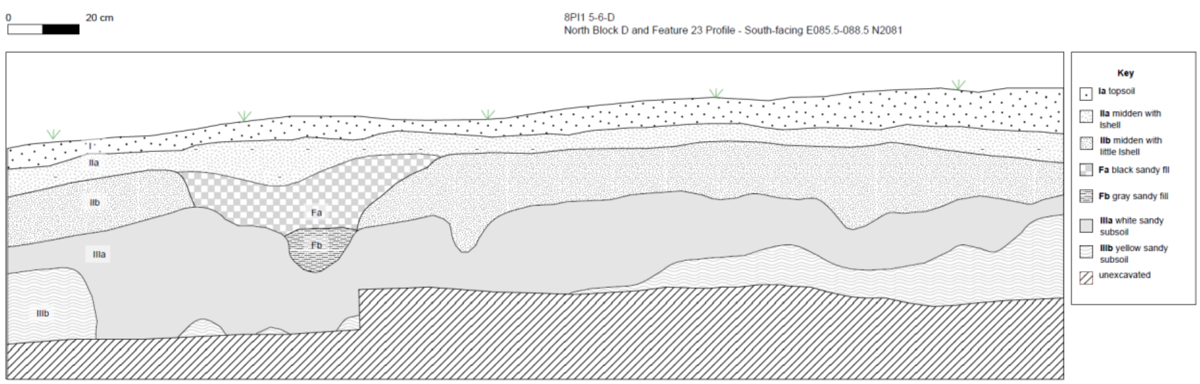

Figure 5.21 - Schematic drawing of variation in North Block D midden and Feature 23 profile on south-facing wall

Feature 24. Feature 24 is a small potential post hole that was bisected and photographed close to its base. It is near the northern wall of the 3 x 2 meter excavation but not close enough to be visible in the profile view of the unit.

Area 4

Area 4 is located to the west of the southern part of the Three Ogres Mound. It is represented in magnetometer survey area #3 as a cluster of strong positive anomalies of varying sizes, two of them quite large, and overlapping with at least one weaker positive anomaly (Figure 3.7). These anomalies are located to the east of Area 3, closer to the topographic rise designated as the Three Ogres Mound, and they are in fact higher in elevation than Area 3; the associated features seem to be located on the edge of the slope of the Three Ogres Mound and underlying dune sands. The Block C excavations took place in the location of these anomalies (Figure 5.11).

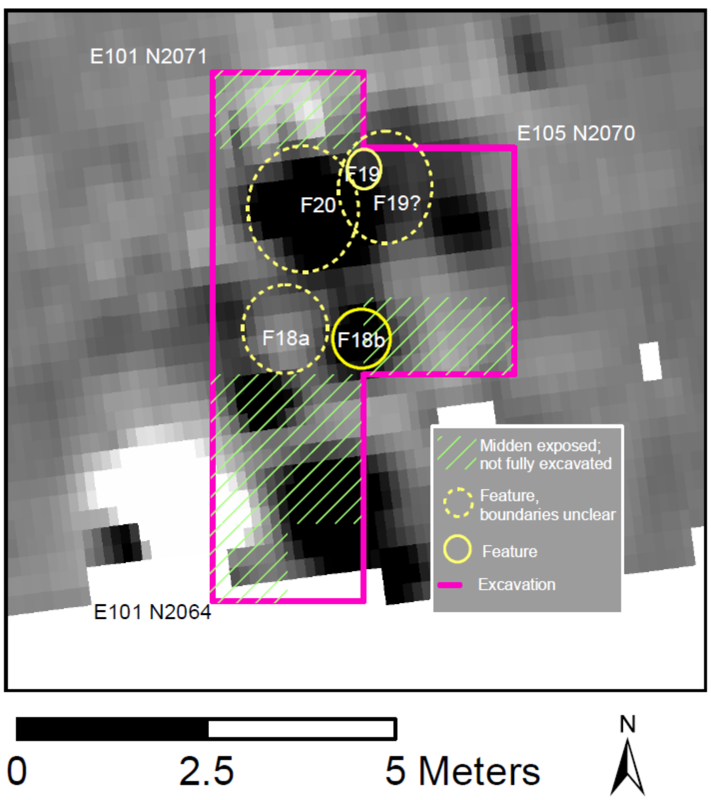

Figure 5.22 - Overview of deposits and features in Block C

Block C. Excavation in Block C began with 2 x 2 and 2 x 1 meter units, designed to expose plan views of features that might correspond with magnetic anomalies. Smaller units were also eventually excavated to sample large deposits and reveal profile views. Compared with Block D, excavations in this location encountered shell deposits close to the surface and throughout the block; discrete feature outlines were therefore much more elusive (Figure 5.22). The shapes, boundaries, and interfaces of deposits were generally only revealed towards the base of a given deposit, or in profile views. The deposits and features were also characterized more by their shell content than by burning or other stains, or by distinct shapes.

The initial excavations in this block began with a 2 x 2 m unit at SW corner E101 N2068. This unit was placed approximately over a large, round, strong positive magnetic anomaly. At a little over 10 cm below the surface, whole shells, many of them large gastropod, were identified across most of the unit (Figure 5.23). At this point the shell was somewhat denser in the northeastern part of the unit, which eventually seemed to correspond with the slope of the ground surface and the underlying midden. (In the next level of this 2 x 2 area, shell began to appear more concentrated in the southwest portion of the unit.)

Figure 5.23 - View of shell midden exposed in Block C, E101 N2068 2 x 2 m unit

Additional units within the block were excavated to expose the surface of shell midden and determine whether it had any boundaries within this area. These included a 2 x 1 m unit at SW corner E101 N2070 and 2 x 2 m units to the east and south (at SW corners E103 N2068, E101 N2066, and E101 N2064), as well as a 2 x 1 m unit at SW corner E103 N2067.

At this point shell midden was present across the surface of this block; however, it was also at this point that some variation in deposits could be identified, at least some of which seemed to correspond with anomalies on the magnetometer map.

The following description of this block excavation is organized into three sections. The first (”Northern C Block) focuses on the northern third of the block, in particular a wide shallow deposit of shell and related features. The second section (”Central C Block”) details crushed features and deposits encountered in the center of the block. The third section (”Southern C Block”) reports on deposits in the southern 2 x 2 m area of the excavation block.

Northern C Block

Within the 4 x 2 m area at SW corner E101 N2068—and partly within the 2 x 1 m area just to the north—a midden deposit with a relatively distinct content was revealed. The midden here had a high proportion of whole shell, and in the field it was observed that many of these were crown conch and lightning whelk (although other typical species like oyster, clam, and sharks eye shells were also present). Many bones and ceramic sherds were also recovered from the midden.

During excavation it was difficult to determine whether the midden uncovered here was itself a feature, or midden overlying features below. Much of this area was therefore excavated in relatively large units (i.e., 2 x 2 meters) in an effort to reveal a clear plan view of any variation across the area. Eventually, two separate deposits or features were identified within the area; one (Feature 20) corresponding with a strong positive anomaly, and the other (Feature 19) corresponding with a weaker positive anomaly. The anomalies overlap in the magnetometer map; unfortunately profile views from the block excavation were not well situated to examine the interface of the deposits.

Feature 19. Feature 19 was initially identified as a pit shaped deposit with shell midden fill, seen in profile view on the E104 line, at the northern edge of the block (Figure 5.24a). However, its location relative to the weak positive magnetic anomaly at this location, and its relationship with other deposits in this area of the excavation block, suggest the feature might be a somewhat larger deposit than seen here (see Figure 5.11).

In the excavation of the 2 x 2 m unit at SW corner E103 N2068, the extent of shell deposits were initially observed to extend from the NW corner to the southern edge of the unit, covering most of the unit's eastern half. However, with further excavation it appeared that the deposit in the NW corner might be distinct from the shell and midden found in the southern part of the unit in earlier levels (Figure 5.25). A sample of wood charcoal from the northwest area of this 2 x 2 m unit (i.e., Feature 19) was dated to AD 1294-1397, 2σ [Sample No. UM-FS203.1/UGAMS-21779]).

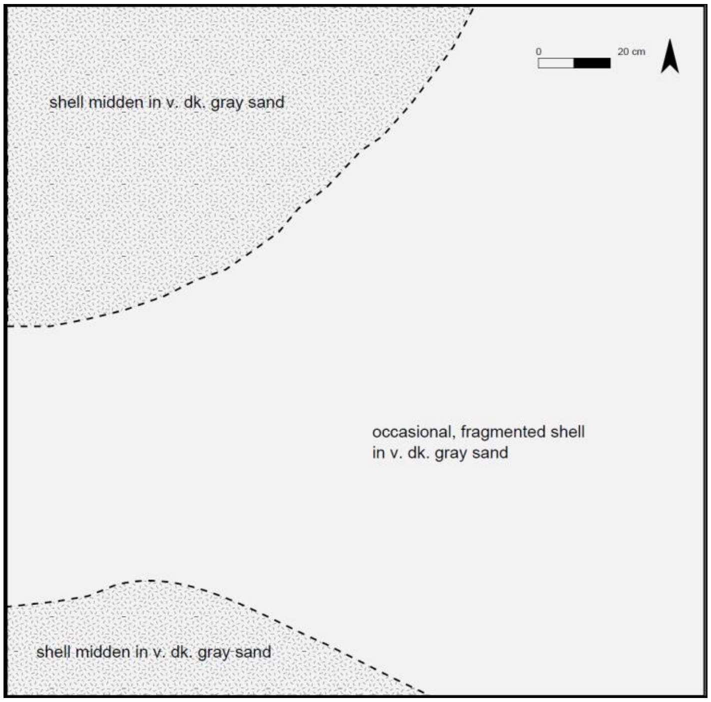

Figure 5.24 - Schematic plan view drawing of E103 N2068, showing extent of midden corresponding with Feature #19 deposit in northwest, and another possible unnamed shell midden feature in the southwest.

The deposit of shell seen at the southwest of this 2 x 2 m unit in earlier levels was never given a feature designation. Referring again to the geophysical survey map, it could correspond with a weak negative anomaly in that location, but it was ultimately not investigated intensively enough to confirm that. (In some areas of the site negative anomalies have corresponded with deposits containing shell, but without concentrations of organic content and/or burning.)

Feature 20. In the 2 x 2 meter unit at SW corner E101 N2068, the shell deposit consistently contained a high proportion of small crown conch and lightning whelk (Feature 5.24b). The soil here was relatively loose, perhaps because of the quantity of whole shell. It was eventually determined that the deposit in this location had a wide, shallow form and distinct characteristics that probably qualified it as a discrete feature, and it was designated as Feature 20.

Based on its shape and location, this deposit might correspond with the large, strong positive magnetic anomaly within the 2 x 2 m area at SW corner E101 N2068 (Figure 5.11).

A sample of wood charcoal from this area was dated to cal AD 1522-1654, 2σ [Sample No. UM-FS196.1/OS-135113]). A sample of deer bone from the same deposit produced an AMS radiocarbon date range beginning at cal AD 1522 but which may extend out of range of IntCal 2013 curve (Sample No. UM-FS200.1/D-AMS-031059). With regard to these late dates, fragments of iron were recovered from excavation in the vicinity of Feature 20 although their provenance and association is is unclear.

Although the north-facing profile view that runs through the center of Feature 20 is only partial (because of excavations completed above it), this view does seem to show a distinction between deposits designated as Feature 20 and those designated as Feature 19 (Figure 5.24c).

Central C Block

The area designated here as the central portion of the C Block falls primarily within the 2 x 2 m unit at SW corner E101 N2066. As with other units in this block, initial excavation revealed midden with whole shells close to the surface. In this unit an area of burning was identified in the northwest corner of the unit, but it was attributed to recent burning because of its proximity to the surface and because the wood was not fully carbonized.

Features 18a-b. Features 18a-b appear to be related although their content and form are different. Feature 18a is a deposit with significant quantities of crushed shell, especially mussel shell (Figure 5.26b). Feature 18b is an adjacent pit that is lined with a layer of shell, with a strata of dark organic fill overlying the shell layer; above the dark fill is the a strata of shell-bearing sheet midden deposit that appears across much of the Block C excavation (Figure 5.26a).

As an additional note, fragments of iron were recovered in the screen from materials excavated in the upper levels of each of these 1 x 1 m units. These do not appear to have contributed substantially to the magnetometer signal (as there are no strong, polarized readings in this location); perhaps these fragments originated with some piece or pieces of metal just to the west of the southern part of this block, where a strong polarized signal indicative of metals was recorded.

(a) (b)

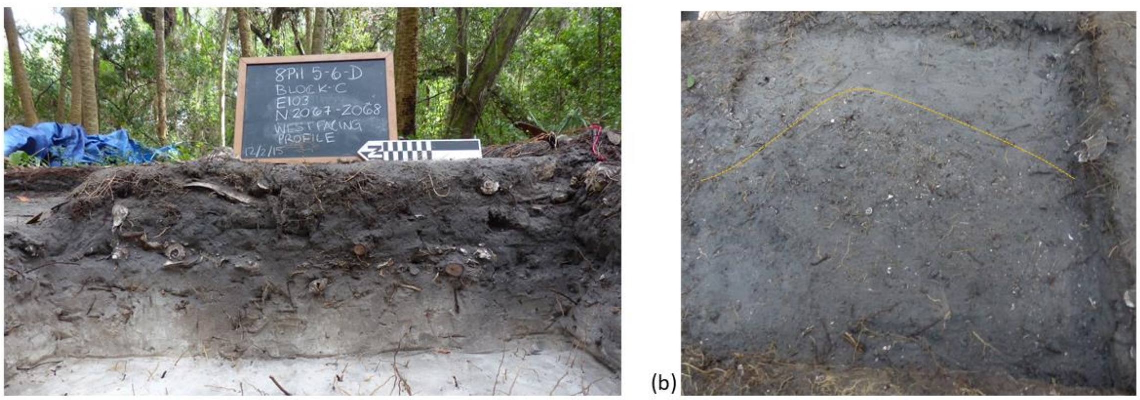

Figure 5.25 - Features #18a-b, Block C: (a) West-facing profile view of Feature #18b, shell-lined pit with dark organic fill and overlying shell midden, and (b) Features #18a (area of crushed shell below yellow line) and #18b (shell-free fill above yellow line) in E102 N2067 1 x 1 m unit (north at top).

Southern C Block

The southernmost 2 x 2 m unit in Block C was located at SW corner E101 N2064. As with other units in the block, a layer of shell-bearing midden was initially exposed close to the surface. The excavation here was intended to target a large positive magnetic anomaly (possibly 2 overlapping anomalies) on the eastern side of this unit.

After this initial midden exposure, a 1 x 1 m unit was excavated at SW corner E102 N2064. However, within the first 10 cm level of this unit, the deposit was found to be extensively disturbed by the roots of a nearby oak tree. It became apparent that even if the anomaly here represented a cultural feature, it would not be possible to map any features in plan or profile view in this location, and so excavation here did not continue beyond the first level.

It was observed in the field that very large crown conch were present in the deposit here.

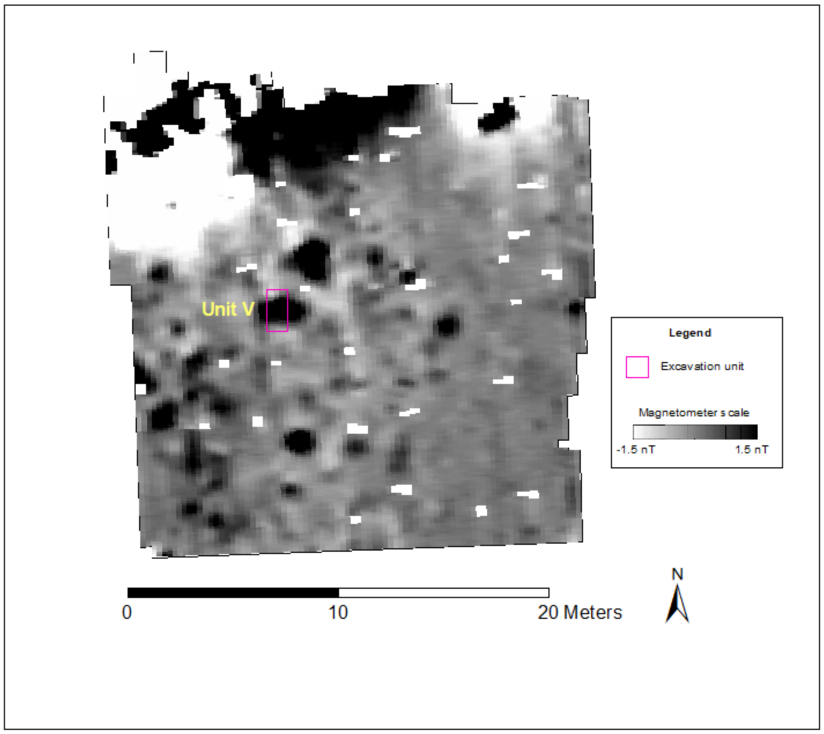

Figure 5.26 - Locations of excavation in magnetometer survey area #4

Area 5

Area 5 is located to the west of the center of the Three Ogres Mound. It is represented in magnetometer survey area #4 by two large, strong positive, irregularly-shaped anomalies, and a nearby series of strong positive anomalies of various sizes and shapes (Figure 3.7). Excavation in this area was limited to two adjacent 1 x 1 m units targeting one of the larger anomalies (Figure 5.27). This area is at a lower elevation than nearby Areas 3 and 4 and lacks the thin layer of midden that is ubiquitous closer to the Three Ogres Mound.

Unit V. Unit V was a 1 x 2 meter excavation intersecting a large, strong positive magnetic anomaly (Figure 5.27). This excavation revealed shell-bearing midden and a substantial pit feature (Feature 21). The uppermost levels of excavation were similar in content to midden fill at other site locations. Two samples of wood charcoal from the midden levels were AMS radiocarbon dated to cal AD 1287-1390, 2σ (excavation level 3; Sample No. UM-FS373.1/OS-135167) and cal AD 1224-1263, 2σ (excavation level 4; Sample No. UM-FS376.1/D-AMS-030676). In subsequent levels of excavation, the extent of midden constricted and a dark stain was evident on the east-central portion of the unit (Figure 5.28a-b). Excavation of midden fill at this level produced several notable artifacts: a fossilized shark tooth tool, a Safety Harbor incised sherd, a rectangular drilled shell pendant and two shell disk beads, large fragments of whelk, potentially debitage from shell-working (see Chapter 7).

Figure 5.27 - (a) Midden and feature stain in Unit V at base of level 4, (b) Top of Feature #21 pit in Unit V at base of level 5, and (c) West-facing profile view of Feature #21 pit.

Feature 21 was also identified at this point and excavated separately, and these excavations recovered additional atypical artifacts like varied bird remains (see Chapter 6), a large piece of clay, and a large whelk cutting-edged tool. A sample of wood charcoal from upper levels of the Feature 21 pit fill was radiocarbon dated to cal AD 1018-1149, 2σ (Sample No. UM-FS379.1/OS-135166). A second charcoal sample from the lower levels of the pit fill produced an AMS radiocarbon date of cal AD 1041-1154, 2σ (Sample No. UM-FS380.1/D-AMS-030677). An additional charcoal sample from lower in the pit produced an AMS radiocarbon date of 235-357 cal BC, 2σ (Sample No. UM-FS380.1/OS-135166), which probably indicates that the sample selected for dating in that case may have been from old wood or otherwise does not accurately represent the pit filling event.

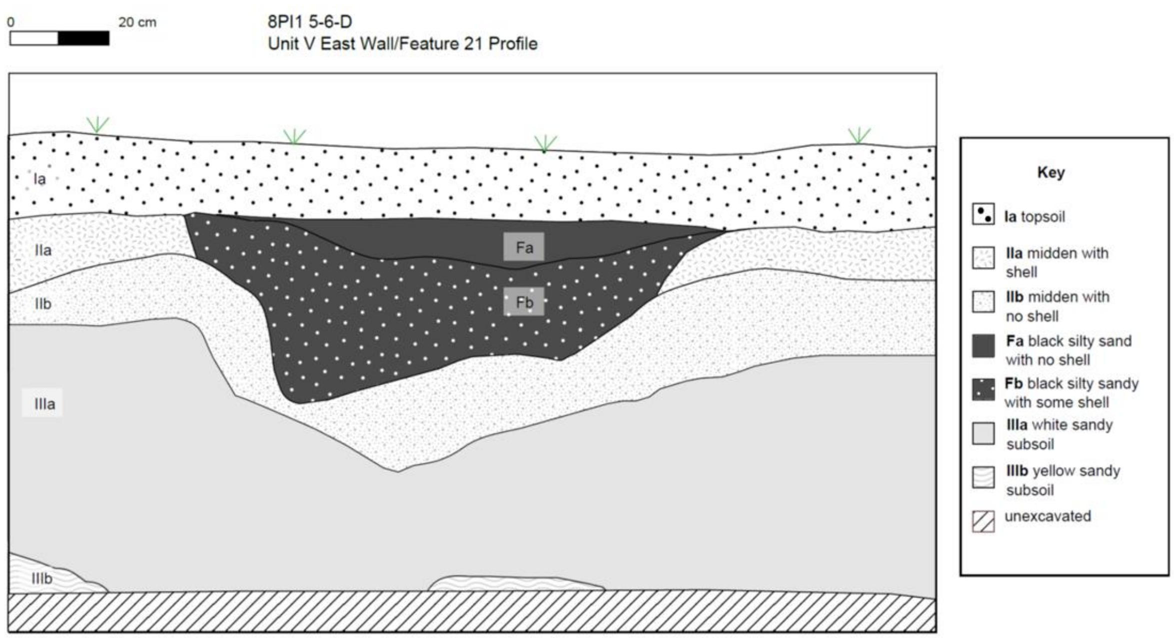

Figure 5.28 - Schematic drawing of Feature #21 in profile view

When excavation of the unit was complete, evidence of the pit feature was visible in the profile view of the west-facing wall (Figure 5.28c, 5.29). The deepest part of the pit was located within the unit, but the profile view shows its location and shape to a point. In this view, it sits flush with the shell midden in the rest of the unit that was not identified as a feature, but the fill of the pit is not necessarily continuous with this surrounding midden. As indicated in the profile drawing, there is a portion at the top of the feature (”feature-a”) which has the same sediment/soil content as the surrounding midden (Strata IIa) but less/no shell, whereas the main fill of the pit (”feature-b”) is similar in content to the surrounding IIa midden, but slightly darker in color. A layer labeled as Strata IIb runs next to and below the feature; while this layer did not include shell and the content was fairly sandy, this layer did include artifacts (e.g., the shark tooth, shell ornaments, and other notable artifacts from excavation level 5).

At lower levels of excavation, adjacent to a stain remaining from Feature 21, a relatively large potential posthole was identified and bisected. There initially appeared to be a second posthole in the plan view of the base of level 8, but this stain turned out to be more ephemeral and may have resulted from bioturbation of mottled staining related to the nearby feature or overlying midden.

In sum, this unit included notable deposits, artifacts, and faunal remains. The pit was larger and deeper than the majority of feature pits that were excavated through this process of targeting geophysical anomalies with test excavations. The artifacts point to activities related to crafting shell ornaments. Two different types of cutting tools (the shell cutting-edged tool and shark tooth knife) were recovered, along with shell debitage (large broken/cut fragments of whelk), and three shell beads/ornaments. The clay found within the feature pit might point to a function for this location, as a repository/storage area for crafting related implements and materials, although the surrounding midden and midden content of the pit indicate that items were being discarded here.

The location and orientation of the pit and overlying midden match closely with the large magnetic anomaly that these units were placed over. It is unclear whether the magnetic anomaly was produced primarily by the feature pit, or if the overlying midden also excavated in this unit contributed to that signal as well. The testing in this area (magnetometer survey area #4) was not extensive enough to show whether a thin layer of shell midden is part of the "background" of this area, as it is in magnetometer survey area #3. Overall the location of this unit is at a noticeably lower elevation than the area where excavation Blocks C and D are located, and it is farther removed from the large midden ridge, so that surrounding thin layer of shell might not be present here. In either case, the strategy of targeting magnetic anomalies proved particularly fruitful in this location. There are actually several additional positive magnetic anomalies of varying sizes within this magnetometer grid; these could not be tested as part of this project due to time constraints, but these would probably be some of the most promising areas to target with any future excavations.

<u>Other Examples of Ground-Truthing Magnetic Anomalies</u>

Unit U. The Unit U excavation was designed to ground-truth a geophysically "quiet" spot identified between Area 3 and Area four in magnetometer survey area #3 (Figure 5.11). In this unit, a thin layer of shell midden was identified of the type and depth that was found consistently across the study area and especially adjacent to the midden ridges (Figure 5.30). No discrete archaeological features were identified, and the prevalence of artifacts in this midden strata was limited compared to locations where magnetic anomalies corresponded with features (Table 5.2). Excavations recovered no lithic artifacts from midden strata in Unit U (lithic debitage was recovered from subsoil deposits, but these likely predate the Safety Harbor occupation and are unrelated to the magnetic signatures we recorded). The density of ceramic artifacts was lower than in other feature or midden contexts, as was the proportion of vertebrate bone to shell by weight. These patterns indicate that the Unit U location was the site of incidental discard but not intensive occupational activities. The results of this test excavation suggest that magnetically quiet areas in the magnetometer survey are indeed likely to have less significant archaeological deposits than the locations marked by magnetic anomalies.

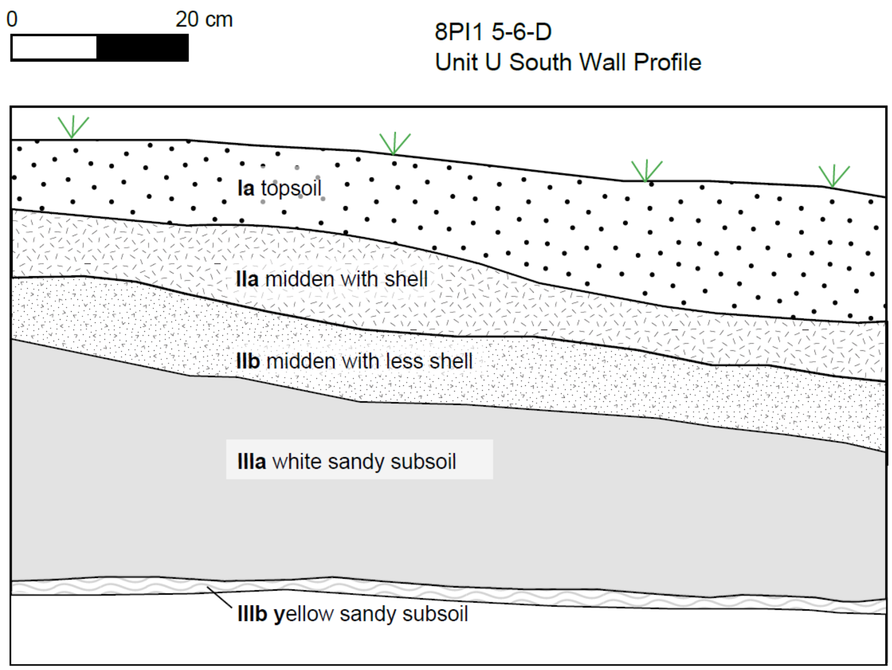

Figure 5.29 - Profile view of Unit U stratigraphy

	Unit U midden	Features	Other midden
Average bone:shell weight	0.0038	0.0350	0.0142
Average lithic density	0 g/m^3	50.47 g/m^3	36.91 g/m^3
Average ceramic density	375.15 g/m^3	475.20 g/m^3	555.91 g/m^3

Table 5.2 - Unit U midden content vs. other excavated contexts

Unit E. The Unit E excavation was located to test the deposits associated with a weak, negative anomaly in magnetometer survey area #1 (Figure 5.1). The unit was consistently sandy, without any in situ midden content, although some isolated artifacts and shell were recovered (including a Pinellas projectile point). The gray sands of the upper levels became mottled with browner sands in subsequent levels; this mottling increased throughout the unit before transitioning into the orange-brown sands typical of the IIIb strata across the site. It was noted during excavation that some of the isolated artifacts and shells had darker sand and some soil clinging to them. That observation, combined with this unit's location at a relatively lower elevation within this area of the site, suggests that artifacts recovered in this unit may have washed or otherwise made their way down into the unit from surrounding midden deposits with richer soil and artifact content. The negative magnetic signal of this area might similarly relate to the natural characteristics of the relatively well-drained sand that was found in this lower-lying area.

Unit L. The Unit E excavation was located to test the deposits associated with a strong, positive anomaly in magnetometer survey area #1 (Figure 5.1). Excavation soon recovered a large iron nail, and after re-examination of the magnetometer survey map it was determined that the strong positive magnetic anomaly was associated with a strong negative magnetic anomaly—this combination typically results from a polarized material like metal. Excavation of the unit was halted at this point as it seemed that the magnetic signature did not point to prehistoric activity, and excavation of these first two levels had produced only a few isolated shell fragments and gray sand without midden deposits.

Unit M. The Unit E excavation was located to test the deposits associated with a strong, positive anomaly in magnetometer survey area #1 (Figure 5.1). The excavation did not reveal any features that clearly corresponded with the magnetic anomaly. The unit was similar in many ways to Unit E, with gray sand transitioning into orange-brown sands throughout the unit. Shell (gastropods and oysters) were recovered, along with isolated ceramic and lithic artifacts. A large shark tooth was also recovered. It is unclear if these artifacts were deposited in this area or moved here through natural post-depositional processes. It is possible that any features associated with the observed magnetic anomaly were located beyond the edge of this excavation unit.

Radiocarbon Dating the Safety Harbor Occupation at Weeden Island

Twenty five AMS radiocarbon dates produced by this project (Table 5.3, Figure 5.31) provide new information about the chronology of the Safety Harbor occupation at Weeden Island. (One sample beyond these 25, OS-135166, produced an incongruously early date of 2270 +/- 15, suggesting that the charcoal used came from old wood; this sample is omitted from the discussion of Safety Harbor chronology and from Figure 5.31. An additional sample of grape seed with a modern date has also been omitted from discussion here.) Calendar dates discussed here represent a 2σ range, calibrated using the IntCal2013 curve in OxCal 4.3.

Radiocarbon dates from Area 4 deposits indicate that activities here took place later than at other areas of the site; this is reinforced by the prevalence of Pinellas sherds in the ceramic assemblage from Block C (see Chapter 7). One sample from Feature 19 produced a date of cal AD 1294-1397, which would be later in the Pinellas phase compared to other Safety Harbor deposits. Two dates from cal AD 1522 on from the Feature 20 deposit suggest it was produced at a relatively late date.

The earliest date from this project (excluding OS-135166) is cal AD 995-1149, from a possible cooking feature in Unit N. Unit N is in the vicinity of Area 1 (located over an anomaly

UM FS#	Sample ID	Material	C14 age	Age error	δ13C	2σ calibrated date*	Sample provenience
117	OS-135381	Charcoal	855	15	Not available	cal AD 1160-1220	Area 1/Unit H/lvl 2 midden
123	OS-135382	Charcoal	875	30	Not available	cal AD 1043-1241	Area 1/Unit H/lvl 3 midden
136	OS-135383	Charcoal	895	25	Not available	cal AD 1042-1212	Area 1/Unit H/lvl 5 midden
11	UGAMS-18448	Charcoal	960	20	-27.4	cal AD 1021-1154	Area 1/Unit A/adjacent to F1 pit
82	UGAMS-18449	Charcoal	850	20	-23.9	cal AD 1158-1247	Unit D/F2 burn feature
97	UGAMS-18450	Charcoal	990	20	-25.5	cal AD 995-1149	Unit N/shell and burning feature
368	OS-135116	Charcoal	880	15	Not available	cal AD 1052-1215	Area 2/Unit R/shell midden lvl 3
388	D-AMS 031057	Deer bone	745	27	Not available	cal AD 1224-1289	Area 2/Unit R/shell midden lvl 4
253	UGAMS-21780	Charcoal	850	20	-25.3	cal AD 1158-1247	Area 3/Block D North Midden/shell midden
278	OS-135114	Charcoal	900	15	Not available	cal AD 1044-1189	Area 3/Block D North Midden/F9 pit
233	OS-135115	Charcoal	905	20	Not available	cal AD 1039-1118	Area 3/Block D North Midden/shell midden
333	D-AMS 031058	Deer bone	770	25	Not available	cal AD 1220-1280	Area 3/Block D/F15 pit
351	OS-135168	Charcoal	895	15	Not available	cal AD 1046-1208	Area 3/Block D/F17 pit
287	UGAMS-21781	Charcoal	800	20	-25.8	cal AD 1211-1270	Area 3/Block D/F13a pit
309	D-AMS 030672	Charcoal	748	26	Not available	cal AD 1224-1287	Area 3/Block D/brown soil midden
341	D-AMS 030673	Charcoal	330	26	Not available	cal AD 1482-1624	Area 3/Block D/F13c
322	D-AMS 030674	Charcoal	844	29	Not available	cal AD 1059-1262	Area 3/Block D/brown soil midden
169	D-AMS 030675	Charcoal	629	26	Not available	cal AD 1288-1397	Area 3/Unit T/lvl 3 midden
203	UGAMS-21779	Charcoal	620	20	-24.9	cal AD 1294-1397	Area 4/Block C/F19
196	OS-135113	Charcoal	285	15	Not available	cal AD 1522-1654	Area 4/Block C/F20
200	D-AMS 031059	Deer bone	255	27	Not available	cal AD 1522-**	Area 4/Block C/F20
373	OS-135167	Charcoal	645	15	Not available	cal AD 1287-1390	Area 5/Unit V/lvl 3 midden
380	OS-135166	Charcoal	2270	15	Not available	235-357 cal BC	Area 5/Unit V/F21 pit
379	OS-135165	Charcoal	975	15	Not available	cal AD 1018-1149	Area 5/Unit V/upper F21 pit
376	D-AMS 030676	Charcoal	789	26	Not available	cal AD 1224-1263	Area 5/Unit V/lvl 4 midden
380	D-AMS 030677	Charcoal	930	26	Not available	cal AD 1041-1154	Area 5/Unit V/lower F21 pit

*All dates calibrated using the IntCal2013 curve in OxCal 4.3. **Date may extend out of range of IntCal 2013 curve.

Table 5.3 - Results of UM-WIAP AMS radiocarbon dating

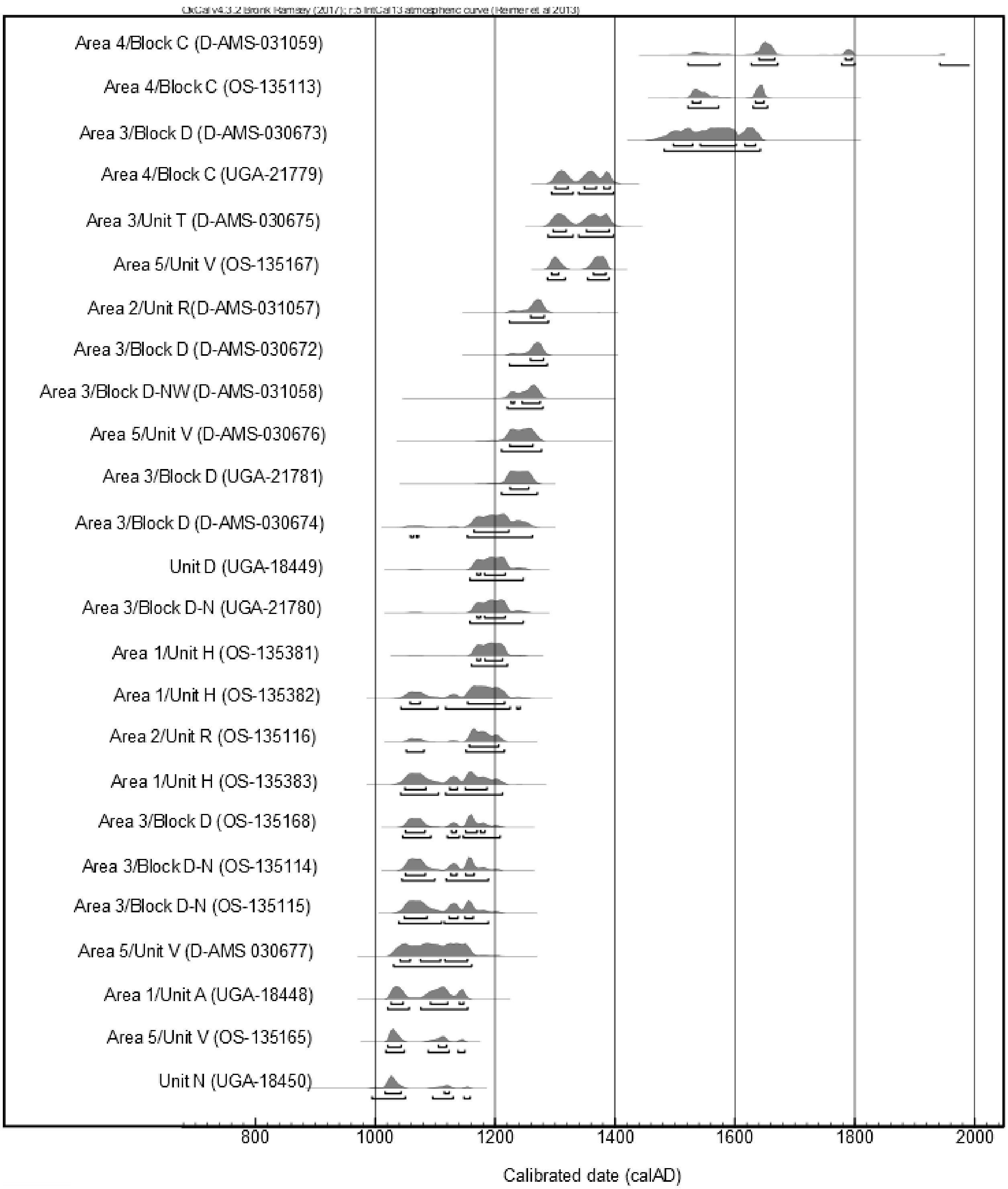

Figure 5.30 - Multiplot of UM-WIAP radiocarbon dates from the Weeden Island site

in magnetometer survey area #1) though it is not spatially associated with that cluster of magnetic anomalies and features. However, some Area 1 deposits that were not dated for this project may be coeval with the Unit N feature. The earliest dated sample from a deposit that corresponds with an anomaly in the Area 1 cluster was recovered adjacent to the Feature 1 pit in Unit A (cal AD 1021-1154). The lowest level of midden tested in Unit H (part of Area 1) produced a radiocarbon date of cal AD 1042-1212, and a sample from lower levels of Unit A (also in Area 1) produced a date of cal AD 1021-1154. The latest date from Area 1 is cal AD 1160-1220, from the upper midden levels of Unit H. However, a sample from the lower levels of a feature in Unit D, which tested a magnetic anomaly in magnetometer survey area #1 (but separate from the Area 1 cluster) produced a potentially later date of cal AD 1158-1247.

The two available dates from Area 2, in the R unit, are ambiguous because a charcoal sample from a lower level that appears to represent a distinct strata of shell midden dates to cal AD 1224-1289, while a deer bone sample from a level above that dates within the same 1 x 1 m area dates to cal AD 1052-1215.

In Area 3, all available samples post-date the earliest deposits from Area 1 (and nearby) and Area 5, but otherwise indicate occupation over a span of time from cal AD 1039-1118 (in the Block D "North Midden") to 13th century, with one late date of cal AD 1482-1624 derived from an apparent feature in the north central portion of Block D. Deposits throughout Area 3 appear to be basically continuous rather than representing sequential depositions in different locations.

Dates from Area 5 include one of the oldest and one of the most recent in the study area. A sample from the Feature 21 pit produced dates of cal AD 1018-1149 and cal AD 1041-1154 (from upper and lower levels of the pit, respectively), similar to date of the Unit N feature at the other end of the study area. It appears that at least some of the midden above Feature 21 were deposited later, given dates of cal AD 1287-1390 and cal AD 1224-1264 from samples derived from overlying midden levels.

Comparing radiocarbon dates from this project with radiocarbon dates from excavations in the midden of the Jeanne Mound Complex indicates that accumulation of midden at the edge of the Jeanne Mound Complex was concurrent with occupation in Areas 1-5 studied for this project. The dates O'Donnell reports as spanning the depth of the midden deposit in that location cover much the same period of time as dates from deposits in Areas 1, 2, 3, and 5 (O'Donnell 2015:19-20). Additional dates from AWIARE and USF excavations in the Jeanne Mound Complex midden indicate that occupation or use of this location continued through the late pre-contact Safety Harbor and into the 15th or 16th century (Robert Austin, personal communication 2018).

Discussion

Excavations targeting magnetic anomalies demonstrated the utility of our geophysical survey methodology and indicated that the pattern of magnetic activity did indeed reflect the spatial structure of the Safety Harbor occupation at the site. Previous survey work on the Preserve, using traditional methods, had identified "dark earth" occupational middens in areas adjacent to the Jeanne Mound Complex and Three Ogres Mound (Weisman et al. 2005:113, 143-150; Figure 3.5). The combined magnetic susceptibility and magnetometer survey that Timothy Horsley and I conducted at the site identified five concentrations of activity (i.e., Areas 1-5) that were outside the midden boundaries identified in the previous survey. This recognition led to the development of a framework for assessing community settlement at Weeden Island by comparing the chronology and range/scale of activities at each area. The information garnered from the geophysical survey at Weeden Island thus contributed to the formation of new research questions (Horsley et al. 2014).

The results of the UM-WIAP ground-truthing excavations provided information about how magnetic anomalies at the site correspond to archaeological features (Table 5.4). Positive magnetic anomalies were the most extensively tested and most consistently corresponded to cultural features, including pits with midden fill and/or evidence of in-situ burning and areas of increased burning or organic content within more extensive middens (Kvamme 2006:215-217). One anomaly, ground-truthed in Unit R, might reflect an accumulation of pottery fragments within the midden (Kvamme 2006:216-217), as the ceramic artifact density for that unit was unusually high and fragments recovered were especially large. Negative magnetic anomalies corresponded variously to shell deposits with decreased proportions of organic material (i.e., more shell), naturally well-drained sandy sediments (i.e., lacking in soil formation and iron minerals), or historic metal (when paired with positive anomalies). In several instances, we could not confirm the exact source of the anomaly through excavations; in most of these cases, shell midden was present in the excavation unit, and the heightened magnetic signature might reflect variation in the distribution of dispersed fired or organic materials within the midden deposit. The excavation of Unit U over a geophysical "blank spot" indicated that that location was the site of incidental discard but not intensive occupational activities.

The features and deposits identified through excavations point primarily to domestic activities like food collection and preparation and the production of subsistence related tools. Most excavated contexts included substantial quantities of shell-bearing midden, either as refuse locations or as fill in pit or post features. Chapters 6, 7, and 8 expand on this interpretation by considering specific patterns of food and artifacts within these areas and deposits. One possible exception to the pattern of generalized domestic activity is Feature 21 pit and associated midden deposits in Area 5, which suggest a more focused production of shell ornaments and possible ceremonial activities, along with other anomalous patterns that I discuss further in the next three chapters.

Excavation Unit	Anomaly Source
Positive/Strong Anomalies	
Unit A – 1 x 1 m	Stratified pit feature (F1)
Unit C – 1 x 1 m	Unknown (Shell midden present with extensive root disturbance)
Unit D – 1 x 1 m	Pit feature with midden fill and evidence of burning (F2)
Unit H – 1 x 1 m	Area of increased burning/organic content within shell midden (F4)
Unit L – 1 x 1 m	[Iron nail]
Unit M – 1 x 1 m	Unknown
Unit N – 1 x 1 m	Pit feature with midden fill and charcoal (F3)
Unit R – 1 x 2 m	Unknown (possibly increased burning/organic content in midden)
Unit S – 1 x 1 m	Unknown (possible occupational midden)
Unit T – 1 x 1 m	Pit feature with midden fill (F7)
Unit V – 1 x 2 m	Pit feature with midden fill (F21)
E086.5 N2075 – 1 x 1 m	Pit feature with stratified midden fill (F14)
E087.6 N2075 – 2 x 2 m	Overlapping: pit with charcoal/pit with oxidized sediment/posthole (F13a-c)
E087.5 N2074 – 1 x 1 m	Shallow pit feature with midden fill (F16)
E087.5 N2072 – 1 x 2 m	Occupational midden
E085.5 N2079 – 3 x 2 m	Shell midden deposit pit and post features
E101 N2068 – 2 x 2 m	Wide shallow shell midden deposit with distinct taxa profile (F20)
E104 N2069 – 1 x 1 m	Unknown (midden with charcoal present)
E101 N2064 – 2 x 2 m	Unknown (shell midden present with extensive root disturbance)
E101 N2067 – 1 x 2 m	Pit feature with stratified fill (F18b)
Positive/weak anomalies	
E086.5 N2076 – 1 x 1 m	Pit feature with midden fill (F15)
E086.5 N2074 – 1 x 1 m	Occupational midden
E088.5 N2073 – 1 x 2 m	Pit feature with midden fill, charcoal, and ashy sediment (F17)
E103 N2069 – 1 x 1 m	Pit feature with midden fill (F19)
Negative/strong anomalies	
Unit I – 1 x 1 m	Deposit with elevated proportion of whole shell within midden
Negative/weak anomalies	
Unit E – 1 x 1 m	[Well-drained sandy sediments with no in-situ midden]
E101 N2070 – 1 x 2 m	Unknown (shell midden exposed but not fully excavated)
E101 N2067 – 1 x 2 m	Crushed mussel shell feature (F18a)
No anomaly	
Unit U – 1 x 1 m	[Thin layer of midden present with no distinct features]

Table 5.4 - Summary of results of ground-truthing magnetic anomalies

The occupation of the study area, based on all excavated midden contexts, spanned the pre-contact phases of Safety Harbor and continued into the post-contact era. The majority of dates fell between cal AD 1000 and 1300, during the early Safety Harbor phases. There was overlap in the use of Areas 1, 2, 3, and 5, as well as the deposition of midden on the Jeanne Mound Complex. Area 4 was the result of activities that took place later than the other locations in this study, during the post-contact Safety Harbor period, although one sample from the Jeanne Mound Complex produced a similar date.

Seasonality data can add important resolution to chronologies developed with radiocarbon dating; unfortunately, information about the seasonality of these deposits is currently limited. Archaeologists may determine the season of procurement for multiple resources to provide evidence about the seasonal use of an archaeological site (Aten 1981; Quitmyer 2013; Russo 1998). The research design of this study anticipated drawing on multiple lines of evidence about the seasonality of site use, including size demographics of mollusk species with a one-year life cycle (bay scallops and impressed odostomes) and the potential presence of vertebrate taxa like migratory. Bay scallops would have been consumed as a food resource, while odostomes are small parasitic mollusks that live on oysters, so that the seasonality of odostome death is a proxy for the season of oyster collection; for each of the taxa, body size correlates with season of the year (Russo 1998; Russo and Quitmyer 1996, 2008; Quitmyer 2013). A recent study of impressed odostomes from a test unit in the Jeanne Mound Complex (one of the shoreline ridges of midden) demonstrated the utility of this method at the site and found preliminary evidence for year-round occupation (Edwards 2015). Ultimately, however, evidence about these taxa collected for this project was not sufficient to conclusively determine the seasonality of activity areas at the site. No migratory birds were identified in the vertebrate zooarchaeology sample, but that absence is not persuasive evidence about whether the site was occupied in winter months. The presence of sea catfish and sharks have been used to establish warm weather seasonality at southern Atlantic coastal sites (e.g., Reitz 2008), but the warmer waters of the Gulf of Mexico were likely habitable for these species in winter as well. Bay scallops were collected during excavations and subsequently measured, but sample sizes were not sufficient to reconstruct demographic profiles. No impressed odostomes were recovered from midden samples collected in 1/8” screens, nor from the 1/16” screened sediment collected from large gastropods (following Edwards 2015).

In sum, the results of excavation and radiocarbon dating show (1) that the study area was occupied during the pre-contact and post-contact Safety Harbor era, though most intensively from about cal AD 1000-1300; (2) that the study area encompassed the diverse spatial and social contexts one would expect from a village setting, including variable mounded midden refuse deposits, small pit features, cooking areas, and more diffuse midden deposits that might represent occupational activity areas; and (3) that our geophysical survey methodology successfully expanded the recognized boundaries of intensive occupational activity in the area and resulted in the identification of specific domestic features. These results provide a new and more detailed picture of the Safety Harbor occupation of the site, which can inform the interpretation of material remains and the reconstruction of community organization. In the following chapters, I turn to the material remains recovered from excavations in the study area (Chapters 6-7), then provide a synthesis of the view of Safety Harbor residential community organization provided by these combined data sets (Chapter 8).

Chapter 6 - Food Resources and the Organization of Subsistence Activities

Plant and animal remains provide a basis for evaluating questions about the coordination of labor and the relationship between daily practices and the creation of local and regional communities. In this chapter I address choices made among habitats and prey types, the use of different fishing technologies, and special uses for certain animals. Information about practices in each of these areas contributes to an assessment of community organization with respect to labor coordination and access to resources. I focus on the following research questions:

- How were subsistence practices intertwined with uses for plant and animal resources other than consumption?
- How did Weeden Island residents cooperate, compete, and coordinate labor through subsistence technologies and strategies?

First, I describe relevant methods and procedures and summarize the results of zooarchaeological and botanical analysis. Next I describe site-wide patterns and relationships among these resources in more detail. I present an overview of animal resources according to the circumstances under which they would be foraged, including shellfish collection, saltwater fishing, terrestrial hunting, and sea turtle harvesting. I observe that data on resources from each of these categories implicates technological and social factors in Weeden Island residents' decisions about which animals to target. Then, I discuss a series of indices of relative abundance, which are used to measure how different categories of resources (i.e., terrestrial and marine, fish and shellfish, hunted and fished foods) were used relative to one another. As expected, marine resources predominate in most of the assemblage, but shellfish in particular have very high representation in most contexts. These indices also reveal some variability between deposits and site areas. I also examine variability in the record of the most common edible mollusk taxa, the category of fauna for which the most data was collected; these results have implications for understanding both site formation processes and food collection strategies. Then, I turn to measures of faunal variability that reflect the marine habitats where resources were harvested, particularly with respect to the relative importance of local Tampa Bay estuarine waters compared with the open waters of the Gulf. I also examine zooarchaeological evidence of fishing technology, which has a major impact on the organization and returns of subsistence in coastal settings. Finally, I discuss how the results in this chapter begin to provide answers to the research questions presented above, and how these data contribute to an interpretation of community organization at Weeden Island.

Invertebrate Zooarchaeology (Mollusk Shell)

Field and Laboratory Procedures

During excavation, all materials and sediments were screened through 1/8" mesh. In those contexts that lacked substantial shell midden deposits, artifacts and bone were collected directly from the screen and any small fragments of shell were discarded. In contexts with substantial midden deposits, field procedures were designed to preserve a representative sample of midden contents while reducing the volume of material that would eventually need to be transported from Florida to Michigan for analysis. Large whole mollusk shells were removed from the screen and bagged separately to be sorted and measured in the Florida field lab. "Whole" shells were defined throughout this process as those which contained 90%+ of a non-repeating element, for the purpose of estimating MNI (minimum number of individuals); for gastropods, this the non-repeating element was the columnella, and for oysters and other bivalves it was the umbo (left or right). After artifacts were collected and bagged, all material remaining in the screen (i.e., small and fragmented shell, bone, and small artifacts) was also collected. An expedited version of the shell collection procedure was used for certain contexts that were already well-sampled: all artifacts and vertebrate bone were collected from 1/8" screens, and whole shells were counted by taxa, but the remaining shell matrix was weighed and discarded rather than being saved for laboratory sorting.

Large whole mollusk shell from select contexts (representing all 5 main areas of excavation) were sorted by taxa, counted, and weighed. (Any shell tools or modified shell identified during this process was cataloged and saved.) At this stage, gastropods were further sorted into "whole" and "partial" categories. Shells in both categories retained their columnellae, but "whole" shells at this stage were almost entirely unbroken, while "partial" shells might be missing any amount of the whorl. Shells were counted and weighed separately within these categories. This distinction was designed to allow an estimate of average shell weight by taxa (i.e., the weight of whole shell in given context divided by the number of whole shell in that context) that would not be biased by the lower weight of fractured shells, as the difference can be substantial, especially for large crown conch with thick body whorls. Oyster shell, a common constituent of shell midden deposits, was not sorted in this way because the shells were generally too friable for the recovery of many truly whole individuals. After analysis, shells were generally discarded on site as backfill, although occasional samples were cataloged as examples of particular features, unusually large sized individuals, etc. Several of these shell samples were initially sorted in public archaeology lab sessions conducted by the Florida Public Archaeology Network (FPAN), with the author measuring and recording counts and weights afterward.

A subset of all samples collected from 1/8” screens (Table 6.1) were sorted and analyzed at the Museum of Anthropological Archaeology at the University of Michigan, by the author and undergraduate researchers and volunteers. At this stage, all vertebrate bone was sorted, weighed, and collected for analysis at the Florida Museum of Natural History (see below).

Given the abundance of materials recovered from sites with extensive shell deposits, the sorting of shell was limited by taxa to facilitate the specific research goals of this study (Reitz and Shackley 2012:365-373). Shell identification procedures at this stage were designed with two purposes: First, to reflect the relative abundance of taxa representing sources of food and shell for the crafting of ornaments and tools. Second, to quantify non-edible taxa to a degree that could be useful for characterizing shell-bearing deposits (i.e, rate of deposit, exposure) or making inferences about food collection strategies (i.e., habitats targeted, individual or mass collection). Weights and/or estimates of MNI (based on non-repeating elements) were favored as measurements over complete specimen counts (NISP); for this study, NISP of mollusk shell likely would not provide enough additional analytical value to outweigh the time required to collect it.

To these ends, diagnostic fragments were used to identify common edible taxa, which generally include shells of larger size. These shells could frequently be identified to the species level. Within each taxon identified, shell were sorted into “partial” and “fragment” categories; as with the sorting of whole large shells in the field lab, “partial” shells retained 90%+ of the designated non-repeating element for that class (i.e., gastropod columnella or bivalve umbo), while “fragments” of a taxon did not. Shells in the “partial” category were counted as well as weighed, to facilitate MNI calculations; shell “fragments” were only weighed.

Beyond edible resources, these samples contained a number of colonizer species, typically smaller individuals probably collected incidentally along with species targeted as sources of food/raw material. Compared with the larger, edible taxa, these were less commonly identified to the species level, as a comparative collection was not available and these data were less crucial to project goals. However, smaller taxa that were only identified to the level of class (e.g., “small unidentified gastropods”) were collected and cataloged for future study.

FS#	**Area#**	**Deposit label**	**Excavation context**	**Components analyzed**
1	**1**	**A**	**Unit A: Shell midden level (above FS 7/30)**	**Shell**
7/30	**1**	**A**	**Unit A: Shell midden level (surrounding feature pit [F1], between FS 1 and FS 12)**	**Shell**
12	**1**	**A**	**Unit A: Shell midden level (below FS 7/30)**	**Shell**
23	**1***	**B**	**Unit D: Shell midden level (above FS 27)**	**Shell**
27	**1***	**B**	**Unit D: Shell midden level (above FS 34)**	**Shell**
34	**1***	**B**	**Unit D: Shell midden level/feature pit (F2) (above FS 48)**	**Shell and Bone (1/4”)**
48	**1***	**B**	**Unit D: Shell midden level/feature pit (F2) (above FS 50)**	**Shell and Bone (1/4”)**
50	**1***	**B**	**Unit D: Shell midden level**	**Shell**
66	**1***	**B**	**Unit D: Feature pit (F2)**	**Shell**
76	**1***	**B**	**Unit D: Sub-midden level (below FS 50, FS 66)**	**Shell**
99	**1**	**C**	**Unit I: Shell midden level (above FS 102)**	**Shell**
102	**1**	**C**	**Unit I: Shell midden level (above FS 106)**	**Shell**
106	**1**	**C**	**Unit I: Shell midden level**	**Shell**
110	**1**	**D**	**Unit C: Shell midden level (above FS 116)**	**Shell**
116	**1**	**D**	**Unit C: Shell midden level**	**Shell**
113	**1**	**E**	**Unit H: Shell midden level (above FS 117)**	**Shell**

FS#	Area#	Deposit label	Excavation context	Components analyzed
117	**1**	**E**	**Unit H: Shell midden level (above FS 123)**	**Shell and Bone (1/4")**
123	**1**	**E**	**Unit H: Shell midden level (above FS 136)**	**Shell and Bone (1/4")**
136	**1**	**E**	**Unit H: Shell midden level (above FS 141)**	**Shell**
139	**1**	**E**	**Unit H: Feature area (within FS 136 unit-level)**	**Shell**
141	**1**	**E**	**Unit H: Shell midden level**	**Shell**
150	**2**	**F**	**Unit S: Shell midden level**	**Shell**
170	**3**	**G**	**Unit T: Shell midden level/feature pit (F7) (above FS 171)**	**Shell**
171	**3**	**G**	**Unit T: Shell midden level/feature pit (F7) (above FS 173)**	**Shell**
173	**3**	**G**	**Unit T: Shell midden level/feature pit (F7)**	**Shell**
200	**4**	**H**	**Block C: Shell deposit feature (F20)**	**Shell and Bone (1/4")**
230	**3**	**I**	**Block D North Midden: shell midden level**	**Bone (1/4")**
208	**3**	**J**	**Block D North Midden: Shell midden level (adjacent to FS 236)**	**Shell and Bone (1/4")**
236	**3**	**J**	**Block D North Midden: Shell midden level (adjacent to FS 208)**	**Shell and Bone (1/4")**
220	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell**
255	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell**
315	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell (count only)**
316	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell (count only)**
324	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell (count only)**
325	**3**	**K**	**Block D Brown Soil Midden: Midden level**	**Shell (count only)**
240	**4**	**L**	**Block C: Shell midden level**	**Shell**
248	**4**	**M**	**Block C: Shell midden level**	**Shell**
289	**n/a**	**N**	**Test of geophysical blank spot (above FS 290)**	**Shell**
290	**n/a**	**N**	**Test of geophysical blank spot (above FS 291)**	**Shell**
291	**n/a**	**N**	**Test of geophysical blank spot (above FS 292)**	**Shell**
292	**n/a**	**N**	**Test of geophysical blank spot**	**Shell**
326	**3**	**O**	**Block D NW Midden: Shell midden level**	**Shell**
227	**3**	**O**	**Block D NW Midden: Shell midden level**	**Shell**
333	**3**	**P**	**Block D NW Midden: Feature pit (F15)**	**Bone (1/4")**

FS#	Area#	Deposit label	Excavation context	Components analyzed
336	3	P	Block D NW Midden: Feature pit (F15)	Shell (count only)
342	3	Q	Block D North Central: Adjacent to F13	Shell (count only)
344	3	Q	Block D North Central: Adjacent to F13)	Shell (count only)
349	3	R	Block D North Central: Feature pit (F16)	Shell
350	3	S	Block D North Central: Feature pit (F17)	Shell and Bone (1/4”)
375	5	T	Unit V: Shell midden level (adjacent to FS 376)	Shell
376	5	T	Unit V: Shell midden level (adjacent to FS 375)	Shell
377	5	T	Unit V: Shell midden level (adjacent to FS 378)	Shell
378	5	T	Unit V: Shell midden level (adjacent to FS377)	Shell and Bone (1/4”)
380/396	5	T	Unit V: Feature pit (F21)	Shell and Bone (1/4”)
373	5	U	Unit V: Shell midden level (above F21)	Shell and Bone (1/4”)
149	2	V	Unit R: Shell midden level (adjacent to FS 388)	Shell and Bone (1/8” and 1/4")
388	2	V	Unit R: Shell midden level (adjacent to FS 149)	Shell and Bone (1/4”)

***Unit D is in magnetometer survey area #1, in the vicinity of Area #1**

Table 6.1 - Analyzed shell and bone samples by excavation context

Summary of Invertebrate Remains

Across all analyzed contexts and sampling strategies, a minimum of 38,067 individuals were identified. The total weight of shell examined was 482.43 kg, of which 402.75 kg was identified to a taxa of class or lower. As noted above, NISP was not utilized for the analysis of invertebrate remains. The abundance of invertebrate animals by taxa for the entire identifiable, analyzed assemblage are shown by provenience (FS#) in Appendix A. Because the total assemblage of analyzed shell included a mix of sampling strategies for different contexts (i.e., analyzing only specimens of larger taxa identified as whole or partial in the field, analyzing only the 1/8”+ size fraction with whole large shells removed, or analyzing all recovered shell 1/8”+), the following summary provides only a general overview of the assemblage characteristics. The subsequent section of this chapter focused on intra-site patterning takes into account variable sampling strategies in more detail.

Weight and MNI measures produced different results for taxa abundance (Table 6.2). By weight, bivalves were most abundant, at 44.79% of the total analyzed shell assemblage (or 53.65% of the identified assemblage), while gastropods accounted for 38.56% of the total analyzed shell assemblage (or 46.18% of the identifiable assemblage). By MNI, gastropods were more abundant, at 62.16% of the assemblage, versus 39.21% for bivalves. This difference in the results of the two measurements is probably a consequence of taphonomy, as oyster shells are more friable than common gastropods like crown conch and lightning whelk. Eastern oyster accounts for over 95% of the identified assemblage of bivalves by either MNI or weight. Thus, the MNI calculation, which requires 90%+ of a diagnostic non-repeating element is likely biased in favor of the more sturdy gastropods. Beyond measuring abundance by class, MNI was not calculated for all taxa. Overall, weight is likely the most consistent and accurate measure for describing the total assemblage of analyzed shell.

Within the class Bivalvia, *Crassostrea Virginica* (eastern oyster) dominate, at 96.23% by weight. The next most abundant taxa is *Mercenaria sp* (quahog clam, 1.80%), followed by Mytilidae (mussel, 0.84%) and *Ostrea equestris* (crested oyster, 0.99%).

Within the class Gastropoda, the most common taxa identified are *Melongena corona* (crown conch) and *Busycon contrarium* (lightning whelk). By weight, crown conch were most common at 49.88% of gastropods, with lightning whelk accounting for 41.79% of gastropods by weight. By MNI, lightning whelk were more common at 43.67% of gastropods, compared to crown conch at 26.04%. For this species to species comparison, MNI is probably more useful than weight because the shells of the two taxa are similarly durable, and MNI is calculated by the

Taxa	Wgt (g)	%	MNI	%
Balanus sp (barnacle)	691.00	100.00	0.00	-
Total Maxillopoda	**691.00**	**0.14**	**0.00**	**0.00**
Callinectes sp (blue crab)	0.73	100.00	3.00	-
Total Malacostraca	**0.73**	**0.00**	**3.00**	**0.01**
Mytilidae (mussel)	1804.65	0.84	0.00	0.00
Crassostrea Virginica (eastern oyster)	207911.81	96.23	12351.00	95.25
Mercenaria sp. (quahog clam)	3879.37	1.80	2.00	-
Macrocallista nimbosa (sunray venus clam)	216.56	0.10	19.00	0.15
Argopecten irradians (bay scallop)	9.40	0.00	8.00	0.06
Ostrea equestris (crested oyster)	2142.11	0.99	506.00	3.90
Cardiidae (cockle)	10.40	0.00	2.00	0.02
Eontia ponderosa (ponderous ark)	5.02	0.00	1.00	0.01
Veneroida (UID clams)	71.90	0.03	0.00	0.00
Veneroida (sm)	1.50	0.00	78.00	0.60
Bivalvia (UID bivalve)	6.70	0.00	0.00	0.00
Total Bivalvia	**216059.42**	**44.79**	**12967.00**	**39.21**
Gastropoda (lg) (UID gastropods, large)	3756.60	2.02	851.00	4.14
Gastropoda (sm) (UID gastropods, small)	60.70	0.03	403.00	1.96
Polygyra sp (flat coil snail)	46.67	0.03	1178.00	5.73
Crepidula spp (slipper shell)	143.02	0.08	1924.00	9.36
Neverita duplicata (shark eye)	4476.92	2.41	755.00	3.67
Sinum perspectivum (white baby ear)	3.30	0.00	2.00	0.01
Urosalpinx sp. (oyster drill)	16.70	0.01	56.00	0.27
Melongena corona (crown conch)	92772.54	49.88	5353.00	26.04
Busycon contrarium (lightning whelk)	77741.22	41.80	8977.00	43.67
Busycotypus spiratus (pear whelk)	4853.02	2.61	712.00	3.46
Fasciolaria lilium (banded tulip)	2079.73	1.12	329.00	1.60
Triplofusus giganteus (horse conch)	0.00	0.00	0.00	0.00
Busycon carica (knobbed whelk)	0.00	0.00	0.00	0.00
Phyllonotus pomum (apple murex)	0.00	0.00	1.00	0.00
Olividae (olive shell)	50.29	0.03	15.00	0.07
Total Gastropoda	**186000.71**	**38.56**	**20556.00**	**62.16**
Invertebrate (UID shell)	90385.40	18.74	0.00	0.00
Total Invertebrates	**482426.41**	**-**	**33067.00**	**-**

Table 6.2 - Summary of total invertebrate taxa abundance

same element for both (the columnella), but crown conch in the assemblage were typically more robust so their weight skews higher. By MNI, other common taxa in this class were *Polygyra sp* (flat coil snails, 5.73%), *Neverita duplicata* (shark eye, 3.67%), *Busycotypus spiratus* (pear whelk, 3.46%), *Crepidula spp* (slipper shell, 9.36%) and *Fasciolaria lilium* (banded tulip, 1.60%).

Maxillopoda (i.e, *Balanus* sp, barnacles) and Malacostraca (i.e., *Callinectes* sp, blue crab) make up the remaining small fraction of the total assemblage, by weight 0.14% and less than 0.01%, respectively.

Vertebrate Zooarchaeology

Field and Laboratory Procedures

Vertebrate bone was identified and analyzed by Sharlene O'Donnell at the Florida Museum of Natural History. As noted above, vertebrate bone was collected in most case from 1/8" screens, the majority of it in the laboratory setting. Some midden samples were subsequently screened through 1/4" mesh for the expedited collection of artifacts and vertebrate bone. Excavations for this project recovered over 7 kg of vertebrate bone, much of it from fish; only a small sample (by weight, a total of 1234.60g) of the total available vertebrate bone could be analyzed at this time, although remaining samples are cataloged and stored with AWIARE for future study. Contexts to be analyzed were chosen with the primary goal of documenting the relative abundance of food sources and any other animals with an intentional cultural use across the five main areas of the site (Table 6.5). More individual samples were analyzed from Areas 3 and 5 because excavations in these locations produced the clearest discrete features. Analysis focused on the 1/4" size fraction (aside from one context, from which both 1/4" and 1/8" size fractions were analyzed); this maximized the number of contexts that could be analyzed while giving an accurate picture of animals targeted, albeit at the expense of collecting information about smaller animals and elements that can have utility for reconstructions of environment or seasonality.

Area and deposit	Eastern Oyster %MNI	Lightning Whelk %MNI	Crown Conch %MNI	Pearl Whelk %MNI	Tulip Shell %MNI	Sharks Eye %MNI
1	**54.91**	**31.40**	**10.36**	**1.01**	**0.28**	**2.03**
a	81.21	13.14	4.09	0.97	0.05	0.54
b	64.04	24.81	7.01	0.00	0.28	3.85
c	32.65	51.00	14.93	0.49	0.07	0.86
d	53.73	29.94	11.82	2.92	0.44	1.16
e	42.64	38.92	14.62	1.82	0.46	1.54
2	**40.00**	**42.18**	**14.73**	**1.54**	**0.08**	**1.48**
f	11.76	61.76	20.59	2.94	0.00	2.94
v	54.12	32.39	11.79	0.84	0.13	0.76
3	**35.74**	**24.28**	**31.22**	**1.19**	**0.49**	**7.08**
g	33.07	24.03	36.66	1.32	0.21	4.71
j	79.51	9.67	7.25	0.71	0.40	2.46
k	13.97	29.64	39.70	1.24	0.78	14.67
o	75.57	8.06	13.21	1.20	0.60	1.36
p	16.67	16.67	66.67	0.00	0.00	0.00
q	22.12	43.33	30.00	0.00	0.00	4.55
r	21.03	35.42	32.47	4.43	0.37	6.27
s	68.28	12.87	13.76	1.79	1.07	2.32
4	**16.27**	**47.33**	**23.27**	**5.81**	**4.14**	**3.18**
h	19.86	46.57	22.35	5.14	2.32	3.76
l	16.91	47.28	14.19	9.28	8.16	4.18
m	12.04	48.14	33.27	3.01	1.95	1.59
5	**31.06**	**39.46**	**20.25**	**2.31**	**0.45**	**6.51**
t	30.55	38.64	20.49	2.68	0.54	7.08
u	33.56	43.54	19.05	0.45	0.00	3.63
Total	**42.19**	**31.41**	**19.90**	**1.54**	**0.59**	**4.38**

Table 6.3 - MNI proportions of common bivalve and gastropod species by Area and deposit

Results of vertebrate bone analysis were quantified by the number of identified specimens (NISP), estimates of minimum number of individuals (MNI), and the total weights of the taxa in tenths of grams. MNI estimates were made by tabulating the occurrence of each bone portion by side, age was also taken into consideration when possible (Reitz and Wing 2008). Measurements of complete identifiable fish atli were recorded in millimeters to aid in allometric equations for future study (Reitz and Wing 2008). The identifiable assemblage consists of 7,936 specimens. When possible, fauna were identified to the lowest taxonomic level.

Summary of Vertebrate Bone

In total, 7,936 specimens were identified from the contexts analyzed. The abundance of vertebrate animals by taxa for the entire identifiable, analyzed assemblage are shown by provenience (FS#) in Appendix A. Fish bones dominate the assemblage by all measures, though a variety of other classes of animals also appear consistently across the site.

In the analyzed assemblage of vertebrate bone[3], there were a minimum of 372 individuals identified (Table 6.3). Based on MNI, 79.84% of the assemblage are Actinopterygii (ray-finned fishes). Within Actinopterygii, the most common taxa (5%+) are *Ariopsis felis* (hardhead catfish, 35.35%), *Mugil* sp (mullet, 12.45%), *Cynoscion* sp (seatrout, 10.44%), *Archosargus probatocephalus* (sheepshead, 7.07%) and *Sciaenops ocellatus* (red drum, 6.73%), and Diodontidae (burrfish, 5.72%). (Actinopterygii are also the most common class by weight and by NISP, and the representation of individual fish taxa within the class are similar by NISP, except that by NISP *Paralichthys* sp [flounder, 1.72%] is better represented than Chilomycterus sp (burrfish) [0.04%].)

Reptiles are the second most common class in the assemblage by MNI (10.22%). Within Reptilia, the most common taxa are a variety of Testudines (tortoises and turtles) including *Kinosternon subrubrum* and other species (eastern mud turtle/mud turtles, 31.57%), *Pseudemys*

[3] The following summary is limited to remains from the 1/4" screen size and excludes the 1/8" size fraction of bone analyzed for FS# 149.

sp (cooters, 13.16%), *Malaclemys terrapin* (diamondback terrapin, 7.89%), *Emydidae* (pond and marsh turtles, 5.26%), *Terrapene carolina* (common box turtle, 5.26%), and *Chelydra serpentina* (common snapping turtle, 5.26%). *Alligator mississippiensis* is also present at 5.26% of Reptilia by MNI.

The third most common class by MNI are mammals (5.91%); within mammals the most common taxa are *Odocoileus virginianus* (white-tailed deer, 54.55%) and *Sylvilagus* sp (rabbit, 13.64%). Birds represent 3.49% of the total identified assemblage by MNI, with a variety of species represented in equally small numbers.. Finally, Chondrichthyes (cartilaginous fish) are 1.34% of the identified assemblage by MNI.

Taxa	**Wgt (g)**	**%**	**MNI**	**%**	**NISP**	**%**
Mammalia (UID mammal)	13.52	0.09	0.00	0.00	34.00	27.42
Mammalia (lg)	23.55	15.33	1.00	4.55	16.00	12.90
Mammalia (md)	3.59	2.34	0.00	0.00	8.00	6.45
Mammalia (sm)	0.00	0.00	0.00	0.00	0.00	0.00
Sylvilagus sp. (rabbit)	1.40	0.91	3.00	13.64	4.00	3.23
Rodentia (rodents)	0.14	0.09	1.00	4.55	1.00	0.81
Sciurus niger (fox squirrel)	0.25	0.16	1.00	4.55	1.00	0.81
Sigmodon hispidus (hispid cotton rat)	0.20	0.13	1.00	4.55	1.00	0.81
Canis lupus (wolf)	18.33	11.93	1.00	4.55	1.00	0.81
Procyon lotor (racoon)	1.44	0.94	2.00	9.09	3.00	2.42
Odocoileus virginianus (white-tailed deer)	91.23	59.38	12.00	54.55	55.00	44.35
Total Mammalia	**153.65**	**12.97**	**22.00**	**5.91**	**124.00**	**1.71**
Aves (UID bird)	0.72	2.61	2.00	15.38	3.00	10.34
Aves (sm-med)	0.11	0.40	1.00	7.69	1.00	3.45
Aves (med)	1.05	3.81	2.00	15.38	3.00	10.34
Nycticorax nycticorax (black-crowned night heron)	0.21	0.76	1.00	7.69	1.00	3.45
Anatidae (ducks, scaulps)	0.73	2.65	1.00	7.69	1.00	3.45
Anas sp (duck)	0.93	3.37	1.00	7.69	1.00	3.45
Mergus serrator (red-breasted merganser)	0.45	1.63	1.00	7.69	1.00	3.45
Haliaeetus Ieucocephalus (bald eagle)	18.30	66.33	1.00	7.69	12.00	41.38
Meleagris gallopavo (turkey)	4.36	15.80	1.00	7.69	2.00	6.90
Colinus virginianus (northern bobwhite quail)	0.49	1.78	1.00	7.69	3.00	10.34
Corvus brachyrhynchos (American crow)	0.24	0.87	1.00	7.69	1.00	3.45
Total Aves	**27.59**	**2.33**	**13.00**	**3.49**	**29.00**	**0.40**

Testudines (tortoise, turtle)	60.78	28.44	3.00	7.89	216.00	54.27
Chelydra serpentina (common snapping turtle)	2.56	1.20	2.00	5.26	2.00	0.50
Kinosternidae (mud and musk turtles)	1.04	0.49	0.00	0.00	4.00	1.01
Kinosternon sp (mud turtles)	3.26	1.53	4.00	10.53	15.00	3.77
Kinosternon subrubrum (eastern mud turtle)	12.21	5.71	8.00	21.05	42.00	10.55
Kinosternon baurii (striped mud turtle)	1.06	0.50	1.00	2.63	9.00	2.26
Emydidae (pond and marsh turtles)	8.59	4.02	2.00	5.26	15.00	3.77
Terrapene carolina (common box turtle)	0.80	0.37	2.00	5.26	4.00	1.01
Malaclemys terrapin (diamondback terrapin)	2.84	1.33	3.00	7.89	6.00	1.51
Pseudemys sp (cooters)	20.05	9.38	5.00	13.16	22.00	5.53
Gopherus polyphemus (gopher tortoise)	0.98	0.46	1.00	2.63	3.00	0.75
Cheloniidae (sea turtle)	2.76	1.29	1.00	2.63	2.00	0.50
Apalone ferox (softshell turtle)	0.27	0.13	1.00	2.63	1.00	0.25
Scincidae (skink)	0.00	0.00	0.00	0.00	0.00	0.00
Serpentes (snakes)	0.18	0.08	1.00	2.63	2.00	0.50
Colubridae (non-venomous snakes)	0.10	0.09	1.00	2.63	1.00	0.25
Nerodia sp (water snake)	0.41	0.19	1.00	2.63	4.00	1.01
Alligator mississippiensis (alligator)	95.83	44.84	2.00	5.26	50.00	12.56
Total Reptilia	**213.72**	**18.04**	**38.00**	**10.22**	**398.00**	**5.50**
Elasmobranchii (cartilaginous fishes, rays, sharks, skates, torpedoes)	0.00	0.00	0.00	0.00	0.00	0.00
Euselachii (shark)	1.80	35.71	0.00	0.00	4.00	21.05
Carcharhinidae (requiem sharks)	0.24	4.76	1.00	20.00	2.00	10.53
Rajiformes (rays, sawfishes, skates)	0.62	12.30	2.00	40.00	4.00	21.05
Dasyatidae (whip tail stingrays)	2.38	47.22	2.00	40.00	9.00	47.37
Dasyatis sabina (Atlantic sting ray)	0.00	0.00	0.00	0.00	0.00	0.00
Total Chondrichthyes	**5.04**	**0.43**	**5.00**	**1.34**	**19.00**	**0.26**
Actinopterygii (UID fish)	145.51	21.75	0.00	0.00	2370.00	47.41
Lepisosteus sp (gar)	13.91	2.08	2.00	0.67	106.00	2.12
Amia calva (bowfin)	0.35	0.05	2.00	0.67	2.00	0.04
Elops saurus (ladyfish)	0.00	0.00	0.00	0.00	0.00	0.00
Clupeidae (herrings, shads, sardines)	0.00	0.00	0.00	0.00	0.00	0.00
Ariidae (saltwater catfish)	13.97	2.09	0.00	0.00	102.00	2.04
Ariopsis felis (hardhead catfish)	197.07	29.46	105.00	35.35	981.00	19.62
Bagre marinus (gafftopsail catfish)	15.88	2.37	9.00	3.03	60.00	1.20
Opsanus sp (toadfish)	0.00	0.00	0.00	0.00	0.00	0.00
Opsanus beta (Gulf toadfish)	1.72	0.26	3.00	1.01	7.00	0.14
Mugil sp (mullet)	116.64	17.44	31.00	10.44	791.00	15.82
Mugil cephalus (flathead grey mullet)	1.26	0.19	6.00	2.02	7.00	0.14
Belonidae (needlefish)	0.12	0.02	1.00	0.34	1.00	0.02
Cyprinodontiformes (pupfish, topminnows, killifish)	0.00	0.00	0.00	0.00	0.00	0.00
Fundulus sp (topminnows, killifish)	0.03	0.00	2.00	0.67	2.00	0.04
Cyprinodontidae (pupfish)	0.00	0.00	0.00	0.00	0.00	0.00
Prionotus sp (sea robin)	0.00	0.00	0.00	0.00	0.00	0.00

Centropomus sp (snook)	2.62	0.39	4.00	1.35	7.00	0.14
Carangidae (jacks, pompanos, jack mackerals, runners, scads)	3.38	0.51	1.00	0.34	9.00	0.18
Caranx sp (jack)	2.20	0.33	2.00	0.67	2.00	0.04
Caranx hippos (crevalle jack)	5.31	0.79	4.00	1.35	8.00	0.16
Trachinotus sp (pompano, permit, palometa)	4.32	0.65	8.00	2.69	15.00	0.30
Lutjanus campechaus (red snapper)	0.35	0.05	1.00	0.34	1.00	0.02
Orthopristis chrysoptera (pigfish)	0.00	0.00	0.00	0.00	0.00	0.00
Centrarchidae (sunfish, bass)	0.33	0.05	1.00	0.34	2.00	0.04
Sparidae/Sciaenidae (drum or porgie)	0.00	0.00	0.00	0.00	0.00	0.00
Sparidae (seabreas, porgies)	1.01	0.15	0.00	0.00	12.00	0.24
Archosargus probatocephalus (sheepshead)	42.93	6.42	21.00	7.07	128.00	2.56
Lagodon rhomboides (pinfish)	0.15	0.02	2.00	0.67	2.00	0.04
Sciaenidae (drums, croakers, seatrout)	9.46	1.41	0.00	0.00	28.00	0.56
Bairdiella chrysoura (American silver perch)	0.00	0.00	0.00	0.00	0.00	0.00
Cynoscion sp (seatrout)	42.50	6.35	31.00	10.44	217.00	4.34
Leiostomus xanthurus (spot croaker)	0.00	0.00	0.00	0.00	0.00	0.00
Pogonias cromis (black drum)	4.26	1.27	7.00	4.71	16.00	0.64
Sciaenops ocellatus (red drum)	27.54	4.12	20.00	6.73	70.00	1.40
Ostraciidae (box fish)	0.88	0.13	1.00	0.34	11.00	0.22
Paralichthys sp (flounder)	10.32	1.54	10.00	3.37	86.00	1.72
Tetraodontidae (pufferfish)	0.23	0.03	2.00	0.67	3.00	0.06
Lagocephalus laevigatus (smooth puffer)	0.86	0.13	1.00	0.34	2.00	0.04
Sphoeroides sp (pufferfish)	1.03	0.15	3.00	1.01	7.00	0.14
Diodontidae (burrfish)	13.40	2.00	15.00	5.05	30.00	0.60
Chilomycterus sp (burrfish)	0.16	0.02	2.00	0.67	2.00	0.04
Diodon sp (burrfish)	0.00	0.00	0.00	0.00	0.00	0.00
Total Actinopterygii	**668.98**	**56.48**	**297.00**	**79.84**	**4999.00**	**69.10**
Vertebrata (UID vertebrate)	130.81	-	0.00	-	1665.00	-
Total Vertebrata	**1184.55**	**-**	**372.00**	**-**	**7234.00**	**-**

Table 6.4 - Summary of total vertebrate taxa abundance

Paleoethnobotany

Field and Laboratory Procedures

A total of 32 bulk soil samples for flotation were collected from feature and midden contexts throughout the excavation. These were processed by water flotation to produce light and heavy fractions. The number of samples that have been analyzed to date is small (11) and probably not sufficient to adequately represent taxa ubiquity (Diel 2017). Instead, these results provide a preliminary view of plant use by Weeden Island residents.

Analysis of the light and heavy fractions produced by flotation was conducted by Jessie Johanson. Each sample was weighed to the nearest 0.01g, then filtered through nested brass sieves to size-grade the material into units of > 2.0 mm, >1.4-2.0 mm, >0.07-1.4 mm, and >0.05-0.07 mm. Materials greater than 2.0 mm were sorted into categories including contaminants (≥2 mm non-plant material), residue (<2 mm non-plant material), and plant material, and weight was recorded from each category. A stereoscopic microscope at 10 to 40 power magnification was used to identify plant remains from the greater than 2.0 mm category into the lowest taxonomic category possible. The less than 2.0 mm materials were scanned for smaller plant material that would pass through the larger seed or material not represented in the larger size fraction. Acorn, a fragile material that fractures easily, was pulled from both 2.0 and 1.4 mm sieves. Some samples with a very high volume were subsampled by running the heavy fraction, and sometimes the light fraction, through a riffle splitter. All plant taxa categories were weighed, and taxa other than wood (which fragments easily) were also counted.

Summary of Botanical Remains

The results of the botanical analysis are summarized in Table 6.4 and more detailed data by provenience are provided in Appendix B. A total of 5.2 g of botanical material was identified from the analyzed sample, representing small quantities of fruit and starchy/oily seeds, nuts (especially acorn fragments), and other miscellaneous or unidentified plant materials. These summary remains confirm some basic expectations about plant consumption in the region, including the dietary use of mast like acorn and hickory. Although grape seeds were identified in various deposits, they were often uncarbonized, and a sample from FS# 200 (Block C) produced a modern radiocarbon date (D-AMS 031061).

Taxa	Total Weight (g)	Total Count
fruit	**0.15**	**16**
Vitis sp. (Grape)	0.13	13
Vitis sp. (Grape cf.)	0.02	2
Passiflora incarnata (Maypop cf.)	0	1
miscellaneous	**4.49**	**562**
Bark	0.12	5
Poaceae (Monocot stem)	0	3
Pinus sp. (Pine cone)	0.03	14
Pitch	3.91	454
Stem	0.05	11
Unidentifiable	0.33	60
Unidentifiable seed	0.05	14
Verbena sp. (Verbena cf.)	0	1
nut	**0.53**	**133**
Quercus sp. (Acorn)	0.37	115
Quercus sp. (Acorn cf.)	0.02	7
Carya sp. (Hickory)	0.12	8
Carya sp. (Hickory cf.)	0.02	2
Nutshell cf.	0	1
starch/oil seed	**0**	**1**
Chenopodium (Chenopod)	0	1
other	**0.03**	**7**
Insect gall	0.01	2
Unidentifiable seed cf.	0.02	5
Grand Total	**5.2**	**719**

Table 6.5 - Summary of total plant taxa abundance

Some individual sample results, while too minimal to make robust comparisons across contexts, provide some hints about the activities associated with specific features and deposits. The presence of acorn remains in a sample from the black shell-free fill of Feature 1 in Area 1/Unit A may be congruent with the interpretation of this feature as a cooking area. Acorn also appears in two samples from Unit D (one from the feature pit fill and the other from the general midden), and the midden sample also includes hickory and partially carbonized grape. A sample from the fill of a feature in Unit N—Feature #3, which may represent a partially cleaned out cooking feature—includes acorn and grape along with other unidentifiable seeds and miscellaneous remains. A sample from Feature #13b in Block D contained hickory, grape, and unidentifiable seeds and stems, while the only remains identified in sample from the associated Feature #13a were pitch and stem. A sample from Feature #17, a feature in Block D apparently associated with oyster consumption, also contained acorn and hickory remains. A single specimen of chenopod seed was identified in a sample from the midden in Unit V associated with Feature 21, along with acorn, hickory, grape, and other unidentifiable seeds and other remains. Finally, a single specimen of maypop was recovered from a sample in Unit R along with acorn remains.

Given the small quantities of plant remains available, in the remainder of this chapter I will focus on quantitative and qualitative assessments of animal resources.

Patterns and Relationships of Animal Resources

Overview of Animal Resources by Hunt Type

Animal resource use at the site can be categorized according to the circumstances of foraging in which they would be collected, like the "hunt type" categories developed to refine optimal foraging models (Bliege and Bliege Bird 1991; Smith 1991). In an estuarine environment like Weeden Island, four possible categories of foraging relevant to the collection of animals resources are shellfish collection, saltwater fishing, terrestrial hunting, and sea turtle harvesting (Thomas 2008:71-72). Within a hunt type, the assumptions behind diet breadth models—that resources are distributed uniformly and encountered randomly—are more accurate than across the entire spectrum of resources (Smith 1991). Thus, the rank of a resource within a hunt type reflects how its energetic return is expected to compare to other resources that might be encountered in the same foraging excursion. As discussed in Chapter 4, a diet breadth model of optimal foraging anticipates that a forager will always pursue foods that will provide the greatest net return in energy, and apparent violations of this rule should provoke further questioning about the additional factors driving prey choice.

—

Saltwater fishing. The fish assemblage includes mostly ray-finned fish (Actinopterygii) and a smaller quantity of cartilaginous fishes (Chrondrichthyes, sharks and rays), both of which would have been obtained through various forms of saltwater fishing. Hardhead catfish (Ariopsis felis) make up 34.7% of the fish assemblage by MNI (105 of 302) although by NISP they make up only 19.5% (981 of 5018); I speculate that the discrepancy might be due to the prevalence of catfish otoliths in the analyzed assemblage, which may be more durable and identifiable because of their unique rounded shape. However, the hardhead catfish is still the most prevalent fish taxa by either measure. As noted above, the next most common fish are mullet (*Mugil* sp), seatrout (*Cynoscion* sp), and sheepshead (*Archosargus probatocephalus*), drum fish (*Pogonias cromis* and *Sciaenops ocellatus*), and burrfish (*Chilomycterus* sp).

Within the saltwater fishing hunt type, rank in terms of post-encounter return is probably best characterized through generalized size categories (Thomas 2008:971-972). Technology and strategies of fishing can dramatically affect return rates, limiting the accuracy of return rate estimates based on size alone. With this focus on size, the "very large" cartilaginous fish (rays and sharks) would have the highest rank, upwards of 17,000 kcal/hr, assuming the use of weirs and canoes (Thomas 2008:126). These taxa are limited to a total of 5 individuals (NISP=19) in this assemblage: at least one shark (Carcharhinidae) and three rays (two order Rajiformes and two family Dasyatidae). (Analysis of the 1/8" screened material from FS#149 in Area 2 also recovered 7 fragments of subclass Elasmobranchii [ray or shark] and two bones from at least one individual *Dasyatis sabina*, or Atlantic stingray).

Thomas calculates that a second category of "large" fish might provide between 5655-62,792 kcal/hr, depending on the method of fishing (spear, weir, trot line, or gill net), demonstrating the effect of fishing technology on overall energetic returns (Thomas 2008:126). In this assemblage, red drum and gar fish would qualify for this category, while several other taxa might be large or medium (with returns of 3206-25,265 kcal/hr), as there is a wide range of sizes for these fish: gafftopsail catfish, other drum fish, flounder, and sheepshead. Small fish (with returns of 1086-9894 kcal/hr) would include mullet, hardhead catfish, and seatrout (sea trout being medium/small).

The widths of any fish atli identified were measured as part of the zooarchaeological analysis, and these provide some information about the size of fish within certain taxa (Appendix A). These include mullet (*Mugil* sp) from areas 1, 3, and 5; various drum fish (family Sciaenidae) from Areas 1 and 2; and pinfish (*Lagodon rhomboidoides*) from the only sample for which the 1/8" screened material was sorted, in Area 2. For each of these species, constants are available to calculate allometric length estimates based on atlas width (Fradken 2016; Reitz and Wing 2008: 68; Russo et al. 1993). Atlas widths are also available for a limited number of other fish taxa, although standard lengths were not calculated for these. Among mullet, the average estimated standard length is 278.63 mm with a range of 257.15-357.24 mm (n=7). Among drum fish, the average estimated standard length is 238.96 mm with a range of 149.211-271.0 9mm (n=6). For pinfish, the average estimated standard length is 31.10 mm with a range of 24.66-35.59 mm (n=10).

—

Sea turtle harvesting. There was only one instance of *s*ea turtle harvesting documented in this study, recovered from a feature pit in Area 5. Harvesting of nesting sea turtles takes place on the shore, and a planned sea turtle harvest might be coordinated with other beach foraging activities like the collection of eggs and hunting of raccoons (Thomas 2008:156-157). They are generally larger than freshwater or brackish water turtles, although size varies by species. There are several species that nest on the Gulf Coast of Florida, and the single specimen from this assemblage could be identified only to the family level.

—

Terrestrial hunting. The terrestrial vertebrate assemblage includes mammals, birds, and reptiles. This assemblage is dominated by various turtles and tortoises (MNI=32 of 72, or 44.4%), and secondly, by white-tailed deer (MNI=12 of 72, or 16.7%). Various bird taxa also account for a minimum total of 13 individuals (or 18.1%), but 5 of these are from a single unusual deposit (Feature 21) discussed in section 6.X of this chapter. Small turtles are ubiquitous at the site, appearing in every analyzed sample. The collection of small turtles takes place on land but is different from other forms of hunting, as they can generally be picked up by hand, or sometimes on lines or in traps (Thomas 2008:152-3).

The highest ranked resources in the terrestrial hunting type identified in this assemblage are alligator and white-tailed deer. Thomas calculated post-encounter return rates for these two animals to be 22,000 kcal/hr and 12,096-19,659 kcal/hr, respectively (2008:145-151). These returns are based on the assumption of one individual foragers hunting one deer at a time, or two individual foragers hunting one alligator at a time. Following Thomas 2008, these two taxa have much greater estimated post-encounter returns than the other animals from the assemblage that would have been hunted on land, which include raccoons (9408-13,569 kcal/hr), turkey (7765-

11,2000 kcal/hr), rabbit (2042-5248 kcal/hr), small turtles (1600-2758 kcal/hr), duck (1230-2278 kcal/hr), and squirrels (672-1244 kcal/hr) (Thomas 2008:148).

Alligator remains were identified in two analyzed samples. Burned dentary and cranial fragments were recovered from FS#123, from a unit-level of a small midden-mound in Area 1. A vertebral fragment was recovered from FS#200, within the large shell deposit/feature in Area 4.

Deer remains were identified from each of the five areas of the site. The minimum number of individuals identified from each of these contexts was typically 1 (or 2, from FS#123, a unit-level in Area 1); however, for a large animal like deer that might be shared, biomass might be a more appropriately conservative measure for characterizing the dietary contribution of deer. By biomass, the highest value is from the feature pit (Feature 21) in Area 5 (0.378 Kg). Other samples from midden contexts are somewhat lower and range from 0.079 to 0.244 Kg (excluding the sample from FS#378, a single rib fragment which likely comes from the same specimen as the deer rib in the feature pit below). The highest of these is from FS#333, a feature deposit in Area 3. Deer elements found across the assemblage include portions of the head, feet, and body/leg of the animal. Elements of the body and leg are most common, indicating the deposit of bones associated with consumption. Foot elements are less common but appear regularly, and could indicate either slaughtering/cooking methods or consumption, perhaps through boiling. Head elements and particularly teeth are probably associated with discard of refuse, or perhaps the consumption of brain or tongue, in the case of the petrousal fragment.

—

Collecting shellfish. The mollusk assemblage from this project includes a variety of edible taxa in large quantities. Oysters (*Crassostrea Virginia* and smaller quantities of *Ostrea equestris)*, crown conch (*Melongena corona*), and lightning whelk (*Busycon contrarium*) are consistently the most abundant animal resources represented in deposits across the site. Pear whelk (*Busycotypus spiratus)*, shark eye (*Neverita duplicata)*, tulip snails (*Fasciolaria lilium)*, quahog clam (*Mercenaria sp*), and mussels (Mytilidae) also appear regularly (Table 6.3). Variability in the mollusk assemblage from Weeden Island is discussed in more detail in a subsequent section of this chapter.

In the case of shellfish collection, the data from St. Catherines Island again provide some insight into the circumstances in the Tampa Bay area; however, because shellfish species availability is quite different in the vicinity of Weeden Island (i.e., seagrass meadow taxa like whelk and conch are more readily available), the comparison is less apt than with vertebrate resources. An experimental study of eastern oyster collection on St. Catherines Island produced estimated return rates of 209-1096 kcal/hr for winter oysters and 231-1235 kcal/hr for oysters collected in the summer (Blair and Thomas 2008:99). The authors found that experience in harvesting was a critical factor in collection time (Blair and Thomas 2008:91-92). Ultimately, however, the return rate ranges were quite wide, given seasonal variation in nutritional value and different possible methods of procurement and processing (Blair and Thomas 2008:100-101). Further studies of shellfish from St. Catherines Island produced estimates of post-encounter return rates for taxa that are also found at Weeden Island: for ribbed mussels, 387-1259 kcal/hr; for hard clams (*Mercenaria mercenaria*), 2246-4379 kcal/hr; for blue crab (*Callinectes sapidus*), 310 kcal/hr (Blair and Thomas 2008:103-113).

Comparing Marine and Terrestrial Resource Use

The summaries of vertebrate and invertebrate faunal remains show that marine resources dominate the assemblage by any direct measure of archaeological remains or by the MNI estimate. I define terrestrial foods here as those foraged primarily on land, although some of these animals spend time in and around small ponds or other freshwater areas. These include hunted mammals like deer, rabbit, and raccoon (no sea mammals were identified in this assemblage). Various turtles (families Emydidae, Kinosternidae, and Chelydridae) are considered terrestrial, although they may spend time in and around water: harvesting would probably have taken place on land, when nesting on land or basking on logs or rocks (Thomas 2008:150-154). Similarly, alligators occupy marshes, rivers, and lakes, but they also hunt on land, where they might be taken by human hunters (Swanton 1922:358; Thomas 2008:149).

Marine resources are defined as those which live in and are primarily collected in the waters of the bay or the open sea, as well as some animals that would be foraged on the shores of these bodies of salt- and brackish water. These include the most common mollusk taxa in the assemblage (eastern oyster, quahog clam and other bivalves, and various marine gastropods) various bony and cartilaginous fish (Chondrichthyes and Actinopterygii), along with sea turtle (Cheloniidae). In contrast to the freshwater turtles described above, sea turtles live in the open waters, and might be captured by boat (e.g., Bliege Bird and Bird 2003; Thomas 2008:131-132); they also nest on shore, but from the Weeden Island locale this would probably entail traveling south or west to shores along the open waters, so they are best classified with other marine species.

The **Terrestrial Food Index-MNI** is a measure of the relative abundance of animal terrestrial foods, as a proportion of all animal foods (following Thomas 2008:975). The calculation of MNI (minimum number of individuals) for this assemblage is discussed in the field and lab procedures section of this chapter. MNI takes into account both provenience designations and characteristics of the archaeological assemblage to quantify zooarchaeological remains (Reitz and Wing 2008). However, it is subject to several potential sources of bias, including an overemphasis of small species and an assumption that provenience designations have cultural significance, as well as an inability to account for practices like meat sharing (Reitz and Wing 2008:205-210).

The **Terrestrial Food Index-Biomass** uses an alternative quantification of zooarchaeological remains that mitigates some of the issues of the MNI estimate. Skeletal weight (bone or shell) alone does not accurately reflect the potential dietary contributions of animals in an archaeological assemblage, because the relationship between skeletal weight and meat weight is not linear and is significantly different for vertebrates and the mollusk taxa discussed here (e.g., Thomas and Maninno 2017). The allometric equation Y=aX^b describes the relationship between body weight and skeletal weight. Using constants derived from contemporary comparative collections, this equation can be used to predict the total weight of animal (i.e., biomass) represented by a given quantity of archaeological bone or shell (Reitz and Wing 2008). This allometric prediction does not take into account assumptions about which portions of the animal are consumed or how many individuals a sample represents. There are some caveats to using this approach to estimate dietary contribution, including that archaeological specimen weights will typically be less than the skeletal weight of those animals when living, so that biomass estimates are seem low (Reitz and Wing 2008:239). However, for the purpose of comparing deposits, this quality should be relatively consistent—at least, to the degree that preservation is consistent across deposits. Also, this more conservative estimate takes into account the likely sharing of large animals, so that a single individual animal like a deer might be expected to be consumed across multiple areas (Reitz 2008:610). To calculate biomass for this assemblage, I use published constants derived from calculations based on data from various contemporary specimens (Lawson 2005:137; Reitz and Wing 2008:69).

The Terrestrial Food Indices can be used to compare the relative abundance of terrestrial and marine resources in different deposits and across areas of the site. In this section and throughout this chapter, I use three levels of classification to examine intrasite patterns, from coarsest to finest resolution: Area (i.e., the five excavated locations of intense activity), deposits (see Tables 6.1 and 6.4), and excavation contexts (FS#). Field sample numbers reflect excavation procedures more than cultural activity, while deposits and site areas are expected to reflect patterns of human behavior. This analysis only takes into account contexts for which both the vertebrate and invertebrate component were fully analyzed (see Table 6.1).

—

By MNI, marine resources consistently contribute much more to each assemblage than terrestrial resources (Figure 6.1). The relative durability of mollusk shell compared to bone probably contributes to this difference, in part. Area 5 has a much higher ratio of terrestrial foods to marine foods than the other four areas (0.018). Among deposits, both the Feature 21 pit and associated midden ("t", 0.020) and the overlying midden ("u", 0.013) that constitute the Area 5 samples exhibit relatively high ratios; the ratio is the highest for the sample from the feature pit itself (FS #380/396). A deposit in Area 1 also shows comparably higher ratios of terrestrial resources ("b," 0.014), although the values for the two samples within this deposit are quite different at 0.018 (FS #34) and 0.007 (FS #48). The lowest values are from FS#117 (0.001), FS#208 (0.001), and FS#200 (0.002), each of which is in a different area of the site. In all of these samples, however, the MNI estimate for terrestrial resources is so much lower than that of the marine resources that biomass (which takes into account a greater proportion of the sample remains) may be a more reliable measure. By FS#, the Terrestrial Food MNI values range from 1-8 while the Marine Food MNI values range from 143-4180.

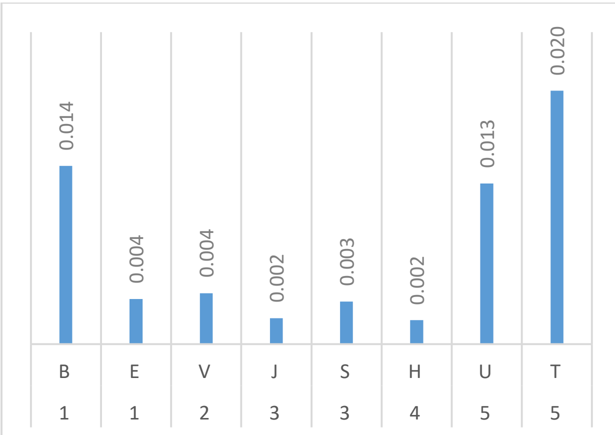

Figure 6.1 - Terrestrial food index-MNI values by Area and deposit

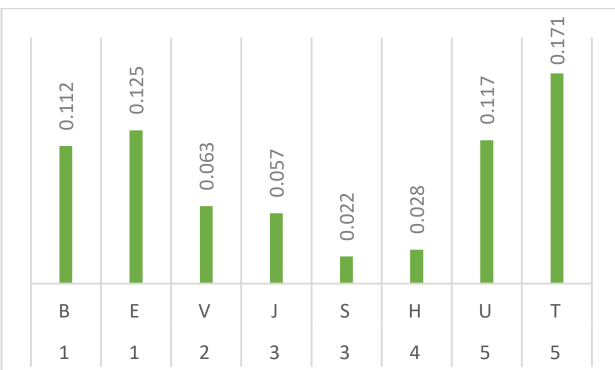

Figure 6.2 - Terrestrial food index-biomass values by Area and deposit

By biomass, the overall pattern of results is similar (Figure 6.2). This measure gives greater representation to terrestrial foods because in this particular assemblage they tend to be larger animals, and also because the biomass estimate includes bones not accounted for by the MNI estimate. As with MNI, marine resources consistently contribute a greater proportion of the total biomass to each deposit and area than terrestrial resources do. Area 5 has the highest proportion of terrestrial foods (0.166), and this proportion is about equal between the two deposits (Feature 21 pit and the associated midden, and the upper midden levels, at 0.171 and

0.117 respectively) that constitute the Area 5 samples. Area 1 still has the second highest proportion of terrestrial foods by area (0.122), driven by samples from both of the deposits in this location. Area 4 has the lowest value by this measure (0.028). Comparing the biomass and MNI versions of the Terrestrial Foods Index, there is some variation across specific sample assemblages in terms of their relative index value; this is probably due to the presence of bones from some larger animals (e.g., deer) that can be relatively underrepresented with the MNI measure.

Comparing Fish and Shellfish Use

The relative representation of fish and shellfish across deposits is one way of measuring the contribution of animal resources from two types of foraging. These are both marine and aquatic resources, but they are also the remains of two types of two different foraging circumstances, with attendant potential differences in labor and technology requirements, risk and return rates, and the gender of collectors. In all cases, shellfish was better represented in the archaeological samples analyzed than fish.

By MNI, the patterning of the Fish/Shellfish Index is similar to the Terrestrial Food Index, above (Figure 6.3). Samples from deposit “t” (Feature Pit 21 in Area 5) have the highest value (0.078). The samples from a deposit in Area 1 (“b,” 0.050) are also relatively high. The lowest values are from the single available sample from Area 4 (FS#200, 0.010), a shell deposit that was observed in the field to have remarkably large quantities of whole small marine gastropods; and deposit “j” (0.009), from the Block D North Shell Midden.

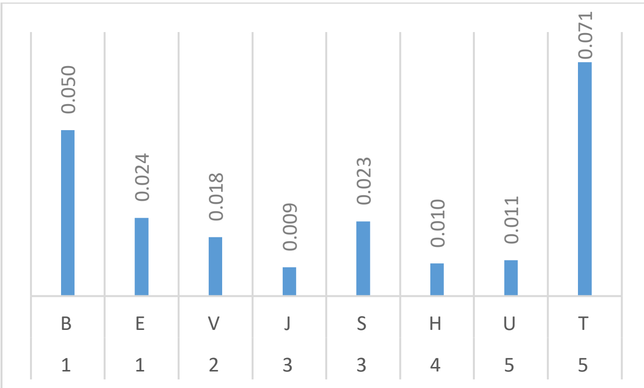

Figure 6.3 - Fish to Shellfish index-MNI values by Area and deposit

Figure 6.4 - Fish to Shellfish Index-Biomass values by Area and deposit

The Fish/Shellfish Index-MNI is subject to the same potential problems as the Terrestrial Food Index above, as MNI estimates for vertebrate fish are consistently much lower than what could be estimated for shellfish; however, because fish are a substantial portion of the vertebrate assemblage, the numbers here are not as skewed towards shellfish as they were to marine resources in the previous measure.

By biomass, the patterns of variation are largely similar to the MNI measure. The highest values are from deposit “t” in Area 5 (0.405) and deposit “b” in Area 1 (0.392). By this measure, deposit “j” in Area 3 has the lowest value at 0.067, and the value for deposit “h” in Area 4 is elevated to 0.227. This difference might relate to the predominance of gastropod shells in Area 4 which have a different ratio of biomass to individual shell count than oysters.

Comparing Hunting and Fishing

Two Hunting/Fishing Indices compare relative contributions of terrestrial hunting and fishing. The Hunting/Fishing Index displays the dietary contribution of hunting as a proportion of the dietary contribution of hunted and fished foods. As before, MNI and biomass versions of this index are both presented.

For the assemblage as a whole, hunted foods represent 18.6% of all hunted or fished animal foods by MNI. By biomass, hunted foods represent 28.5% of all hunted or fished foods. The greater representation of hunted foods by biomass is probably due to MNI’s tendency to over-represent smaller species, as the terrestrial hunted foods include larger animals like deer and alligator.

Across the site, the Hunting/Fishing Index-MNI is under 0.5 for each site area and deposit (for a single sample, FS#373, the index is exactly 0.5, with a relatively low total MNI of 6) (Figure 6.5). By this measure, fish consistently contributed more than hunted foods. Differences in the index between areas are not dramatic, with a range of 0.153 (Area 4) to 0.220 (Area 5). Between deposits, the range is 0.147 (“e”) to 0.333 (“p”). Among individual samples, FS#117 stands out as having a particularly low index of 0.072, and as mentioned, FS#373 has a particularly high index of 0.5.

Figure 6.5 - Hunting to Fishing Index-MNI values by Area and deposit

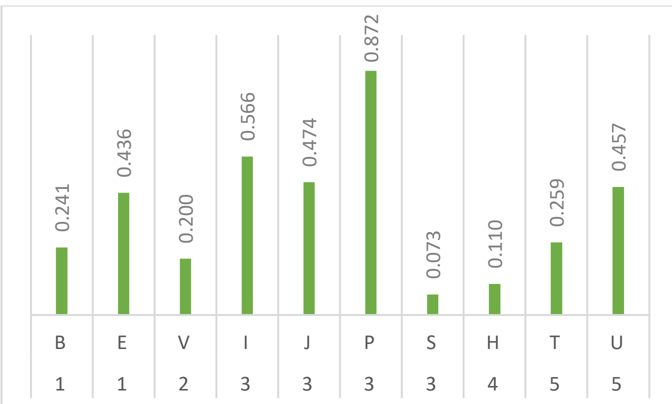

Figure 6.6 - Hunting to Fishing Index-Biomass values by Area and deposit

By biomass, the Hunting/Fishing Index is somewhat more variable (Figure 6.6). As with the site average, these values tend to be higher than for MNI. No area has an index above 0.5, but two deposits do: ”p” from Feature 15 in the Block D NW Midden at 0.872 and ”i”, from the Block D North Midden at 0.566. Area 4 has the lowest value at 0.111 (this was also the lowest area by MNI). In contrast to the MNI index, Areas 3 and 1 have the highest value by biomass (0.423 and 0.381, respectively). There is a greater range of values among deposits, from “s,” a feature pit in the central portion of Block D, at 0.073 to “p,” noted above, at 0.872.

Variation in Mollusk Resource Use

Examining all contexts for which the invertebrate (i.e., mollusk shell) component of excavated zooarchaeological remains has been fully analyzed (Table 6.1) significantly expands the sample of mollusk remains, albeit at the expense of fully contextualizing those data with associated vertebrate remains.

The relative representation of oysters and edible marine gastropods varies across the site by both MNI and biomass (Tables 6.4 and 6.5). At the level of site Areas, there is some variation in the relative abundance of the major taxa: Area 1 has the greatest relative abundance of eastern oyster (54.91% MNI), while Area 4 has the lowest relative abundance of oyster at 16.27%. The relative abundance of the most common gastropods also varies between areas (for lightning whelk, from 24.28% in Area 3 to 47.33% MNI in Area 4; and for crown conch from 10.36% in Area 1 to 31.22% in Area 4 MNI). But the relative abundance of major food species vary within Areas, too, accounting for some of this variation: individual deposits tend to have different resource profiles.

In **Area 1** the Unit A deposit and feature (”a”) and the Unit D midden deposits (”b”) have particularly high quantities of oyster represented. Deposits from Unit I (”c”) had much higher representation of lightning whelk, at an average of 51.00% MNI; crown conch were also better represented than in most deposits in the area, at 14.92% MNI. This matches observations in the field, that the deposit had a higher quantity than usual of whole gastropods.

In **Area 2**, a sample from Unit S (”f”) is higher than average in lightning whelk (60.77% MNI). Two samples from a midden mound in the area (“v”, FS #149 and FS #388) are actually quite different from each other, with one sample having predominantly lightning whelk (50.12% from FS #149) and the other dominated by oyster (81.31% in FS 388). This differences point to variation in an unconsolidated deposit of midden that probably represents cumulative discard events.

In **Area 3**, deposits in the North Block D shell midden (deposit “j”) are especially high in oysters (79.51% MNI; 9.67% MNI lightning whelk and 7.25% MNI crown conch). Two samples from the NW Shell Midden of Block D (”o”) have a similar profile in terms of these shellfish taxa: 75.57% MNI oyster; 8.06% MNI lightning whelk; 12.21% MNI crown conch. This suggests that these two deposits may be continuous with each other or result from related activities, as was speculated in the field based on anecdotal observations about their content and locations (see Chapter 5).

In contrast to the relative uniformity of shellfish proportions in the NW Shell Midden and Block D North Midden, samples from the brown soil midden that characterizes the central and southern portions of excavation Block D are more variable, suggesting that these remains result from more diverse activities over a longer period of time (Figure 6.7). Samples from non-feature pit portions of the Block D Brown Soil Midden deposits (”k”) vary in composition, including the relative abundance of the three primary taxa and the three secondary taxa (pear whelk, tulip snail, and sharks eye). A discrete deposit within the Brown Soil Midden area of Block D, Feature 17 (“s”), has a relatively high representation of oysters at 68.19% MNI; again, this matches observation in the field about the content of this feature. Feature 16, another pit feature in the Brown Soil Midden area (“r”), has proportions comparable to the surrounding midden that was not designated as a feature, consistent with the interpretation that the fill of Feature 16 is probably continuous with the brown soil midden deposit.

Samples from midden fill adjacent to Feature 13 in the North Central portion of Block D have an especially high proportion of lightning whelk, higher than any other deposits in Area 3.

Finally, Feature pit 7 ("g") in Unit T, north of Block D, includes proportions of the primary mollusk taxa that are similar to those of the brown soil midden deposits.

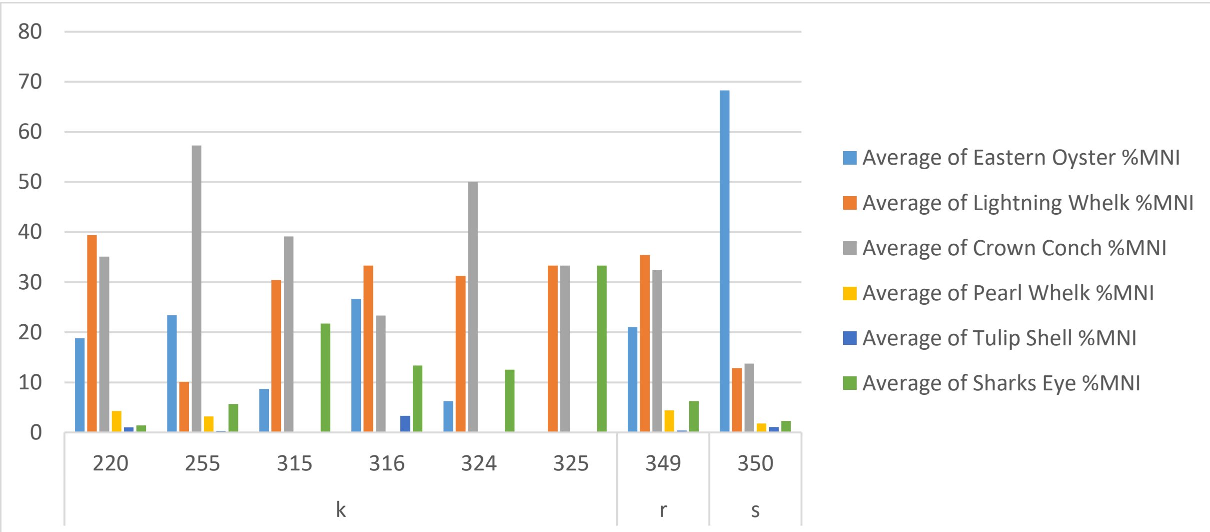

Figure 6.7 - Variability in mollusk resource abundance in the Brown Soil Midden of Block D

In **Area 4**, the relative proportion of gastropods is generally higher than in other areas. This is true for lightning whelk, pear whelk, and tulip snails, though Area 3 has a higher proportion of crown conch and Areas 3 and 5 have higher proportions of shark eye. The relative proportion of oyster in this area is low at 16.27%. Overall the profile of major shellfish taxa looks notably different for Area 4/Block C compared to other areas of the site, though it is relatively consistent across the three samples analyzed from this location. Zooarchaeological assemblages from Feature 18a, in the central portion of Block C, have not been analyzed to date; however, it was observed in the field and during the sorting of midden samples that this feature contained especially high quantities of mussel shell.

In **Area 5**, the feature pit (FS 380) and the immediately overlying midden (FS 377 and 378) have lower proportions of oyster by MNI, under 15%—and correspondingly, higher proportions of gastropods—than the upper levels of this excavation unit, which have 33.6%-70.3% oyster (i.e., FS 373, 375, and 376). This variability cuts across the deposit designations "t" and "u" for this area, which are based on limited radiocarbon dates from the midden and feature.

Area and deposit	Eastern Oyster %Biomass	Lightning Whelk %Biomass	Crown Conch %Biomass	Pear Whelk %Biomass	Tulip Shell %Biomass	Sharks Eye %Biomass	Quahog Clam %Biomass
1	**45.91**	**26.27**	**22.35**	**1.21**	**0.28**	**2.24**	**16.30**
a	65.02	18.54	13.69	1.50	0.18	0.83	0.58
b	54.96	19.60	17.53	0.00	0.07	4.98	9.73
c	41.12	23.79	33.54	0.50	0.16	0.51	14.12
d	32.11	32.28	29.10	3.03	0.95	0.78	48.96
e	32.80	37.16	24.47	2.24	0.41	1.09	22.02
2	**27.09**	**39.31**	**27.99**	**2.76**	**0.14**	**0.97**	**25.18**
f	2.84	32.12	54.92	5.86	0.00	1.55	4.25
v	39.22	42.90	14.52	1.22	0.22	0.68	35.64
3	**33.76**	**15.01**	**47.40**	**1.21**	**0.39**	**1.47**	**12.45**
g	15.91	17.64	62.89	1.12	0.16	2.20	0.83
j	64.01	13.24	20.30	0.85	0.40	1.07	5.43
k	7.55	17.09	70.93	1.83	0.47	1.23	16.47
o	59.83	11.23	25.55	0.42	0.58	0.87	20.13
r	10.03	19.86	62.17	3.14	0.33	2.47	21.34
s	50.77	9.18	36.93	0.62	0.54	0.81	29.06
4	**8.60**	**43.20**	**37.91**	**5.46**	**3.36**	**1.34**	**13.47**
h	11.68	36.04	42.84	5.41	2.68	0.97	40.42
l	8.93	51.22	23.88	7.78	6.33	1.85	0.00
m	5.21	42.33	47.01	3.20	1.06	1.19	0.00
5	**15.40**	**45.70**	**32.87**	**1.43**	**0.27**	**2.48**	**21.54**
t	13.67	47.82	32.34	1.71	0.32	2.52	22.58
u	24.10	35.05	35.52	0.02	0.00	2.28	16.33
Total	**34.89**	**28.15**	**31.49**	**1.64**	**0.51**	**1.93**	**16.46**

Table 6.6 - Biomass proportions of common bivalve and gastropod species by Area and deposit

Across all contexts, quahog clams were measured by weight and biomass estimates were calculated for these, but MNI estimates were not made for this taxa. By biomass, their abundance varies across deposits: they are most abundant in Area 2 and Area 5 (25.18% and 21.54%, respectively) (Table 6.6). Anecdotally, clam shells were commonly found fragmented rather than with intact valves, perhaps as a result of processing of the shell for consumption or for use as expedient tools.

<u>Assessing Marine Habitat Use</u>

Marine resources can also be examined in terms of the different aquatic habitats exploited to collect them. Previous zooarchaeological research at Weeden Island suggested that residents collected resources from the waters of Tampa Bay and nearby shores, but not the open waters of the Gulf of Mexico (O'Donnell 2015). The sample examined in that study lacked evidence for marine mammals (like manatees or dolphins), shore birds, sea turtles, or many of the fish taxa that prefer offshore, high salinity environments (O'Donnell 2015:36-39). However, within the waters of Tampa Bay, O'Donnell's study pointed to evidence that Weeden Island residents did travel south to locations closer to the mouth of the bay, where higher salinity gradients would have supported greater quantities of certain species, including marine gastropods (O'Donnell 2015:41-42).

The vertebrate assemblage studied here has some commonalities with O'Donnell's 2015 study: there are no shore birds or marine mammals, and the faunal assemblages of individual areas and deposits seem to represent foraging in moderate to high salinity waters (O'Donnell 2015:95). However, this project did find some evidence for the potential collection of resources on or near open waters, specifically the remains of at least one red snapper (*Lutjanus campechaus*) and one sea turtle (Cheloniidae). However, sea turtles do sometimes feed on the seagrass vegetation of estuaries (Walker 2013:322). Both of these specimens were recovered from the Feature 21 pit in Area 5 of the site (FS#380/396), a deposit which is also unusual in other respects (see Chapter 6). Beyond these individual specimens, the vertebrate assemblage is ultimately fairly limited in its information about specific habitats exploited. Many of the vertebrate taxa occupy varied habitats because of mobility across seasons and lifetimes, so relative abundance rather than presence or absence is the best indicator of salinity gradients exploited (Walker 1992:280).

The mollusk remains found at Weeden Island likewise generally come from inshore waters, rather than the open sea. Even within the waters of Tampa Bay, however, there is some variation in salinity. In her zooarchaeological study of Calusa sites, Karen Walker identifies several categories of aquatic habitats, in order of increasing salinity: tidal streams, mangrove edge, oyster beds, seagrass meadows, and the littoral to Gulf zone (Walker 1992:355-359). She also identifies the habitat locations of modern aquatic taxa, along with the degree of salinity preferred (i.e., estuarine or oceanic) (Walker 1992:355-359). While there is a degree of overlap across these habitats for many taxa, there are a few that have more distinct preferences. On the estuarine side, several species identified in this assemblage prefer habitats no more brackish than the mangrove edge or oyster bed, including species of crab and mussel, as well as the eastern oyster (*Crassostrea virginica*). There are also some species that are limited to seagrass meadow habitats, including the pear whelk (*Busycon spiratum*), shark eye (*Neverita duplicata*), scallops (*Argopecten* spp.), ponderous ark (*Noetia ponderosa*), quahog clam (*Mercenaria spp.*). Finally, some species prefer oceanic waters in seagrass meadow or littoral to Gulf habitats, including the Florida horse conch (*Pleuroplaca gigantea)* and sunray venus clams (*Marcocallista nimbosa*, littoral/Gulf only).

Other non-food taxa that live in oyster bar communities can also contribute to interpretations of salinity. While Walker identifies barnacles (*Balanus* sp) as appearing in estuarine waters throughout these habitats, there is also evidence that barnacles are sensitive to salinity in estuarine habitats; at least some species may be more reproduce at greater rates and become more prevalent at salinity ranges closer to that of oceanic waters (Starczak et al. 2011). The crested oyster (*Ostrea equestrus*) requires higher salinity waters than the eastern oyster, and so its relative abundance can indicate variation in salinity of the waters where oysters were harvested (Walker 1992:280). (The crested oyster grows to a small size, and is not itself considered a source of food, but it can grow on eastern oyster shells and be collected incidentally with them.) Slipper shells (*Crepidula* spp.) are also sensitive to salinity changes (Walker 1992:280). While environmental variability that affects salinity is better studied at a long-term scale, often across multiple sites (e.g., Walker 1992), examining multiple lines of evidence at an intra-site scale can suggest some hypotheses about habitat exploitation. Slipper shell and barnacle tolerances vary by species, and in this assemblage they were identified only to the level of genus, so variation in these taxa is less clearly tied to salinity; however, crested oysters can be difficult to distinguish from juvenile eastern oysters in archaeological samples, so they may be underrepresented in this analysis.

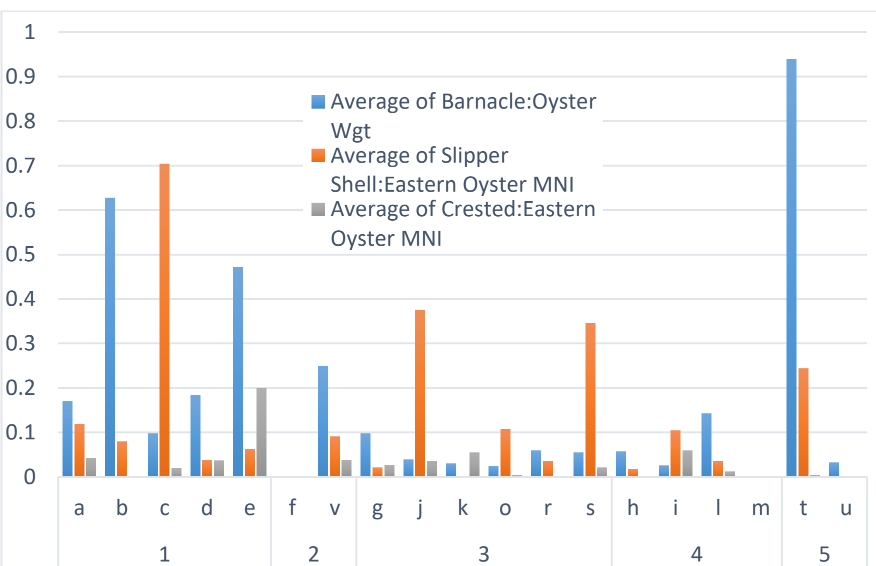

Figure 6.8 - Average values for ratios affected by salinity in oyster habitats by Area and deposit

I use three measures to detect variation in the salinity of oyster habitats: the ratio of barnacles to eastern oyster (by weight), the ratio of crested oyster to eastern oyster (by MNI), the ratio of slipper shells to eastern oyster (by MNI). I also compare the representation of taxa that are live in seagrass meadows with the representation of eastern oysters, which thrive in more estuarine conditions.

Beginning with the three measures that relate to oyster beds, there is variation across the site, although the three measures do not vary consistently with each other (Figure 6.8) The ratio of barnacles to oysters is particularly high (0.94) in the feature pit (Feature 21) in Unit V and the associated overlying midden. The ratio of slipper shells to oysters is likewise high at 1.18. No other locations have barnacle to oyster ratios as high as Feature 21, but some deposits in Area 1 are the next highest, specifically two samples within deposit “b” (FS #34 at 0.033 and FS #76 at 0.048) and a sample in deposit “e” (0.034). A different deposit in Area 1 (deposit “c”) has the highest ratio of slipper shells to eastern oysters at 0.703). In all, the feature deposit in Area 5 has the most anomalous set of indicators, while these three indicators vary without further apparent significant across other deposits at the site. These patterns suggest variability in the salinity of exploited habitats that is not clearly linked to change over time, as deposits from points throughout the occupation show high and low measures. Thus, rather than long-term factors like sea level changes, variability might be attributed to seasonal availability of resources or social factors affecting decisions about where to harvest resources. While geochemical studies may provide a more robust assessment of mollusk habitats (e.g., Lulewicz et al. 2017), these trends in invertebrate remains do indicate variability in the habitats exploited by Weeden Island residents.

The ratios of seagrass meadow species to eastern oyster show patterns similar to the proportions of gastropods and oyster identified in the previous section (Figure 6.9). Samples associated with Feature 21 in Area 5 have the highest value, pointing to the use of resources from relatively more saline environments. Deposits from Area 4 also have high values, consistent with the high proportions of gastropods generally identified in Block C, as do samples some deposits in Area 2 and Area 3. On this measure, values from Area 1 are consistently low.

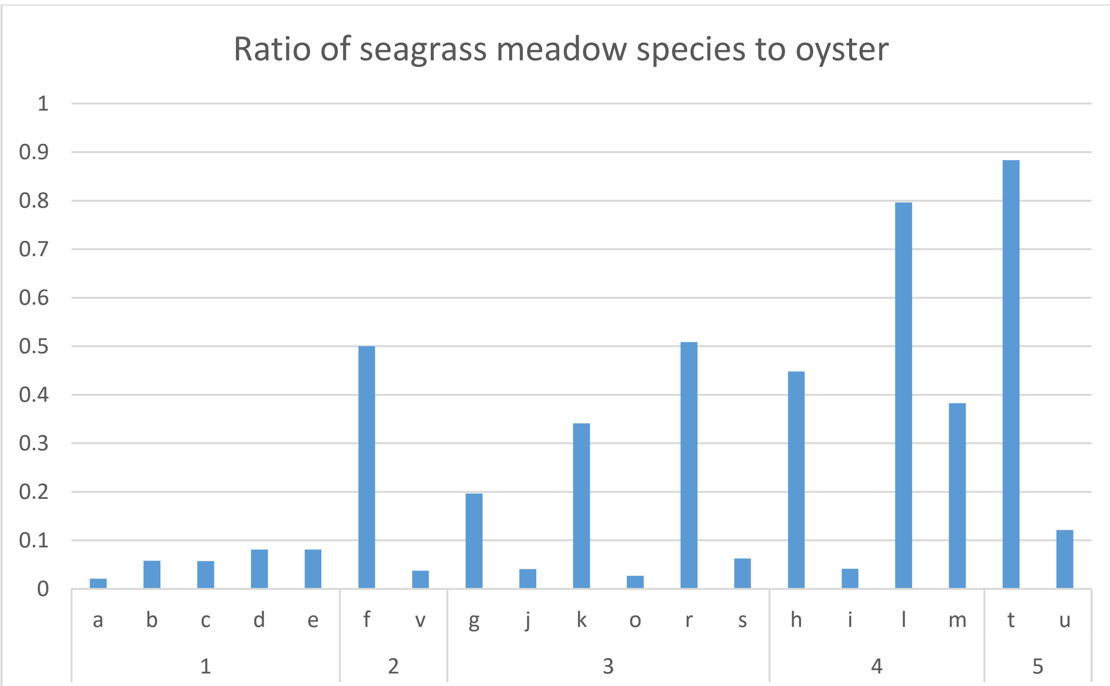

Figure 6.9 - Average values for ratios of seagrass meadow species to eastern oyster by Area and deposit

<u>Zooarchaeological Evidence of Fishing Technologies</u>

Zooarchaeological data provide one dataset for evaluating the use of different subsistence technologies. (In Chapter 7, I also present information about fishing-related artifacts.) First, to assess evidence for the use of mass capture techniques site-wide, I classified each taxa of fish identified in the zooarchaeological analysis according to its expected method of capture, either individual or mass (or in some cases, unclassified), following Reitz et al. (2009) and Colaninno (2011). This classification takes into account fish body size and behavior. In general, larger fish are more likely to have been caught by individual capture techniques like spears and hooks. Smaller fish, especially those that tend to aggregate or school, are more susceptible to mass capture than fish that are larger and/or more solitary. A caveat to the classification of fish by taxa is that both size and behavior can change over time for a particular species (Reitz and Wing 2008:266-272). Further, because the vertebrate taxa presented here are all from 1/4" screens, smaller mass-captured fish are likely underrepresented in the analyzed assemblage.

All samples except one include fish that are typically collected with mass capture technology as well as fish that are typically collected by individual capture methods (Figure 6.10). The exception is FS#373, which only has a total MNI of 3, all mass capture taxa (hardhead catfish and mullet). The MNI of mass-captured fish is higher in all analyzed samples except for FS#33, which has only one individual of each category of fish capture identified in it, and FS#117, which has a minimum of 9 mass-captured fish and 10 individually-captured fish.

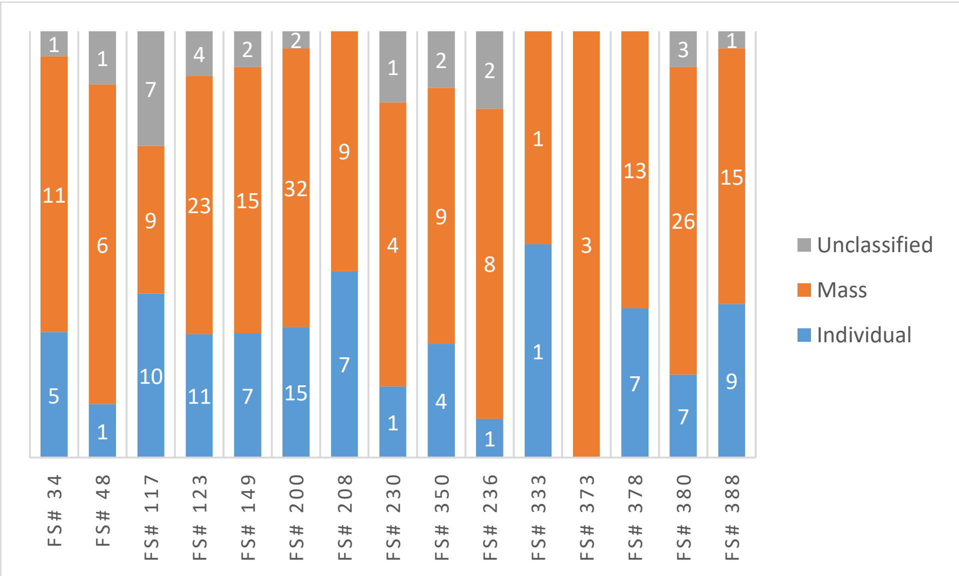

Figure 6.10 - Proportions of fish as classified by expected capture technique

The fully analyzed assemblage from FS#149, which includes 1/4" and 1/8" size fractions, may more detailed a fuller picture of capture techniques than other samples. With the smaller size fraction included, the proportion of mass captured fish in this sample increases from 62.5% (15 of 24) to 82.6% (76 of 92). In particular, the identification of a minimum of 11 pinfish (*Lagondon rhomboides*) and 38 topminnows/killfish (*Fundulus* sp.) changes the profile of this sample.

A secondary method of assessing the use of mass capture techniques is the interpretation of size distributions for common fish taxa, following Colaninno (2011). The size distribution of an archaeologically-identified assemblage of fish can be compared to the expected size distribution of various fishing technologies to infer which technologies were used for capture (Colaninno 2011:341-2). Data on standard length estimates are presented here in the context of fishing technology, although the sample size and sampling for this assemblage are not adequate to generate a reliable distribution curve (Table A.4). However, the individual size estimates provide a basis for some tentative inferences about fishing technology. For both mullet and drum fish, individuals with an estimated standard length between 200-275 mm are most common. These would probably be considered "medium-bodied" fish relative to the modern expected standard length for these taxa (200-1000mm for adult *Cynoscion nebulosus* and 200-1200mm for adult *Mugil cephalus*) and the distributions identified by Colaninno (2011:345). While the relative absence of smaller individuals probably results from the small sample as well as limitations of sampling strategy and mesh size, the predominance of "medium-bodied" fish indicates that stationary gill nets could have been used, or seine nets with a small to medium mesh size.

Finally, looking more holistically at the fish assemblage also supports the use of gill nets by Weeden Island's residents. In her analysis of materials from the Yat Kitischee site, Pamela Vojinowski observed that catfish (both *Ariopsis felis* and *Bagre marinus*) are particularly susceptible to capture in gill nets because of their preference for turbid waters, nocturnal schooling behavior, and bottom feeding–all of which make it more difficult for them to see and avoid nets—and because their spines become easily tangled in nets (Vojnovski 1995:69). *Ariopsis felis* was the most commonly identified bony fish in this assemblage. Vojnovski (1995:67-69) also compares the Yat Kitischee assemblage to modern and archaeological assemblages collected by gill net fishing and finds overlap in the most common species, which is also true to a degree of the Weeden Island assemblage. By contrast, rays and sharks (Chondrichthyes), which are especially likely to have been caught by individual methods of capture rather than nets, are fairly scarce in the assemblage.

Discussion: Food, Community, and Subsistence Choices

How were subsistence practices intertwined with uses for plant and animal resources other than consumption?

There are two instances of deposits with vertebrate animal remains that may have used for purposes other than food. (In Chapter 6, I address the related issue of how the collection of molluscan shell for crafting was intertwined with the procurement of food resources.)

Birds in Unit V pit feature (Area 5). The pit feature excavated in Unit V of Area 5 includes a number of unusual finds, including artifacts related to shell crafting (see Chapter 6), and zooarchaeological remains that set this location apart from others at the site, such as those of a sea turtle (see previous discussion of habitats utilized) and several birds of different species. A minimum of one individual of each of the following birds was identified from within the pit feature: duck or scaup (Antidae), turkey (*Meleagris gallopavo*), northern bobwhite quail (*Colinus virginianus*), American crow (*Corvus brachyrhynchos)*, and bald eagle (*Haliaeetus Leucocephalus*). While at least some of these species are plausible food resources, the assemblage stands out among other midden deposits at the site.

Birds sometimes had symbolic significance among native communities, which was reflected in iconographic depictions throughout the pre-Columbian Southeast. Researchers have paid particular attention to bird symbolism in Mississippian art, in which birds (particularly birds of prey, including falcons) appear prominently (Brown 1976, 1997). Falcons may evoked life, death, and regeneration for Mississippians (Brown 2010). Mississippians at Cahokia also deposited ritually-significant bird remains in the course of feasting and other ceremonies (Kelly 2010). However, while bird iconography in peninsular Florida shares some elements with Mississippian art—like the common depiction of woodpeckers—examples from Florida are stylistically different and probably developed from existing local traditions (Mitchem 1996:233-234). Effigy vessels of the Weeden Island ceramic complex commonly represented birds, and these realistic representations were probably important to the ritual drama of mortuary ceremony (Milanich 1997; Wallis 2013). Without locating the precise symbolic meaning of the birds recovered from this excavation, it is plausible that their deposition represents some kind of symbolically significant activity or ceremony.

The ritual significance of birds does not exclude the possibility that these animals were consumed as food, although taxa like duck and turkey would be more commonly eaten than solitary predator birds like the eagle. The limited skeletal elements recovered, however, might indicate that there was an emphasis on the use of legs and wings at this location. When feathers are ritually important, the archaeological samples from ceremonial contexts may have a bias towards wing bones (Speth et al. 2004). In the Feature 21 samples, the eagle, most elements of a single foot were recovered (i.e., tibiotarsus, tarsometatarsus, hallux, and phalanges from digits I-IV). A single wing bone (carpometacarpus) was recovered from the crow and duck. From the bobwhite quail, both wing (humerus) and leg (tibiotarsus, tarsometatarsus) elements were recovered. Finally, there were two bones recovered from the turkey, both wing elements (carpometacarpus and ulnare). (Note that this unit bisected the feature pit and therefore did not excavate it entirely, so this assemblage of bird elements may not include everything that was initially deposited here.) There was also one vertebra of an unidentified bird (Ariidae) recovered.

A similar feature pit, though with a different assemblage of bird species, was excavated by USF St. Petersburg in a portion of the site close to the location I have designated Area 1 (O'Donnell 2015:18, 26-27). This feature included heron (Ardeidae), red-breasted merganser (*Mergus serrator*), wood warbler (Paruline), and turkey vulture (*Cathartes aura*). These remains were recovered from a pit feature within shell midden, though it was smaller than Feature 21 discussed above. Like Feature 21, this pit also included zooarchaeological remains that would be typical dietary resources, as well as the more unusual deposit of a cluster of unopened ribbed mussels that were apparently placed in the pit whole.

In both cases, the pit feature deposits likely reflect specific consumption events where relatively unusual resources were consumed, perhaps in the course of ceremony. Whether or not the birds served as a food, they were deposited along with other typically edible resources. The deposits themselves may not necessarily be structured in an especially intentional way (e.g., as a bundle or cache of special items), but their content reflects atypical activities. As discussed in Chapter 7, this pit and associated midden also contain uncommon crafting and crafted items.

Garfish. Garfish (*Lepisosteus* sp.) are striking in appearance, with thick scales, sharp teeth, and aggressive behavior. Their remains are common at Native American archaeological sites in the Southeastern United States, but Peres and Deter-Wolf (2016) have argued that they may not have been regularly consumed as food; instead, their bony scales and other body parts could have been used for tools or decoration (with gar scales) or for scratching/tattooing (with gar teeth or jaws). The animal itself may have had additional significance as a totem, leading to special treatment of gar remains. Peres and Deter-Wolf (2016) describe a variety of ethnographic and ethnohistorical accounts of these uses, and minimal such evidence that they were considered a food item.

Two instances of garfish were identified in this assemblage, from a shell deposit in Area 4 and a midden sample in Area 1. In Area 4, six scales and a cranial fragment were recovered. In Area 1, eleven scales were recovered. Collections of scales without associated skeletal elements suggest that the scales were being set aside or used for other functions (Peres and Deter-Wolf 2016:107, 109). The cranial fragment from Area 4 could conceivably be the remains of processing to remove the dentary element of the garfish.

How did Weeden Island residents cooperate, compete, and coordinate labor through subsistence technologies and strategies?

In the domain of prey choice and habitat exploitation, there are several unsurprising results and a few more unexpected or ambiguous patterns. Marine foods (including shellfish and fish) are vastly more abundant than terrestrial foods, although preservation bias may contribute to the higher representation of shellfish. However, the Hunting/Fishing Index also indicates that fish consistently contributed more to the diet than hunted foods. This is in line with expectations about the high return rates of saltwater fishing and consistent with a vision of coastal residents as fishers. While comparing shellfish to fish or vertebrate foods brings up issues of preservation bias, variation within the mollusk assemblage suggests that shellfish was more or less important to consumption at different times or places. Since shellfish are more likely to be collected by women than other animal resources, these patterns have implications for the scheduling of individuals by gender or their contribution to different specific events. For instance, the unusual deposits in Unit V also have a particularly high proportion of fish and terrestrial foods. Throughout the site, marine prey with high post-encounter return rates (e.g., sharks) are not well represented. The rarity of these highly ranked marine vertebrates suggests they were encountered infrequently, following the assumptions of the optimal foraging model; alternatively, taking into account fishing technology, other taxa were simply much less risk and effort to procure once caught in a weir (e.g., Larson 1980:81-86).

A range of mangrove estuarine environments were exploited, as evidenced by vertebrate and invertebrate remains. Some freshwater habitats were also exploited to capture gar and various turtles. The use of resources from deeper, open waters of the Gulf or at the mouth of Tampa Bay appears to have been limited, although there is some evidence of resources from such habitats in deposits from Area 5/Unit V/Feature 21. Variation in the representation of mollusk foods probably results from focusing on harvesting different locations, as the habitat locations of oysters and marine gastropods overlap but are not entirely equivalent. Harvesting seagrass meadows would return greater quantities of lightning whelk, crown conch, tulip snail, pear whelk, and shark eye snails than focusing primarily on oyster beds in shallower waters. These decisions could be structured by a range of cultural, local, and long-term environmental factors. In the short term, for instance, harvesting different locations can emerge from cultural principles like a ritual calendar particularly if these practices vary in a regular way throughout the year (e.g., Lulewicz et al. 2017). Variation across the site in the apparent salinity of oyster bed habitats harvested might reflect incidental differences in harvesting locations; however, Feature 21 stands out again as having uniquely high indicators by these measures. A lingering question, limited by the small scale of excavation in Area 5, is whether some of the unusual patterns in deposits from that location are limited to the pit feature and its overlying fill, or reflect a difference in the use of that area more broadly.

Access to types of animal foods appears to have been fairly equal across site areas. Deer is relatively common, though total quantities are not high. The sample size is not large enough to assess the distribution of elements rigorously, although based on the limited specimens available, processing does not seem to be spatially restricted.

Given the limited analysis of botanical remains and the challenges of preservation, it is not possible to rigorously assess intra-site variation in plant remains. The presence of mast like acorn and hickory confirms the expectation that Weeden Island residents used these resources, though the quantities recovered from samples here were unremarkable. Mast is collected in the fall, but it can be stored relatively easily and therefore could be an important resource year round (Thomas 2008:165-166).

Mass-capture methods of fishing would have been a major collaborative subsistence activity for many coastal populations. An assessment of fishing technology in this study indicates that mass capture techniques were ubiquitous, with species that are typically captured en masse appearing in all locations studied. Distinguishing among specific techniques is challenging, but important, for reasons including the differential labor investments and coordination required by different techniques. This assemblage provides evidence for the use of a variety of fishing techniques, including trolling for individual fish with composite hooks, and techniques involving nets, especially gill nets that could be anchored in place. While gill nets require some cooperative labor to construct, maintain, and use, they probably did not entail the same degree of investment in the landscape as weirs would. Future analysis of selected 1/8" size fraction samples might reveal a more complete picture of fish size demographics and thus provide more information about techniques used.

Comparing the Weeden Island assemblage with faunal remains from nearby and contemporary sites reveals commonalities, like the use of mass capture techniques, likely including stationery gill nets, and the general prominence of fish and shellfish (Fradkin 2008; Vojnovski 1995, 1998). The capture of sharks may have been more typical at Anderson and Yat Kitischee than at Weeden Island, which could have varied explanations; for one, shark tooth tool manufacture appears to have been a focus of craft production at Anderson (Austin 2000). However, whereas Vojnovski found (using biomass measures) that fish contributed the majority of meat to the diet, in this study, shellfish were better represented than fish by both MNI and biomass estimates. This variation between sites could relate in part to differences in the specific locations sampled rather than dietary differences between populations: at the Pineland site in South Florida, researchers found that general midden deposits had higher quantities and greater variety of shell refuse than house or activity area deposits (deFrance and Walker 2013:324), and this observation may hold for other shell-bearing sites too.

In general, food procurement at Weeden Island called for cooperation for projects like mass capture fishing or fishing by boat, while other activities (like mast collection or oyster harvesting) may have been undertaken collectively for social and cultural reasons. Further, while marine and estuarine resources can be a relatively abundant source of food, they tend to be temporally and spatially variable in sometimes unpredictable and changing ways, as researchers working on the Gulf coast have observed (Widmer 1988; Marquardt and Walker 2013; Pluckhahn and Thompson 2018). These resource patterns may have prompted increased interdependence within communities when compared to early horticultural villages, a difference that Pluckhahn and Thompson (2018:205-207) have suggested could have contributed to the resilience of coastal villages in the region. Similarly, Thompson and colleagues (2018) have recently argued that political and economic strategies of collective action among the Calusa emerged as a response to changes in estuarine productivity over time.

At Weeden Island, salinity indicators and variation in taxa profiles indicates habitat variability. If gill nets were used rather than weirs, there may have been increased flexibility in the selection of locales to target for harvesting, reflecting decision making about scheduling alongside collaborative labor. There is no clear evidence for competition in the realm of food resources in this study, like an uneven distribution of high status resources or private storage caches. Even so, the need for leadership in decision making and the coordination of labor are commonly implicated in explanations for the development of inequality in forager communities (Ames 1985; Johnson 1982; Kelly 2013). However, this study has not evaluated whether the circumstances in the region would have supported the crystallization of leadership that is a feature of Kelly’s patron-client model and others that depend on the expectation of population growth and territorial conscription. The cooperative subsistence activities that took place at

Weeden Island also may not have required the formal coordination of labor or access to defensible resources that Kelly describes. Cooperation in subsistence activities at Weeden Island may also have emerged from participation in a local communal economy. Rather than local access to food resources, it could have been in the realms of craft production and trade that Safety Harbor people began to exert power at a regional level.

Chapter 7 – Material Culture and Craft Production

Material culture is ubiquitous in human society, and for those communities that once regularly made their own objects, the production of goods was also part of the everyday rhythm of life. Craft production is the skilled transformation of raw materials into functional and valuable objects, including both ordinary and extraordinary items; in the broadest sense craft production might encompass objects beyond what we can reliably recover archaeologically: perishable items like textiles, and even food or music (Costin 2005:1033-1034). I focus here on specific artifacts recovered from the Safety Harbor occupation at Weeden Island, and I use information about these items to explore the role of material culture and craft production in the social organization of the Weeden Island residential community. In this chapter I address the following research questions:

- What priorities were reflected in raw material procurement practices?
- What was the relationship between the local production of crafted goods and social interactions at a regional, or inter-regional scale?
- What role did craft production play in the organization of labor and space within the Weeden Island residential community?

First, I present an overview of the methods and results of analysis for four classes of crafted artifacts: pottery, stone tools and debitage, modified shell, and modified bone. Then, I draw on these results to discuss raw material procurement, crafting for trade, and the organization of crafting activities in the residential community.

Ceramics

Ceramic artifacts were recovered from a majority of midden deposits and associated contexts. Sherds were generally recovered during excavation and screening of sediments in the field or during the sorting of shell midden samples in the lab. Larger fragments of pottery (>1/2") were also separated from the flotation samples prior to processing and included in this analysis. Selected sherds were piece-plotted in the field if they had notable characteristics or were identified in situ in a potential feature area.

During ceramic analysis, attributes were recorded and standard types determined for all sherds greater than 2 cm diameter. Total weights for unanalyzed sherds <2 cm were also recorded for each excavated context. Attributes recorded for all sherds included weight, thickness, temper, surface decoration and/or treatment, and any additional modifications. Additional attributes recorded for rim sherds included (as size and preservation permitted) an estimate of orifice diameter and percent of orifice-arc present (if 5% or greater), rim orientation, rim form and/or decoration, lip shape, and vessel form. All rim sherds were also photographed on each side and in profile view. A total of 781 sherds were recovered and analyzed from the 2013-2015 UM-WIAP excavations; of these, 97 were rim sherds. Additionally, sherds under 2 cm diameter were weighed but not otherwise analyzed for 160 excavated contexts. The total weight of all ceramics recovered from this project was 7161.36g. Appendix C presents the full results of ceramic analysis.

	Belle Glades	Carrabelle	Dunns Creek	Grog Tempered	Papys Bayou	Pinellas	Safety Harbor	Sand Tempered					Sponge Tempered	St Johns		Wakulla	Weeden Island	
	Plain	Incised	Red	Plain	Punctated	Plain	Incised	Check Stamped	Cord Marked	Plain	Punctated	Simple Stamped	Curvilinear Stamped	Check Stamped	Plain	Check Stamped	Incised	Plain
Area 1	1	0	0	3	0	6	0	7	0	32	0	1	0	12	6	3	0	1
Area 2	0	0	0	2	0	15	1	6	1	44	0	0	0	13	5	2	0	2
Area 3	0	0	0	2	0	55	0	1	0	65	0	0	0	43	15	0	0	0
Area 4	0	0	0	0	0	94	0	0	0	34	1	0	0	2	2	1	0	0
Area 5	0	1	0	3	0	17	0		0	81	0	0	0	5	6	1	0	0
Unit U	0	0	0	0	0	3	0	0	0	0	0	0	0	2	2	0	0	0
Other Units*	0	0	1	4	1	28	0	5	0	78	0	0	1	17	36	1	1	2
Total	**1**	**1**	**1**	**14**	**1**	**218**	**1**	**19**	**1**	**334**	**1**	**1**	**1**	**94**	**72**	**8**	**1**	**5**

*Test Units D, E, L, M, and N were excavated in the vicinity of "Area 1" but seem to be temporally distinct and/or disturbed deposits

Table 7.1 - Pottery Type Category Counts by Area

	Belle Glades	Carrabelle	Dunns Creek	Grog Tempered	Papys Bayou	Pinellas	Safety Harbor	Sand Tempered					Sponge spiculate tempered	St Johns		Wakulla	Weeden Island	
	Plain	Incised	Red	Plain	Punctated	Plain	Incised	Check Stamped	Cord Marked	Plain	Punctated	Simple Stamped	Curvilinear Stamped	Check Stamped	Plain	Check Stamped	Incised	Plain
Area 1	1.39	0.00	0.00	4.17	0.00	8.33	0.00	9.72	0.00	44.44	0.00	1.39	0.00	16.67	8.33	4.17	0.00	1.39
Area 2	0.00	0.00	0.00	2.20	0.00	16.48	1.10	6.59	1.10	48.35	0.00	0.00	0.00	14.29	5.49	2.20	0.00	2.20
Area 3	0.00	0.00	0.00	1.10	0.00	30.39	0.00	0.55	0.00	35.91	0.00	0.00	0.00	23.76	8.29	0.00	0.00	0.00
Area 4	0.00	0.00	0.00	0.00	0.00	70.15	0.00	0.00	0.00	25.37	0.75	0.00	0.00	1.49	1.49	0.75	0.00	0.00
Area 5	0.00	0.88	0.00	2.63	0.00	14.91	0.00	0.00	0.00	71.05	0.00	0.00	0.00	4.39	5.26	0.88	0.00	0.00
Unit U	0.00	0.00	0.00	0.00	0.00	42.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.57	28.57	0.00	0.00	0.00
Other Units*	0.00	0.00	0.57	2.29	0.57	16.00	0.00	2.86	0.00	44.57	0.00	0.00	0.57	9.71	20.57	0.57	0.57	1.14

*Test Units D, E, L, M, and N were excavated in the vicinity of "Area 1" but seem to be temporally distinct and/or disturbed deposit

Table 7.2 - Pottery Type Category Percentages by Area

Standard type categories and temporal/regional context

The assemblage is dominated by a handful of standard cultural historical types (following Luer and Almy 1980; Mitchem 1989; Willey 1949), including named and generic types (Tables 7.1-7.2). In general, ceramic sherds were associated with shell midden deposits and appear to represent primarily Safety Harbor period occupations, based on context and diagnostic types. As an exception, however, several very worn sherds were recovered from yellow sand strata underneath the midden deposit in the Block D North excavation area (FS#271-279) (Figure 7.1). These seem to have been eroded by exposure to the acidic soils in ways similar to a series of spiculate sherds recovered during the comprehensive survey of the Preserve (Weisman et al. 2005:329). However, the sherds in the present assemblage were tempered with sand or grog, rather than the spiculate tempered sherds that Weisman and colleagues suggest may date to the Late Archaic period. These were not assigned a diagnostic type during analysis. However, an Early/Middle Woodland Hernando basal notched projectile point/knife was refit from two fragments recovered from this location (FS# 271 and 272), suggesting that the sub-midden assemblage in this location predates the other deposits studied in Area 3.

Weeden Island Complex ceramic sherds were also identified in the assemblage in small numbers (8/774 or 1%) (Figure 7.2). These were likely produced prior to the Safety Harbor period occupation (i.e., during Manasota-Weeden Island phases of occupation) and some or all were probably produced farther north, towards the Weeden Island cultural heartland where some degree of specialized production of vessels has been reported (Pluckhahn and Cordell 2011; Wallis et al. 2017). These sherds were among the thinnest in the assemblage (Table 7.3). Three of the Weeden Island series sherds were recovered from test units in Area 1 that are outside of the main concentration of activity (Units D and N), while a fourth was recovered from Unit I, in a shell deposit adjacent to the main concentration of activity. A Papys Bayou Punctated sherd was recovered from Unit M, which is also outside of the main concentration of activity called Area 1. The final two probable Weeden Island series sherds were recovered from the midden excavated as Unit R, in Area 2. A lone Carrabelle Incised sherd was identified in this assemblage, recovered from excavations in Unit V, in Area 5. In total, then, these Weeden Island types are limited to the southern areas of the study area, with the exception of the Carrabelle Incised sherd from Unit V.

Figure 7.1 - Ceramic sherds recovered from Zone III yellow sands

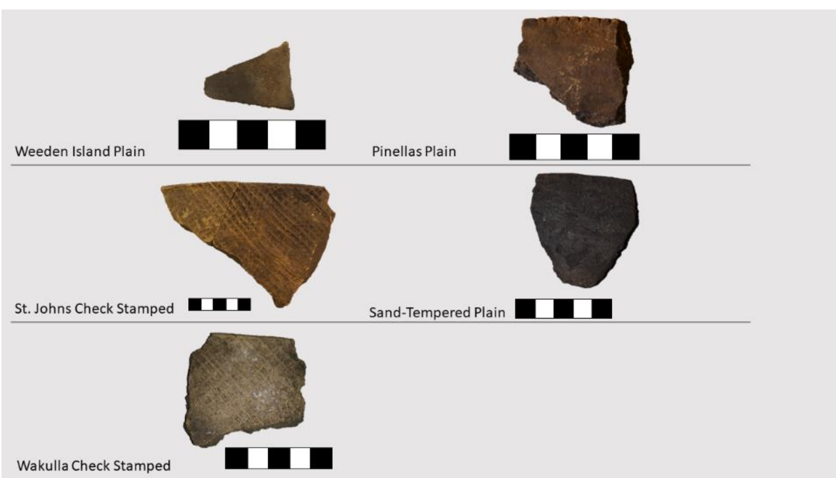

Figure 7.2 - Examples of common pottery types (WI, St Johns, Wakulla, PP, STP)

The majority of sherds in this assemblage come from vessels that were probably produced locally, though some sherds at least resemble exogenous ceramic types. The Weeden Island series sherds discussed above fall into this category, but much more common are spiculate sherds that include sponge spicules and minimal sand in the paste. Sponge spicule (or sponge/sand) tempered sherds totaled 168/774 (22%); of these, 1 was the Papys Bayou punctated sherd discussed above, 92 were check stamped (2 of these identified as linear check stamped), 1 was red slipped, 1 was stamped with a curvilinear design, and the remaining 73 were undecorated. In this assemblage these sherds were typed primarily as **St. Johns Plain** or **St. Johns Check Stamped** (Figure 7.2)**.** A single **Dunns Creek Red** sherd (recovered from Unit D, near Area 1) has similar characteristics to St. Johns sherds in the assemblage, with the addition of a red slip. St. Johns series pottery, which has also been called Biscayne ware, has a distinctive chalky feel and softness, with typically buff surfaces and buff to black cores (Luer and Almy 1980; Goggin 1940; Willey 1949:444-446). On the central Gulf coast of Florida, it appears as early as about A.D. 800 and remained in use through the Safety Harbor period (Luer and Almy 1980:212; Austin et al. 2014). It is currently unknown whether spiculate sherds from Weeden Island were indeed imported, or if they were produced locally in the style of St. Johns or Belle Glade wares (Goggin 1952:108; Weisman et al. 2005:340). The distribution of St. Johns series ceramics in the study area was fairly ubiquitous with exception of Block C, where relatively few sherds of the St. Johns series were recovered.

A potential **Belle Glade series** vessel fragment in this assemblage is FS# 130.1.1, a relatively large sherd from Unit H in Area 1. This vessel has the thickened and outward-curving rim with a flattened lip that is typical of the Belle Glade bowls found in the central peninsular Gulf Coast; such vessels were probably traded to the area from the Lake Okeechobee Basin region of South Florida (Luer and Almy 1980:212). Belle Glade pottery shares some similarity to St. Johns series pottery in paste quality, though it tends to be somewhat harder and contain more sand temper (Porter 1951). The fragment is unusual because three arches have been cut or ground from the body portion, for unknown reasons (Figure 7.3).

Figure 7.3 - Vessel fragment with three arches

Wakulla Check Stamped pottery (Figure 7.2) may have been traded into the central peninsular Gulf coast area via from northern Florida (Luer and Almy 1980:213). This type is sometimes defined very broadly, though in this analysis I limited use of the category to sherds with a hard, compact, sand-tempered paste with grit/quartz inclusions (Willey 1949:437-438), consistent with the approach of other ongoing analysis of ceramics from the Weedon Island Preserve (Austin 2017, personal communication). In this assemblage, only 8/774 sherds (1%) were identified as Wakulla Check Stamped type-variety. These were recovered from varied locations at the site, including Areas 1, 2, 4, and 5. An additional 19/774 sherds (2%) were assigned the more generic category of sand-tempered check stamped; these came primarily from Area 1 (12/19) and Area 2 (6/19), with one of these sherds recovered from Block D in Area 3.

Pinellas Plain (Figure 7.2) ceramics are common in this assemblage, as is typical for other Safety Harbor village contexts. There is wide variability within this type category, though in general the quality of the ceramics is unremarkable: the paste is typically laminated, with minimal sand temper or inclusions, of gray to brown color. Vessels are usually simple bowls, with straight or outward curving rims, sometimes thickened, and rounded or flattened lips (Luer and Almy 1980:209; Willey 1949:482). Vessel lips are sometimes notched or ticked; although some Pinellas Plain style vessels were manufactured during the Manasota-Weeden Island phase, vessels with notched lips evidently only occur in Safety Harbor contexts (Luer and Almy 1980:211). In this assemblage, 218/774 (28%) of analyzed sherds were identified as Pinellas Plain. Pinellas Plain sherds were recovered from all of the five areas studied.

Figure 7.4 - Safety Harbor Incised sherd

A single **Safety Harbor Incised** sherd was identified in this assemblage; it was recovered from Unit R in Area 2. Safety Harbor Incised pottery is recovered primarily from burial mounds, and only occasionally from domestic contexts (Mitchem 2012:177). Safety Harbor Incised wares have dot punctations and incised lines in various geometric designs, and the vessels are shaped into bowls of various forms, jars, and bottles; the paste often includes some quantity of sand temper and the texture of the ware is somewhat rougher and cruder than

Weeden Island decorated pottery (Willey 1949:479-480). The sherd from this assemblage is small but includes an area of small punctations below an incised line (Figure 7.4).

The analyzed assemblage includes categories of pottery that are not formally defined ceramic types, including sand-tempered plain and grog-tempered plain. **Sand-tempered plain** (Figure 7.2) has become a commonly used category that encompasses wares tempered with quartz sand of varying coarseness, smooth but unpolished surfaces, and a range of thicknesses, vessel forms (flattened-globular bowls, simple bowls, pots with straight or incurved rims) and rim forms (Luer and Almy 1980:207-209) Pottery of this type was produced along the Gulf Coast of peninsular Florida for thousands of years, although its dominance in the region waned somewhat around A.D. 400 as other types became more common (e.g., St. Johns and Wakulla Check Stamped, certain Weeden Island decorated wares, Belle Glade Plain and grog-tempered plain wares) (Austin et al. 2014; Luer and Almy 1980, 1982). While sand-tempered plain pottery was produced and used during Safety Harbor period occupations, it becomes secondary in prominence to Pinellas Plain pottery in assemblages from A.D. 1200 on (Austin et al. 2014:105). (While Austin and colleague's post A.D. 1200 seriation is based on data from a single site, results from this study corroborate that trend towards Pinellas Plain's dominance, as discussed below.) In this assemblage, 329/774 (43%) of analyzed sherds were identified as sand-tempered plain. Sand-tempered plain sherds were recovered from all of the 5 Areas studied. A single sand-tempered sherd with a cord-marked exterior was also recorded in this assemblage, FS#388.18.1 from Unit R in Area 2, though it was not assigned to a formal type category. A single sand-tempered sherd with a line of punctations on the surface was also identified, FS#200.35.1 from excavation Block C, but not assigned to a formal type category.

Grog-tempered plain pottery includes lumps of clay in the temper, typically along with small quantities of sand grains. It can be found in small quantities in assemblages by A.D. 800, just before the introduction of St. Johns pottery in the region (Luer and Almy 1980:213). In this assemblage, 14/774 (2%) of analyzed sherds were identified as grog-tempered plain. These sherds were recovered from Areas 1, 2, 3, and 5 (i.e., excluding only Area 4, the location of excavation Block C).

—

The type categories identified in this assemblage reinforce that the study area was occupied during the Safety Harbor period, though there is also evidence of earlier Woodland-period occupation in at least some of these locations. (Cultural deposits in the Zone III sand layers probably represent pre-ceramic Archaic period occupations [Weisman et al. 2005:326-9]) The proportion of sand-tempered plain sherds in the assemblage is higher than that of Pinellas Plain sherds (43% compared to 28%), which is consistent with the Austin and colleague's temporal seriation of ceramics from proveniences dated between A.D. 1000-1200 (Austin et al 2014:105). These proportions do vary across locations in the study area as discussed below. Pinellas Plain and sand-tempered plain vessels are thought to have been produced locally, while the exact provenance of other ceramic types from this time (i.e., spiculate temper ceramics or Wakulla Check Stamped varieties) is less clear.

The two most common type categories in the assemblage, sand-tempered plain and Pinellas Plain, are found in different proportions across areas of the site (Table 7.2). As noted above, Pinellas Plain tends to dominate assemblages that post-date A.D. 1200. The assemblages from Areas 1-3 have proportions of sand-tempered plain at under half (36-48%) and proportions of Pinellas Plain that range from 8-16%. The Area 5 assemblage differs in that a higher proportion is sand-tempered plain (71%) and a lower proportion (5%) is Pinellas Plain. Area 4, however, is the most distinct in this measure, with a much higher proportion of Pinellas Plain sherds (70%) and a lower proportion of sand-tempered plain (25%). This difference in Area 4 is consistent with radiocarbon dating of Area 4.

Ceramic Type Category	Avg Sherd Thickness (mm)	Min Thickness (mm)	Max Thickness (mm)	n
Belle Glades	**6.01**	**6.01**	**6.01**	**1**
Plain	6.01	6.01	6.01	1
Carrabelle	**4.58**	**4.58**	**4.58**	**1**
Incised	4.58	4.58	4.58	1
Dunns Creek	**8.19**	**8.19**	**8.19**	**1**
Red	8.19	8.19	8.19	1
Grog Tempered	**7.758461538**	**0**	**10.67**	**14**
Plain	7.758461538	0	10.67	14
Papys Bayou	**5.25**	**5.25**	**5.25**	**1**
Punctated	5.25	5.25	5.25	1
Pinellas	**7.581126761**	**3.54**	**13.82**	**218**
Plain	7.581126761	3.54	13.82	218
Safety Harbor	**4.82**	**4.82**	**4.82**	**1**
Incised	4.82	4.82	4.82	1
Sand Tempered	**6.945637394**	**2.65**	**12.18**	**356**
Check Stamped	7.506315789	5.54	9.17	19
Cord Marked	9.75	9.75	9.75	1
Plain	6.90510574	2.65	12.18	334
Punctated	8.5	8.5	8.5	1
Simple Stamped	5.35	5.35	5.35	1
St Johns	**5.448674699**	**1.97**	**10.81**	**166**
Check Stamped	5.56287234	3.31	10.81	94
Plain	5.299583333	1.97	9.6	72
Sponge Tempered	**4.39**	**4.95**	**7.98**	**1**
Curvilinear Stamped	4.39	4.95	7.98	1
Wakulla	**6.0825**	**3.45**	**5.96**	**8**
Check Stamped	6.0825	4.2	4.2	8
Weeden Island	**4.7**	**3.45**	**5.96**	**6**
Incised	4.2	4.39	4.39	1
Plain	4.8	4.39	4.39	5

Table 7.3 - Ceramic Sherd Thickness

The other notable difference across areas is in the proportion of St. Johns series sherds. In Areas 1, 2, and 3, 20-25% of the assemblage is St. Johns Check Stamped or Plain. In Area 5 only 9% of sherds are St. Johns series, and in Area 4 only 4% (4 sherds) are of the St. Johns series. The relatively low proportions of St. Johns wares in Area 4 appear to be consistent with temporal trends in the region (Austin et al. 2014). In Area 5, the low proportion of St. Johns Check Stamped may be influenced by the latter date of deposits from the upper midden levels of Unit V.

Pottery Type Category	straight-walled pot	globular bowl	simple bowl	bowl	uncategorized
Belle Glades			**1**		
Plain			1		
Carrabelle					**1**
Incised					1
Grog Tempered					**1**
Plain					1
Papys Bayou				**1**	
Punctated				1	
Pinellas		**2**	**12**	**1**	**22**
Plain		2	12	1	22
Sand Tempered	**1**		**7**	**1**	**24**
Plain	1		7	1	24
St Johns		**1**	**11**		**6**
Check Stamped			8		4
Plain		1	3		2
Wakulla		**2**	**1**		**3**
Check Stamped		2	1		3
Total	**1**	**5**	**32**	**3**	**57**

Table 7.4 - Attributes of Vessel Form

<u>Attributes of vessel form and function</u>

The formal attributes of the pottery assemblage can provide information about vessel function and site use. In this analysis, vessels could be categorized as bowls (simple, flattened-globular, or not specified) or pots (straight rim or converged orifice) (following Luer and Almy 1980:210; see also Willey 1949:496-506). However, the majority of sherds were too small or not adequately preserved to confidently determine the shape of the original vessel (Table 7.4). Simple bowls were identified most regularly (32/97 or 33%) because the outward curving shape of the rims of these is relatively distinct. A smaller number of sherds from flattened-globular bowls (5/97 or 5%) or bowls of indeterminate shape (3/97 or 3%) were also identified. The remaining 57 rim sherds were not identified by vessel form. Some pots may be represented among these sherds: 40 sherds with straight rim orientations were identified, but the sherds were generally too small to definitively classify vessel form.

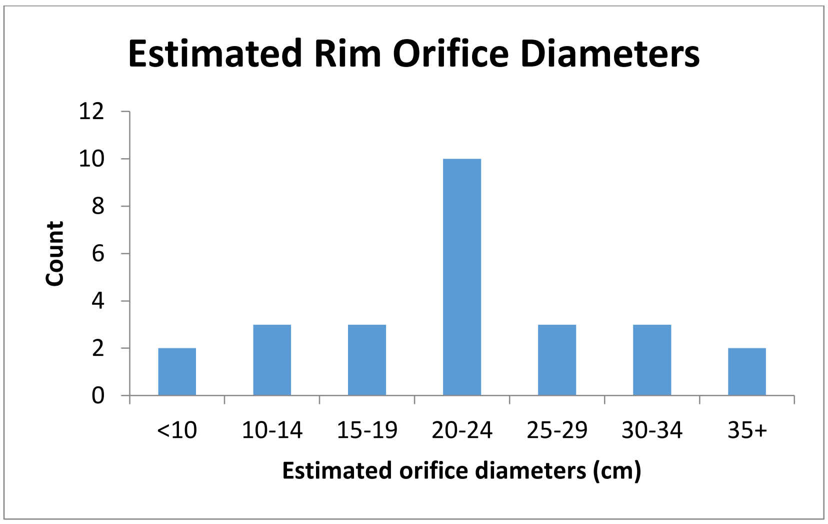

Figure 7.5 - Histogram of estimated vessel orifice diameters

Among sherds identified as representing bowls where rim orifice size could be estimated, diameter estimates ranged from 6-35 cm, with a mean of 21.6 cm (n=26). The distribution is unimodal with a peak in the range of 20-24 cm (Figure 7.5). The two vessels represented with estimated diameters of 35 cm, the largest recorded in the assemblage, are both from Unit R in Area 2; they are St. Johns Check Stamped bowls. Spiculate temper may to be appropriate for larger vessels because of its relative lightness compared with sand. The remaining vessels with estimated orifice diameters above the 20-24 cm range are from various locations around the study area, including all five areas of concentrated activity. While the sample of sherds for which vessel orifice diameter can be estimated is relatively small, it suggests that vessel sizes were relatively homogeneous across the study area, without multimodal peaks that could indicate different categories of vessels for serving smaller versus larger groups (e.g., Blitz 1993).

Intra-site patterns in density of ceramic artifacts

The density of ceramic material in different locations can be calculated as a function of the weight of recovered pottery and the volume of excavated midden. The analysis was restricted to midden contexts as, in this study area, these reflect Safety Harbor occupations whereas underlying deposits might date to earlier periods and contained fewer ceramic sherds. The volume of excavated midden for each location was calculated as the sum of the volume (unit dimensions times excavated depth) of levels labeled as Zone II (i.e., midden) or feature deposits within a given location (Area, Unit, etc.). Ceramic density (grams per cubic meter) was then calculated by dividing the weight of ceramic materials from Zone II contexts in a given area by the volume of excavated material calculated for that area (Tables 7.5-7.10).

	Area 1	Area 2	Area 3	Area 4	Area 5	Unit U	Other Units*
Volume of Midden Excavated (m^3)	1.70	0.78	6.61	1.99	0.66	0.20	0.63
Weight of ceramic artifacts (g)	990.99	1016.70	1447.93	1215.60	776.20	76.80	710.16
Ceramic density (g/m^3)	**582.94**	**1311.87**	**219.01**	**610.85**	**1179.28**	**384.00**	**1132.99**

*Test Units D and N were excavated in the vicinity of Area 1 but appear to be temporally distinct. Test Units E, L, and M did not have any identified Zone II intact midden strata.

Table 7.5 - Ceramic Artifact Density by Area

	Unit A	Unit C	Unit H	Unit I
Volume of Midden Excavated (m^3)	0.39	0.42	0.59	0.3
Weight of ceramic artifacts (g)	209.8	87.85	676.74	16.6
Ceramic density (g/m^3)	**537.95**	**209.17**	**1147**	**55.33**

Table 7.6 - Ceramic Artifact Density in Area 1

	Unit R	Unit S
Volume of Midden Excavated (m^3)	0.65	0.125
Weight of ceramic artifacts (g)	946.2	70.5
Ceramic density (g/m^3)	**1455.7**	**564**

Table 7.7 - Ceramic Artifact Density in Area 2

	Unit T	Block D BSM	Block D NC	Block D NWM	Block D North
Volume of Midden Excavated (m^3)	0.13	2.28	1.23	1.67	1.3
Weight of ceramic artifacts (g)	68.4	254.73	309.7	373.1	442
Ceramic density (g/m^3)	**526.1538**	**111.5**	**252.64**	**222.75**	**339.02**

Table 7.8 - - Ceramic Artifact Density in Area 3

	F21	Lvl 4-6	Lvl 3
Volume of Midden Excavated (m^3)	0.15	0.357	0.15
Weight of ceramic artifacts (g)	239.6	519.7	16.9
Ceramic density (g/m^3)	**1584.7**	**1455.742297**	**112.66667**

Table 7.9 - Ceramic Artifact Density in Area 5

	Unit D	Unit N
Volume of Midden Excavated (m^3)	0.384	0.24
Weight of ceramic artifacts (g)	348.68	361.48
Ceramic density (g/m^3)	**908.0208**	**1506.166667**

Table 7.10 - Ceramic Artifact Density in Other Units

Areas 1 and 2, which encompass test units excavated over distinct features and deposits, exhibit variation between units (Tables 7.6 and 7.7). In Area 1, the ceramic density for Unit H outstrips the other units. Unit H has a ceramic density of 1147 g/m^3 across midden contexts, compared to 537.95 g/m^3 (Unit A), 209.17 g/m^3 (Unit C), and 55.33 g/m^3 (Unit I). The ceramic density in Unit I is especially low, which is consistent with other observations of the unit as primarily consisting of whole or almost whole gastropod shells. In Area 2, the ceramic density of midden contexts in Unit R is high at 1455.7 g/m^3, especially compared with the nearby Unit S with a density of 564 g/m^3.

At the resolution of site areas, ceramic density is lowest for Area 3, at 219.01 g/m^3. This area encompasses a large volume of excavated midden and several discrete features, so breaking it down further by excavation areas and cultural features is more illuminating (Table 7.8). Unit T, which sampled a small strong positive magnetic anomaly that represented a shallow feature pit, had an average ceramic density of 526.15 g/m^3 across the two levels identified as midden zones, higher than the deposits within the Block D excavation. The ceramic density is lowest for the Brown Soil Midden area of Block D, consistent with other observations about this deposit (see Chapter 8).

The ceramic density for Area 4 (Block C) is 610.85 g/m^3, an intermediate density compared to other locations in the study area.

In Area 5, ceramic densities are notably higher for the feature pit (1584.7 g/m^3) and associated midden levels 4-6 (1455.74 g/m^3) (Table 7.9). A radiocarbon date from level 3 of Unit V indicates that the upper levels of midden fill were deposited later (see Chapter 5 section x) than the feature pit and lower levels of midden. The relatively lower ceramic density from this contexts(112.67 g/m^3) appears to be consistent with the interpretation that the upper levels of midden fill resulted from a different set of activities than the feature pit and overlying midden.

The ceramic density of midden levels in Unit U, the test of a geophysical blank spot (see Chapter 4), is on the lower end at 384.00 g/m^x, but not exceptionally low. As noted above, values for certain individual units and deposits associated with distinct cultural features are lower. The ceramic density for midden contexts in this unit is probably consistent with the density that could be found in other portions of the relatively thin spread of shell midden that can be found in many parts of the site adjacent to the more prominent midden ridges.

Stone Tools and Debitage

Lithic artifacts recovered from the study area included primarily chipped stone tools and debitage, as well as smaller quantities of modified and unmodified sandstone and limestone, and fire cracked rock (see Appendix D for complete inventory of lithic artifacts and data from the analysis of chipped stone artifacts). Nodules of hematite (iron concretions) were also found regularly throughout midden deposits or sometimes in underlying sands; these are not addressed in this analysis as they appear to be natural inclusions associated with high iron deposits/sediments rather than cultural artifacts (see Austin 2013:671; Palmer and Williams 1977).

Stone tools and debitage were identified during screening in the field and during the sorting of midden sediments in the laboratory. Stone tools and debitage were recovered from midden and leachate (Zone II) contexts, features, and Zone III white and yellow sands (subsoils) underlying shell midden deposits. Lithic artifacts appeared with greater frequency in these underlying sand contexts than in shell midden, consistent with the earlier comprehensive testing of the Preserve (Weisman et al. 2005:316-329). A total of 1323 chipped stone lithic artifacts (primarily debitage) were recovered from Zone III sands, compared to 464 pieces from Zone II midden contexts and 73 pieces from Zone I topsoil contexts. Yellow class lithics (those found in yellow sands or with a oxide patina) are expected to date to the Middle to Late Archaic period, while white class lithics (from the overlying white sand contexts) likely date to the Late Archaic to Woodland periods (Weisman et al 2005:326-9).

Analysis of chipped stone tools and debitage was conducted by Martin Menz at the University of Michigan. Menz assessed the use of raw material in this assemblage, using the quarry cluster approach to identify raw material source locations based on chert texture, inclusions, and fossil content (Austin and Estabrook 2000; Austin et al. 2014; Endonino 2007, Estabrook 2011; Upchurch et al 2008[1982]). Menz also collected data relevant to tool production and use by analyzing each FS lot according to several variables: size grade, presence and percentage of dorsal cortex, number of dorsal flake scars, and debitage/tool type. Dorsal cortex was recorded based on categories of percent coverage. Tools were classified as biface fragments, flake tools, or projectile point/knives (PP/K). Debitage were sorted into descriptive categories (whole flakes, proximal flake ends, flake fragments, and non-orientable angular debris), following Sullivan and Rozen's (1985) methodology.

Quarry clusters and raw material procurement

A small minority of chert in this assemblage (0.04% or 76/1890 lithic artifacts) contained fossils that could be used to identify quarry clusters (Figure 7.6). The majority of chert identifiable to a quarry cluster (77.6% or 59/76) come from the Tampa Limestone formation, which encompasses the nearby Hillsborough River Quarry Cluster (HRQC). Three other geological formations (Crystal River Formation/Ocala Limestone, Peace River Quarry Cluster, and Bay Bottom Chert from the HRQC) are also represented in smaller quantities in this assemblage at 3.9%, 3.9%, and 14.5%, respectively.

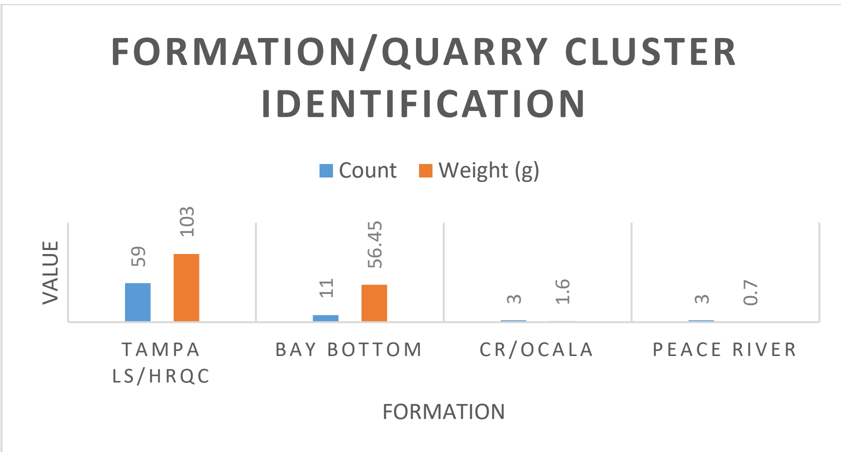

Figure 7.6 - Quarry Cluster bar chart

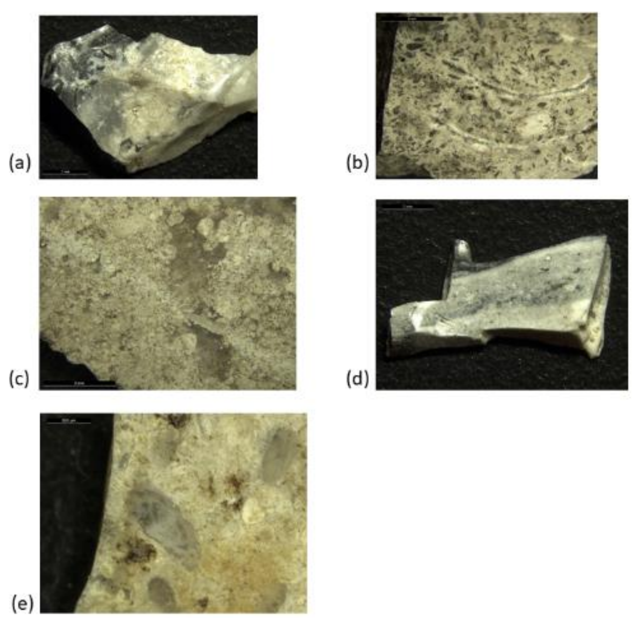

Figure 7.7 - Examples of Chert Materials. Photo credit: Martin Menz.

Most chert in the assemblage appears to have been procured locally. Although the majority of cherts lacked fossil inclusions that would facilitate identification to a specific quarry, most could still be categorized as chalcedonic chert or silicidied wackestones, which are relatively common and probably locally available throughout the Tampa Bay area (Goodyear et al. 1983:58-60). These were light grey to blue gray or sometimes tan in color (Figure 7.7a). As for cherts sourced to quarry clusters, Tampa Limestone/HRQC cherts would probably have been similarly accessible to residents of Weeden Island, though with magnification this material is distinct because it includes peneropolid fossils (Upchurch et al. 2008:53-60) (Figure 7.7b). The assemblage also included smaller quantities of a chert that is tan to gray in color and seems to match Goodyear and colleague's description of what is sometimes called "bay bottom chert" (1983:68-60) (Figure 7.7c). This material may also derive from the HRQC.

Three pieces of debitage may be made of Peace River chert. All of these were recovered from Zone III subsands, 2 pieces in FS#271 from IIIa white sand and 1 piece in FS#346 from Zone IIIb yellow sand, suggesting their manufacture and use predates the Safety Harbor occupation. Peace River Quarry Cluster chert often has a waxy surface, with a high proportion of opal and some phosphate pellets, contributing to their greasy luster (Upchurch et al. 2008:119-120); they may also contain quartz sand or other inclusions (Austin and Estabrook 2000:117) (Figure 7.7d). The Peace River Quarry Cluster chert outcrop is located about 50 miles inland from Tampa Bay, although opaline chert outcrops have also been observed along the Alafia River closer to Tampa Bay (Austin et al. 2014:4).

Three pieces of chert possibly from the Crystal River Formation/Ocala Limestone Quarry Cluster were also identified. Two of these (a flake fragment and piece of angular debris) were recovered from IIIa white sands in Test Unit E (FS#38). The third artifact was a Pinellas type projectile point/knife recovered from the uppermost excavation level of Unit I (FS#80). This chert is identified primarily by the presence of orbitoid fossils, which can be quite large (Upchurch et al. 2008:53-55) (Figure 7.7e). This quarry cluster is located in north central Florida, significantly farther from the Tampa Bay area than the outcrops from which the majority of materials in this assemblage were procured.

Tool functions and usage

Chipped stone tools in the assemblage included 6 projectile point/knives, 8 biface fragments, and 9 flake tools (Table 7.11). Five of the projectile/point knives were Pinellas type, which is typical of Safety Harbor period occupations (Bullen 1975:8). A Hernando PP/K (basal notch) was recovered from the IIIa white sand zone below the midden in the Block D North excavation. One of the Pinellas PP/K was also recovered from Zone IIIa, though this was in Test Unit E, which was observed to be placed in a relatively low-lying location where no midden was present, and isolated artifacts and shells that were evidently disturbed from their original place of deposition were recovered. The remaining four Pinellas PP/K were recovered from Zones I-II, consistent with the expectation that they were produced and used by Safety Harbor period occupants of the site. All of these were produced on grey packstone or grey fossil packstone; the cherts with fossils were identified to quarry clusters, two of them from the HRQC and one (from Test Unit I) tentatively to the Crystal River Formation/Ocala Limestone Quarry Cluster.

The eight biface fragments were recovered from varied locations in the study area: in zone II contexts in Units H (Area 1) and V (Area 5), and in zone III contexts in Units I, T, and Block D. Flake tools were recovered from midden (Zone II) and sand (Zone III) contexts in Area 3 (Unit T and Block D), and from a midden context in Block C.

Location	Flake tools	Biface Fragments	Projectile Point/Knives
Area 1		2	1
Area 2			
Area 3	8	4	3
Area 4	1		
Area 5		2	
Unit D*			1
Unit E*			1
Total	**9**	**8**	**6**

*Test Units D and E are located in the vicinity of the Area 1 features

Table 7.11 - Distribution of Chipped Stone Tools

Debitage attributes and tool production activities

The proportion of debitage that falls into different type categories (whole flakes, proximal flake ends or broken flakes, flake fragments, and non-orientable angular debris) can contribute to an interpretation of primary reduction activities for subsets of the assemblage (Sullivan and Rozen 1985; Rozen and Sullivan 1989a, 1989b). Sullivan and Rozen's descriptive categories take into account variables including whether a single interior surface is discernible, whether a point of applied force is present, and whether flake margins are intact (Sullivan and Rozen 1985:759). The resulting categories are intended to be themselves descriptive and "interpretation-free," though different representation of these categories within an assemblage can indicate behavioral patterns. For instance, high proportions of angular debris typically result from intensive core reduction and the production of flake tools, and whole flake proportions will also be higher in these cases (see Jelinek et al. 1971). Very high proportions of angular debris without as many whole flakes can result from bipolar reduction, an expedient technology in which force is applied to a core that has been placed on an anvil stone (Kuijt et al. 1995). Sullivan and Rozen argue that biface reduction tends to produce lower proportions of angular debris. Instead, proximal ends and flake fragments tend to be produced during biface or tool manufacture, as very thin flakes break during the process (Sullivan and Rozen 1985:769). However, medial-distal flake fragments might also be produced by high-impact core reduction (Prentiss and Romanski 1988) or by non-technological factors like trampling. Although Sullivan and Rozen's approach has been critiqued for failing to account for variability (e.g., Amick and Mauldin 1989; Andrefsky 2005; Prentiss 1998), it has also been validated statistically through an experimental study comparing assemblages (Austin 1999). I use it here in conjunction with the consideration of other factors and variables.

Other attributes including size grades (1 [1-in.]. 2 [1/2-in.], 3 [1/4-in.], and 4 [1/8-in.]), the number of dorsal flake scars, and the percent coverage of dorsal cortex also contribute information about reduction activities. Including these variables can mitigate some of the critiques that Sullivan and Rozen's methods are over simplified. Because dorsal cortex tends to be removed as a core is reduced, less dorsal cortex is associated with relatively later stages of reduction or tool maintenance. Similarly, a greater number of dorsal flake scars points to later-stage reduction or maintenance, as do relatively smaller flakes.

In this section, I use these principles of the relationship between debitage assemblages and reduction activities to compare contexts in the study area. First, I compare Zone II and Zone III contexts, which correspond generally with Safety Harbor and Woodland/Archaic occupation of the site, respectively. Then, I analyze patterns among deposits and areas associated with the Safety Harbor occupation only since that is the main focus of this case study.

Zone II vs. Zone III Lithic Assemblages

I first compare assemblages from stratigraphic zones in the study area, construed generally as Zone II (i.e., all midden and feature contexts, generally attributable to Safety Harbor phase occupations) and Zone III (i.e., all subsoil sand contexts, attributable to Woodland or Archaic period occupations). The following analysis excludes contexts for which only 1/4”+ material was sorted and analysis; the material discussed here was all recovered using 1/8” screening. A comparison of these assemblages is summarized in Table 7.12. Because the composition of the Zone II assemblage is dramatically affected by the large quantity of angular coral stone debitage found in one unit, which may have different material properties and/or purposes (see discussion below), I restrict my comparison of these zones here to chert artifacts. (The relative proportions of debitage categories in each assemblage do remain the same when coral is removed, but the percentages for the chert alone are probably more representative of the occupation as a whole.)

The percentages of debitage and tool categories are different for Zone II and Zone III assemblages, suggesting different technological practices in each context (Table 7.12). The Zone II assemblage includes a higher percentage of angular debris than the Zone III assemblage, and lower percentages of the other three debitage categories. Within the Zone II assemblage, angular debris is the most common (28.0%) followed by flake fragments (31.4%), proximal end flakes (21.8%), and last, whole flakes (15.5%). In the Zone III assemblage, flake fragments are most common (37.4%), followed by proximal end flakes (29.1%), whole flakes (19.9%), and last, angular debris (12.9%).

The high proportion of angular debris in the Zone II assemblage could indicate intensive core reduction, with many flakes removed from each core (Sullivan and Rozen 1985:763; Jeter

1980:243). This technological practice is consistent with a more sedentary mobility pattern, in which cores are utilized as fully as possible (Jeter 1980:300). The Zone II assemblage has a higher proportion of proximal end flakes (broken flakes) than an otherwise comparable assemblage in Sullivan and Rozen's study, for which they propose an interpretation of sedentism and intensive core reduction (1985:763). The Safety Harbor occupation in this case study, then, probably also involved biface or tool production that produced very thin flakes that can break during manufacture (Sullivan and Rozen 1985:759; Hester et al. 1977:244).

	Zone II Chert Artifacts		Zone III Chert Artifacts	
	count	**%**	**count**	**%**
Lithic Categories	*239*		*1304*	
Whole flakes	37	15.48	260	19.94
Proximal end flakes ("broken flakes")	52	21.76	380	29.14
Flake fragments	75	31.38	488	37.42
Angular debris	67	28.03	168	12.88
Flake tools	4	1.67	3	0.23
Biface fragments	3	1.26	3	0.23
Projectile points/knives	1	0.42	2	0.15
Lithic Size Grades	*407*		*1319*	
1 (1")	31	7.62	58	4.40
2 (1/2")	146	35.87	277	21.00
3 (1/4")	208	51.11	647	49.05
4 (1/8")	22	5.41	337	25.55
Dorsal Flake Scars	*166*		*1153*	
0	1	0.60	2	0.17
1	8	4.82	30	2.60
2	21	12.65	140	12.14
3+	136	81.93	981	85.08
Dorsal Cortex Coverage	*176*		*1234*	
0	140	79.55	1127	91.33
1-50%	33	18.75	82	6.65
51-99%	3	1.70	20	1.62
1	0	0.00	5	0.41

Table 7.12 - Comparison of Lithic Debitage and Tools in Zones II and III

However, the Zone III assemblage has even greater evidence of tool manufacture as its proportions of proximal end flakes and flake fragments are higher than in Zone II. Angular debris is still represented within this assemblage to a degree that suggests cores were sometimes reduced intensively. Thus, while both core reduction and tool manufacture were likely components of occupations associated with Zone II and Zone III lithic debitage, Zone II Safety Harbor contexts show greater evidence of intensive core reduction and expedient flake technologies, while earlier Zone III contexts probably involved a greater focus on biface production, with debitage resulting from later stage reduction and maintenance. This could be linked to broader differences in mobility between Safety Harbor and earlier occupations, with greater sedentism in the Safety Harbor occupation. Parry and Kelly (1987) have argued that sedentary communities, having reduced access to lithic resources, would have tended to keep quantities of lithic materials on hand and craft expedient tools when needed. In contrast, people with a more mobile lifestyle would value the portability of bifaces that are reworked over time.

A comparison of the other variables measured support this interpretation (Table 7.12). The smallest size of debitage was more common in the Zone III chert assemblage than the Zone II chert assemblage (25.5% compared to 5.4%). Similarly, the largest two size grades of debitage were more common in Zone II than Zone III (7.6% compared to 4.4% for debitage larger than 1”, and 35.9% compared to 21.0% for debitage between 1/2”-1”). The smaller size of debitage in the Zone III assemblage indicates a later stage of reduction or tool maintenance. Debitage with 0% dorsal cortex coverage was more common in the Zone III assemblage (91.3% compared to 79.5%), again pointing to more debitage that resulted from later-stage reduction or tool manufacture and maintenance. There were also a greater proportion of flakes with three or more dorsal flake scars in the Zone III assemblage (85.1% compared to 81.9%) although overall the assemblage profiles were more similar for this measure.

Intra-Site Comparison of Safety Harbor Lithic Assemblages

I turn now to a more detailed analysis of lithic artifacts from Safety Harbor midden and feature contexts. In the following discussion I include all types of debitage from contexts labeled Zone I or II and exclude Zone III artifacts, which likely date to earlier occupations. I focus on areas or deposits with at least 30 pieces of debitage identified, which limits my discussion to three units in Area 1 (considered together), four distinct deposits within Area 3/Block D, and the 2-x-1 unit in Area 5 (Unit V). In Area 1, four units were excavated, but Unit I contained only 1 flake and 1 Pinellas projectile point/knife, consistent with the interpretation of the deposit here as containing discarded shell and other food remains rather than a site of domestic production activities, so I consider only the other three units in this analysis (Units A, C, and H). Area 3 encompass the Block D excavation and a test unit, Unit T. Unit T contained only 5 lithic artifacts so I do not include it in this analysis. Within Block D, four distinct areas of deposits (the Block D midden, the main D Block Northwest Midden, the North Central features area, and the Brown soil midden; see Chapter 4 for details) have relatively robust lithic assemblages and distinct artifact profiles, so each is considered here on its own. Finally, Unit V, the only excavated unit in Area 5, contains a relatively large assemblage of lithic artifacts, including a high proportion of brown coral stone, which was distinct in appearance and structure from the white coral stone occasionally identified at other locations in the study area. The coral assemblage from this unit may be unique because of the material’s properties and/or its purpose (i.e., it appears to flake less

	Area 1 (Units A, C, H)	Area 3 (Block D BSM)		Area 3 (North Block D)		Area 3 (Block D NW Midden)		Area 3 (Block D Central)		Area 5 (Unit V chert only)		Area 5 (Unit V coral only)	
	%	**count**	**%**	**count**	**%**	**count**	**%**	**count**	**%**	**count**	**%**	**count**	**%**
Lithic Categories		*32*		*35*		*71*		*65*		*76*		*166*	
Whole flakes	9.30	9	28.13	9	25.71	10	14.08	16	24.62	4	5.26	5	3.01
Proximal end flakes ("broken flakes")	27.91	7	21.88	7	20.00	19	26.76	19	29.23	12	15.79	13	7.83
Flake fragments	25.58	13	40.63	12	34.29	25	35.21	22	33.85	19	25.00	36	21.69
Angular debris	34.88	2	6.25	7	20.00	15	21.13	5	7.69	39	51.32	112	67.47
Flake tools	0.00	0	0.00	0	0.00	1	1.41	3	4.62	0	0.00	0	0.00
Biface fragments	2.33	0	0.00	0	0.00	0	0.00	0	0.00	2	2.63	0	0.00
Projectile points/knives	0.00	1	3.13	0	0.00	1	1.41	0	0.00	0	0.00	0	0.00
Lithic Size Grades		*31*		*35*		*70*		*65*		*76*		*167*	
1 (1")	17.50	2	6.45	1	2.86	4	5.71	5	7.69	13	17.11	2	1.20
2 (1/2")	42.50	7	22.58	9	25.71	19	27.14	12	18.46	23	30.26	71	42.51
3 (1/4")	32.50	16	51.61	17	48.57	41	58.57	37	56.92	34	44.74	93	55.69
4 (1/8")	7.50	6	19.35	8	22.86	6	8.57	11	16.92	6	7.89	1	0.60
Dorsal Flake Scars		*29*		*29*		*55*		*60*		*35*		*55*	
0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	5.71	6	10.91
1	3.70	0	0.00	4	13.79	0	0.00	3	5.00	3	8.57	10	18.18
2	11.11	6	20.69	3	10.34	1	1.82	19	31.67	8	22.86	18	32.73
3+	85.19	23	79.31	22	75.86	54	98.18	38	63.33	22	62.86	21	38.18
Dorsal Cortex Coverage		*29*		*31*		*5*		*61*		*35*		*54*	
0	77.78	27	93.10	29	93.55	0	0.00	55	90.16	22	62.86	1	1.85
1-50%	19.44	2	6.90	2	6.45	5	100.00	6	9.84	12	34.29	32	59.26
51-99%	2.78	0	0.00	0	0.00	0	0.00	0	0.00	1	2.86	15	27.78
1	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	6	11.11

Table 7.13 - Comparison of Lithic Debitage and Tools in Midden Contexts

cleanly than chert), so I analyze the chert and coral assemblages from this unit separately. Table 7.13 summarizes comparisons among these assemblages.

The debitage and tool categories across these locations is varied and points to differences in the lithic reduction activities that likely took place in each area. Other attributes including debitage size, cortex coverage, and dorsal flake scar counts supplement the interpretations of activities based on debitage and tool categories.

High proportions of angular debris can indicate intensive core reduction or flake tool industries more generally, as discussed above. Unit V has the highest proportion of angular debris of all of the units considered here; this is especially true of the coral assemblage (67.5%) but the proportion of debris in the chert assemblage is also higher than in other areas (51.3%). However, the proportion of whole flakes is low for both the coral and chert assemblages in Unit V, at 3.0% and 5.3%, respectively. Bipolar reduction, in which a core is struck while resting on an anvil, can produce high levels of angular debris and medial/distal flake fragments (Kuijt et al. 1995). In both material class assemblages from Unit V, flake fragments are the second most common debitage category at 25% (chert) and 21.7% (coral) of the lithic assemblage. These debitage profiles do not quite reach the proportions of flake fragments identified in Kuijt and colleagues' study of bipolar reduction, in which experiments produced roughly equal proportions of angular debris and flake fragments, but given the relatively low quantities of whole flakes, this type of reduction could account for some of the Unit V assemblage.

In other respects, the Unit V assemblage is also distinct from the other assemblages discussed here. It is the only assemblage that includes lithics with no dorsal flake scars, and the proportions of artifacts with no dorsal cortex coverage are lower than at most other deposits (with the exception of the Block D NW midden). This was especially true of the coral assemblage, but the chert assemblage was also distinct in these measures. These characteristics indicate less late-stage reduction or tool manufacture took place at this location, consistent with the high proportions of angular debris. The size grade profile of chert debitage in Unit V was similar to that of Area 1, with more large pieces (17.1% size grade 1 [1”]) and fewer small pieces (7.9% size grade 4 [1/8”]) than any of the Area 3 deposits.

The combined assemblage of lithic artifacts from Units A, C, and H also has a relatively high proportion of angular debris, at 34.9%. As with Unit V, the proportion of whole flakes is also relatively low, at 9.3%. The proportion of flake fragments is close to that of Unit V, at 25.6%, and proximal end flakes are similarly represented at 27.9% (i.e., more frequent than in the Unit V assemblage). The relatively balanced proportions of debitage probably reflects a mix of strategies, especially when compared with the higher representation of angular debris in Unit V, and the Block D assemblages, which suggest more of a focus on tool production. The Area 1 assemblage is intermediate to Block D and Unit V in terms of the representation of whole flakes, angular debris, and flake fragments.

The Area 1 assemblage is also intermediate to Area 3 and Area 5 in terms of dorsal cortex coverage (specifically the proportion of flakes with no dorsal cortex coverage, at 77.8%). The proportion of debitage with 3+ dorsal flake scars is relatively high, at 85.2%; only the Block D NW Midden deposit has a higher proportion. As I mentioned above, the Area 1 assemblage, like the Area 5 assemblage, included a higher proportion of larger artifacts (17.5% size grade 1 [1”]) and a lower proportion of smaller artifacts (7.5% size grade 4 [1/8”]) than the Area 3 deposits.

Turning to Area 3/Block D, the four deposits have distinct profiles of debitage and tool categories, although they share some similarities compared to Area 1 and Area 5. The Brown

Soil Midden has the highest proportion of flake fragments (40.6%), though all four deposits from Area 3/Block D have higher proportions of flake fragments than the units in Area 1 or Area 5. Proximal end flakes (broken flakes) and flake fragments tend to result from tool manufacture, as discussed above, so tool production and maintenance might have been a focus of reduction activities in Area 3 generally. This is especially true for the Brown Soil Midden and North Central Features areas of Block D, which also have low proportions of angular debris, at 6.3% and 7.7%, respectively. Alternatively, or in combination with these technological activities, it is possible that non-technological factors like trampling played some role in producing this assemblage, particularly in the Brown Soil Midden which may represent an occupational surface rather than a dumping ground.

The relatively higher proportions of angular debris in the Block D Northwest Midden and North Midden, 21.2% and 20%, respectively, indicate that core reduction played a relatively greater role in producing those assemblages. The similar proportions of angular debris in these two areas is consistent with some other similarities in the content of these two deposits (e.g., shell taxa profiles), which might speak to some continuity in the activities that produced these middens. Surprisingly, the North Central area of Block D has the highest proportion of flake tools (4.6%, count=3), whereas the assemblages in Areas 1 and Unit V, which are otherwise more suggestive of flake tool industries, do not actually include any flake tools.

Other variables of the lithic artifacts tended to be similar across the Block D assemblages. The size of lithic artifacts from this area tended to be smaller than Areas 1 and 3, as noted above, with some variation between deposits: the Northwest Midden deposit had a lower proportion of very small flakes (size grade 4 [1/8”]) than other deposits. Similarly, this deposit had the highest proportion of debitage with 3+ dorsal flake scars (98.2%). Both of these characteristics indicate later stage reduction or tool manufacture and maintenance. All of the Block D assemblages had minimal dorsal cortex coverage (all flakes at 50% or less coverage).

In sum, while each area of the site probably included a mix of reduction activities, there are general trends evident when the assemblages are compared. Block D locations were probably the site of more tool manufacture and maintenance, perhaps biface tool production. Areas 1 and 5 seem to have included more core reduction, potentially including some bipolar reduction. The Area 1 assemblage has more intermediate characteristics than the Block D deposits and the Area 5/Unit V deposit, perhaps because this assemblage includes materials from three excavation units and thus collapses more distinct activity areas.

Intra-site patterns in density of lithic debitage

The calculation of density of chipped stone debitage within midden contexts uses the same methodology as for pottery: density is calculated as grams of lithic debitage per square meter of excavated area labeled as Zone II or feature deposits (Table 7.14). Area 5 has the highest density of lithic debitage in midden/feature contexts at 192.8 g/m^3. Area 4 also has a relatively high density of lithic debitage at 41.8 g/m^3; the quantity of lithic artifacts recovered in this location is small (total count of 12 artifacts in Zones I-II), but some of the pieces themselves are large (e.g., a 42.6g piece of angular debris). Area 1 (Units A, C, H, and I) has the next highest density at 30.2 g/m^3, followed by Area 3 at 14.1 g/m^3 and Area 2 at 13.2 g/m^3. Outside of the clustered features or areas, the other units in the vicinity of Area 1 (Units D and N) rank relatively high in ceramic density, mostly due to the high density of lithic artifacts recovered from Unit N. No lithic artifacts were recovered from the midden contexts of Unit U, so the density for that unit is 0 g/m^3.

	Area 1	Area 2	Area 3	Area 4	Area 5	Unit U	Other Units*
Volume of Midden Excavated (m^3)	1.70	0.78	6.61	1.99	0.66	0.20	0.63
Weight of lithic artifacts (g)	51.55	10.20	92.90	83.20	126.90	0.00	27.15
Lithic density (g/m^3)	**30.32**	**13.16**	**14.05**	**41.81**	**192.80**	**0.00**	**43.32**

*Test Units D and N were excavated in the vicinity of Area 1 but appear to be temporally distinct. Test Units E, L, and M did not have any identified Zone II intact midden strata.

Table 7.14 – Chipped Stone Artifact Density by Area, Zone II

Sandstone, limestone, and other rock

Small quantities of rock and stone tools other than chipped stone (chert/coral) tools and debitage were recovered from the study area. All stone was collected and recorded as these do not typically occur naturally in the location and typically indicate some human behavior. These artifacts included 2 possible pieces of fire cracked rock, 3 pieces of limestone of indeterminate use, 3 large sandstone rocks (from a single feature context), and 24 other pieces of sandstone or miscellaneous stone of indeterminate use. The three pieces of sandstone were recovered together from Feature 2 in Test Unit N. The largest of these has a flat surface, as if for grinding, but grinding marks or wear were not evident on this surface.

Modified Shell Artifacts

Mollusk shells, besides containing food, served as a raw material for crafting tools and ornaments. Modified shell artifacts recovered from the study area include gastropod hammers and cutting-edge tools; fishing tools like sinkers, net weights, and net gauges; beads and ornaments; and blanks or debitage from ornament or tool production (see Appendix E). Modified shell was collected in the field while screening, in the lab while sorting and identifying large shell samples, and occasionally in the lab during the sorting of midden sediments from 1/8" screens (see Chapter 6 for a full description of shell recovery methods).

Techniques and methodologies for identifying and analyzing shell tools and debitage remain underdeveloped relative to more widespread artifact classes like lithic technology. Typologies and approaches tend to be less consistent across studies. Nevertheless there have been several important efforts to categorize and analyze shell tools, ornaments, and related artifacts. Luer and colleagues (1986), working at Big Mound Key in south-central Florida, identified what they termed a shell tool blank—a modified large lightning whelk shell that could be fashioned into a cutting-edged tool, and subsequently into a hammering tool. The tools in this assemblage were of a standard size and manufacture, apparently specially sourced from marine (rather than estuarine) habits, and were recovered from two caches, suggesting that they were manufactured and stored very deliberately. The authors describe a "continuum of manufacture," with robust whelk reworked into different forms throughout their use lives, and debitage and intermediary forms created along the way (Luer et al 1986:114).

Later, Jonathan Dean picked up this thread of dissecting the stages of manufacture of shell tools with his study of modified gastropods from the comprehensive survey of the Weedon Island Preserve (Weisman et al. 2005:247-316). Dean focuses on juvenile lightning whelks (identified as those under 9 cm long) that could be manufactured into a tool consisting of "a full-length columnella with a sharpened posterior tip and a whorl 'skirt' at the anterior end" (Weisman et al 2005:246), which might be used for various piercing, inscribing, drilling, or other functions. Dean's analysis, building on experiments with reduction alongside the archaeological collection, identifies 25 forms that could be produced on the way to manufacturing the final tool and another 4 forms resulting from subsequent working and/or wearing of the final tool form.

Although Dean's final tool form and most of the intermediary forms can be recognized in the materials recovered from Weeden Island for this project, I did not use this typology for the current research as I could not determine from the 2005 study that the majority of these forms might not also result from incidental fracture in the course of disposal and site formation, or that the sequence of forms described necessarily represented a deliberate reduction sequence to a planned tool type. Instead, following Marquardt (1992:217) I have identified some instances of debitage when it is apparent that a portion of shell has been cut or otherwise removed and discarded, but I have not classified this debitage further into types or forms.

William Marquardt's (1992) typology of shell tools, developed in the Caloosahatchee region of south Florida, has been particularly influential for subsequent studies of shell crafting. Marquardt's work builds on that of Goggin (1949) and Luer and colleagues (1986). His typology describes a range of tools for different purposes and crafted from both gastropods and bivalves. Marquardt's typology has been used in full or modified form by others working in Florida (e.g., Blankenship 2013; Dietler 2008; Eyles 2004; Menz 2012) and I used his typology as a primary reference for classifying shell tools from this assemblage.

Gastropod tools

This assemblage includes a variety of gastropod tools (n=32), primarily hammers (Table 7.15). Gastropod tools with hammering or cutting edges were recovered from all five Areas in the study area. The highest quantity were recovered from Area 3, though the greatest volume of midden was also excavated in this location. Tools were made of lightning whelk (14/32), crown conch (15/32), and Florida fighting conch (1/32), and 1 unidentified gastropod (Table 7.16). Specimens were classified according to Marquardt's typology (1992) and identified by taxa. The length, width, thickness, and weight of each specimen was recorded. Weight was measured to the nearest tenth of a gram using a digital scale. Length, width, and thickness were measured to the nearest tenth of a mm using digital calipers. Length was measured from the apex to the columnella. Width measurements were taken from the outer lip of the shoulder of the shell to the point directly on the other side of the body whorl. Thickness measurements were taken where the body whorl meets the columnella since all specimens retained this portion. Hafting modifications (the presence and number of notches and/or holes) were recorded, as were any other modifications (e.g., sharpening). Evidence of rehafting and use-wear was recorded following Menz (2016:133,138), with each specimen checked for evidence of haft failure and three types of use wear: blunt or grinding wear, spalling or chipping wear, and body whorl damage.

Two **Gastropod Cutting-Edged Tools** (Marquardt 1992:193-199) were identified in this assemblage. These tools would have been hafted and used for purposes like cutting or chopping wood, for instance in constructing boats (Patton 2013). One tool, from excavation Unit V in Area 5, was manufactured from a large lightning whelk (FS 380.8.1) (length 150.14 mm) (Figure 7.8a). Cutting-Edge Tools have a primary working surface placed obliquely relative to the long axis of the columnella, whereas on hammers, the blunt working surface is perpendicular to the columnella’s long axis (Marquardt 1992:193). The cutting-edged specimen from this assemblage

	Columnella Hammer	Cutting-Edged Tool	Gastropod Pounder/Hammer	Gastropod Perforater	UID Tool	Type A Hammer	Type F Hammer	Type G Hammer	Total
Area 1						1		3	4
Area 2		1						3	4
Area 3	4		2	1		1	1	7	16
Area 4	1							4	5
Area 5		1							1
Unit U					1				1
Unit D								1	1
Total	**5**	**2**	**2**	**1**	**1**	**2**	**1**	**18**	**32**

Table 7.15 - Gastropod Tool Type Counts by Area

	Columnella Hammer	Cutting-Edged Tool	Gastropod Pounder/Hammer	Perforator	UID Tool	Type A Hammer	Type F Hammer	Type G Hammer	Total
Crown Conch								15	15
FL Fighting Conch								1	1
Gastropod			1		1				2
Lightning Whelk	5	2	1	1		2	1	2	14
Total	**5**	**2**	**2**	**1**	**1**	**2**	**1**	**18**	**32**

Table 7.16 - Gastropod Tool Type Counts by Taxa

does not fit clearly into one of the categories designated by Marquardt. Like a Type A Cutting-Edged Tool, it has a notch on the outer lip of the body whorl and a hole on the opposite side of the shell, and the shape of the cutting edge is relatively narrow, like a Type A Tool. However, this tool also has a second hole, like a Type B tool, but it is through the top of the shell (rather than on t) which is atypical of these types. The second Gastropod Cutting-Edged Tool (FS 389.5.1) was also manufactured from a lightning whelk and was recovered from Unit R in Area 2 (Figure 7.8b). This specimen might qualify as a Type H tool (Marquardt 1992:198). It has one hole through the top of the shell and another hole (partly obscured by apparent haft failure) on the outer whorl below the shoulder. The working surface of this second specimen is fairly blunted from use.

(a) FS# 380.8.1

(b) FS# 389.5.1

Figure 7.8 - Gastropod Cutting-Edged Tools

Eighteen of the gastropod tools in the assemblage are **Type-G Hammers**; they were manufactured from crown conch (15/18), lightning whelk (2/18), Florida fighting conch (1/18).

Type-G Hammers are typically crafted from average sized shells rather than the largest specimens and may have been relatively expedient tools, rather than a stage in the reduction process of especially robust shells (Luer et al 1986, Marquardt 1992:201) (Figure 7.9). Martin Menz's experimental study and use wear analysis of Type-G hammers from Crystal River (8CI1) and Roberts Island (CI41) sites indicates that the hammers from those sites were probably used to harvest and process oyster shells for consumption (Menz 2016). The Type-G Hammers in this assemblage ranged in length from 59.6 mm to 114.8 mm. Half (9/18) include evidence of hafting failure, reflecting use to exhaustion, though in some cases tools were re-hafted to repair the broken tool. Blunt use wear was the most common, evident on all but one tool which did not have any evidence of use wear. Spalling and/or boy whorl damage also occurred on the majority of tools. The two lightning whelk hammers and the Florida fighting conch hammer sustained all three types of use wear; the lightning whelk tools also showed evidence of hafting damage. Menz's experimental work with Type-G Hammers suggests that blunt wear is typical of use on oyster shell, whereas using the hammers on bone produced more severe damage to the tools including spalling and hafting failure (2016:135). (However, Menz experiments were conducted only with crown conch, so lightning whelk could react differently, perhaps fracturing more easily.)

Figure 7.9 - Examples of Type-G Hammer

The assemblage also includes two **Type-A Hammers** (Marquardt 1992:199) manufactured from larger lightning whelk and hafted with a notch and a hole, as well as one **Type-F Hammer** (Marquardt 1992:201), manufactured from a large lightning whelk from which portions of the columnella and spire have been removed, and hafting is accomplished with two shallow notches; this could represent a later stage of the "continuum of manufacture" or reduction sequence described by Luer et al (1986).

Five **Columnella Hammers** (Marquardt 1992:204-205) were identified in the assemblage. These tools are unhafted and probably represent the end stages of a tool's use life, after several other stages of reduction. All of the five in this assemblage show evidence of blunt use wear, and 4/5 show evidence of spalling wear (body whorls were not generally present on these tools to assess whorl damage).

Two **Gastropod Hammer/Pounders** were identified (Marquardt 1992:203). These are shells from which the outer whorl has been removed, with the remaining posterior portion of the shell used for pounding, using the columnella as a handle; the anterior end was also used as a hammer. These could also represent a relatively late stage in the use life of a large, robust gastropod shell tool.

One **Gastropod Perforator** was identified in this assemblage (FS 210.12.1). Marquardt describes a Columnella Perforator (1992:204) that is sharpened to a point on one or both ends. The tool identified here, however, retains portions of the body whorl and aperture and includes two holes for hafting. The tip appears to have been sharpened but then perhaps somewhat dulled from use, and the point itself is not as fine as one might expect for an awl or a needle. This tool might also have been reworked from a cutting-edged tool that was previously hafted.

—

In their study of gastropod tool blanks at Big Mound Key, Luer et al. (1986:119-120) observed that robust specimens of lightning whelk were specifically selected for use as tools, and that the size and durability of shells crafted into blanks were notably different from that of the majority of shells that were consumed. A comparison of the shell tools in this assemblage and unmodified shell found throughout midden contexts at the site provides some perspective on how Weeden Island residents selected shells to be used as tools. I focus on hammers and cutting-edge tools—excluding columnella hammers and gastropod pounders—as these are the tools that are likely to best represent the original size of the gastropod because they have been subject to relatively less reduction. All of these tools have of course been reduced in some fashion, so their weight will necessarily be lower than the weight of the unmodified shell. Length data are not available from unmodified shell excavated from midden contexts, though average weights for whole gastropods are available for some contexts. I use weight as a point of comparison between general discarded shell and shell tools, keeping in mind the caveat about reduction affecting the size of any recovered shell artifacts.

Within this subset of shell tools, Type G Hammers are made of the smallest shells, with an average length of 73.33 mm and weight of 55.0 g (Table 7.17). Type G hammers made of crown conch are larger than those made of lightning whelk, though a single hammer made of Florida fighting conch is the largest Type G specimen. Cutting-edged tools are the largest at an average length of 162.62 mm and average weight of 485 g, although it should be noted that there were only two such tools recovered. Individual specimens of Type A and Type F hammers were intermediate to these two categories in length and weight measurements.

	Average Length (mm)	Average Weight (g)
Cutting-Edged Tool	162.62	485.00
Lightning Whelk	162.62	485.00
Type A Hammer	107.14	127.90
Lightning Whelk	107.14	127.90
Type F Hammer	112.89	89.90
Lightning Whelk	112.89	89.90
Type G Hammer	77.64	54.96
Crown Conch	77.85	52.65
FL Fighting Conch	88.83	116.30
Lightning Whelk	70.61	40.45
Total	89.65	102.27

Table 7.17 - Gastropod Tool Sizes

Across the study area, a total of 4934 whole intact lightning whelk and 3843 whole intact crown conch were counted (i.e., from a selected sample of excavated contexts where all shells were recorded; see Chapter 6). The average weight of whole intact lightning whelk was 9.44 g, and for crown conch, it was 21.63. These weights are much lower than even the sizes of shells that have been into Type G hammers. The difference, however, is not surprising as it was observed that many midden deposits included large quantities of juvenile lightning whelk and gastropods (see also Luer 1986 et al). While the actual incidence of shells the size of the two cutting-edged tools was not recorded, I observed that it was rare to encounter shells of this size that had not been modified in some way (i.e., into tools or broken down, perhaps for ornament crafting).

Fishing artifacts

This assemblage includes a small collection of shell objects that were likely used to capture fish via both individual and mass capture methods (see Chapter 6).

Net Mesh Gauges. Rectangular artifacts made of shell and bone have been hypothesized to have been used as gauges for maintaining a regular mesh size when manufacturing fishing nets (Walker 1992, 2000). These artifacts are usually polished from use and vary in size and shape, with the width relating to the size of the net mesh they can be used to produce (Walker 2000:33-34). Four potential examples of such net mesh gauges were recovered from these excavations, each produced from Quahog clam shell (*Mercenaria* spp.) (Figure 7.10). Three of the four are squarish in shape, a form that Walker excluded from her type definition and study because of a number of bone rectangles from Key Marco that she believed served a different function (Walker 2000:32-33); however, these are made of shell and seem more likely to have been used as net gauges than for a decorative purpose like the Key Marco rectangles, one of which was incised.

FS#	Length (mm)	Stretched Net Opening (mm)
168	35.88	71.76
285	37.37	74.74
291	47.11	94.22
375	39.76	79.52

Table 7.18 - Net Mesh Gauge Sizes. Stretched net opening size is double the gauge length (Walker 2000:33).

If these artifacts were used for net manufacture, their widths should provide information about the sizes of the nets produced with them: the “bar” of the mesh should equal the width of the net gauge, with the net opening to about twice that measurement when stretched by use (Walker 2000:33). The stretched opening determines the size of fish that can swim through or be trapped by the net. The potential net gauges have widths that range from 35.88 mm to 47.11 mm; nets made from these meshes would have stretched openings of 71.76 mm to 94.22 mm (Table 7.18). Gauges and nets of this size indicate the use of relatively larger mesh nets like gill nets (Walker 2000:34).

Figure 7.10 - Potential shell net mesh gauges

Figure 7.11 - Potential net weights (a-b)

Figure 7.12 - Columnella sinkers (a-b)

Net Weights. A single perforated ark shell (*Noetia ponderosa*) recovered from the site was probably used as a net weight, for instance on a gill or seine net (Marquardt 1992:212) (Figure 7.11a). A single perforated oyster shell (Figure 7.11b) recovered in this study could also have been used for this purpose.

<u>Sinkers</u>. Columnella of conch and whelk shells that have been separated from the inner and outer whorl of the shell, with a groove cut into one or both end, are hypothesized to have been used for hook-and-line fishing: either part of composite shank hooks or as simple line weights (Walker 2000). Composite shank hooks would combine a sinkable material (like stone or shell) with a hook or barb to catch fish at the end of a line. Grooved columnella could be tiedf to a bone point (see below) (Walker 2000:37-38). Hooks like these are typically used for fishing in relatively deeper waters, either offshore or at least deeper inshore waters (Walker 2000:39).

Alternative explanations for these artifacts (also called plummets) are that they were worn as ornaments, especially certain finely made examples (Thompson et al. 2017; Walker 2000:30), or that they were used as loom weights (Lipo et al 2012). A recent analysis by Thompson et al. (2017) suggests that many plummets in the southeast were used as adornment in public ritual, although some may also have been used for fishing. Deposition in domestic contexts and production on readily available materials, however, may point to an object's having been used for utilitarian purposes rather than ritual or adornment.

In this assemblage there is one grooved columnella that clearly matches Walker's type definition and another ungrooved columnella that may still have functioned as a sinker (see Marquardt 1992:206, "columnella sinker, plummet variety") (Figure 7.12).

<u>Quahog clam shell tools</u>

It was observed during this project that some quahog clam shells (*Mercenaria* spp.) showed potential evidence of modification or use wear, and whole and fragmented quahog clam shells were saved from the majority of excavated contexts, but this assemblage has not yet been studied in detail. Some recognized tool forms that utilize whole quahog shell valves include notched valves for digging, perforated valves for anchoring, and whole valves with an area of pounding that may have been used as a kind of anvil and/or chopper (Luer 1986:134-145). Triangular to rectangular segments of the clam shell may also have been used as adzes/celts, particularly in the Gulf coast region of Florida where *Strombus* conch were not available for this purpose (Reiger 1981). Use wear or serration needs to be distinguished from chipping of the lips of quahog clam shells, which is typically the result of lightning whelk predation rather than human modification (Luer 1986). The robust shells of these clams, which zooarchaeological assemblage indicates were consumed regularly, could likely have made reliable expedient and formal tools, for scraping or chopping, perhaps with hides or wood. This is a portion of the shell assemblage that would benefit from further study.

<u>Ornaments and bead blanks</u>

Four shell beads of the disk variety (Marquardt 1992:214-215) were recovered from this project (Figure 7.13, Table 7.19). Three of these were recovered from Unit V, in the vicinity of the Feature 21 pit. One bead was recovered from shell midden deposits in excavation block C. The style and craftmanship was slightly different for each bead. FS 205.13.1, the bead from Block C, was the smallest with a diameter of 7.89 mm, but a relatively large hole diameter of 3.25 mm (Figure 7.13a). FS 377.4.1 is the most finely made bead with even proportions and neatly smoothed edges (Figure 7.13b). FS 377.18.1, by contrast, is wide (26.11 m diameter) with jagged edges and may still have been in progress; it is also of a thinner shell fragment than FS 377.4.1, at 2.82 mm thickness compared with 4.95 mm (Figure 7.13c). FS 382.3.1 falls somewhere between these two in craftsmanship, though it also appears as if smoothing of the outer edge might be in progress (Figure 7.13d). The hole of this bead was drilled at a slight angle.

A shell pendant was also recovered from the Unit V excavation, from the same context as the shell beads. FS 377.9.1 has a triangular shape and a hole drilled at one end (Figure 7.14).

FS	Bead Diameter (mm)	Hole Diameter (mm)	Thickness (mm)	Weight (g)
382	16.58	2.31	3.87	1.4
205	7.89	3.25	2.38	0.1
377	13.95	3.98	4.95	1.4
377	26.11	3.41	2.82	2.3

Table 7.19 - Shell Disk bead Measurements

Figure 7.13 - Shell disk bead images

Figure 7.14 - Drilled shell pendant

Debitage, blanks, and unidentified fragments

Evidence of shell working was identified in blanks and a general category of shell debitage. The recognition of shell debitage was likely not comprehensive across all excavated areas because shell (including taxa that can be consumed as well as utilized for shellworking) was so ubiquitous on the site, and modified shell is not always easily distinguished from breakage through taphonomic processes. Debitage from particularly large gastropods (especially lightning whelk) were the most readily identifiable, and these specimens were also probably the most likely to have been used as a crafting material.

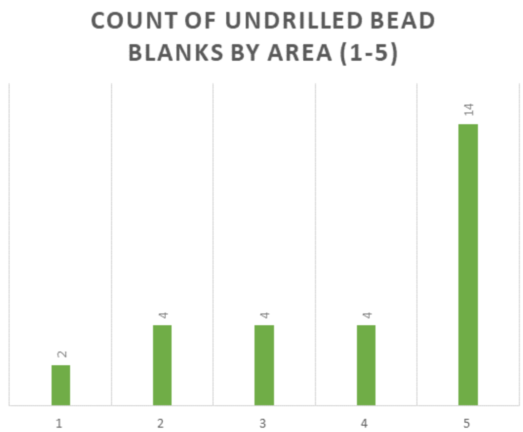

Figure 7.15 - Distribution of shell bead blanks

Figure 7.16 - Examples of undrilled shell bead blanks

Twenty-eight potential bead/ornament blanks were also identified in this assemblage (Figures 7.15 and 7.16). Generally these include round or rectangular shapes that appeared to have been deliberately cut out of larger shell pieces; some more irregular shapes were also identified, and these might be alternately classified as simply debitage . One probable blank was a rectangle with evidence of a failed attempt at drilling that fractured the blank beyond repair (FS 326.6.1). These blanks were identified from all site Areas, but the greatest quantity were identified from Area 5/Unit V.

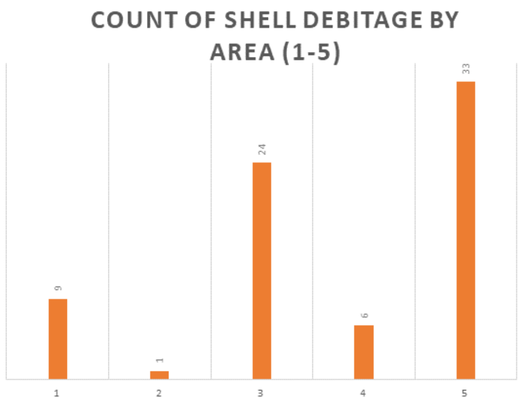

Figure 7.17 - Distribution of shell debitage


Figure 7.18 - Examples of shell debitage

The more general category of debitage included 74 pieces from 28 excavation contexts (FS numbers) (Figures 7.17 and 7.18). All of the fragments except one were identified as gastropod (one was unidentified by taxa), and of these 65 were identified as lightning whelk. Marquardt’s debitage category (1992:217) refers to “large, often roughly triangular fragments” of lightning whelk whorls, which could have been removed in the course of producing columnella tools. I suggest that some instances of debitage identified in this assemblage might also be related to the production of shell beads or ornaments made from the whorls of robust gastropods. Pearson and Cook (2012:92-93) observed that Atlantic knobbed whelk could be used as hand-held hammers to break down other whelk, though the resulting fragments were of variable size and shape. Four of the identified pieces of debitage do have modifications that might have been hafting holes, suggesting they broke off gastropod tools as a kind of use wear damage, or were intentionally removed to modify the tool to a new form, or were broken post-depositionally. Shell debitage was recovered from all Areas, but the highest quantities were recovered from Area 5/Unit V and Area 3.

Other modified shell

Finally, there were two instance of apparently modified shell that do not clearly fit in any of the above categories. One of these is an unusual fragment of a gastropod whorl that has been perforated several times, but the shell is too worn to discern whether the holes are human-made, i.e., there is no evidence of drilling; this was recovered from Block C. The other type of unidentified modified shell comes from Unit D, where gastropod columnella that appeared to have been subject to some type of heat treating were observed during excavation, and a sample of these were saved. The shells were shiny and hard but somewhat brittle, and it is possible this effect was a byproduct of other activity in the area rather than deliberate modification of the shell.

Modified Bone Artifacts

The total quantity of modified bone artifacts is small (14 items) and includes bone points and probable bone point fragments, a cutting-edged tool fashioned from a fossil shark tooth, and a potential bone pendant. These were recovered during excavation, screening, and laboratory sorting of midden sediments.

In this assemblage, four end fragments (i.e., including the point) of bone points were identified, along with 5 fragments of polished bone that are probable central fragments of bone points (one of which appears to be from the same original point as one of the end fragments) (Figure 7.19). The aforementioned points were manufactured of deer bone; additionally, a polished stingray spine was recovered and may have served similar function, albeit while possessing natural barbs. These artifacts were recovered exclusively from two locations: Unit H, located on a small low mound of shell midden in Area 1, and Unit V/Feature 21 in Area 5.

Figure 7.19 - Bone points and fragments of polished bone

Walker (2000) makes a compelling case that the bone points commonly found in Florida were probably used as fishing gear, rather than for terrestrial hunting. Bone points could be a component of a composite hook, perhaps lashed to a grooved columnella sinker. They could also be used as gorges for fishing, functioning similar to a hook at the end of a line; barbless trolling is appropriate for shallower waters, particularly when capturing fish (like *Caranx* sp jack fish) that feed in a striking manner (Walker 2000:27). In some cases bone points may have been part of simple spears or leisters. In all of these uses, bone points are gear for the individual capture of fish (versus mass capture techniques).

Figure 7.20 - Drilled bone pendant

The other modified bone artifacts are also both from Unit V/Feature 21 in Area 5. One of these artifacts may have been a kind of pendant, as it features a drilled hole and some additional cut marks or scoring (Figure 7.20); if this is an ornament it is the only such artifact made of bone recovered from the study area.

The other artifact in this category is quite different: a knife or cutting-edged tool crafted from half of a fossilized shark tooth, likely from an extinct ancestor of the great white shark (Sharlene O'Donnell, personal communication 2017). The edge shows extensive chipping, indicative of the tooth's use as a tool. The use wear and provenience context of this artifact (i.e., alongside shell debitage and shell beads in different stages of manufacture) suggest it have been part of a shell-working toolkit (Figure 7.21).

Figure 7.21 - Fossilized shark tooth tool

Discussion

I return here to the three research questions presented at the start of this chapter, related to raw material procurement, crafting for trade, and the social organization of craft production.

What priorities were reflected in raw material procurement practices?

Most of the raw material was procured locally. Raw material choices prioritized local availability and low-cost materials in most cases. While chert quarry sourcing techniques could be used for only a small portion of the lithic artifacts, the majority of these came from local Tampa Limestone chert outcrops, particularly those lithic artifacts from Safety Harbor contexts. One exception is the Pinellas PP/K from Unit I in Area 1, which may be crafted of stone from the Ocala Limestone Quarry Cluster in north central Florida. This tool, however, might represent the importation of a finished tool rather than production on imported raw materials; this situation would be analogous to that described by Robert Austin at Pineland, where several bifaces manufactured on Ocala Limestone cherts were identified (Austin 2013:677). While the present study did not include a robust sourcing of ceramic artifact materials, in general there is no evidence that the clay or temper used in locally produced pottery involved procuring materials from farther than necessary. Pinellas Plain and sand-tempered pottery were probably produced locally with local clay and temper. Bone crafting is not extensive, but it seems to make use of animals that also served as food resources.

The procurement of shell used for crafting was also intertwined with the collection of food resources, although the extent to which the demands of tool and ornament crafting required significant additional effort is still uncertain. Shell used for crafting implements and ornaments were generally of the same taxa that were also consumed throughout the occupation, suggesting that the procurement of raw materials for these items was embedded in the pursuit of food. A combination of quantitative data and anecdotal observations suggest that the largest shells were reserved for manufacturing specific implements, like cutting-edged tools. For more expedient tools like Type G Hammers, people were able to select shells of suitable sizes and robustness, though these were probably readily available within the populations that were also harvested for food. However, it is not clear whether residents would have had to make a special effort to collect larger *Busycon* whelk, perhaps traveling beyond the local estuarine habitats to the deeper waters of the Gulf. The zooarchaeological data do not not support extensive use of resources from the open waters of the Gulf for subsistence purposes, and it is possible that older, larger specimens of gastropods were sometimes encountered in estuarine contexts.

There are a few instances of potentially special materials being used in crafting activities, both from the Unit V excavation in Area 5. The implement made of a fossilized shark tooth that was recovered from this location is probably an example of opportunistic use of a special material. The coral stone debitage from Unit V requires further study before determining its origin, as it is presently unclear whether it is a heat treated version of the white coral found in other locations at the site, or perhaps has a different provenance than other examples of coral at the site. If special effort was taken to procure or produce this material, it does not seem to have been for technological reasons, as the debitage was primarily angular debris or shatter, and there was no evidence of tools or late-stage manufacture using this material.

The focus on locally available resources means that procurement of raw materials was primarily direct, rather than through exchange. At least some crafted goods, however, may have been produced for the purpose of trade and exchange.

What was the relationship between the local production of crafted goods and social interactions at a regional, or inter-regional scale?

In this study, the exporting of goods and materials from the Tampa Bay region to other locations is difficult to see; that relationship is generally better assessed from the perspective of the sites that received such items. However, where that context is available from other sites, it provides a basis for interpreting some of the production and material culture at Weeden Island in terms of trade and exchange. Indeed, there is an existing record of trade relations among residents of the Tampa Bay area, between Tampa Bay and South Florida, and between the Gulf Coast of Florida and the Mississippian world.

Residents of Tampa Bay may have provided lithic materials to South Florida, where chert is scarce. Chert bifaces, preforms, and cores from quarry sources in the vicinity of Tampa Bay were found imported the Pineland site in South Florida; those quarry clusters in the Tampa Bay region would have been the nearest source of high quality chert for Pineland's residents (Austin

2013:677-679; 695). This study shows that residents of Weeden Island did utilize chert from the same quarry clusters as those that provided lithic material to Pineland residents, including the Hillsborough River Quarry Cluster, which is local to the Tampa Bay area. Austin (2013) argues that Tampa limestone chert came to Pineland in small packages, but it is not certain whether these materials could have been obtained directly by Pineland residents traveling to the region, or imported as part of ongoing trade relations.

The exchange of pottery points to interaction in a general sense, although the potential social mechanisms for such trade are varied. During the Caloosahatchee III period (AD 1200-1350), Pinellas Plain ceramics began to be used and deposited at Pineland (Cordell 2013). In the course of interactions with South Florida populations, Belle Glade pottery could have been imported or brought to the Tampa Bay area. These ceramic patterns could speak to ongoing social involvement, like marriage and alliance, instead of or in addition to economic engagements, although there is an absence of Pinellas ceramics at Pineland during the earlier phase of Safety Harbor. It remains unclear whether St. Johns wares found at Weeden Island were imported from the east coast of Florida or produced more locally in the style of eastern and northeastern Florida. As I discussed in Chapter 2, Weeden Island series ceramics were likely made in northern Florida and southern Georgia and traded to the Tampa Bay area; this would have facilitated local participation in certain mortuary ceremonial practices that were probably adopted from these northern neighbors. However, the production and trade of Weeden Island ceramics would have taken place prior to the Safety Harbor occupation.

The marine shell trade may have been a particularly potent context for trade and exchange, with implications ranging from economic to political to social and religious. As I discussed in Chapter 4, Safety Harbor people probably produced shell beads and goods themselves but may also have exported whole or partial marine shells to be crafted locally by Mississippians. Sourcing studies have shown that shell used to produce many prestige objects in the Mississippian southeastern and midwestern U.S. was originally procured from the Florida Gulf Coast (Bissett and Claassen 2016; Kozuch et al. 2017)—although items have not necessarily been sourced to the Tampa Bay region specifically, and large *Busycon* shells may have been more readily available along the southwest coast of Florida, in the domain of the Calusa. Nevertheless, involvement in the marine shell trade is one likely context for interactions between Safety Harbor and Mississippian people (Mitchem 2012). Trading locally produced shell beads may also have given coastal Safety Harbor people an advantage in relations with their interior neighbors (Austin 2000:309).

Evidence for shell bead production and other instances of shell-working at Weeden Island are the most suggestive of involvement in regional and inter-regional trade. The presence of drilled shell beads, blanks in various stages of production, and an assortment of debitage indicate that shell disk beads were produced on site, even though microliths or stone drills were not recovered.

The archaeological signatures of exporting marine shell as a raw material are more ambiguous, making it difficult to establish conclusively that Safety Harbor people or residents of any particular site participated directly in the marine shell trade (Mitchem 2012:184). The recovery of very large quantities of marine whelk shells at the Mt. Royal site in northeastern Florida has been interpreted as evidence that residents of the site were involved in the Mississippian shell trade (Moore 1894). While whole shell would have been necessary to supply for artifacts like cups and masks, some items like gorgets could have been made of large fragments of the shell’s whorl, and beads could have been manufactured on even smaller fragments of the whorl and columnella. Thus, the procurement and trade of shell for producing these smaller items would be even more difficult to see archaeologically at the source locations. Since the early Safety Harbor occupation and most of the occupation in this study predates the increased demand for gorgets, masks, and cups, we could expect that participation in the shell trade at this time would have focused on materials for beads. At the Weeden Island site, gastropod debitage could point to the breaking down of shells for parts to export, although these pieces could also be related to local bead production or shell tool production or use. It is not presently possible to conclusively link any material evidence of debitage or whole shell at Weeden Island to the Mississippian shell trade, although the material to participate in such trade would certainly have been available.

In exchange for marine shell, residents of the Gulf Coast probably received nonlocal goods and materials from the broader Southeast and Midwest. While exotic items and potential prestige goods like galena, copper, or stone ornaments were not recovered in this study, such objects would probably have been destined for special depositional contexts, like mounds and burials, rather than the domestic contexts investigated in this study (e.g., Bullen 1952; Mitchem 1989, 1996) Indeed, the 1920s Smithsonian excavations of the burial mound at Weeden Island did produce items that could be nonlocal trade items, in particular ground stone artifacts including a stone pendant, a stone plummet, and four large drilled stone objects. Carved ground stone ornaments are among the nonlocal artifacts sometimes found in Safety Harbor burial mounds (Bullen 1952; Mitchem 2012). The burial mound is generally considered to date to the Woodland period and to represent Weeden Island culture ceremonialism. However, Safety Harbor incised sherds were apparently recovered from the mound itself, so some later use of the cemetery is a possibility (Willey 1949:109-110). Unfortunately the stratigraphic location of the ground stone artifacts within the mound is not known, so it is unclear when these artifacts were interred. These burial goods do suggest one potential material basis for trade and exchange with Mississippians or closer neighbors who would have had an interest in the marine shell that Weeden Island residents could offer.

Could any community with access to even fragments of marine shell have participated in the Mississippian marine shell trade, or were there further barriers to entry? The ability and resources to transport the material would also have played a role, along with the social connections to Mississippian contacts and perhaps the means to fend off competition when necessary. In northeastern Florida, St. Johns II groups who provided shell to Mississippian chiefdoms may have navigated these relationships by forging alliances with their more immediate neighbors, the Ocmulgee, who would have had better access to the Macon Plateau; these interactions would have built on a long history between people of this region (Ashley 2002). Safety Harbor people may likewise have built on connections established during the Woodland period, when they were at the periphery of the Weeden Island cultural sphere. For instance, Suwannee Valley people of north Florida appear to be basically continuous with the preceding McKeithen Weeden Island culture (Worth 2012) and could have served as a mid-way point if goods were transported over land.

For residents of Weeden Island, the decision to engage in trade relationships was social and political. There is minimal evidence for importing goods or materials that could be seen as strictly utilitarian or technological. While Woodland-period residents of Tampa Bay apparently obtained nonlocal ceramics so that they could participate in ceremonies developed elsewhere, during the Safety Harbor period, inhabitants of the area may have had a more central role in procuring, crafting, and distributing desirable items to other locations.

What role did craft production play in the organization of labor and space within the Weeden Island residential community?

The classes of artifacts discussed in this chapter provide different types and degrees of evidence about the organization of production during the Safety Harbor occupation at Weeden Island. Beginning with ceramics, no direct evidence of pottery production was recovered within the study area, although the clay deposit in Feature 21/Unit V could potentially reflect the collection of materials for production, and the AWIARE excavations near Area 1 also recovered clay deposits. Utilitarian wares of typical quality are prevalent in the domestic contexts of the study area, and there is no real basis in this data for discussing differential participation in the production of pottery. Differences in the quantities of ceramics deposited at different locations on site (i.e., variability in the density of ceramic artifacts) probably reflect use and deposition of vessels more than anything related to production. Looking beyond the domestic pottery assemblage represented in this study, the incised wares that are more commonly found in mortuary contexts may have been produced under different circumstances or with a greater degree of restriction than utilitarian pottery, although there is no direct evidence for this. Researchers have observed that Safety Harbor mortuary wares have some similarities in form and motifs to Early to Middle Mississippi period (A.D. 1000-1350) vessels from the Mississippi Valley (Mitchem 2012). In other ways Safety Harbor surface decorations maintained traits of Weeden Island decorated wares, which are also found mostly in burial contexts, but with the Safety Harbor vessels exhibiting less apparent skill, resulting in a final product that has been called degenerate in comparison with Weeden Island vessels (Mitchem 2012; Willey 1949:478-479). This difference may be because Weeden Island mortuary vessels were imported from centers of production north of Tampa Bay (perhaps with the exception of Papys Bayou series wares), whereas Safety Harbor mortuary vessels were produced locally. The production of Safety Harbor mortuary wares thus drew on ideological and artistic traditions that originated elsewhere, and which likely had religious significance. However, if Safety Harbor mortuary vessels were produced locally for local consumption, there was probably not an economic motivation for production to take place at a large scale or by fully dedicated artisans.

Some chipped stone reduction took place at almost every location on site, though the intensity varied between deposits and areas. During the Safety Harbor period there was evidently an increased emphasis on intensive core reduction and the production of expedient flake tools, perhaps including bipolar reduction techniques. A greater focus on biface tool manufacture and maintenance in Area 3/Block D suggests different technological strategies at work here, although the social basis for these is ambiguous. Since the tools being produced in all cases were essentially subsistence-related implements, it seems likely that this variation is an effect of the spatial configuration of domestic practices, rather than driven by some specialization of production.

Similarly, turning to modified bone implements, spatial restriction of bone points and polished bone fragments may have more to do with the use of the finished product than with production. For instance, since these implements were likely used for individual capture methods of fishing, their deposition might reflect a focus on these particular methods.

Given their relevance to trade and to local ritual, shell ornaments are a more likely domain for some degree of specialized production. At Safety Harbor sites generally, information about the actual production of shell beads is limited, with the most detailed record coming from an assemblage of microlithic tools at the Anderson mound (8PI154) portion of the Jungle Prado

Complex. Austin (2000) interprets the spatial and stratigraphic restriction of microlithic tools as evidence of a workshop activity are for the production of beads and/or shark tooth tools. Use-wear analysis indicated that the majority of these microliths were used to drill hard materials like shell and bone; a small number of the tools may have been used to engrave bone or wood (Austin 2000:304-305). The limited quantities of beads recovered at the site suggest that if beads were a focus of production, they were either traded out or only deposited in special contexts like graves (Austin 2000:306-312). Given the marine origins of these shells and the presence of shell beads at interior sites (i.e., evidence of trade), it seems likely that there was some degree of community-level specialization (Costin 1991:8; Muller 1984) in the greater Safety Harbor region. However, among the St. Johns II communities of Northeast Florida, Ashley (2012:115) has suggested that shell beads were probably produced in domestic contexts, with shell materials procured alongside daily subsistence activity (see also Brown et al. 1990:271-272). Existing evidence, then, indicates that Safety Harbor shell bead production was regionally concentrated (*sensu* Costin 1991), but there is no clear evidence for elite sponsorship, full-time production, or especially large-scale production; that is, the degree to which the labor of bead production was coordinated or controlled *within* communities remains a major question about Safety Harbor organization.

In this study, there was some dispersed potential evidence of shell-working at the site, but the most compelling assemblage was concentrated in the Unit V/Feature 21 excavation area. This feature and overlying midden included one finished shell disk bead and one shell pendant, two roughly-finished beads or drilled blanks, and dozens of fragments of shell that may be blanks or debitage from breaking down shells. These were found along with half of a fossilized shark tooth with visible chipping along the edge and a drill-like tip, a possible bead-making implement.

However, no drills or microlithic tools were identified here or elsewhere on site. This evidence of bead making was recovered alongside other anomalous patterns and artifacts that are suggestive of some ritual activity or intentional deposition: coral stone angular debris, a deposit of varied bird bones, a lump of raw clay, and food resources that may have been collected from the deeper open waters of the Gulf rather than the nearer estuarine environments. However, evidence of production and potential ritual were also recovered alongside refuse that was not substantially different from what was recovered in other domestic deposits around the site. The remains of at least 38 individual fish were recovered from the pit feature, along with typical foods like deer, turtle, oysters, lightning whelk, and crown conch. The pottery assemblage included utilitarian wares, with the exception of one Carrabelle Incised sherd, and the chert debitage appeared functionally similar to assemblages from other contemporaneous midden deposits at the site. It should be noted that excavations in Area 5 were ultimately limited by time constraints, and the magnetometer survey identified other likely features in the vicinity of Unit V that might expand our view of production activities in this location if they were to be investigated in the future.

While evidence of shell bead production in coastal contexts is generally limited, a case study of shell bead production from Ossabaw Island, Georgia provides a basis for comparison with this assemblage (Pearson and Cook 2012). Excavations at an Irene phase (ca. A.D. 1350 to 1550) shell midden on the island produced stone microdrills, 31 shell beads and blanks, knobbed whelk hammers, and and knobbed whelk shell fragments in much higher quantities than other nearby middens (Pearson and Cook 2012:89-91). The midden also contained typical household trash that had been collected and disposed along with shell-working materials (Pearson and Cook 2012:99). The midden itself was round and 5 m in diameter, one of about 30 such individual middens arranged in an arc across the site; thus, it probably represents the domestic refuse of an individual household (Pearson 1984). Based on the presence of shell beads like those at the Ossabaw site at numerous nearby sites (mostly in mortuary contexts), the authors conclude that beads were produced for local consumption.

Like the Ossabaw case, the Unit V deposits at Weeden Island are an example of bead production that is unique within the site and takes place in a domestic context. Similarly, beads produced at the Weeden Island site were probably consumed locally and distributed to other Safety Harbor communities. The evidence for bead production at Ossabaw is in some ways more robust than at Weeden Island, given the large number of microdrills, the presence of ceramic abraders, and the higher quantities of raw material (knobbed whelk) compared to other middens. On this third point, however, in the Ossabaw case study, oyster was the most common component of shell middens, making it more feasible to distinguish fragments of gastropods like knobbed whelk as specifically crafting debris. At Weeden Island, in contrast, gastropods are as common as or sometimes more common than bivalves like oyster, and suitability for crafting probably had more to do with size and condition than taxa. The scale of production in the Ossabaw case, as measured by beads and blanks, is not that different from at Weeden Island, with five finished disk beads and another 16 roughly finished or undrilled blanks. However, the Weeden Island Unit V assemblage is distinguished from Pearson and Cook's case study by the indications of some type of ceremony and/or intentional deposition associated with the crafting activities.

Shell bead production at Weeden Island thus likely took place in domestic contexts, but it was spatially restricted. This restriction may have reflected a division of labor within the community, in which only certain households or individuals crafted shell beads. A domestic scale and household locus of production is probably to be expected for shell crafting, which is time-consuming but does not require special facilities or collaborative work (Trubitt 2003:255). Returning to Costin's (1991) parameters, then, shell bead production was probably nucleated at coastal sites and took place on a kin-based scale. While an individual or household specializing in shell bead production may have received some community support, these activities were almost certainly part-time, given the apparent scale of production relative to subsistence debris. On the question of context or degree of elite sponsorship, while there is no evidence for attached production, the idea that Safety Harbor artisans were independent in the sense of producing for a "general market" (Costin 1991:11) is complicated by the ceremonial purposes of shell beads, as well as the fact that exchange probably took place between communities rather than among local households. These interactions might have been managed or facilitated by other members of the community without those people acting as patrons or sponsors by themselves supporting artisans economically. The potential indicators of ritual activity found alongside evidence for shell-working raise the possibility that shell bead crafting activities were somehow ceremonially marked, even if they took place in otherwise typical domestic contexts. Thus, even if the labor of craft production was divided unequally among households or individuals, perhaps the broader community still had some responsibility for or ownership over the final product (e.g., Ashley 2012:116). In that case, we might understand the creation of the Feature 21 deposit as representing an event recognizing the special labor of producing shell ornaments, which ultimately had both ceremonial and economic value for the Weeden Island community.

-

Chapter 8 - Safety Harbor Settlement and Community Organization at Weeden Island

The preceding chapters have situated the Safety Harbor culture and the Weeden Island case study, outlined the spatial and temporal structure of the study area, and presented data about and interpretations of the remains of plants, animals, and material culture. In this chapter I synthesize these data to address the project's central research questions about domestic practice, community organization, and late pre-Columbian socio-political development in the Tampa Bay area. First, I return to the site areas and deposits introduced in Chapter 5 to interpret evidence for activity areas in light of the data analyzed in Chapters 6 and 7. Next, I assess scenarios of site use and community organization for the Safety Harbor occupation of Weeden Island. Finally, I discuss how the developing picture of domestic life at Weeden Island fits archaeological models of community organization.

Activity Areas and the Interpretation of Domestic Practice

A residential community will engage in a variety of domestic activities, many of which have material correlates in the archaeological record of the site. Food preparation might involve the creation of cooking features, the occasional breakage and discard of utilitarian vessels, and the discard of inedible materials like marine shell; serving and consumption of food might have the particular material signature of a different size or style of ceramic vessel. The use of specific animal and plant resources can vary seasonally and between ordinary daily consumption versus special events. The storage of food sometimes produces distinct pit features for that function.

Production activities like the manufacture and maintenance of stone tools produce assemblages of debitage that can vary with the particulars of the activity, while the crafting of ornaments and special purpose items have their own related toolkits (sometimes broken and discarded) and evidence of stages of manufacture. Ritual or ceremonial activities may produce unusual material signatures indicative of intentional or meaningful deposit, like pits that have been filled with assemblages of atypical or symbolically charged materials, or of course burials. The scale of activities can also sometimes be gleaned from evidence like serving vessel size (e.g., Blitz 1993) or the quantity of discarded food remains, when the deposit is identified as a single event. These activities can be circumscribed to particular locations where those behaviors take place, although evidence of domestic activities might also be aggregated in secondary locations like middens and pit fill.

Within a temporal context of chronology and seasonality, the *range* of activities evidenced by different deposits and areas can provide information about the social scale and tempo of site use. In the early stages of this study, having observed an apparent spatial structure to off-mound deposits in the study area, I developed heuristic categories of "household" and "communal" activities to describe the behaviors that produced deposits in each area (Table 5.1). I use the general criteria that deposits produced by groups which conducted ordinary subsistence activities at the social scale of the household would include evidence of a broad range of domestic activities, because the household is the main economic unit and they would conduct these activities where they reside. Alternatively, deposits produced through village-level communal productive and consumptive efforts would be more limited materially (i.e., in terms of the activities practiced there or perhaps even the specific resources processed and consumed) because space could be divided by task rather than social unit. These deposits might also include evidence of larger-scale consumption, depending on the size of the group.

In this section I present information about the range and scale of activities undertaken in Areas 1-5 of the study area. For each Area, I discuss the setting, variation in specific assemblages (i.e., faunal remains and different classes of artifacts), and information about deposit formation to develop an assessment of activities practiced in that location. I also consider the range of materials recovered and types of activities evidenced (i.e., food processing, artifact production) at each area. I then characterize each area in terms of the range and scale of activities that contributed to its formation.

Area 1

Area 1 is characterized by a low midden mound adjacent to the more prominent Jeanne Mound Complex. Units A, H, C and I were designed to test geophysical anomalies located on and around this topographic rise.

The zooarchaeological assemblages from Area 1—as well as the more peripheral deposits sampled in Units N and D—display variation that points to the use of different procurement strategies or harvesting locations throughout the creation of this deposit. Four zooarchaeological samples from deposits in each Units D and H were analyzed fully (i.e., including both mollusk and vertebrate components from the 1/4"+ size fraction). In Unit D, fish bone are better represented than shellfish, as compared with the Unit H deposits. The relative contributions of hunting versus fishing to these deposits are more difficult to discern from the zooarchaeological assemblages, as the results for these two deposits differ depending on whether MNI or biomass measures are used.

The assemblage of fishing artifacts includes bone points and probable bone point fragments, all of which were recovered from either Unit H in this area, or Unit V in Area 5; this concentration of worked bone could represent a deliberate pattern of discard for these artifacts (i.e., since Unit H is located at a central location on the small midden mound in this area), or reflects some differential focus on composite-hook fishing techniques associated with the Unit H deposits.

Data on analyzed mollusk assemblages show notable variation in the relative representation of the primary edible shellfish taxa, indicating that different strategies were used or locations harvested over the course of this area's occupation. Variation in measures of salinity across deposits in this area also support this interpretation, as salinity can vary by location as well as seasonally. Type G hammers found in Units C, H, I likely reflect oyster processing, whereas a more robust Type A hammer recovered from Unit H could have more diverse uses.

Analysis of a flotation sample from the fill of Feature 1, a pit within Unit A, identified acorn and other miscellaneous or unidentifiable plant parts.

The scale of consumption activities is varied, as indicated by the estimated diameters of ceramic vessels. As discussed in Chapter 7, the distribution of rim orifice sizes from the total site assemblage peaks in the range of 20-24 cm. There is a sherd from each Unit A and Unit H above this peak, while Unit A also contained rim sherds within and below this peak range. The small number of measurable rim sherds limits the potential for interpreting consumption activities from these datasets, but it does minimally suggest that more than one size of bowl was used.

Variation in the density of ceramic artifacts between deposits in this area points to a range of activities and discard behaviors. Unit H has the highest ceramic density in the area. Unit

I's particularly low ceramic density is consistent with the interpretation of the anomaly targeted by this excavation: it appears to be a dumping event of primarily whole shells, especially gastropods.

Production activities in Area 1 were apparently focused on the manufacture and maintenance of chipped stone tools. As discussed in Chapter 7, the assemblage from Area 1 indicated a relatively generalized strategy of lithic production activities (i.e., a combination of core reduction and tool manufacture/maintenance) compared to the other robust assemblages at the site, from Area 3 and Area 5. Proportions of debitage types were similar across midden units (Units A, C, and H), suggesting some consistency to production activities across this area. Some shell-working debitage was present in Area 1, though not in large quantities (see Chapter 7). Some processing of garfish remains and collection of these elements may also have taken place in Area 1 (see Chapter 6).

In total, Area 1 deposits were apparently formed by a range of typical subsistence activities, without evidence of consumption or production on a particularly large scale or focused intensity; one possible exception is the quantity of bone points found in Unit H, which are not very high in number but nevertheless contrast with most other excavation locations, where none were recovered.

<u>Area 2</u>

The configuration of Area 2 is similar to Area 1, with a low midden mound evident on the surface as well as some outlying deposits. The excavated sample from this location is smaller than Area 1, and most analyzed samples come from the 2 x 1 m Unit R located on that small mound.

Vertebrate assemblages were only analyzed from two adjacent samples in Unit R, so it is not possible to assess variation between Unit R and Unit S. The vertebrate and mollusk assemblages for each sample from Unit R, however, are relatively distinct. FS 149 has relatively more fish (as compared to shellfish, and to hunted resources) and FS 388 includes relatively more terrestrial and hunted resources. In the mollusk assemblage, too, there are differences: FS 149 is dominated by lightning whelk while FS 388 is dominated by oyster (see Chapter 6). This midden was formed by cumulative discard events, and different meals during the time of formation included varied animal resources. A sample of mollusk remains from Unit S is closer in its profile of primarily edible taxa to the FS 149 sample, though the deposit in the location of Unit S generally had fewer zooarchaeological remains than the midden sampled in Unit R. Botanical remains in Unit R included a single specimen of maypop seed along with acorn.

The pottery assemblage from Area 2 suggests a different intensity or scale of consumption from other deposits in the study area. Sherds with measurable rims from Area 2 have relatively high estimated orifice sizes compared to the rest of the ceramic assemblage. Of the four such rim sherds recovered from Unit R, one fell within the 20-24 cm peak range for the total assemblage, while three were at the higher range, including one Pinellas Plain sherd from Unit R with an estimated rim orifice of 32 cm and two St Johns Check Stamped sherds from Unit R, each with estimated rim orifices of 35 cm. The ceramic density is also particularly high in Unit R, compared to other deposits in the study area. Since the rim orifice data as a whole does not suggest that there were different categories of vessels (i.e., the distribution is unimodal), and even these relatively larger vessels could plausibly be used to serve a small group of people, these patterns do not necessarily point to large-scale consumption. Factors like stylistic variation in pottery form or differences in food preparation techniques could also account for some of the differences in the domain of ceramic artifacts.

Production activities in Area 2 included the manufacture and maintenance of chipped stone tools, as in other locations. However, the recovered assemblage of lithic debitage was small, at only 10 pieces from midden contexts in Units R and S. Quantities of shell-working debitage from this Area were low (see Chapter 6).

Area 2 samples are limited and come primarily from the Unit R midden mound, but the available data does point to a range of domestic activities and subsistence strategies, with consumption events perhaps involving some larger-than-average vessels, but not necessarily evidence of remarkable communal feasts or other events on that scale.

Area 3

Area 3 includes diverse deposits and features that appear to represent a continuous occupation of the area. These include the feature pit sampled with Test Unit T, and four larger deposits within the Block D excavation: the North D Midden, Northwest D Midden, Central Block Features, and the Brown Soil Midden (see Chapter 5).

Variation between zooarchaeological assemblages in the Block D deposits suggests that a few different patterns of activity created these deposits (see Chapter 6). The Block D North midden and NW Shell Midden appear to have resulted from relatively consistent strategies of animal resource collection and consumption: both have a high representation of oysters relative to other major shellfish taxa, and samples from the Block D north midden has a low ratio of fish to shellfish and a moderate ratio of hunted to fished foods. The more diffuse brown-soil midden and discrete features in the central portions of Area 3 seem to have resulted from more diverse small-scale activities. The relative quantities of different shellfish taxa is variable across samples in the Brown Soil Midden in particular. One pit feature in this location, Feature 17, could represent a single communal consumption event. The pit does not include any remarkable artifacts or special foods, and the most common resource in the feature is oyster, a fairly ubiquitous food across the study area. Acorn and hickory were also recovered from a flotation sample from this feature. As a discrete deposit with a distinct profile compared to the deposits around it, it may have been the result of a single shared meal, if not necessarily something on the scale of a "feast." A sample from Feature 13b in Block D contained hickory, grape, and unidentifiable seeds and stems, while the only remains identified in sample from the associated Feature 13a were pitch and stem, suggesting the former was more likely created in associated with food preparation.

Relevant measures of the pottery assemblage are variable across Area 3 (see Chapter 7). Regarding the scale of consumption, estimated orifice diameters for measurable rim sherds in Area 3 fall below, within, and above the assemblage's peak range of 20-24cm. The two sherds above the peak range are a St. Johns Check Stamped sherd from the feature pit in Unit T, with an estimated orifice diameter of 26 cm; and a Pinellas Plain sherd from the Block D North midden with an estimated orifice diameter of 30 cm. Ceramic artifact density is heterogeneous across Area 3, both between and within deposits, although samples from the Brown Soil Midden were consistently relatively low. If this central portion of Area 3 was an occupation surface, that could account for the relatively low density of larger artifacts like ceramics.

With respect to lithic production activities, the Block D Northwest Midden and the Block D North Midden again share similarities including evidence of a focus on core reduction, compared to the Brown Soil Midden and North Central Features area where more tool manufacture and/or increased trampling seem to have produced a lithic assemblage with more broken flakes but much less angular debris.

As discussed in Chapter 7, the total quantity of both general shell-working debitage and bead blanks recovered from Area 3 was also relatively high within the study area, suggesting that shell crafting was an activity undertaken in this location.

In total, Area 3 shows evidence of a wide range of domestic tasks, including consumption and production activities, as well as varied approaches in each of these domains. The scale of consumption activities is not definitive but may have included some communal meals and the accumulation of refuse from either a large household or community-level activities, given the relative consistency of certain aspects of large midden deposits like the Block D North midden and NW Shell midden. In comparison to deposits in other areas of the site, the brown midden spread has unique characteristics, both in the form and content of that deposit, and in the increased focus on lithic tool production and potentially shell-working.

Area 4

In Area 4, a continuous spread of shell-bearing midden was identified across the area excavated, perhaps related to the proximity of this excavation block to the nearby prominent ridge of midden-mound (Three Ogres Mound). As discussed in Chapter 5, two partially overlapping shell-bearing features were identified in the northern portion of this excavation area, Features 19 and 20. This area also dates later than other deposits studied, which may account in part for some of the differences in the assemblages recovered here.

The analysis of vertebrate remains from this Area was limited to a single, relatively large sample encompassing Feature 20 (FS #200). This sample had among the lowest relative abundance of terrestrial foods (compared to aquatic resources) of all samples analyzed from the study area, and it ranks low in the Hunting/Fishing Index measure as well (see Chapter 5). This deposit was also observed during excavations to be marked by large quantities of whole (intact), relatively small gastropods (though other mollusk taxa were also present). The relative abundance of primarily edible mollusk taxa is actually very similar between this sample and the other two analyzed for Area 4, probably because FS #200 encompasses Feature 20 but was collected before the boundaries of that feature were really evident, and the other two samples were collected from lower levels of the same or nearby locations. In other words, there are methodological challenges to making quantitative distinctions between the contents of these deposits. To the extent that Feature 20 does represent a large deposit of relatively uniform animal remains (i.e., with a high proportion of gastropods, and particularly smaller or juvenile individuals, perhaps harvested at the same time or location), it may indicate consumption at a communal, rather than household scale.

There is limited information about the size of ceramic vessels from Area 4, as only two measurable rim sherds were recovered. Orifice estimates for both of these (a Pinellas Plain sherd from FS #200, in the vicinity of F20, and a Sand Tempered Plain sherd from the adjacent 2 x 2 m unit) fall in the most common range for the total assemblage, at 20 cm and 22 cm, respectively, so these do not necessarily point to large-scale consumption. Within the Block C excavation, the ceramic density is varied; as noted in Chapter 6, some of this variation corresponds with the density of the midden, but different areas of the block also seem to have different densities of ceramic material. Although midden deposits in this area are overlapping, they do seem to represent patterns of behavior that are distinct in ways like the use and discard of ceramic material.

The sample of lithic artifacts from midden contexts in Block C is small at 12 total pieces, which makes characterizing specific reduction activities difficult. The assemblage from this location does include a relatively high proportion of angular debris, including one large (42.1 g) piece. This limited evidence, then, points to some core reduction activities. Quantities of shell debitage recovered from Area 4 were relatively low (see Chapter 6), though a single small, finished shell bead was recovered here. Finally, some processing of garfish remains for their dentary elements may also have taken place in this location (see Chapter 5).

Area 4 is different from the other areas discussed here in a few ways, including the horizontal extent of midden deposits, the prominence of gastropod shell remains, and the relatively low quantities of production-related debris. Additionally, as discussed in Chapter 5, deposits here date later than other locations in the study area. The range of activities here was more limited, in particular to the deposit of food remains, especially gastropod shell, with less evidence of crafting activities. Based on the size and content of the Feature 21 deposit, the scale of consumption represented by these deposits may have been at least occasionally greater and focused on communal meals.

Area 5

The limited scale of excavation in Area 5 makes it difficult to fully characterize the nature of activities in this location. Area 5 does lack the small mounds (and potential household refuse dumps) evident in Areas 1 and 2. Excavations here focused on the Feature 21 pit, which has some atypical qualities compared to other areas.

Unit V midden deposits do show evidence of typical domestic activities, including the remains of the same types of foods eaten and discarded throughout the study area. Acorn, hickory, chenopod, and grape remains were identified in a flotation sample from the midden overlying Feature 21, along with miscellaneous and unidentified plant remains. The range of subsistence behavior evidenced in Area 5 is actually greater for this Area than others, due to the inclusion of some atypical specimens, as detailed in Chapter 6: higher proportions of terrestrial foods (relative to aquatic resources) and of fish (relative to shellfish); red snapper and sea turtle, potentially collected closer to the open waters of the Gulf; and 5 different taxa of birds, including the bones of a bald eagle.

The scale of consumption activities is difficult to determine since only a single feature and overlying midden was excavated here, and the results of ceramic orifice estimates are also inconclusive: of the two measurable rim sherds recovered in Area 5, one Sand Tempered Plain sherd had an estimated orifice of 28 cm, relatively high compared to the total assemblage, while another Carrabelle Incised sherd had a smaller estimated orifice diameter of 16 cm. The high density of ceramic artifacts for the feature pit and immediately overlying midden probably indicate domestic discard activities, since the types of pottery recovered were the usual utilitarian types, with the exception of a single Carrabelle Incised sherd (see Chapter 6).

Some atypical production activities also expands the range of production behaviors evident in Area 5. As discussed in Chapter 7, there is evidence for shell bead production in this location, albeit on a small scale (at least, based on the current extent of excavations). The density of lithic debitage is high, and the profile of debitage types is unusual, with a higher proportion of angular debris and over half of the lithic artifacts made of coral boundstone rather than chert (see Chapter 6). This assemblage might reflect an increased use of bipolar percussion technologies, or perhaps some non-technological use of lithic materials. The majority of the coral stone, along with the bird remains and a lump of raw clay were found within a feature pit that may represent intentional deposition.

In total, then, there is a range of activities evidenced in Area 5, including domestic tasks evident throughout the study area, but with a focus on shell crafting alongside some other atypical patterns of consumption.

Assessing Scenarios of Mobility and Site Use Patterns

At the start of Chapter 5, I presented two questions that guided my investigation of the structure of the Safety Harbor settlement at Weeden Island. I proposed four potential scenarios for site use and associated material expectations, based on the intersection of the social scale of domestic practice and the tempo of site use practices: that the site was occupied by (1) communities comprising long-term, sedentary, household groups; (2) sedentary communities with a low degree of social segmentation; (3) smaller communities of short-term, mobile household groups; or (4) seasonally mobile low-segmentation communities (Table 5.1). I developed these scenarios based on the expectation that concentrations of magnetic anomalies along the edges of the midden mound ridges represented distinct areas of occupational activities, which could be compared and contrasted to characterize overall site use patterns. In this section, I draw on the preceding discussion of the range and scale of activities to address those questions and identify some limitations of the four-part heuristic for characterizing site use.

What was the tempo of occupation of Weeden Island by Safety Harbor people, in terms of seasonal practices and continuity of occupation over time?

To characterize the tempo of occupation at the site, I planned to compare evidence from AMS radiocarbon dating, seasonality indicators, and the range of activities represented in deposits at each area. Evidence from seasonality indicators was, however, ultimately too limited to distinguish whether a given area was used throughout the year or on a more restricted seasonal basis. AMS radiocarbon dates does provide important new information about the tempo of the Safety Harbor occupation at Weeden Island.

For those areas with multiple radiocarbon dates (i.e., Areas 1, 3, 4, and 5), occupation of the areas appears to have been occupied relatively long-term, as in encompassing multiple generations, although the degree of apparent continuity of occupation for each area varies based on the available evidence (see Figure 5.31). Dated samples from deposits corresponding with the Area 1 concentration of anomalies range from cal AD 1021-1154 to cal AD 1160-1220; the duration of occupation for the area defined more broadly to encompass adjacent anomalies tested by Units D and N may have been even longer. In Area 3, dates from five samples indicate that occupation took place from at least cal AD 1039-1118 to cal AD 1211-1270, without a clear gap in the continuous use of this location. In Area 5, it appears that the Feature 21 pit was filled during between the early 11th and mid 12th century, whereas upper levels of midden above it were deposited as late as cal AD 1287-1390; the sequential dates from stratified samples in the midden suggest a gradual deposition of midden deposits during this thirteenth century use of the area. Area 4 was occupied later than the other Areas and apparently over centuries though again occupation may not have been continuous given three dates from two deposits. Dates from within the tested areas do not support short-term intensive use of each location, but instead indicate that each area was either continuously occupied for generations or perhaps revisited and reoccupied over time.

The chronology of site use emerging from these new dates suggests that while multiple areas were occupied at the same time, there were some apparent changes over time in the focus of settlement activities. Area 4 appears to be a distinct occupation, which could be related to a significant gap in site use. However, it may also reflect shifting mobility at a smaller scale, or perhaps changes in the scale and character of occupation that means that activities after about AD 1200 are less visible archaeologically in the study area. Two post-AD 1400 dates from AWIARE excavations in the Jeanne Mound Complex midden indicate that there was activity at these later dates south of Area 4 as well. This modeling also supports that individual areas represent sustained long-term occupation rather than sequential short-term use of activity areas (i.e., scenario a or b, Table 5.1).

What was the social scale (communal and/or household) at which Safety Harbor period residents of Weeden Island conducted typical domestic activities?

Data regarding the tempo of occupation in the study area pointed to scenarios in the “sustained long-term” category. As summarized by the criteria in Table 5.1, the range of activities evidenced in each area of concentrated deposits should then provide information to distinguish the social scale of activity in the community.

In general, excavations in the study area suggest that Safety Harbor residents of Weeden Island practiced a range of domestic activities in each location, Areas 1-5. As discussed in the first section of this chapter, excavations in each area produced evidence of consumption of varied resources and production of varied classes of artifacts, both within discrete features and in midden deposits that probably represent an amalgamation of discarded materials. Because midden deposits could represent an accumulation of trash from activities that initially took place in distinct locations nearby, the probable occupational activity area in Area 3 may be a better in situ representation of domestic tasks. In the “brown midden” portions of Block D, several small pit features were identified, and lithic debitage profiles suggest a relatively greater focus on chipped stone tool production; shell-working also appears to have taken place there. While this occupational area was apparently the site of diverse tasks and activities, it also evokes a communal activity area when viewed in the context of surrounding deposits and the broader study area. That is, no comparable area of probable occupational refuse of this size was excavated and the magnetic signature of this location—a moderately positive anomaly of irregular shape superimposed with stronger positive anomalies—is not especially common throughout the magnetometer survey data. There are other signals that may be comparable but have not yet been tested with excavation; for instance, an area in magnetometer survey area #4 to the southeast of Unit V (see Figure 3.7). The spacing and frequency of areas like this do not suggest discrete household locations. While estimates of pottery vessel sizes (orifice diameters) in this area and throughout the site do not necessarily indicate the regular use of larger dishes, baskets were probably in widespread use especially for tasks like the collection and transportation of shellfish. Further, bivalves and other shellfish were probably roasted without the use of pottery (Waselkov 1987:100-103).

Thus, while the range of activities represented in each area is diverse and initially appears to satisfy the criteria for "sedentary high-segmentation groups" (Table 5.1), additional contextual information from excavations indicates that some consumption took place on a larger scale, and that some activity areas may have been the site of domestic tasks communally rather than by discrete household units. On the other hand, the configuration of some refuse areas—like the small low mounds sampled by Unit H (Area 1) and Unit R (Area 2)—as well as the small cooking features occasionally identified throughout the study area suggest a smaller scale of activity. This finding highlights some limitations of the material correlates of the heuristic proposed early in this project, as a "sedentary low-segmentation group" might use community space in diverse ways over time, resulting in large refuse areas that effectively look like household trash. Additionally, the size of task groups may have varied without substantial community reorganization, especially if families were working together on domestic tasks but not necessarily storing surplus or attempting to restrict access to resources. In sum, the available evidence from the study area does not rule out elements of a communal economy, in which neighbors cooperated on subsistence and other activities and shared a stake in local resources. While some activities were probably undertaken by smaller units, perhaps sometimes reflecting family units, these may not necessarily have operated as truly independent households within the community.

Material Dimensions of Community Organization

To examine some material dimensions of community organization, I adapt Kolb and Snead's (1997) framework, which assesses labor investment, spatial organization, and boundary maintenance. One caveat is that Kolb and Snead advise taking a microregional approach to investigating archaeological communities, because a more limited scale of analysis will probably not capture the real space of community interaction (1997:612-613). The methodology of the present study was not based on full-coverage survey (Fish and Kowalewski 1990), and instead examines only a portion of the area that was probably regularly used by the Safety Harbor community at Weeden Island. This means that the analysis of spatial organization in particular is more limited than Kolb and Snead advise, although information from the geophysical survey and prior survey of the Preserve (Weisman et al. 2005) provide some useful context.

Some characteristics of community organization emerge from the degree of cooperative labor, how it is organized, and the ends to which it is put. Labor investment can be categorized into three levels: family, festive (communal labor exchanged for other commodities), and corvée (enforced communal labor) (Kolb and Snead 1997:613; Kolb 1997). Kolb and Snead use both qualitative and quantitative information about stone architectural remains to categorize different types of archaeological features according to these levels of labor organization; in Kolb's analysis of a native Hawaiian community the qualitative criteria includes ethnohistoric references to labor mobilization (Kolb 1997). Beyond the agricultural communities investigated in Kolb and Snead's study, archaeologists have in recent decades paid more attention to large-scale communal labor projects by hunter-gatherer communities. It is now widely acknowledged that hunter-gatherers throughout the Eastern U.S. constructed monuments and other public structures; by the categories above, these would probably have resulted from festive labor. Many hunter-gatherer communities also invested communal labor in hunting/fishing architecture, but labor and planning demands for different approaches varied and did not always require a substantial investment (Lemke 2016:21; Mahar 2005; Moss and Erlandson 1998). Fisher communities using passive mass capture techniques invested in infrastructure like weirs and traps; for these, too, there is variability in the technology and labor requirements of weirs and traps, some of which might demand the coordination of large corporate groups and others of which could have been put together by small task groups (Moss and Erlandson 1998). In many cases, and especially where architectural remains are not well preserved, there are significant challenges to quantitatively accounting for how and where community labor was invested.

In the Weeden Island case, it appears that residents used mass capture fishing techniques, but the present analysis cannot reliably assess the specific technologies used, beyond identifying the likelihood that stationery gill nets were part of the fishing repertoire. These require the construction of nets and associated artifacts, which probably depended on some sharing of knowledge and resources, but which could be daily tasks with less overt coordination than large scale projects like architectural construction. As I discuss in Chapter 7, the crafting of shell ornaments for trade with interior communities could very well have been a communal effort as a whole, though with some individualized allocation of labor to the actual crafting of items and facilitating exchange. On a larger scale, a number of Safety Harbor communities constructed platform mounds—as I discuss in Chapter 3, early archaeological expeditions indicated that one was present at the Weeden Island site though subsequent research could not confirm this with certainty. On a regional scale, then, to the extent that Safety Harbor people belonged to a community that transcended the residential site, some probably contributed what could be designated festive labor to these efforts.

The spatial organization of a community encompasses factors like relationships among areas of dwelling and economic activities, the degree of planning evident in community settlement, and access to productive resources and cosmologically important features. One theme of the present study has been the investigation of community settlement and site use patterns in a context that lacks a reliable pattern of residential structures. In other comparable contexts, including the shell midden sites that characterize the Gulf coast region of Florida more broadly, the circular or arcuate configuration of midden provides a basis for interpreting the broader village plan (Milanich et al. 1997; Pluckhahn 2003; Pluckhahn, Thompson, and Cherkinsky 2015; Russo 2004; Wallis et al. 2015). At Weeden Island, midden deposits generally form an arced shape, though this results at least in part from the geography of the peninsula, with midden-topped dunes edging the estuary wetland and waters (Figure 3.2). While high readings on the magnetic susceptibility survey appear to have a curved linear configuration (Figure 3.5), excavations did not clearly show, for instance, that these represented a series of discrete household deposits. There are, however, several possibilities for further examining the spatial organization and extent of domestic activities in these areas. First, this study focused on clusters of anomalies, primarily strong positive ones, but there are also a number of smaller anomalies of moderate strength throughout the magnetometer survey areas. A systematic study of these could potentially reveal additional structure to the site as represented by smaller features like postholes or midden deposits. A high level of planning in the domestic realm is not evident from work so far, aside from a general proximity to the dune ridges and coastline, which may reflect a prioritization of economic activities and access to subsistence resources.

One potential indication of a greater level of planning comes from the USF survey of the Preserve, which tentatively identified a possible plaza location outside of the study area I examine here. Researchers observed a low, flat area of about 80 x 90 m, adjacent to dune hills north of the study area (Weisman et al. 2005:99-100, 382). This feature is hypothetical and based on expectations of Weeden Island culture and Safety Harbor residential settlement plans. If this location did serve as a plaza it would have been located several hundreds of meters from the study area described here and thus probably did not structure daily life at this location.

Boundary maintenance in Kolb and Snead's framework represents their main gesture to the ideological aspects of community, as boundaries can be maintained symbolically as well as physically. The boundaries they discuss serve two different purposes: the delineation of uses of space within the community through physical features, and the symbolic bounding of the community as a local group with some shared identity. In their case study, the comparative value of an assessment of boundary maintenance seems limited, perhaps in part because of the incongruous activities and features it encompasses. The first type of boundary (reflecting intracommunity organization) seems to be an aspect of spatial organization, while the second (reflecting community identity) has more to do with the affective assemblages that Harris (2014:90-91) evokes.

There is no evidence of intentional physical boundaries to the Weeden Island residential community, either delineating exterior boundaries or interior use of space. The accumulation of midden refuse that we still see evidence of today probably provided enduring evidence of occupation, evoking communal memory and a sense of place. Beyond this, if symbolic bounding of the community was enacted through material culture, it is not evident on the utilitarian pottery, shell and stone tools, and undecorated bone points that typify the domestic artifact assemblage. The occasional ornaments are probably the most notable in this regard, especially two unique specimens in the assemblage: the triangular shell pendant (Figure 7.14) and drilled bone pendant (Figure 7.20) recovered from Area 5. But these are only glimpses of the rich symbolic world that was probably enacted through perishable materials and in nonmaterial ways like language or customs without clear material remains. As those who have critiqued Kolb and Snead's approach have recognized (Harris 2014; Yaeger and Canuto 2000), aspects of the living community that created these archaeological deposits would have emerged dynamically through interaction with one another and their material and environmental surroundings.

Chapter 9 - Conclusion

Cooperative Labor and Local Authority in a Fisher-Forager Community

This project has aimed to assess how the Safety Harbor era residents of Weeden Island organized their local community—how they divided and allocated tasks, coordinated labor, and the degree to which they competed for resources or participation in regional exchange networks. As I established in Chapter 2, archaeologists' understanding of Safety Harbor lifeways and socio-political organization has emerged in large part from regional patterns of settlement and mound construction, stylistic indicators of interaction with early Mississippian groups, and the recognition of a continued reliance on wild resources from local estuarine and terrestrial upland environments. By adding a new example of community life and domestic activity to the record of Safety Harbor culture, this study provides additional detail about how Tampa Bay area residents of the time organized themselves at a local residential level. While hierarchical power structures and material inequality do not always emerge in concert at local and regional (intracommunity) scales, understanding interactions between smaller scale units like households or lineages is important to realizing detailed histories of culture change. As I summarize here, this study has provided some new insights into those interactions within the Safety Harbor occupation at Weeden Island.

In Chapter 5, I discussed community settlement at Weeden Island in terms of the site structure and chronology of occupation in the study area, an area of about 4.8 hectares. While the study area was partly constrained by logistical limitations, it nevertheless encompasses a substantial portion of the 8Pi1 site, including two areas of interest identified by Weisman and colleagues' (2005) survey of the Preserve. In sum, these results showed that the study area represented pre-contact and post-contact Safety Harbor era occupation with the most intensive use occurring early in the Safety Harbor period from about cal AD 1000-1300, and that the deposits identified by geophysical surveys and subsequently excavated represent diverse domestic activities. The scale of deposits varied, including small cooking features and filled pits, occasional postholes, relatively small mounded midden areas (distinct from the midden-topped dune ridges known as the Jeanne Mound Complex and the Three Ogres Mound), and somewhat larger occupational areas and midden deposits closer to the more prominent midden ridges. These investigations indicated that this occupation was characterized by diverse activities and social configurations.

In Chapter 6, I presented evidence about subsistence strategies from data about plant and animal remains. While botanical remains were limited, instances of mast, grape seed, and chenopod provided some evidence about plant use, which has generally been difficult to identify in the environmental conditions of this region due to poor preservation. The record of animal remains was extensive and included vertebrate bone and mollusk shell. In general, the cumulative record conforms to expectations that people in the region utilized aquatic estuarine resources like fish and shellfish along with terrestrial resources including deer, turtles, and birds. The types of fish captured broadly point to the use of mass capture technology like gill nets, in addition to some individual fish collection with spears or trolling hooks. Gill nets might require multiple people to manufacture and use, but the degree of labor investment would depend on whether they were used in coordination with fishing architecture like weirs. A detailed look at variation in the assemblages of animal remains also indicated that fishing, hunting, and shellfish collecting were each relatively more abundant in different deposits. This variability probably reflects a combination of social and environmental factors. For instance, the prominence of mollusk shell and gastropods specifically in a large deposit in Area 4, which appear to represent occupation in the later phases of Safety Harbor, could indicate a more collaborative effort to procure a large quantity of food; however the evidence from this phase of occupation is presently too limited to say if this was a general trend in subsistence or only reflects a single event or type of activity. In sum, cooperative subsistence activities appear to have been the norm or at least common throughout the Safety Harbor occupation of Weeden Island, and there is no evidence that food resources were consistently restricted in some way within the community.

In Chapter 7, I analyzed varied classes of material culture from the study area, including ceramics, stone tools and debitage, modified shell, and modified bone. On the issue of raw material procurement, there appears to have been a strong focus on locally available resources that could be acquired directly. In the case of shell ornaments, gastropods suitable for bead production could probably have been collected in the course of ordinary subsistence activities. While the present study did not recover any cups or other objects that would be made from whole, robust specimens of lightning whelk (as these would likely have been traded and/or deposited in mortuary contexts), there were partial and fragmented large *Busycon* whelk recovered during excavation and evident on the surface in the vicinity of Area 3 and Area 4. If any special effort was expended to collect raw materials it would have been for these, although some such larger specimens could also have been encountered in the local estuary. While there was no clear evidence in the domestic deposits of importing raw materials or finished goods, there is reason to expect that residents exported lithic materials, pottery, and raw marine shell and finished ornaments, as I discussed in a synthesis of some relevant literature in Chapter 7.

Weeden Island residents likely traded shell beads that they produced themselves to communities inland from Tampa Bay; they may also have sent marine gastropods farther north, perhaps to distributors who traded directly with Mississippian traders, though the evidence for this is indirect. In terms of the local organization of craft production, the most interesting information again comes from the domain of shell crafting. I suggest that the identification of a shell bead manufacture area in Area 5 of the study area appears to represent a restriction of production activities that probably also reflected some division of labor. However, possible ceremonial activities associated with this location also point to some community involvement in the shell crafting industry, perhaps reflecting a communal investment in the process, and a community level of specialization rather than something more individualized or household based.

To return to the central theme of community organization, this study demonstrates that the Safety Harbor occupation was extended, probably continuous, and encompassed at least some communal productive and consumptive events. As I discuss in Chapter 8, the apparent spatial restriction of crafting activity appears to have taken place in the context of an economy that otherwise had communal elements. There is little evidence that material goods were systematically divided unequally within the local community, although some such divisions may have been more likely expressed in mortuary ceremony, which is not visible in this study. When it comes to documenting practices with the potential to contribute to broader processes of cultural change, this study identifies a few areas of domestic life where social relations, political aspirations, and the local economy may have converged. The typical patterns of collecting food and especially aquatic resources like fish and shellfish probably required cooperation but not necessarily of a scale or intensity that would demand institutions of management. On the other hand, the capability to collect larger quantities of food via mass capture was present and could have been utilized on select occasions in Safety Harbor communities more broadly, for instance if festive labor was sometimes required for projects like mound construction. Shell ornament manufacture was a more likely domain for potential efforts to exploit the value of marine resources when traded to inland locations, although there is presently no evidence that this would not have been handled collectively, as opposed to by individual artisans or even an autonomous local authority.

Future Directions

The findings and limitations of this study together point to several promising directions for future research at the Weeden Island site and in the broader central peninsular Gulf Coast region.

First, drawing on interpretations of regional settlement patterns, there is the question of how population or settlement density changed in the Tampa Bay area at the start of and throughout the Safety Harbor era. Did migration and possibly population growth create a basis for new aggregations, along with the consolidation of political or ceremonial influence at communities associated with mound complexes? An integrated study of residential communities throughout the Safety Harbor region may begin to address these issues.

In a related point, more intensive coverage survey and dating of the Weeden Island site and surrounding sites of the Weeden Island Preserve will contribute to a better understanding of the tempo of occupation in this area. A microregional approach to the Safety Harbor community at Weeden Island could lead to a fuller picture of community activities and organization.

Further study of existing collections of zooarchaeological remains may provide new insights into how variability in the assemblage relates to issues of labor allocation and fishing technology, topics that were recognized in this study but could be investigated more comprehensively through the analysis of additional vertebrate bone samples. Future studies focused on the ceramic artifacts from this and related projects are expected to reveal new dimensions of variability in these assemblages; along with the dates and other information produced by this study, this data may provide a basis for interpreting how patterns of labor organization are revealed through ordinary crafting activities. Type categories like Pinellas Plain and sand tempered plain exhibit variability that is not fully captured by a basic analysis of attributes related to function and use.

Crafting Regional Histories of the Central Peninsular Gulf Coast

This study contributes to growing efforts to reassess how archaeologists investigate instances of nonagricultural community and socio-political formation. As I discussed in the first chapter to this volume, one avenue for such research is to focus on the contingency of regional scale developments on the histories of specific communities.

Set in the context of a broader regional history, late pre-Columbian life at Weeden Island was part of a historical trajectory that included changes in ideology and ceremony as well as the regional stature of Tampa Bay area communities. Locally, Weeden Island-Manasota occupants of Tampa Bay have been characterized by archaeologists primarily for their adaptations to local ecological conditions and peripheral participation in the Weeden Island ceremonial culture, which has its origins farther north. While this is an area of ongoing research, presently it appears that late Woodland period inhabitants managed to import some Weeden Island decorated wares to deploy in mortuary rituals, but they were not producers or distributors of this material culture, and their economic and political status in the broader Gulf coast region was probably limited.

Safety Harbor people, on the other hand, have been cited as influencing the development of Calusa polities because of their active involvement in regional trade (Thompson et al. 2018:41; Marquardt 2014). This increasing boldness may have coincided with a growing population in the region, perhaps related to the relative depopulation of areas of the Gulf coast to the north, which had previously been major centers of the Woodland period (Pluckhahn and Thompson 2018:192-193).

This study highlights that craft production and trade were likely venues for social change in these Safety Harbor residential and regional communities. At the local scale, coastal Safety Harbor communities focused on the production of shell beads, and this may also have been an area of experimentation with new divisions of labor, or the development of new ideological or ceremonial concepts. By transitioning from peripheral participants in Weeden Island era ceremonial culture to purveyors of raw and crafted shell goods, Safety Harbor people created a new role for themselves on the regional landscape, with implications for local historical trajectories.

APPENDICES

Appendix A - Faunal Remains

Appendix A includes data from the analysis of vertebrate remains (by Sharlene O'Donnell) and the analysis of mollusk remains conducted by the author. Recovery and analysis methods are described in Chapter 6.

Taxon/FS#	**34**	**48**	**117**	**123**	**149**	**200**	**208**	**230**	**236**	**333**	**350**	**373**	**378**	**380/ 396**	**388**	**Total**
	Weight (g)															
Mammalia (UID mammal)			2.02	8.82			1.67		0.72						0.29	13.52
Mammalia (lg)				19.88								3.28			0.39	23.55
Mammalia (md)						3.59										3.59
Mammalia (sm)																0
Sylvilagus sp. (rabbit)				0.15		0.14					1.11					1.4
Rodentia (rodents)						0.14										0.14
Sciurus niger (fox squirrel)					0.25											0.25
Sigmodon hispidus (hispid cotton rat)									0.2							0.2
Canis lupus (wolf)							18.33									18.33
Procyon lotor (racoon)					0.98	0.46										1.44
Odocoileus virginianus (white-tailed deer)	8.32		8.45	10.41	5.52	3.4		6.01	3.65	13.13			1.22	19.33	11.79	91.23
Total Mammalia	8.32	0	10.47	39.26	6.75	7.73	20	6.01	4.57	13.13	1.11	3.28	1.22	19.33	12.47	153.65
Aves (UID bird)			0.4										0.32			0.72
Aves (sm-med)									0.11							0.11
Aves (med)				0.57		0.16								0.32		1.05

Taxon/FS#	**34**	**48**	**117**	**123**	**149**	**200**	**208**	**230**	**236**	**333**	**350**	**373**	**378**	**380/ 396**	**388**	**Total**
	Weight (g)															
Nycticorax nycticorax (black-crowned night heron)	0.21															0.21
Anatidae (ducks, scaulps)														0.73		0.73
Anas sp (duck)											0.93					0.93
Mergus serrator (red-breasted merganser)															0.45	0.45
Haliaeetus Ieucocephalus (bald eagle)														18.3		18.3
Meleagris gallopavo (turkey)														4.36		4.36
Colinus virginianus (northern bobwhite quail)														0.49		0.49
Corvus brachyrhynchos (American crow)														0.24		0.24
Total Aves	0.21	0	0.4	0.57	0	0.16	0	0	0.11	0	0.93	0	0.32	24.44	0.45	27.59
Testudines (tortoise, turtle)	4.6	0.62	0.42	3.67	1.26	14.65	1.61	0.84	4.38		0.64	3.58	19.92	3.91	0.68	60.78
Chelydra serpentina (common snapping turtle)				0.52		2.04										2.56
Kinosternidae (mud and musk turtles)									0.76				0.28			1.04
Kinosternon sp (mud turtles)		0.08		0.78	0.64	0.66						0.13		0.97		3.26
Kinosternon subrubrum (eastern mud turtle)	4.1	0.22						1.88	1.14				0.24	2.81	1.82	12.21
Kinosternon baurii (striped mud turtle)														1.06		1.06
Emydidae (pond and marsh turtles)	0.51			2.4		4.23						0.37	1.08			8.59

Taxon/FS#	34	48	117	123	149	200	208	230	236	333	350	373	378	380/ 396	388	Total
	Weight (g)															
Terrapene carolina (common box turtle)						0.63									0.17	0.8
Malaclemys terrapin (diamondback terrapin)				2.12					0.32				0.4			2.84
Pseudemys sp (cooters)				2.88		1.06			0.67				12.7	2.74		20.05
Gopherus polyphemus (gopher tortoise)															0.98	0.98
Cheloniidae (sea turtle)													2.76			2.76
Apalone ferox (softshell turtle)															0.27	0.27
Scincidae (skink)																0
Serpentes (snakes)												0.18				0.18
Colubridae (non-venomous snakes)							0.1									0.1
Nerodia sp (water snake)													0.41			0.41
Alligator mississippiensis (alligator)				95.2		0.63										95.83
Total Reptilia	9.21	0.92	0.42	107.57	1.9	23.9	1.71	2.72	7.27	0	0.64	4.26	37.79	11.49	3.92	213.72
Elasmobranchii (cartilaginous fishes, rays, sharks, skates, torpedoes)																0
Euselachii (shark)						1.8										1.8
Carcharhinidae (requiem sharks)						0.24										0.24
Rajiformes (rays, sawfishes, skates)			0.15				0.47									0.62
Dasyatidae (whip tail stingrays)						1.58								0.8		2.38

Taxon/FS#	34	48	117	123	149	200	208	230	236	333	350	373	378	380/ 396	388	Total
	Weight (g)															
Dasyatis sabina (Atlantic sting ray)																0
Total Chondrichthyes	0	0	0.15	0	0	3.62	0.47	0	0	0	0	0	0	0.8	0	5.04
Actinopterygii (UID fish)	9.52	0.93	4.49	19.37	49.14	27.17	1.56	0.9	2.89	0.15	4.58	1.19	5.89	10.72	7.01	145.51
Lepisosteus sp (gar)						1.51									1.68	13.91
Amia calva (bowfin)													0.17	0.18		0.35
Elops saurus (ladyfish)																0
Clupeidae (herrings, shads, sardines)																0
Ariidae (saltwater catfish)	0.66			1.4		5.7						0.13	0.21	5.76	0.11	13.97
Ariopsis felis (hardhead catfish)	7.6	1.75	4.82	26.85	9.37	54.76	4.5	0.7	2.93	1.36	0.9	1.34	19.39	49.6	11.2	197.07
Bagre marinus (gafftopsail catfish)			0.48	0.52		0.85							0.43	13.6		15.88
Opsanus sp (toadfish)																0
Opsanus beta (Gulf toadfish)							0.89						0.83			1.72
Mugil sp (mullet)	20.26	1.34		8.01	3.91	31.46	4.7	1.1	2.65		18.04	1.27	3.99	14.68	5.23	116.64
Mugil cephalus (flathead grey mullet)	0.65		0.08		0.13	0.4										1.26
Belonidae (needlefish)			0.12													0.12
Cyprinodontiformes (pupfish, topminnows, killifish)																0
Fundulus sp (topminnows, killifish)			0.03					0								0.03
Cyprinodontidae (pupfish)																0
Prionotus sp (sea robin)																0

Taxon/FS#	**34**	**48**	**117**	**123**	**149**	**200**	**208**	**230**	**236**	**333**	**350**	**373**	**378**	**380/ 396**	**388**	**Total**
	Weight (g)															
Centropomus sp (snook)	1.03		0.2			1.08									0.31	2.62
Carangidae (jacks, pompanos, jack mackerals, runners, scads)			0.17	3.02									0.19			3.38
Caranx sp (jack)														2.2		2.2
Caranx hippos (crevalle jack)				0.58		3.51								0.16	1.06	5.31
Trachinotus sp (pompano, permit, palometa)			1.9	1.35		0.3							0.14	0.63		4.32
Lutjanus campechaus (red snapper)														0.35		0.35
Orthopristis chrysoptera (pigfish)																0
Centrarchidae (sunfish, bass)														0.33		0.33
Sparidae/Sciaenidae (drum or porgie)																0
Sparidae (seabreas, porgies)														0.08	0.93	1.01
Archosargus probatocephalus (sheepshead)	2.92	0.33	7.32	2.44	2.11	22.75	0.78		2.26	0.36	0.3		0.14	0.5	0.72	42.93
Lagodon rhomboides (pinfish)														0.03	0.12	0.15
Sciaenidae (drums, croakers, seatrout)				0.47	0.65						4.15		0.44	2.37	1.38	9.46
Bairdiella chrysoura (American silver perch)																0
Cynoscion sp (seatrout)	2.96	0.63	1.53	10.88	4.04	2.77	0.92	0.54	0.74		4.93		2.53	3.75	6.28	42.5

Taxon/FS#	34	48	117	123	149	200	208	230	236	333	350	373	378	380/ 396	388	Total
	Weight (g)															
Leiostomus xanthurus (spot croaker)																0
Pogonias cromis (black drum)	0.27			1.88	0.32	1.6							0.09	0.1		4.26
Sciaenops ocellatus (red drum)	3.52		0.5	2.57	4.94	7.32	1.67	0.37			1.4		0.49	0.63	4.13	27.54
Ostraciidae (box fish)									0.88							0.88
Paralichthys sp (flounder)	2.08		1.74	1.63	1.59	0.11	0.05				0.26		0.47	2.2	0.19	10.32
Tetraodontidae (pufferfish)				0.23												0.23
Lagocephalus laevigatus (smooth puffer)	0.86															0.86
Sphoeroides sp (pufferfish)			1.03													1.03
Diodontidae (burrfish)		0.26	2.8	1.98	1.14	1.85		1.87	0.19		1.23			1.18	0.9	13.4
Chilomycterus sp (burrfish)				0.08		0.08										0.16
Diodon sp (burrfish)																0
Total Actinopterygii	52.33	5.24	27.21	83.26	77.34	163.22	15.07	5.48	12.54	1.87	35.79	3.93	35.4	109.05	41.25	668.98
Vertebrata (UID vertebrate)	4.6	2.19	2.01	17.24	32.67	25.96	1.22		0.71	0.24	1.57	4.09	8.6	22.44	7.27	130.81
Total Vertebrata	74.67	8.35	40.66	247.9	118.66	224.59	38.47	14.21	25.2	15.24	40.04	15.56	83.33	187.55	65.36	1184.55

Table A.1 – All Vertebrate Remains by Weight, 2014-2015 UM-WIAP Excavations

Taxon/FS#	34	48	117	123	149	200	208	230	230	333	350	373	378	380/ 396	388	Total
	Number of Identified Specimens (NISP)															
Mammalia (UID mammal)			7	21			4		1						1	34
Mammalia (lg)				12								3			1	16
Mammalia (md)						8										8
Mammalia (sm)																0
Sylvilagus sp. (rabbit)				1		1					2					4
Rodentia (rodents)						1										1
Sciurus niger (fox squirrel)					1											1
Sigmodon hispidus (hispid cotton rat)									1							1
Canis lupus (wolf)							1									1
Procyon lotor (racoon)					2	1										3
Odocoileus virginianus (white-tailed deer)	6		3	5	4	3		1	3	1			1	15	13	55
Total Mammalia	**6**	**0**	**10**	**39**	**7**	**14**	**5**	**1**	**5**	**1**	**2**	**3**	**1**	**15**	**15**	**124**
Aves (UID bird)			2										1			3
Aves (sm-med)									1							1
Aves (med)				1		1								1		3
Nycticorax nycticorax (black-crowned night heron)	1															1
Anatidae (ducks, scaulps)														1		1
Anas sp (duck)											1					1
Mergus serrator (red-breasted merganser)															1	1
Haliaeetus Ieucocephalus (bald eagle)														12		12

Taxon/FS#	**34**	**48**	**117**	**123**	**149**	**200**	**208**	**230**	**230**	**333**	**350**	**373**	**378**	**380/ 396**	**388**	**Total**
	Number of Identified Specimens (NISP)															
Meleagris gallopavo (turkey)														2		2
Colinus virginianus (northern bobwhite quail)														3		3
Corvus brachyrhynchos (American crow)														1		1
Total Aves	**1**	**0**	**2**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**20**	**1**	**29**
Testudines (tortoise, turtle)	16	4	3	18	14	47	5	3	16		4	15	52	15	4	216
Chelydra serpentina (common snapping turtle)				1		1										2
Kinosternidae (mud and musk turtles)									2				2			4
Kinosternon sp (mud turtles)		1		5	1	4						1		3		15
Kinosternon subrubrum (eastern mud turtle)	21	1						3	4				1	7	5	42
Kinosternon baurii (striped mud turtle)														9		9
Emydidae (pond and marsh turtles)	2			4		6						1	2			15
Terrapene carolina (common box turtle)						2									2	4
Malaclemys terrapin (diamondback terrapin)				2					2				2			6
Pseudemys sp (cooters)				4		2			3				8	5		22
Gopherus polyphemus (gopher tortoise)															3	3
Cheloniidae (sea turtle)													2			2

Taxon/FS#	34	48	117	123	149	200	208	230	230	333	350	373	378	380/ 396	388	Total
	Number of Identified Specimens (NISP)															
Apalone ferox (softshell turtle)															1	1
Scincidae (skink)																0
Serpentes (snakes)												2				2
Colubridae (non-venomous snakes)							1									1
Nerodia sp (water snake)													4			4
Alligator mississippiensis (alligator)				49		1										50
Total Reptilia	**39**	**6**	**3**	**83**	**15**	**63**	**6**	**6**	**27**	**0**	**4**	**19**	**73**	**39**	**15**	**398**
Elasmobranchii (cartilaginous fishes, rays, sharks, skates, torpedoes)																0
Euselachii (shark)						4										4
Carcharhinidae (requiem sharks)						2										2
Rajiformes (rays, sawfishes, skates)			1				3									4
Dasyatidae (whip tail stingrays)						8								1		9
Dasyatis sabina (Atlantic sting ray)																0
Total Chondrichthyes	**0**	**0**	**1**	**0**	**0**	**14**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**19**
Actinopterygii (UID fish)	85	9	37	133	1643	188	17	4	28	2	41	9	46	88	40	2370
Lepisosteus sp (gar)						7									11	106
Amia calva (bowfin)													1	1		2
Elops saurus (ladyfish)																0
Clupeidae (herrings, shads, sardines)																0
Ariidae (saltwater catfish)	5			12		47						2	2	33	1	102

Taxon/FS#	**34**	**48**	**117**	**123**	**149**	**200**	**208**	**230**	**230**	**333**	**350**	**373**	**378**	**380/ 396**	**388**	**Total**
	Number of Identified Specimens (NISP)															
Ariopsis felis (hardhead catfish)	41	8	18	161	100	242	23	2	11	6	2	7	98	207	55	981
Bagre marinus (gafftopsail catfish)			2	3		3							3	49		60
Opsanus sp (toadfish)																0
Opsanus beta (Gulf toadfish)							4						3			7
Mugil sp (mullet)	104	11		55	46	183	33	6	23		162	6	33	100	29	791
Mugil cephalus (flathead grey mullet)	2		1		1	3										7
Belonidae (needlefish)			1													1
Cyprinodontiformes (pupfish, topminnows, killifish)																0
Fundulus sp (topminnows, killifish)			1					1								2
Cyprinodontidae (pupfish)																0
Prionotus sp (sea robin)																0
Centropomus sp (snook)	1		1			4									1	7
Carangidae (jacks, pompanos, jack mackerals, runners, scads)			2	5									2			9
Caranx sp (jack)														2		2
Caranx hippos (crevalle jack)				2		4								1	1	8
Trachinotus sp (pompano, permit, palometa)			4	4		3							1	3		15
Lutjanus campechaus (red snapper)														1		1

Taxon/FS#	34	48	117	123	149	200	208	230	230	333	350	373	378	380/ 396	388	Total
	Number of Identified Specimens (NISP)															
Orthopristis chrysoptera (pigfish)																0
Centrarchidae (sunfish, bass)														2		2
Sparidae/Sciaenidae (drum or porgie)																0
Sparidae (seabreas, porgies)														1	11	12
Archosargus probatocephalus (sheepshead)	11	2	18	11	8	56	2		12	1	2		1	1	3	128
Lagodon rhomboides (pinfish)														1	1	2
Sciaenidae (drums, croakers, seatrout)				2	3						7		3	10	3	28
Bairdiella chrysoura (American silver perch)																0
Cynoscion sp (seatrout)	18	3	11	51	36	8	2	3	4		19		13	23	26	217
Leiostomus xanthurus (spot croaker)																0
Pogonias cromis (black drum)	1			6	2	5							1	1		16
Sciaenops ocellatus (red drum)	7		2	8	13	17	3	1			5		2	2	10	70
Ostraciidae (box fish)									11							11
Paralichthys sp (flounder)	13		13	15	19	1	1				1		5	16	2	86
Tetraodontidae (pufferfish)				3												3
Lagocephalus laevigatus (smooth puffer)	2															2

Taxon/FS#	34	48	117	123	149	200	208	230	230	333	350	373	378	380/ 396	388	Total
	Number of Identified Specimens (NISP)															
Sphoeroides sp (pufferfish)			7													7
Diodontidae (burrfish)		1	5	3	7	3		2	2		3			2	2	30
Chilomycterus sp (burrfish)				1		1										2
Diodon sp (burrfish)																0
Total Actinopterygii	**290**	**34**	**123**	**475**	**1878**	**775**	**85**	**19**	**91**	**9**	**242**	**24**	**214**	**544**	**196**	**4999**
Vertebrata (UID vertebrate)	23	13	12	65	1273	116	8		5	2	10	20	41	53	24	1665
Total Vertebrata	**359**	**53**	**151**	**663**	**3173**	**983**	**107**	**26**	**129**	**12**	**259**	**66**	**330**	**672**	**251**	**7234**

Table A.2 – All Vertebrate Remains by NISP, 2014-2015 UM-WIAP Excavations

Taxon/FS#	34	48	117	123	149	200	208	230	230	333	350	373	378	380/ 396	388	Total
	Estimated Minimum Number of Individuals (MNI)															
Mammalia (UID mammal)																0
Mammalia (lg)												1				1
Mammalia (md)																0
Mammalia (sm)																0
Sylvilagus sp. (rabbit)				1		1					1					3
Rodentia (rodents)						1										1
Sciurus niger (fox squirrel)					1											1
Sigmodon hispidus (hispid cotton rat)									1							1
Canis lupus (wolf)							1									1
Procyon lotor (racoon)					1	1										2
Odocoileus virginianus (white-tailed deer)	1		1	2	1	1		1	1	1			1	1	1	12
Total Mammalia	**1**	**0**	**1**	**3**	**3**	**4**	**1**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**22**
Aves (UID bird)			1										1			2
Aves (sm-med)									1							1
Aves (med)				1		1										2
Nycticorax nycticorax (black-crowned night heron)	1															1
Anatidae (ducks, scaulps)														1		1
Anas sp (duck)											1					1
Mergus serrator (red-breasted merganser)															1	1
Haliaeetus Ieucocephalus (bald eagle)														1		1

Meleagris gallopavo (turkey)														1		1
Colinus virginianus (northern bobwhite quail)														1		1
Corvus brachyrhynchos (American crow)														1		1
Total Aves	**1**	**0**	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**0**	**1**	**0**	**1**	**5**	**1**	**13**
Testudines (tortoise, turtle)					1		1				1					3
Chelydra serpentina (common snapping turtle)				1		1										2
Kinosternidae (mud and musk turtles)																0
Kinosternon sp (mud turtles)				1	1	1						1				4
Kinosternon subrubrum (eastern mud turtle)	2	1						1	1				1	1	1	8
Kinosternon baurii (striped mud turtle)														1		1
Emydidae (pond and marsh turtles)	1											1				2
Terrapene carolina (common box turtle)						1									1	2
Malaclemys terrapin (diamondback terrapin)				1					1				1			3
Pseudemys sp (cooters)				1		1			1				1	1		5
Gopherus polyphemus (gopher tortoise)															1	1
Cheloniidae (sea turtle)													1			1
Apalone ferox (softshell turtle)															1	1
Scincidae (skink)																0
Serpentes (snakes)												1				1

Colubridae (non-venomous snakes)							1									1
Nerodia sp (water snake)													1			1
Alligator mississippiensis (alligator)				1		1										2
Total Reptilia	**3**	**1**	**0**	**5**	**2**	**5**	**2**	**1**	**3**	**0**	**1**	**3**	**5**	**3**	**4**	**38**
Elasmobranchii (cartilaginous fishes, rays, sharks, skates, torpedoes)																0
Euselachii (shark)																0
Carcharhinidae (requiem sharks)						1										1
Rajiformes (rays, sawfishes, skates)			1				1									2
Dasyatidae (whip tail stingrays)						1								1		2
Dasyatis sabina (Atlantic sting ray)																0
Total Chondrichthyes	**0**	**0**	**1**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**5**
Actinopterygii (UID fish)																0
Lepisosteus sp (gar)						1									1	2
Amia calva (bowfin)													1	1		2
Elops saurus (ladyfish)																0
Clupeidae (herrings, shads, sardines)																0
Ariidae (saltwater catfish)																0
Ariopsis felis (hardhead catfish)	4	3	4	16	9	20	7	1	6	1	1	2	10	12	9	105
Bagre marinus (gafftopsail catfish)			1	1		1							1	5		9
Opsanus sp (toadfish)																0
Opsanus beta (Gulf toadfish)							2						1			3

Mugil sp (mullet)	4	2		2	2	5	1	1	1		5	1	2	3	2	31
Mugil cephalus (flathead grey mullet)	1		1		1	3										6
Belonidae (needlefish)			1													1
Cyprinodontiformes (pupfish, topminnows, killifish)																0
Fundulus sp (topminnows, killifish)			1					1								2
Cyprinodontidae (pupfish)																0
Prionotus sp (sea robin)																0
Centropomus sp (snook)	1		1			1									1	4
Carangidae (jacks, pompanos, jack mackerals, runners, scads)			1													1
Caranx sp (jack)														2		2
Caranx hippos (crevalle jack)				1		1								1	1	4
Trachinotus sp (pompano, permit, palometa)			2	3		1							1	1		8
Lutjanus campechaus (red snapper)														1		1
Orthopristis chrysoptera (pigfish)																0
Centrarchidae (sunfish, bass)														1		1
Sparidae/Sciaenidae (drum or porgie)																0
Sparidae (seabreas, porgies)																0

Archosargus probatocephalus (sheepshead)	1	1	2	2	2	6	1		1	1	1		1	1	1	21
Lagodon rhomboides (pinfish)														1	1	2
Sciaenidae (drums, croakers, seatrout)																0
Bairdiella chrysoura (American silver perch)																0
Cynoscion sp (seatrout)	2	1	2	4	3	3	1	1	1		3		2	5	3	31
Leiostomus xanthurus (spot croaker)																0
Pogonias cromis (black drum)	1			2	1	1							1	1		7
Sciaenops ocellatus (red drum)	1		1	2	3	2	2	1			2		1	1	4	20
Ostraciidae (box fish)									1							1
Paralichthys sp (flounder)	1		1	1	1	1	1				1		1	1	1	10
Tetraodontidae (pufferfish)				2												2
Lagocephalus laevigatus (smooth puffer)	1															1
Sphoeroides sp (pufferfish)			3													3
Diodontidae (burrfish)		1	4	1	2	1		1	1		2			1	1	15
Chilomycterus sp (burrfish)				1		1										2
Diodon sp (burrfish)																0
Total Actinopterygii	**17**	**8**	**25**	**38**	**24**	**48**	**15**	**6**	**11**	**2**	**15**	**3**	**22**	**38**	**25**	**297**
Vertebrata (UID vertebrate)																0
Total Vertebrata	**22**	**9**	**28**	**47**	**29**	**60**	**19**	**8**	**17**	**3**	**18**	**7**	**29**	**48**	**31**	**372**

Table A.3 – All Vertebrate Remains by MNI, 2014-2015 UM-WIAP Excavations

Taxa	Screen size	FS	Measurement value (mm)
Archosargus probatocephalus	1/4"	117	6.18
Archosargus probatocephalus	1/4"	123	4.68
Bairdiella chrysoura	1/8"	149	2.51
Cynoscion sp	1/4"	34	4.83
Cynoscion sp	1/4"	123	6.68
Cynoscion sp	1/4"	123	6.35
Cynoscion sp	1/4"	388	6.55
Cyprinodontidae	1/8"	149	1.93
Fundulus sp	1/8"	149	2.56
Fundulus sp	1/8"	149	2.67
Fundulus sp	1/8"	149	2.61
Fundulus sp	1/8"	149	3.66
Fundulus sp	1/8"	149	2.55
Fundulus sp	1/8"	149	2.4
Fundulus sp	1/8"	149	2.87
Fundulus sp	1/8"	149	2.95
Lagodon rhomboidoides	1/8"	149	2.69
Lagodon rhomboidoides	1/8"	149	2.44
Lagodon rhomboidoides	1/8"	149	2.04
Lagodon rhomboidoides	1/8"	149	2.45
Lagodon rhomboidoides	1/8"	149	2.52
Lagodon rhomboidoides	1/8"	149	1.71
Lagodon rhomboidoides	1/8"	149	2.42
Lagodon rhomboidoides	1/8"	149	2.33
Lagodon rhomboidoides	1/8"	149	2.9
Lagodon rhomboidoides	1/8"	149	2.45
Mugil sp.	1/4"	34	5.57
Mugil sp.	1/4"	34	5.47
Mugil sp.	1/4"	378	5.21

Mugil sp.	1/4"	350	5.16
Mugil sp.	1/4"	350	5.37
Mugil sp.	1/4"	350	5.37
Mugil sp.	1/4"	350	7.59
Orthopristis chrysopterus	1/8"	149	1.83
Paralichthys	1/4"	117	5.87
Paralichthys sp	1/4"	123	5.4
Prionotus sp	1/8"	149	3.12
Sciaenops ocellatus	1/4"	123	6.25

Table A.4 - Fish Atlas Length Measurements

Taxon/FS	**1**	**7/30**	**12**	**23**	**27**
Weight (g)					
Balanus sp (barnacle)	32	96.4			6.9
Total Maxillopoda	**32**	**96.4**	**0**	**0**	**6.9**
Callinectes sp (blue crab)				0.2	
Total Malacostraca	**0**	**0**	**0**	**0.2**	**0**
Mytilidae (mussel)	4.6	19.2		<.1	0.7
Crassostrea Virginica (eastern oyster)	6465	18269	1945	148.4	897.6
Mercenaria sp. (quahog clam)	28.4	1			127.2
Macrocallista nimbosa (sunray venus clam)		5			
Argopecten irradians (bay scallop)		0.1			
Ostrea equestris (crested oyster)	15.5	182			
Cardiidae (cockle)					
Eontia ponderosa (ponderous ark)					
Veneroida (UID clams)					
Veneroida (sm)	0.1	1.4			
Bivalvia (UID bivalve)				6.7	
Total Bivalvia	**6513.6**	**18477.7**	**1945**	**155.1**	**1025.5**
Gastropoda (lg) (UID gastropods, large)	62.1	2.7		18.6	
Gastropoda (sm) (UID gastropods, small)	4.8	1.5		0.7	1.6
Polygyra sp (flat coil snail)	0.6	4.2			0.2
Crepidula spp (slipper shell)	4.5	19			0.5
Neverita duplicata (shark eye)	14.5	26.06	4.86		
Sinum perspectivum (white baby ear)					
Urosalpinx sp. (oyster drill)		5		<.1	2.9
Melongena corona (crown conch)	674.9	717.4	115.06		
Busycon contrarium (lightning whelk)	772.8	762	235	1.5	72.4
Busycotypus spiratus (pear whelk)	19.4	60.51	22.5		
Fasciolaria lilium (banded tulip)	14.5				
Triplofusus giganteus(horse conch)					
Busycon carica(knobbed whelk)					
Phyllonotus pomum (apple murex)					
Olividae (olive shell)					
Total Gastropoda	**1568.1**	**1598.37**	**377.42**	**20.8**	**77.6**
Invertebrate (UID shell)	3075	4120		17.5	1045
Total Invertebrates	**11188.7**	**24292.47**	**2322.42**	**193.6**	**2155**

99	**76**	**66**	**50**	**48**	**34**	***Taxon/FS***
6	0.3			19.9	82.9	*Balanus* sp (barnacle)
6	**0.3**	**0**	**0**	**19.9**	**82.9**	**Total Maxillopoda**
						Callinectes sp (blue crab)
0	**0**	**0**	**0**	**0**	**0**	**Total Malacostraca**
0.4		0.3	<.1	3.2	3.7	Mytilidae (mussel)
2110	6.3	21.4	71.4	962.76	2545	*Crassostrea Virginica* (eastern oyster)
9.8				116.91	42.9	*Mercenaria* sp. (quahog clam)
6.8				17.58	27.9	*Macrocallista nimbosa* (sunray venus clam)
						Argopecten irradians (bay scallop)
7.5						*Ostrea equestris* (crested oyster)
					9.8	Cardiidae (cockle)
						Eontia ponderosa (ponderous ark)
						Veneroida (UID clams)
						Veneroida (sm)
						Bivalvia (UID bivalve)
2134.5	**6.3**	**21.7**	**71.4**	**1100.45**	**2629.3**	**Total Bivalvia**
84.6	0.3	77		212.55		Gastropoda (lg) (UID gastropods, large)
0.1				1.5	3.5	Gastropoda (sm) (UID gastropods, small)
0.3	<.1		<.1	0.4	0.5	*Polygyra* sp (flat coil snail)
0.5				0	5.3	*Crepidula* spp (slipper shell)
50.4			4.6	16.6	64.7	*Neverita duplicata* (shark eye)
						Sinum perspectivum (white baby ear)
0.8				<.1		*Urosalpinx* sp. (oyster drill)
3773.2				1232.5	1335	*Melongena corona* (crown conch)
1803.5		77	2.9	191.76		*Busycon contrarium* (lightning whelk)
48.5						*Busycotypus spiratus* (pear whelk)
				1.2	5.9	*Fasciolaria lilium* (banded tulip)
						Triplofusus giganteus(horse conch)
						Busycon carica(knobbed whelk)
						Phyllonotus pomum (apple murex)
				0.1		Olividae (olive shell)
5761.9	**0.3**	**154**	**7.5**	**1656.61**	**1414.9**	**Total Gastropoda**
2130	5.2	9.5	140	1765	3230	Invertebrate (UID shell)
10032.4	**12.1**	**185.2**	**218.9**	**4541.96**	**7357.1**	**Total Invertebrates**

Taxon/FS	**102**	**106**	**110**	**113**	**116**	**117**
Balanus sp (barnacle)	10.1		38	4.1	16.3	4.8
Total Maxillopoda	**10.1**	**0**	**38**	**4.1**	**16.3**	**4.8**
Callinectes sp (blue crab)						
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)	3.8		29	1.6	11.8	22.1
Crassostrea Virginica (eastern oyster)	3400	20.6	10080	839.1	4530	3890
Mercenaria sp. (quahog clam)	193.8		336.3	82.11	241.22	160.51
Macrocallista nimbosa (sunray venus clam)			23.66		11.33	
Argopecten irradians (bay scallop)						2
Ostrea equestris (crested oyster)	1.3		43.4		20	6.4
Cardiidae (cockle)	0.6					
Eontia ponderosa (ponderous ark)				5.02		
Veneroida (UID clams)						
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**3599.5**	**20.6**	**10512.36**	**927.83**	**4814.35**	**4081.01**
Gastropoda (lg) (UID gastropods, large)	53.3	2.7	166	132.99		37.4
Gastropoda (sm) (UID gastropods, small)	0.6		0.3	1		1.6
Polygyra sp (flat coil snail)	0.9	0.3	0.3	2.8	0.2	0.9
Crepidula spp (slipper shell)	1.5	0	1.7		1	0.2
Neverita duplicata (shark eye)	78.75		29.79		71.04	163.85
Sinum perspectivum (white baby ear)						0.8
Urosalpinx sp. (oyster drill)			1.8		<.1	
Melongena corona (crown conch)	4974.3		2905.9	2676.7	1605.5	1565.5
Busycon contrarium (lightning whelk)	4830.5		2585.9	2619.5	2215.91	4753.6
Busycotypus spiratus (pear whelk)	34.27		149.83	85	200	149.83
Fasciolaria lilium (banded tulip)	37.27		14.67	38.69	76.12	22.52
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)	9.16					3.7
Total Gastropoda	**10020.55**	**3**	**5856.19**	**5556.68**	**4169.77**	**6699.9**
Invertebrate (UID shell)	2800	7.4	9975	3480	3000	3105
Total Invertebrates	**16430.15**	**31**	**26381.55**	**9968.61**	**12000.42**	**13890.71**

150	**149**	**141**	**139**	**136**	**123**	***Taxon/FS***
	4.9	0.3	2	24.4	85.8	*Balanus* sp (barnacle)
0	**4.9**	**0.3**	**2**	**24.4**	**85.8**	**Total Maxillopoda**
						Callinectes sp (blue crab)
0	**0**	**0**	**0**	**0**	**0**	**Total Malacostraca**
	6.5	0.1	4.6	12.3	161.3	Mytilidae (mussel)
28.93	4010	8.7	951.65	2335	24245	*Crassostrea Virginica* (eastern oyster)
7.9	301.7		54.41	60.9	258	*Mercenaria* sp. (quahog clam)
						Macrocallista nimbosa (sunray venus clam)
						Argopecten irradians (bay scallop)
	12.5			1577.45		*Ostrea equestris* (crested oyster)
						Cardiidae (cockle)
						Eontia ponderosa (ponderous ark)
				1.1	65.2	Veneroida (UID clams)
						Veneroida (sm)
						Bivalvia (UID bivalve)
36.83	**4330.7**	**8.8**	**1010.66**	**3986.75**	**24729.5**	**Total Bivalvia**
42.96	83.2		14.95	92.39	17.7	Gastropoda (lg) (UID gastropods, large)
	0.3		0.4	0.4	1	Gastropoda (sm) (UID gastropods, small)
	1	<.1	0.1	0.6	4.7	*Polygyra* sp (flat coil snail)
	0.8			1.8	5.9	*Crepidula* spp (slipper shell)
1.02	30.5		5.9	56.32	78.77	*Neverita duplicata* (shark eye)
						Sinum perspectivum (white baby ear)
					4.1	*Urosalpinx* sp. (oyster drill)
189.04	1036.3	0.7	38.87	700.82	5348	*Melongena corona* (crown conch)
105.53	4925.3	2.1	117.54	799.06	4473	*Busycon contrarium* (lightning whelk)
16.6	60.1		29.75	43.21	75.59	*Busycotypus spiratus* (pear whelk)
	11.1			14.72	39.2	*Fasciolaria lilium* (banded tulip)
						Triplofusus giganteus(horse conch)
						Busycon carica(knobbed whelk)
						Phyllonotus pomum (apple murex)
				4.68		Olividae (olive shell)
355.15	**6148.6**	**2.8**	**207.51**	**1714**	**10047.96**	**Total Gastropoda**
595	1600	75	135.8	1135	9260	Invertebrate (UID shell)
986.98	**12084.2**	**86.9**	**1355.97**	**6860.15**	**44123.26**	**Total Invertebrates**

Taxon/FS	**170**	**171**	**173**	**200**	**208**	**220**
Balanus sp (barnacle)	2.4	3.4		10.8	7.3	
Total Maxillopoda	**2.4**	**3.4**	**0**	**10.8**	**7.3**	**0**
Callinectes sp (blue crab)						
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)	19.7	15.7		222	75.7	
Crassostrea Virginica (eastern oyster)	775	1255	535	9562	21555	1275
Mercenaria sp. (quahog clam)	3.6			216.86	31.4	160.48
Macrocallista nimbosa (sunray venus clam)		5.7		2.5		
Argopecten irradians (bay scallop)					0.4	
Ostrea equestris (crested oyster)	5.7	14.3			25	
Cardiidae (cockle)						
Eontia ponderosa (ponderous ark)						
Veneroida (UID clams)						
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**804**	**1290.7**	**535**	**10003.36**	**21687.5**	**1435.48**
Gastropoda (lg) (UID gastropods, large)	35.9	28.3		309.7	207.1	14.44
Gastropoda (sm) (UID gastropods, small)	0.3			1.1	9.3	
Polygyra sp (flat coil snail)	0.1	0.4		0.7	2.1	
Crepidula spp (slipper shell)		0.8		0.4	16.3	
Neverita duplicata (shark eye)	25	123.8	11.66	926.9	183.73	30.75
Sinum perspectivum (white baby ear)						
Urosalpinx sp. (oyster drill)				2.1		
Melongena corona (crown conch)	1851.2	4108.5	274	14043.5	2396.7	2695
Busycon contrarium (lightning whelk)	335.7	845.4	120	11640.3	1265.6	1405
Busycotypus spiratus (pear whelk)	26.8	22.5	5.81	1482.2	76.77	144.86
Fasciolaria lilium (banded tulip)		17.6		689.4	46.79	33.51
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)				20		5.31
Total Gastropoda	**2275**	**5147.3**	**411.47**	**29116.3**	**4204.39**	**4328.87**
Invertebrate (UID shell)	750		7440	5570		1130
Total Invertebrates	**3831.4**	**6441.4**	**8386.47**	**44700.46**	**25899.19**	**6894.35**

Taxon/FS	**227**	**236**	**240**	**248**	**255**	**289**
Balanus sp (barnacle)	4.6	31.7	8		0.8	
Total Maxillopoda	**4.6**	**31.7**	**8**	**0**	**0.8**	**0**
Callinectes sp (blue crab)						
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)	17.71	252.5	410.5		52.04	
Crassostrea Virginica (eastern oyster)	9260	26592	2810	710	666.63	-
Mercenaria sp. (quahog clam)	77.94				135.09	77.1
Macrocallista nimbosa (sunray venus clam)	3.36	37.24				
Argopecten irradians (bay scallop)		1.5				
Ostrea equestris (crested oyster)	16.4	82.5	5.2		10.4	
Cardiidae (cockle)						
Eontia ponderosa (ponderous ark)						
Veneroida (UID clams)						
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**9375.41**	**26965.74**	**3225.7**	**710**	**864.16**	**77.1**
Gastropoda (lg) (UID gastropods, large)	54.62	63.4	156.8		116.3	
Gastropoda (sm) (UID gastropods, small)	0.4	10.4	4.6		0.3	
Polygyra sp (flat coil snail)	0.37	9.4	1.1		0.4	
Crepidula spp (slipper shell)	2.72	38	0.7			
Neverita duplicata (shark eye)	25.55	344.6	562.3	58.88	78.63	
Sinum perspectivum (white baby ear)						
Urosalpinx sp. (oyster drill)						
Melongena corona (crown conch)	1708.02	2777.9	2737.3	2410	4098.8	
Busycon contrarium (lightning whelk)	832.96	2053	6275	2150	167.76	
Busycotypus spiratus (pear whelk)	33.09	86.74	808.8	130	59.46	
Fasciolaria lilium (banded tulip)	32.99	22.76	646.8	39.27	13.06	
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)		2.74	1			
Total Gastropoda	**2690.72**	**5408.94**	**11194.4**	**4788.15**	**4534.71**	**0**
Invertebrate (UID shell)	2970	2890		695		
Total Invertebrates	**15040.73**	**35296.38**	**14428.1**	**6193.15**	**5399.67**	**77.1**

Taxon/FS	**290**	**291**	**292**	**315**	**316**	**324**
Balanus sp (barnacle)		1.7	0.3			
Total Maxillopoda	**0**	**1.7**	**0.3**	**0**	**0**	**0**
Callinectes sp (blue crab)						
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)		11.9	19.2			
Crassostrea Virginica (eastern oyster)	-	2650	700.1	-	-	-
Mercenaria sp. (quahog clam)		24	85			
Macrocallista nimbosa (sunray venus clam)					-	
Argopecten irradians (bay scallop)		0.3				
Ostrea equestris (crested oyster)						
Cardiidae (cockle)						
Eontia ponderosa (ponderous ark)						
Veneroida (UID clams)		1.5				
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**0**	**2687.7**	**804.3**	**0**	**0**	**0**
Gastropoda (lg) (UID gastropods, large)		177.8	290.2			
Gastropoda (sm) (UID gastropods, small)		0.7				
Polygyra sp (flat coil snail)		<.1	0.1			
Crepidula spp (slipper shell)		2.3				
Neverita duplicata (shark eye)		303.9	198.8			
Sinum perspectivum (white baby ear)						
Urosalpinx sp. (oyster drill)						
Melongena corona (crown conch)		6169.1	4265.5			
Busycon contrarium (lightning whelk)		2275.5	1690.4			
Busycotypus spiratus (pear whelk)		240.7	244.9			
Fasciolaria lilium (banded tulip)		113.1	57.3			
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)						
Total Gastropoda	**0**	**9283.1**	**6747.2**	**0**	**0**	**0**
Invertebrate (UID shell)	1680	1030				
Total Invertebrates	**1680**	**13002.5**	**7551.8**	**0**	**0**	**0**

Taxon/FS	325	326	336	342	344	349
Balanus sp (barnacle)		4.4				0.9
Total Maxillopoda	**0**	**4.4**	**0**	**0**	**0**	**0.9**
Callinectes sp (blue crab)						
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)		115.5				6.5
Crassostrea Virginica (eastern oyster)		9160	-	-	-	768.2
Mercenaria sp. (quahog clam)		194.58				84.77
Macrocallista nimbosa (sunray venus clam)			-			
Argopecten irradians (bay scallop)						
Ostrea equestris (crested oyster)		4.1				
Cardiidae (cockle)						
Eontia ponderosa (ponderous ark)						
Veneroida (UID clams)		4.1				
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**0**	**9478.28**	**0**	**0**	**0**	**859.47**
Gastropoda (lg) (UID gastropods, large)		172.63				79.9
Gastropoda (sm) (UID gastropods, small)		3.8				0.2
Polygyra sp (flat coil snail)		1.1				0.2
Crepidula spp (slipper shell)		4.4				0.1
Neverita duplicata (shark eye)		46.53				78.04
Sinum perspectivum (white baby ear)						
Urosalpinx sp. (oyster drill)						
Melongena corona (crown conch)		985				1739.5
Busycon contrarium (lightning whelk)		302.4				503.1
Busycotypus spiratus (pear whelk)		28.65				67.7
Fasciolaria lilium (banded tulip)		12.5				5.8
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)		0.4				
Total Gastropoda	**0**	**1557.41**	**0**	**0**	**0**	**2474.54**
Invertebrate (UID shell)		3225			445	1880
Total Invertebrates	**0**	**14265.09**	**0**	**0**	**445**	**5214.91**

Taxon/FS	**350**	**373**	**375**	**376**	**377**	**378**
Balanus sp (barnacle)	10.9	0.6	6.8	2.8	1.8	1.7
Total Maxillopoda	**10.9**	**0.6**	**6.8**	**2.8**	**1.8**	**1.7**
Callinectes sp (blue crab)	0.15					
Total Malacostraca	**0.15**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)	151.7		1	1.8	3.2	7.1
Crassostrea Virginica (eastern oyster)	9990	938	1714.69	3132.86	693.8	514.5
Mercenaria sp. (quahog clam)	133.49	57.2	26.1	59.2	108.6	80.5
Macrocallista nimbosa (sunray venus clam)	17.49		14.2	7.7	3.7	9.5
Argopecten irradians (bay scallop)	0.7					
Ostrea equestris (crested oyster)	9.6			1.5		
Cardiidae (cockle)						
Eontia ponderosa (ponderous ark)						
Veneroida (UID clams)						
Veneroida (sm)						
Bivalvia (UID bivalve)						
Total Bivalvia	**10302.98**	**995.2**	**1755.99**	**3203.06**	**809.3**	**611.6**
Gastropoda (lg) (UID gastropods, large)	41.1	86.9	82.95	70.27	31.42	120.39
Gastropoda (sm) (UID gastropods, small)	5.8					0.6
Polygyra sp (flat coil snail)	4.3		<.1	0	0.3	<.1
Crepidula spp (slipper shell)	10.2		0.6	0		
Neverita duplicata (shark eye)	49.54	19.5	37.49	41.44	104.8	184.1
Sinum perspectivum (white baby ear)			2.5			
Urosalpinx sp. (oyster drill)						
Melongena corona (crown conch)	2532.9	450.6	223.96	1577.35	873.4	1038.3
Busycon contrarium (lightning whelk)	557.8	444.1	707.52	5167.69	1440.3	862.7
Busycotypus spiratus (pear whelk)	29.74	0.1	14.26	27.27	65	24.5
Fasciolaria lilium (banded tulip)	25.79				6.49	16.46
Triplofusus giganteus(horse conch)						
Busycon carica(knobbed whelk)						
Phyllonotus pomum (apple murex)						
Olividae (olive shell)						
Total Gastropoda	**3257.17**	**1001.2**	**1069.28**	**6884.02**	**2521.71**	**2247.05**
Invertebrate (UID shell)	455	525	690	865	995	1580
Total Invertebrates	**2452**	**3357.07**	**10779.88**	**4197.81**	**3855.35**	**4440.35**

Taxon/FS	**380**	**388**	**TOTAL**
Balanus sp (barnacle)	27.7	127.3	691
Total Maxillopoda	**27.7**	**127.3**	**691**
Callinectes sp (blue crab)	0.38		0.73
Total Malacostraca	**0.38**	**0**	**0.73**
Mytilidae (mussel)	106.1	29.6	1804.65
Crassostrea Virginica (eastern oyster)	333.19	14540	207911.8
Mercenaria sp. (quahog clam)	219.4	81	3879.37
Macrocallista nimbosa (sunray venus clam)	10.2	12.7	216.56
Argopecten irradians (bay scallop)	1.4	3	9.4
Ostrea equestris (crested oyster)		101.36	2142.11
Cardiidae (cockle)			10.4
Eontia ponderosa (ponderous ark)			5.02
Veneroida (UID clams)			71.9
Veneroida (sm)			1.5
Bivalvia (UID bivalve)			6.7
Total Bivalvia	**670.29**	**14767.66**	**216059.4**
Gastropoda (lg) (UID gastropods, large)	482.84	32.2	3756.6
Gastropoda (sm) (UID gastropods, small)	1.4	2.5	60.7
Polygyra sp (flat coil snail)	<.1	8.1	46.67
Crepidula spp (slipper shell)	14.9	8.9	143.02
Neverita duplicata (shark eye)	272.92	70.4	4476.92
Sinum perspectivum (white baby ear)			3.3
Urosalpinx sp. (oyster drill)			16.7
Melongena corona (crown conch)	3801.32	1125	92772.54
Busycon contrarium (lightning whelk)	3406.29	1945.9	77741.22
Busycotypus spiratus (pear whelk)	150.88	87.2	4853.02
Fasciolaria lilium (banded tulip)	13.13	11.09	2079.73
Triplofusus giganteus(horse conch)			0
Busycon carica(knobbed whelk)			0
Phyllonotus pomum (apple murex)			0
Olividae (olive shell)	3.2		50.29
Total Gastropoda	**8146.88**	**3291.29**	**186000.7**
Invertebrate (UID shell)	1580	3285	90385.4
Total Invertebrates	**10425.25**	**21471.25**	**482426.4**

Table A.5 - All Mollusk Remains by Weight, 2014-2015 UM-WIAP Excavations

Taxon/FS	1	7/30	12	23	27	34	48	50
Estimated Minimum Number of Individuals (MNI)								
Balanus sp (barnacle)								
Total Maxillopoda	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Callinectes sp (blue crab)				1				
Total Malacostraca	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Mytilidae (mussel)								
Crassostrea Virginica (eastern oyster)	564	1407	63	3	65	215	54	6
Mercenaria sp. (quahog clam)								
Macrocallista nimbosa (sunray venus						1	1	
Argopecten irradians (bay scallop)		1						
Ostrea equestris (crested oyster)	11	148						
Cardiidae (cockle)						1		
Eontia ponderosa (ponderous ark)								
Veneroida (UID clams)								
Veneroida (sm)	7	71						
Bivalvia (UID bivalve)								
Total Bivalvia	**582**	**1627**	**63**	**3**	**65**	**217**	**55**	**6**
Gastropoda (lg) (UID gastropods, large)	6	1		1			14	
Gastropoda (sm) (UID gastropods, small)	11	40		1	5	18	6	
Polygyra sp (flat coil snail)	29	87			13	13	22	1
Crepidula spp (slipper shell)	71	323			10	66	5	
Neverita duplicata (shark eye)	1	6	1			8	2	2
Sinum perspectivum (white baby ear)								
Urosalpinx sp. (oyster drill)		11		1	8		1	
Melongena corona (crown conch)	21	26	7			33	44	
Busycon contrarium (lightning whelk)	86	66	21	3	27		20	1
Busycotypus spiratus (pear whelk)	3	5	2					
Fasciolaria lilium (banded tulip)	1					3	1	
Triplofusus giganteus(horse conch)								
Busycon carica(knobbed whelk)								
Phyllonotus pomum (apple murex)								
Olividae (olive shell)							1	
Total Gastropoda	**229**	**565**	**31**	**6**	**63**	**141**	**116**	**4**
Invertebrate (UID shell)								
Total Invertebrates	**811**	**2192**	**94**	**10**	**128**	**358**	**171**	**10**

Taxon/FS	**66**	**76**	**99**	**102**	**106**	**110**	**113**	**116**	**117**
Balanus sp (barnacle)									
Total Maxillopoda	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Callinectes sp (blue crab)									
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)									
Crassostrea Virginica (eastern oyster)	1	1	145	225	1	712	124	305	336
Mercenaria sp. (quahog clam)									
Macrocallista nimbosa (sunray venus			1			1		1	
Argopecten irradians (bay scallop)									1
Ostrea equestris (crested oyster)			7	2		29		10	3
Cardiidae (cockle)				1					
Eontia ponderosa (ponderous ark)							1		
Veneroida (UID clams)									
Veneroida (sm)									
Bivalvia (UID bivalve)									
Total Bivalvia	**1**	**1**	**153**	**228**	**1**	**742**	**125**	**316**	**340**
Gastropoda (lg) (UID gastropods, large)	1	1	18	13	1		21		8
Gastropoda (sm) (UID gastropods, small)			1	4		3	3		5
Polygyra sp (flat coil snail)		1	9	40	7	22	23	15	19
Crepidula spp (slipper shell)			3	20	2	16		16	3
Neverita duplicata (shark eye)			5	17		5		12	19
Sinum perspectivum (white baby ear)									1
Urosalpinx sp. (oyster drill)			2			5		1	
Melongena corona (crown conch)			148	188		134	122	79	53
Busycon contrarium (lightning whelk)	2		267	561	1	332	414	204	494
Busycotypus spiratus (pear whelk)			5	6		17	9	28	14
Fasciolaria lilium (banded tulip)				2		1		5	2
Triplofusus giganteus(horse conch)									
Busycon carica(knobbed whelk)									
Phyllonotus pomum (apple murex)									
Olividae (olive shell)				2					1
Total Gastropoda	**3**	**2**	**458**	**853**	**11**	**535**	**592**	**360**	**619**
Invertebrate (UID shell)									
Total Invertebrates	**4**	**3**	**611**	**1081**	**12**	**1277**	**717**	**676**	**959**

Taxon/FS	**123**	**136**	**139**	**141**	**149**	**150**	**170**	**171**	**173**
Balanus sp (barnacle)									
Total Maxillopoda	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Callinectes sp (blue crab)									
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)									
Crassostrea Virginica (eastern oyster)	1010	90	23	1	323	4	76	97	25
Mercenaria sp. (quahog clam)									
Macrocallista nimbosa (sunray venus								1	
Argopecten irradians (bay scallop)									
Ostrea equestris (crested oyster)		107			6		2	5	
Cardiidae (cockle)									
Eontia ponderosa (ponderous ark)									
Veneroida (UID clams)									
Veneroida (sm)									
Bivalvia (UID bivalve)									
Total Bivalvia	**1010**	**197**	**23**	**1**	**329**	**4**	**78**	**103**	**25**
Gastropoda (lg) (UID gastropods, large)	2	6	1		11		12	33	
Gastropoda (sm) (UID gastropods, small)	10	3	2		7		1		
Polygyra sp (flat coil snail)	20	14	2	1	35		4	9	
Crepidula spp (slipper shell)	109	23			10			6	
Neverita duplicata (shark eye)	9	9	1		6	1	7	21	4
Sinum perspectivum (white baby ear)									
Urosalpinx sp. (oyster drill)	19								
Melongena corona (crown conch)	153	34	2	1	257	7	56	181	28
Busycon contrarium (lightning whelk)	313	85	10	1	602	21	35	166	12
Busycotypus spiratus (pear whelk)	9	5	2		11	1	3	4	1
Fasciolaria lilium (banded tulip)	5	5			2			3	
Triplofusus giganteus(horse conch)									
Busycon carica(knobbed whelk)									
Phyllonotus pomum (apple murex)									
Olividae (olive shell)		1							
Total Gastropoda	**649**	**185**	**20**	**3**	**941**	**30**	**118**	**423**	**45**
Invertebrate (UID shell)									
Total Invertebrates	**1659**	**382**	**43**	**4**	**1270**	**34**	**196**	**526**	**70**

289	255	248	240	236	227	220	208	200	*Taxon/FS*
									Balanus sp (barnacle)
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**Total Maxillopoda**
									Callinectes sp (blue crab)
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**Total Malacostraca**
									Mytilidae (mussel)
3	74	68	255	1144	290	92	1110	788	*Crassostrea Virginica* (eastern oyster)
	1				1				*Mercenaria* sp. (quahog clam)
				1	1			1	*Macrocallista nimbosa* (sunray venus
				1			1		*Argopecten irradians* (bay scallop)
	8		3	66	17		15		*Ostrea equestris* (crested oyster)
									Cardiidae (cockle)
									Eontia ponderosa (ponderous ark)
									Veneroida (UID clams)
									Veneroida (sm)
									Bivalvia (UID bivalve)
3	**83**	**68**	**258**	**1212**	**309**	**92**	**1126**	**789**	**Total Bivalvia**
5	60		24	8	23	15	15	162	Gastropoda (lg) (UID gastropods, large)
	3		13	94	4		59	17	Gastropoda (sm) (UID gastropods, small)
	1		41	274	1		60	39	*Polygyra* sp (flat coil snail)
			9	677	>20		176	14	*Crepidula* spp (slipper shell)
	18	9	63	52	6	7	19	149	*Neverita duplicata* (shark eye)
									Sinum perspectivum (white baby ear)
								8	*Urosalpinx* sp. (oyster drill)
10	181	188	214	111	62	172	95	887	*Melongena corona* (crown conch)
5	32	272	713	152	41	193	123	1848	*Busycon contrarium* (lightning whelk)
	10	17	140	10	6	21	10	204	*Busycotypus spiratus* (pear whelk)
	1	11	123	2	3	5	9	92	*Fasciolaria lilium* (banded tulip)
									Triplofusus giganteus(horse conch)
									Busycon carica(knobbed whelk)
									Phyllonotus pomum (apple murex)
			1	1		1		3	Olividae (olive shell)
20	**306**	**497**	**1341**	**1381**	**146**	**414**	**566**	**3423**	**Total Gastropoda**
									Invertebrate (UID shell)
23	**389**	**565**	**1599**	**2593**	**455**	**506**	**1692**	**4212**	**Total Invertebrates**

Taxon/FS	**290**	**291**	**292**	**315**	**316**	**324**	**325**	**326**	**336**
Balanus sp (barnacle)									
Total Maxillopoda	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Callinectes sp (blue crab)									
Total Malacostraca	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)									
Crassostrea Virginica (eastern oyster)	10	197	78	2	8	1		514	1
Mercenaria sp. (quahog clam)									
Macrocallista nimbosa (sunray venus					1				1
Argopecten irradians (bay scallop)		1							
Ostrea equestris (crested oyster)								2	
Cardiidae (cockle)									
Eontia ponderosa (ponderous ark)									
Veneroida (UID clams)									
Veneroida (sm)									
Bivalvia (UID bivalve)									
Total Bivalvia	**10**	**198**	**78**	**2**	**9**	**1**	**0**	**516**	**2**
Gastropoda (lg) (UID gastropods, large)	7	45	213	4	1			33	
Gastropoda (sm) (UID gastropods, small)		4						23	
Polygyra sp (flat coil snail)		1	2					29	
Crepidula spp (slipper shell)		1						55	
Neverita duplicata (shark eye)		67	54	5	4	2	1	8	
Sinum perspectivum (white baby ear)									
Urosalpinx sp. (oyster drill)									
Melongena corona (crown conch)	25	709	470	9	7	8	1	72	4
Busycon contrarium (lightning whelk)	3	402	393	7	10	5	1	39	1
Busycotypus spiratus (pear whelk)		45	47					6	
Fasciolaria lilium (banded tulip)		22	11		1			3	
Triplofusus giganteus(horse conch)									
Busycon carica(knobbed whelk)									
Phyllonotus pomum (apple murex)		1							
Olividae (olive shell)						1		1	
Total Gastropoda	**35**	**1297**	**1190**	**25**	**23**	**16**	**3**	**269**	**5**
Invertebrate (UID shell)									
Total Invertebrates	**45**	**1495**	**1268**	**27**	**32**	**17**	**3**	**785**	**7**

Taxon/FS	**342**	**344**	**349**	**350**	**373**	**375**	**376**	**377**	**378**
Balanus sp (barnacle)									
Total Maxillopoda	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Callinectes sp (blue crab)				1					
Total Malacostraca	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Mytilidae (mussel)									
Crassostrea Virginica (eastern oyster)	6	1	57	382	74	156	99	47	30
Mercenaria sp. (quahog clam)									
Macrocallista nimbosa (sunray venus				1		1	2	1	1
Argopecten irradians (bay scallop)				1					
Ostrea equestris (crested oyster)				8			2		
Cardiidae (cockle)									
Eontia ponderosa (ponderous ark)									
Veneroida (UID clams)									
Veneroida (sm)									
Bivalvia (UID bivalve)									
Total Bivalvia	**6**	**1**	**57**	**392**	**74**	**157**	**103**	**48**	**31**
Gastropoda (lg) (UID gastropods, large)	1		8	8	9	2	3	15	19
Gastropoda (sm) (UID gastropods, small)			2	29					3
Polygyra sp (flat coil snail)			2	127		1	5	2	2
Crepidula spp (slipper shell)			2	132		2	2		
Neverita duplicata (shark eye)	5		17	13	8	5	8	21	30
Sinum perspectivum (white baby ear)						1			
Urosalpinx sp. (oyster drill)									
Melongena corona (crown conch)	33		88	77	42	13	35	69	68
Busycon contrarium (lightning whelk)	11	2	96	72	96	45	55	167	115
Busycotypus spiratus (pear whelk)			12	10	1	3	4	12	4
Fasciolaria lilium (banded tulip)			1	6				2	3
Triplofusus giganteus(horse conch)									
Busycon carica(knobbed whelk)									
Phyllonotus pomum (apple murex)									
Olividae (olive shell)									
Total Gastropoda	**50**	**2**	**228**	**474**	**156**	**72**	**112**	**288**	**244**
Invertebrate (UID shell)									
Total Invertebrates	**56**	**3**	**285**	**230**	**229**	**215**	**336**	**275**	**408**

Taxon/FS	**380**	**388**
Balanus sp (barnacle)		
Total Maxillopoda	**0**	**0**
Callinectes sp (blue crab)	1	
Total Malacostraca	**1**	**0**
Mytilidae (mussel)		
Crassostrea Virginica (eastern oyster)	22	966
Mercenaria sp. (quahog clam)		
Macrocallista nimbosa (sunray venus	1	1
Argopecten irradians (bay scallop)	1	1
Ostrea equestris (crested oyster)		55
Cardiidae (cockle)		
Eontia ponderosa (ponderous ark)		
Veneroida (UID clams)		
Veneroida (sm)		
Bivalvia (UID bivalve)		
Total Bivalvia	**24**	**1023**
Gastropoda (lg) (UID gastropods, large)	18	3
Gastropoda (sm) (UID gastropods, small)	14	18
Polygyra sp (flat coil snail)	5	200
Crepidula spp (slipper shell)	26	145
Neverita duplicata (shark eye)	36	12
Sinum perspectivum (white baby ear)		
Urosalpinx sp. (oyster drill)		
Melongena corona (crown conch)	103	26
Busycon contrarium (lightning whelk)	160	174
Busycotypus spiratus (pear whelk)	16	9
Fasciolaria lilium (banded tulip)	3	1
Triplofusus giganteus(horse conch)		
Busycon carica(knobbed whelk)		
Phyllonotus pomum (apple murex)		
Olividae (olive shell)	2	
Total Gastropoda	**383**	**588**
Invertebrate (UID shell)		
Total Invertebrates	**408**	**1611**

Table A.6 - All Mollusk Remains by MNI, 2014-2015 UM-WIAP Excavations

Appendix B – Macrobotanical Remains

Appendix B includes data from the analysis of macrobotanical remains (by Jessie Johanson) recovered from flotation samples. Recovery and analysis methods are described in Chapter 6.

FS#	Flot #	Plant Wgt (g)	Wood Wgt (g)	Common Name	Count	Wgt (g)	Comment
20	9	3.09	2.79	Acorn	8	0.02	
20	9	3.09	2.79	Acorn cf.	7	0.02	eroded; possibly cap
20	9	3.09	2.79	Pine cone	5	0	
20	9	3.09	2.79	Pitch	1	0	
20	9	3.09	2.79	Stem	9	0.03	
20	9	3.09	2.79	Unidentfiable	2	0	fruit meat cf.?
20	9	3.09	2.79	Unidentifiable	3	0.01	
20	9	3.09	2.79	Unidentifiable seed	7	0.01	no id features - eroded/small
29	25	5.96	5.32	Acorn	64	0.17	
29	25	5.96	5.32	Bark	2	0.02	
29	25	5.96	5.32	Grape	1	0.01	Partially Carbonized
29	25	5.96	5.32	Hickory	5	0.08	
29	25	5.96	5.32	Pine cone	4	0.01	
29	25	5.96	5.32	Pitch	33	0.25	
29	25	5.96	5.32	Unidentifiable	19	0.1	
67	14	4.17	4.01	Acorn	19	0.03	
67	14	4.17	4.01	Pitch	36	0.12	
67	14	4.17	4.01	Unidentifiable	5	0.01	
67	14	4.17	4.01	Unidentifiable seed	1	0	small
86	3	2.54	2.26	Acorn	2	0.08	Partially Carbonized - large fragments
86	3	2.54	2.26	Bark	2	0.1	
86	3	2.54	2.26	Grape	1	0	Partially Carbonized
86	3	2.54	2.26	Monocot stem	1	0	
86	3	2.54	2.26	Pine cone	5	0.02	
86	3	2.54	2.26	Pitch	13	0.05	
86	3	2.54	2.26	Unidentifiable	6	0.01	Partially Carbonized (3)
86	3	2.54	2.26	Unidentifiable seed	1	0.02	Shape of wild bean - no cotylodon
86	3	2.54	2.26	Unidentifiable seed cf.	1	0	

FS#	Flot #	Plant Wgt (g)	Wood Wgt (g)	Common Name	Count	Wgt (g)	Comment
202	11	4.51	2.75	Grape	9	0.1	Uncarbonized
202	11	4.51	2.75	Pitch	203	1.65	
202	11	4.51	2.75	Unidentifiable seed	1	0.01	
202	11	4.51	2.75	Verbena	1	0	
284	23	10.65	10.55	Grape	1	0.01	Uncarbonized
284	23	10.65	10.55	Hickory cf.	1	0.01	<1.4 mm
284	23	10.65	10.55	Monocot stem	2	0	
284	23	10.65	10.55	Stem	1	0.01	
284	23	10.65	10.55	Unidentifiable	7	0.06	
284	23	10.65	10.55	Unidentifiable seed	2	0	
284	23	10.65	10.55	Unidentifiable seed cf.	3	0.01	
333	30	44.09	43.84	Grape cf.	1	0.01	
333	30	44.09	43.84	Nutshell cf.	1	0	
333	30	44.09	43.84	Pitch	21	0.24	
333	30	44.09	43.84	Unidentifiable	1	0	
345	31	0.44	0.41	Pitch	2	0.02	
345	31	0.44	0.41	Stem	1	0.01	
350	18	16.28	15.91	Acorn	8	0.02	
350	18	16.28	15.91	Hickory	3	0.04	
350	18	16.28	15.91	Pitch	29	0.19	
350	18	16.28	15.91	Unidentifiable	17	0.12	bark?
376	29	3.33	3.15	Acorn	9	0.03	
376	29	3.33	3.15	Bark	1	0	
376	29	3.33	3.15	Chenopod	1	0	
376	29	3.33	3.15	Grape	1	0.01	Uncarbonized
376	29	3.33	3.15	Grape cf.	1	0.01	distorted
376	29	3.33	3.15	Hickory cf.	1	0.01	small fragments
376	29	3.33	3.15	Pitch	12	0.07	
376	29	3.33	3.15	Unidentifiable	2	0.02	
376	29	3.33	3.15	Unidentifiable seed	1	0	
376	29	3.33	3.15	Unidentifiable seed cf.	1	0.01	
388	26	10.01	8.65	Acorn	5	0.02	
388	26	10.01	8.65	Insect gall	2	0.01	
388	26	10.01	8.65	Maypop cf.	1	0	small fragment
388	26	10.01	8.65	Pitch	104	1.32	
388	26	10.01	8.65	Unidentifiable seed	1	0.01	Uncarbonized

Table B.1 – All Analyzed Macrobotanical Remains by FS#

Appendix C – Ceramic Artifacts

Appendix C includes data from the analysis of ceramic artifacts. Methods of analysis are described in Chapter 7.

Excavation context	**Weight of all sherds (g)**	**Count of analyzed sherds***
Unit A	**213.9**	**22**
Feature 1	3	1
Midden	207.2	20
Mixed (wall/floor clean)	3.7	1
Block C	**1225.18**	**134**
Feature 20	140.5	14
Midden	0.5	113
Topsoil	1009.8	6
Mixed (wall/floor clean)	59.68	1
Block D	14.7	**175**
Feature 15	**1641.2**	2
Feature 16	2.7	3
Feature 17	11.6	2
Feature 8	36.6	6
Subsoil	7.6	8
Midden	97.9	141
Topsoil	0.2	9
Mixed (wall/floor clean)	52.4	4
Unit C	**85.65**	**9**
Midden	85.65	9
Unit D	**375.53**	**60**
Feature 2	13.3	1
Midden	348.38	56
Topsoil	11.65	1
Mixed (wall/floor clean)	2.2	2
Unit E	**98.22**	**15**
Subsoil	91.32	12
Mixed (wall/floor clean)	6.9	3
Unit H	**646.55**	**36**
Feature 4	1.1	0
Midden	639.15	35
Mixed (wall/floor clean)	6.3	1
Unit I	**20.6**	**5**

Excavation context	Weight of all sherds (g)	Count of analyzed sherds*
Midden	16.6	4
Mixed (wall/floor clean)	4	1
Unit L	**50.6**	**8**
Topsoil	50.6	8
Unit M	**209.46**	**35**
Subsoil	56.86	10
Midden	29.3	5
Topsoil	123.3	20
Unit N	**440.04**	**60**
Subsoil	0.86	0
Midden	348.58	48
Topsoil	71.8	9
Mixed (wall/floor clean)	18.8	3
Unit R	**861.2**	**77**
Subsoil	35.8	1
Midden	752.5	66
Topsoil	72.9	10
Unit S	**136.03**	**17**
Subsoil	60.5	10
Midden	70.2	5
Topsoil	3.63	1
Mixed (wall/floor clean)	1.7	1
Unit T	**91.9**	**7**
Midden	80.4	6
Topsoil	11.5	1
Unit U	**80.2**	**7**
Midden	73.8	6
Topsoil	6.4	1
Unit V	**985.1**	**114**
Feature 21	222.8	25
Feature 22	1	0
Subsoil	130.3	12
Midden	540.4	65
Topsoil	90.6	12
Grand Total	**7161.36**	**781**

*Counts exclude sherds under 2cm diameter

Table C.1 - Ceramic totals from all units, 2014-2015 UM-WIAP Excavations

Unit Name	Strat. Zone	Body Thickness (mm)	Type	Variation	Temper	Color	Lamination	Sooting	Fire Clouding	Surface Treatment	Rim Orientation	Rim/Lip Decoration	Lip Shape	Vessel Form	Orifice Diam. (mm)	Arc %
A	Mdn.	5	Pinellas	Plain	sand	black/ buff			X	incised	straight	incised line	rounded	simple bowl	23	5
A	Mdn.	5	Pinellas	Plain	sand	black /buff					straight		rounded	simple bowl	18	8
A	Mdn.		Grog Temp.	Plain	grog	buff/ gray							flattened, thickened			
D	Mdn.	8	St Johns	Plain	sponge	buff/ gray					straight		rounded			
A	Mdn.	7	Sand Temp.	Plain	sand	buff					outward curving		flattened	simple bowl	14	7
A	Mdn.	6	St Johns	Check Stamp.	sponge	Buff /gray		X		check stamp.	outward curving		rounded	simple bowl	26	7
D	Mdn.	5	Sand Temp.	Plain	sand	buff /gray					outward curving		rounded, thickened (int)	simple bowl	18	5
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray					straight		rounded	straight wall pot		
D	Mdn.	7	Sand Temp.	Plain	sand	black/buff							rounded			
N	Tpsl.	8	Sand Temp.	Plain	sand	dark gray					outward curving		rounded	simple bowl		
N	Mdn.	4	St Johns	Plain	sponge	buff					straight		flattened, thickened (ext)	simple bowl	10	9
N	Mdn.	5	Wakulla	Check Stamp.	sand	black				check stamp.	inward curving	incised line	rounded	glob. bowl	14	6

A	Mixed (W/FC)	5	Wakulla	Check Stamp.	sand	light gray				check stamp.	outward curving	incised line	rounded	simple bowl		
M	Tpsl.	9	Pinellas	Plain	none	brown	X				outward curving		flattened	simple bowl		
M	Tpsl.	8	St Johns	Plain	sponge/sand	buff					outward curving		flattened	simple bowl		
M	Tpsl.	5	Papys Bayou	Punct.	sponge	buff/dark gray				punct. and incised	straight	incised line and punctation	flattened	bowl		
M	Tpsl.	8	St Johns	Plain	sponge/sand	buff					straight		flattened			
M	Mdn.	7	St Johns	Plain	sponge	buff/black					inward curving		flattened	glob. bowl		
M	Mdn.	10	Sand Temp.	Plain	sand	dark gray/brown		X			straight		rounded, thickened (int)			
C	Mdn.	6	Sand Temp.	Plain	sand	buff					straight		rounded			
H	Mdn.	6	Belle Glades	Plain	sponge/sand	buff/dark gray		X	X		outward curving		flattened	simple bowl	34	21
H	Mdn.	8	Wakulla	Check Stamp.	sand	buff/dark gray			X	check stamp.	inward curving		rounded			
R	Tpsl.	7	Sand Temp.	Plain	sand	buff/dark gray					straight		flattened			
R	Tpsl.	7	Wakulla	Check Stamp.	sand	buff/black				check stamp.	straight		rounded, thickened (ext)			
S	Mdn.	8	Sand Temp.	Plain	sand	dark gray							rounded			
S	Sbsl.	6	Pinellas	Plain	sand	black	X	X			straight		rounded		32	5
S	Sbsl.	6	Sand Temp.	Plain	sand?	buff	X				straight	tooling/indentation (?)	flattened			
S	Sbsl.	7	Pinellas	Plain	sand	black	X				straight		rounded			

S	Sbsl.	9	Pinellas	Plain	sand	buff/black	X				outward curving		flattened	bowl		
S	Sbsl.	6	Pinellas	Plain	sand	dark gray	X				outcurving		rounded			
L	Tpsl.	5	Sand Temp.	Plain	sand	dark gray-buff					straight		flattened	bowl	20	5
L	Tpsl.	4	Sand Temp.	Plain	sand	dark gray-buff					straight		flattened			
H	Mixed (W/FC)	6	Wakulla	Check Stamp.	sand	dark gray/buff				check stamp.	incurving		rounded	glob. bowl		
T	Mdn.	6	St Johns	Check Stamp.	sponge	buff/gray	X			check stamp.	outward curving		flattened	simple bowl	26	5
T	Mdn.	8	Sand Temp.	Plain	sand	black/buff					outward curving		flattened	simple bowl		
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X				outward curving		flattened	simple bowl	20	6
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	black				burnished	outward curving		flattened	simple bowl		
Blk. C	Tpsl.	6	Pinellas	Plain	sand	black	X				straight	ticked lip	flattened			
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	black					straight		rounded			
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff	X				straight	notched lip	flattened			
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	black					straight		rounded/beveled (int)			
Blk. C	Mdn.	9	Pinellas	Plain	sand	black/buff	X				outward curving		flattened	simple bowl		
Blk. C	F20	9	Pinellas	Plain	sand	black	X				straight	notched lip	flattened		20	7
Blk. C	F20	10	Sand Temp.	Plain	sand	brown					outward curving		flattened	simple bowl		

Blk. C	F20	6	Wakulla	Check Stamp.	sand	black				check stamp.	straight		flattened			
Blk. C	Mdn.	8	Pinellas	Plain	sand	black	X				outward curving	ticked lip	flattened	simple bowl		
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff/brown					straight		rounded		22	5
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff/black	X				straight		flattened			
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown/dark gray	X				outward curving	ticked lip	flattened			
Blk. C	Mdn.	6	Pinellas	Plain	sand	black	X				straight		flattened			
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff/black	X				straight	ticked lip	flattened			
Blk. D	Mdn.	5	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp.	incurving		flattened			
Blk. D	Mdn.	4	Pinellas	Plain	sand	brown	X				inward curving	notched lip	flattened, thickened (int)	simple bowl	6	15
Blk. D	Tpsl.	7	Pinellas	Plain	sand	black	X				outward curving	notched lip	rounded	simple bowl		
Blk. D	Mdn.	7	Pinellas	Plain	sand	black/brown	X				outward curving	notched lip	rounded	simple bowl	20	9
Blk. D	Mdn.	5	Pinellas	Plain	sand	black	X				straight		rounded/beveled (int)			
Blk. D	Tpsl.	6	Sand Temp.	Plain	sand	brown	X				straight		flattened			
Blk. D	Tpsl.	6	Sand Temp.	Plain	sand	brown	X		X		straight		flattened			
Blk. D	Mdn.	4	Pinellas	Plain	sand	brown	X				outward curving		flattened	simple bowl	9	12.5
Blk. D	Mdn.	4	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp.	outward curving		flattened/beveled (ext)	simple bowl		
Blk. D	Mdn.	5	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp.	outward curving		flattened	simple bowl		
Blk. D	Mdn.	10	Sand Temp.	Plain	sand	buff/gray					straight		flattened			

Blk. D	F 8	10	Sand Temp.	Plain	sand	buff/gray					straight		flattened			
Blk. D	Mixed (W/FC)	7	Pinellas	Plain	sand	brown	X				outward curving		flattened/beveled (ext)			
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X				outward curving		rounded	simple bowl	30	6
Blk. D	Mdn.	5	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp.	outward curving		rounded			
Blk. D	Mdn.	4	Pinellas	Plain	sand	black	X				straight		rounded			
Blk. D	Mdn.	8	Pinellas	Plain	sand	black	X				straight		flattened		20	5
Blk. C	Mdn.	8	Pinellas	Plain	none	black/brown	X				straight	ticked lip	flattened			
Blk. C	Mdn.	9	Pinellas	Plain	none	black/brown	X				straight	ticked lip	flattened			
Blk. C	Mdn.	6	Pinellas	Plain	none	black	X				outward curving	ticked lip	flattened			
Blk. C	Mdn.	6	Pinellas	Plain	sand	black/buff	X				inward curving		rounded	glob. bowl		
Blk. C	Mdn.	6	Pinellas	Plain	sand	black/buff	X				inward curving		rounded	glob. bowl		
Blk. D	Mdn.	5	St Johns	Check Stamp.	sponge	buff/gray				check stamp. (faint)	outward curving		flattened	simple bowl		
Blk. D	Mdn.	7	Pinellas	Plain	sand	dark brown	X				straight		flattened			
Blk. D	Mdn.	7	Pinellas	Plain	sand	dark brown	X				straight		rounded			
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown	X				outward curving	notched rim	flattened		22	5
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X				straight		rounded			
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	orange-brown					straight		flattened, thickened (int/ext)		22	5

U	Mdn.	4	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp. (faint)	outward curving		rounded	simple bowl		
U	Mdn.	5	St Johns	Plain	sponge	buff/dark gray					outward curving		flattened	simple bowl		
Blk. D	Mdn.	10	Sand Temp.	Plain	sand	brown		X			straight		rounded			
Blk. D	Mdn.	6	Pinellas	Plain	none	brown	X				straight		flattened			
R	Mdn.	6	Sand Temp.	Plain	sand	black/red-brown					straight		rounded			
V	Mdn.	4	St Johns	Check Stamp.	sponge	buff/dark gray				check stamp.	outward curving		rounded/thickened (ext)			
V	Mdn.	8	Sand Temp.	Plain	sand	dark gray	X				inward curving		flattened			
V	Mdn.	10	Sand Temp.	Plain	sand	brown					inward curving		rounded			
V	Mdn.	10	Sand Temp.	Plain	sand	buff					everted		flattened			
V	Mdn.	8	Sand Temp.	Plain	sand	black					straight		flattened		28	7
V	Mdn.	5	Carrabelle	Incised	sand	brown				incised vertical lines	straight		rounded		16	5
V	Mdn.	8	Sand Temp.	Plain	sand	dark brown							rounded			
V	F 21	8	Sand Temp.	Plain	sand	dark brown					straight		flattened			
V	F 21	9	Sand Temp.	Plain	sand	dark brown					everted		rounded			
V	Sbsl.	10	Sand Temp.	Plain	sand	black/brown					outward curving		rounded	simple bowl		

R	Mdn.	6	Pinellas	Plain	none	orange - brown/ black	X				outward curving		flattened	simple bowl		
R	Mdn.	6	St Johns	Check Stamp.	sponge	buff/dark gray		X		check stamp.	outward curving		flattened/beveled (int)		35	12.5
R	Mdn.	9	Pinellas	Plain	none	black/brown	X				straight		rounded		22	7
R	Mdn.	9	St Johns	Check Stamp.	sponge	brown/ black		X		check stamp.	outward curving		rounded	simple bowl	35	7.5
Blk. D	Mdn.	7	St Johns	Check Stamp.	sponge	buff/dark gray/orange	X	X	X	check stamp.	outward curving		flattened	simple bowl		

Table C.2 - All rim sherds, 2014-2015 UM-WIAP Excavations

Unit Name	Strat. Zone	Body Thickness (mm)	Type	Variation	Temper	Color	Lamination	Sooting	Fire Clouding	Other modification	Surface Treatment	Notes
A	Mdn.	6	Sand Temp.	Plain	sand	red/buff		X	X			
A	Mdn.	8	Pinellas	Plain	sand	black/buff	X					
A	Mdn.	8	Grog Temp.	Plain	grog	buff/gray						
A	Mdn.	11	Grog Temp.	Plain	grog	buff/gray						
A	Mdn.	8	Sand Temp.	Plain	sand	buff/gray		X				
D	Tpsl.	7	Pinellas	Plain	none	gray/buff	X					
A	F1	5	Sand Temp.	Plain	sand	gray						
D	Mdn.	7	Sand Temp.	Plain	sand	red/buff/gray						

D	Mdn.	7	Pinellas	Plain	sand	black	X					later PP with more sand?
D	Mdn.	7	Grog Temp.	Plain	grog/sand	buff						
D	Mdn.	5	St Johns	Check Stamped	sponge	buff/gray					check stamped	
D	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Pinellas	Plain	sand	black	X					later PP with more sand?
D	Mdn.	6	St Johns	Plain	sponge	gray						
D	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	4	Pinellas	Plain	sand	black	X					later PP with more sand?
D	Mdn.	6	Sand Temp.	Plain	sand	red/gray						
D	Mdn.	6	Pinellas	Plain	sand	black	X					later PP with more sand?
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	6	Pinellas	Plain	sand	black	X					later PP with more sand?
A	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
A	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						
A	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						cracked and chunky paste
D	Mdn.	5	Sand Temp.	Plain	sand	brown						
D	Mdn.	5	Pinellas	Plain	sand	black	X					later PP with more sand?
D	Mdn.	5	St Johns	Plain	sponge	black						

D	Mdn.	5	Weeden Island	Plain	sand	light gray						
D	Mdn.	5	St Johns	Check Stamped	sponge/sand	buff/gray					check stamped (faint)	
D	Mdn.	7	Pinellas	Plain	sand	black	X					
D	Mdn.	5	St Johns	Plain	sponge	buff/black						
D	Mdn.	8	Sand Temp.	Plain	sand	red/buff						
D	Mdn.	6	St Johns	Plain	sponge/sand	black						
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	2	St Johns	Plain	sponge	black						
D	Mdn.	6	Sand Temp.	Plain	sand	gray		X				
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Sand Temp.	Plain	sand	gray						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						Shell inclusion (?)
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray		X				
D	Mdn.	6	Sand Temp.	Plain	sand	buff/black						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/black						

D	Mdn.	8	Sand Temp.	Plain	sand	buff/black						
D	Mdn.	5	Sand Temp.	Plain	sand	gray						
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						borderline Pinellas type
D	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	6	Sand Temp.	Plain	sand	gray						
D	Mdn.	7	Sand Temp.	Plain	sand	gray						
D	Mdn.	8	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	5	Sand Temp.	Plain	sand	buff/black						
E	Sbsl.	7	Pinellas	Plain	none	red-brown	X					highly laminated
E	Sbsl.	5	St Johns	Plain	sponge	buff						
E	Sbsl.	6	Sand Temp.	Plain	sand	gray/buff						
A	Mdn.	6	Sand Temp.	Plain	sand	black/brown	X					borderline Pinellas type
A	Mdn.	7	Sand Temp.	Plain	sand	black	X					borderline Pinellas type
A	Mdn.	7	Pinellas	Plain	sand	black	X					later PP with more sand?

A	Mdn.	7	Sand Temp.	Plain	sand	buff/gray					check stamped; burnished interior	
A	Mdn.	7	St Johns	Check Stamped	sponge/sand	buff/gray						
A	Mdn.	7	St Johns	Check Stamped	sponge/sand	buff/gray						
D	Mdn.	7	St Johns	Check Stamped	sand	buff/gray	X				check stamped	
D	Mdn.	3	Weeden Island	Plain	sand	gray/buff			X		burnished interior and exterior	
D	Mdn.	6	Sand Temp.	Plain	sand	buff/gray						
D	Mdn.	6	Sand Temp.	Plain	sand	red/gray						
D	Mdn.	4	Sand Temp.	Plain	sand	dark gray						
E	Mixed (W/FC)	8	Sand Temp.	Plain	sand	buff/gray						
E	Mixed (W/FC)	6	Sand Temp.	Plain	sand	buff/gray						
E	Mixed (W/FC)	7	Sand Temp.	Plain	sand	buff/gray						
A	Mdn.	7	St Johns	Check Stamped	sponge	buff/gray		X			check stamped	broken but treated as 1 sherd
E	Sbsl.	7	Sand Temp.	Plain	sand	buff/gray		X				
E	Sbsl.	4	St Johns	Plain	sponge	buff						
E	Sbsl.	5	St Johns	Check Stamped	sponge	buff/gray					check stamped	

E	Sbsl.	7	Sand Temp.	Plain	sand	buff/gray						
E	Sbsl.	6	St Johns	Check Stamped	sponge	buff/gray					check stamped	
E	Sbsl.	7	Sand Temp.	Plain	sand	brown						
E	Sbsl.	9	St Johns	Check Stamped	sponge	buff/gray					check stamped	
E	Sbsl.	5	St Johns	Check Stamped	sponge	light gray/buff					check stamped	
D	Mdn.	7	St Johns	Plain	sponge	buff/gray		X				2 broken pieces recorded as 1 sherd
D	Mdn.	0										
E	Sbsl.	10	Grog Temp.	Plain	grog	buff						
N	Tpsl.	6	St Johns	Plain	sponge	buff/dark gray						
N	Tpsl.	10	Pinellas	Plain	none	red-brown/black	X					
N	Tpsl.	7	St Johns	Plain	sponge	buff/gray		X				2 broken pieces recorded as 1 sherd
N	Tpsl.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
N	Tpsl.	5	Sand Temp.	Plain	sand	red-brown/black						
N	Tpsl.	5	St Johns	Plain	sponge	buff/dark gray						
N	Tpsl.	6	St Johns	Plain	sponge	buff/dark gray						
N	Tpsl.	5	St Johns	Plain	sponge	buff/dark gray					possible faded check stamp	
N	Mdn.	7	Sand Temp.	Plain	sand	dark gray						
N	Mdn.	9	Pinellas	Plain	none	red-brown/black	X					

N	Mdn.	7	St Johns	Check Stamped	sponge	buff/dark gray					check stamped (faint)	
N	Mdn.	8	Sand Temp.	Check Stamped	sand	dark gray					check stamped	borderline Wakulla type
N	Mdn.	8	Sand Temp.	Plain	sand	red-brown/black			X			
N	Mdn.	9	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	6	St Johns	Plain	sponge	dark gray		X				
N	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
N	Mdn.	8	Sand Temp.	Check Stamped	sand	dark gray					check stamped	
N	Mdn.	7	Sand Temp.	Plain	sand	red-brown/black			X			
N	Mdn.	7	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	5	St Johns	Plain	sponge	dark gray						
N	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped; scraped lines on interior	
N	Mdn.	8	Sand Temp.	Check Stamped	sand	dark gray					check stamped	
N	Mdn.	8	Sand Temp.	Plain	sand	buff/gray						
N	Mdn.	10	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	3	St Johns	Plain	sponge	dark gray						
N	Mdn.	5	Sand Temp.	Plain	sand	red/black			X			
N	Mdn.	9	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	5	St Johns	Plain	sponge	buff/gray						
N	Mdn.	6	Sand Temp.	Plain	sand	red/black						
N	Mdn.	5	Pinellas	Plain	none	red-brown/black	X					

N	Mdn.	6	St Johns	Plain	sponge	dark gray						
N	Mdn.	8	Sand Temp.	Plain	sand	buff/gray						
N	Mdn.	8	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	4	St Johns	Plain	sponge	buff/dark gray						
N	Mdn.	7	Sand Temp.	Plain	sand	red/black						
N	Mdn.	9	Pinellas	Plain	none	red-brown/black	X					
N	Mdn.	5	St Johns	Plain	sponge	buff/dark gray					scraped lines on interior	
N	Mdn.	6	Sand Temp.	Plain	sand	red/black						
N	Mdn.	6	Pinellas	Plain	sand	dark gray	X					borderline Pinellas type
N	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
N	Mdn.	4	Weeden Island	Incised	sand	light gray					Incised; lightly burnished int. and ext.	
N	Mdn.	5	Sand Temp.	Plain	sand	black					possible check stamp; burnished int.	
N	Mdn.	7	Sand Temp.	Check Stamped	sand	buff/black					check stamped	micacious paste
N	Mdn.	5	St Johns	Check Stamped	sponge	buff/gray					check stamped	
N	Mdn.	4	Sponge Temp.	Curvilinear Stamped	sponge	buff/gray					curvilinear stamp	
N	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						

N	Mdn.	9	Sand Temp.	Plain	sand	buff/red/black						
N	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
N	Mdn.	6	Sand Temp.	Plain	sand	buff/red/black						
N	Mdn.	0										
D	F2	8	Dunns Creek	Red	sponge	red/buff/gray					red slipped exterior/interior	
N	Mdn.	7	Sand Temp.	Plain	sand	red/black			X			
N	Mdn.	6	Sand Temp.	Plain	sand	red/black			X			
N	Mdn.	5	Sand Temp.	Plain	sand	red/black						
N	Mdn.	6	Sand Temp.	Plain	sand	red/black						
M	Tpsl.	5	Sand Temp.	Plain	sand	red-buff/gray						
M	Tpsl.	0	Grog Temp.	Plain	grog	buff						
M	Tpsl.	9	Pinellas	Plain	none	brown	X					
M	Tpsl.	7	Sand Temp.	Plain	sand	dark gray						
M	Tpsl.	10	Pinellas	Plain	none	brown/black	X					
M	Tpsl.	5	Sand Temp.	Plain	sand	buff/black						
M	Tpsl.	5	St Johns	Plain	sponge	buff/gray						
M	Tpsl.	9	Pinellas	Plain	none	brown	X					

M	Tpsl.	4	Sand Temp.	Plain	sand	buff/red					possible impressions of some kind on interior	
M	Tpsl.	2	St Johns	Plain	sponge	buff/gray		X				
M	Tpsl.	9	Pinellas	Plain	none	brown	X					
M	Tpsl.	4	St Johns	Plain	sponge	buff/gray						
M	Tpsl.	9	Pinellas	Plain	none	brown/black	X					
M	Tpsl.	7	St Johns	Plain	sponge	red-buff/gray						
M	Tpsl.	8	Pinellas	Plain	none	brown	X					
M	Tpsl.	7	Pinellas	Plain	none	buff/dark gray	X					
M	Sbsl.	4	Sand Temp.	Plain	sand	gray						
M	Sbsl.	8	Sand Temp.	Check Stamped	sand	gray/red					check stamped	
M	Sbsl.	4	St Johns	Check Stamped	sponge	buff/gray					check stamped	
M	Sbsl.	7	Sand Temp.	Plain	sand	red/black						
M	Sbsl.	5	St Johns	Check Stamped	sponge/sand	buff/gray					check stamped	
M	Sbsl.	4	St Johns	Plain	sponge	gray/blacks						
M	Sbsl.	7	Pinellas	Plain	none	buff/dark gray	X					
M	Sbsl.	5	St Johns	Check Stamped	sponge/sand	buff/gray					check stamped	
M	Sbsl.	6	St Johns	Check Stamped	sponge/sand	buff/gray						
M	Sbsl.	5	St Johns	Check Stamped	sponge/sand	buff/gray		X				
D	Mixed (W/FC)											

D	Mixed (W/FC)	7	Sand Temp.	Plain	sand	gray/buff						
I	Mdn.	7	Pinellas	Plain	none	brown						
I	Mdn.	6	St Johns	Plain	sponge	gray/black						
I	Mdn.	6	Weeden Island	Plain	sand	black					burnished interior & exterior	micacious paste (?)
I	Mdn.	6	St Johns	Plain	sponge	gray/black						
M	Mdn.	6	St Johns	Plain	sponge	buff/black						
M	Mdn.	9	Sand Temp.	Plain	sand	red/black						
M	Mdn.	6	St Johns	Plain	sponge	buff/black						
N	Mixed (W/FC)	7	Sand Temp.	Plain	sand	brown					burnished interior/exterior	sherd shaped into disk
N	Mixed (W/FC)	7	Sand Temp.	Plain	sand	gray						
C	Mdn.	4	St Johns	Plain	sponge	gray						
C	Mdn.	8	St Johns	Check Stamped	sponge	buff/gray/pink					check stamped	
C	Mdn.	9	Sand Temp.	Check Stamped	sand	black					check stamped	
C	Mdn.	4	St Johns	Check Stamped	sponge	light gray/dark gray					check stamped	
C	Mdn.	9	Sand Temp.	Check Stamped	sand	black					check stamped	
H	Mdn.	7	Sand Temp.	Plain	sand	buff/black	X					
H	Mdn.	6	Sand Temp.	Plain	sand	buff/black	X					

H	Mdn.	8	St Johns	Check Stamped	sponge	buff					check stamped	broken, analyzed as 1 sherd
C	Mdn.	5	St Johns	Check Stamped	sponge	buff/gray					check stamped	
C	Mdn.	5	St Johns	Plain	sponge	black		X				
C	Mdn.	8	Sand Temp.	Plain	sand	gray/red-brown					lightly burnished interior	
N	Mixed (W/FC)	8	Grog Temp.	Plain	grog	red-brown/black	X					
H	Mdn.	5	Sand Temp.	Simple Stamped	sand	black/buff		X			linear simple stamped (?); scraped lines on terior	
H	Mdn.	8	Sand Temp.	Plain	sand	buff/black	X					
H	Mdn.	5	Sand Temp.	Plain	sand	buff/black					burnishing/brush marks visible on exterior and interior	
H	Mdn.	7	Sand Temp.	Check Stamped	sand	buff/black		X			check stamped	
H	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
H	Mdn.	5	St Johns	Plain	sponge/sand	buff						
H	Mdn.	8	Sand Temp.	Plain	sand	buff/black	X					
H	Mdn.	8	Sand Temp.	Check Stamped	sand	dark gray					check stamped	

H	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
H	Mdn.	8	Sand Temp.	Plain	sand	buff/blak	X					
H	Mdn.	7	Sand Temp.	Check Stamped	sand	red/dark gray					check stamped	
H	Mdn.	5	St Johns	Check Stamped	sponge	light gray/dark gray					check stamped	
H	Mdn.	8	Sand Temp.	Plain	sand	black/buff	X					
H	Mdn.	6	Sand Temp.	Check Stamped	sand	black					(fine) check stamped; interior impressions (linear stamp?)	
H	Mdn.	8	Sand Temp.	Plain	sand	buff/black		X				
H	Mdn.	9	Sand Temp.	Plain	sand	buff						
H	Mdn.	6	Sand Temp.	Plain	sand	buff/black		X				
H	Mdn.	7	Sand Temp.	Plain	sand	buff/black		X				
H	Mdn.	6	Sand Temp.	Plain	sand	buff/black						
H	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
H	Mdn.	8	Sand Temp.	Plain	sand	buff/gray						
H	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
H	Mdn.	9	Sand Temp.	Plain	sand	buff/dark gray	X					

H	Mdn.	8	St Johns	Check Stamped	sponge/sand	buff					check stamped	
H	Mdn.	9	Sand Temp.	Plain	sand	buff/black						
H	Mdn.		Pinellas	Plain	none	buff/dark gray	X				lightly burnished interior and exterior	Less crude than typical Pinellas type
H	Mdn.	9	Sand Temp.	Plain	sand	buff/black						
H	Mdn.	6	Sand Temp.	Plain	sand	dark gray						
H	Mdn.	7	Sand Temp.	Plain	sand	buff						
R	Tpsl.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Tpsl.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Tpsl.	5	Sand Temp.	Plain	sand	buff/dark gray						
R	Tpsl.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Tpsl.	5	Sand Temp.	Plain	sand	buff/dark gray						
R	Tpsl.	6	Sand Temp.	Plain		buff						
S	Mdn.	8	Sand Temp.	Plain	sand	buff/dark gray						
S	Mdn.	9	Sand Temp.	Check Stamped	sand	red					check stamped	
R	Mdn.	7	Sand Temp.	Plain	sand	dark gray						

R	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Mdn.	8	Sand Temp.	Plain	sand	dark gray	X					
R	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Mdn.	10	Sand Temp.	Plain	sand	dark gray						
R	Mdn.	8	Sand Temp.	Plain	sand	buff/black		X				
R	Mdn.	8	Sand Temp.	Plain	sand	buff	X					
R	Mdn.	8	Sand Temp.	Plain	sand	buff/black						
R	Mdn.	5	Sand Temp.	Plain	sand	dark gray						
R	Mdn.	11	Sand Temp.	Plain	sand	black						
R	Mdn.	10	Sand Temp.	Plain	sand	black						
S	Mdn.	6	Wakulla	Check Stamped	sand	dark gray		X			check stamped	
S	Mdn.	9	Grog Temp.	Plain	grog	buff						
H	Mdn.	6	St Johns	Plain	sponge	buff/dark gray						
S	Mixed (W/FC)											
S	Sbsl.	5	St Johns	Plain	sponge	buff/black		X				
S	Sbsl.	6	St Johns	Check Stamped	sponge	buff/gray					check stamped?	

S	Sbsl.	7	Pinellas	Plain	sand	buff	X					
S	Sbsl.	6	Pinellas	Plain	sand	black	X					
S	Sbsl.	7	Pinellas	Plain	sand	buff/dark gray	X					
I	Mixed (W/FC)	8	Sand Temp.	Check Stamped	sand	red/dark gray					check stamped	
L	Tpsl.	5	St Johns	Plain	sponge	buff/dark gray						
L	Tpsl.	4	St Johns	Plain	sponge	buff/dark gray						
L	Tpsl.	7	Sand Temp.	Plain	sand	dark gray-buff					lightly burnished interior and exterior	
L	Tpsl.	4	St Johns	Plain	sponge	buff/dark gray						
L	Tpsl.	7	Sand Temp.	Plain	sand	dark gray-buff						
L	Tpsl.	4	St Johns	Plain	sponge	buff/dark gray						
T	Tpsl.	9	Sand Temp.	Plain	sand	buff/gray					possible incised line on interior	
T	Mdn.	10	Pinellas	Plain	sand	buff/gray	X					
T	Mdn.	10	Pinellas	Plain	sand	buff/gray	X					
T	Mdn.	11	Pinellas	Plain	sand	buff/dark gray	X				lightly burnished interior and exterior	
T	Mdn.	5	St Johns	Check Stamped	sponge	buff/gray	X				check stamped	
Blk. C	Tpsl.	8	Sand Temp.	Plain	sand	black					burnished interior and exterior	
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	buff						

Blk. D	Mdn.	7	Pinellas	Plain	none	brown	X					
Blk. D	Mdn.		Pinellas	Plain	sand	dark gray/brown	X					
Blk. D	Tpsl.											
Blk. D	Tpsl.	7	Sand Temp.	Plain	sand	black/dark brown						
Blk. C	Tpsl.	9	Pinellas	Plain	sand	brown	X					
Blk. D	Tpsl.	7	Pinellas	Plain	sand	brown	X					
Blk. C	Tpsl.	4	Pinellas	Plain	sand	buff	X					
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. C	Tpsl.	8	Pinellas	Plain	sand	black	X					
Blk. C	Tpsl.	11	Pinellas	Plain	sand	black	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff/black	X				brush marks on interior	
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	buff/black	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff/black	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	red-buff/black/buff	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	black	X					

Blk. C	Mdn.	6	Pinellas	Plain	sand	dark gray-buff	X					
Blk. C	Mdn.	6	Sand Temp.	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	5	Pinellas	Plain	sand	buff/dark grays	X					
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	black					some linear mark on exterior	
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown/black	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	5	Pinellas	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff/dark gray						
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	7	Sand Temp.	Plain	sand	buff						
Blk. C	Mdn.	5	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	6	Sand Temp.	Plain	sand	black					stamping (?)	
Blk. C	Mdn.	5	Sand Temp.	Plain	sand	buff/black						
Blk. C	Mdn.	6	Sand Temp.	Plain	sand	black						
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	buff/dark gray						
Blk. C	Mdn.	6	Sand Temp.	Plain	sand	buff/black						

Blk. C	Mdn.	8	Sand Temp.	Plain	sand	brown/black		X				
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. C	F20	9	Sand Temp.	Punct.?	sand	dark gray					punctated (?)/stamped	
Blk. C	F20	9	Pinellas	Plain	sand	black	X					
Blk. C	F20	7	Sand Temp.	Plain	sand	brown						
Blk. C	F20	8	Pinellas	Plain	sand	buff-pink	X					
Blk. C	F20	9	Sand Temp.	Plain	sand	buff/gray						
Blk. C	F20	6	Pinellas	Plain	sand	black	X					
Blk. C	F20	6	Sand Temp.	Plain	sand	brown/dark gray						
Blk. C	F20	8	Pinellas	Plain	sand	black	X					
Blk. C	F20	9	Sand Temp.	Plain	sand	buff/black						
Blk. C	F20	8	Pinellas	Plain	sand	buff-gray	X					

Blk. C	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. C	Mdn.	4	Sand Temp.	Plain	sand	buff			X			
Blk. C	Mdn.	12	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	14	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	11	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	brown/black	X					
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	black	X					
Blk. C	Mdn.	10	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff/dark gray	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff-black	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	6	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	11	Pinellas	Plain	sand	buff	X					

Blk. C	Mdn.	12	Pinellas	Plain	sand	brown/buff	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	black/brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown/black	X					
Blk. C	Mdn.	4	St Johns	Plain	sponge	buff/dark gray						
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	brown						
Blk. C	Mdn.	11	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	black/brown	X					
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	brown/black	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Tpsl.	7	Sand Temp.	Plain	sand	brown/black						
Blk. D	Tpsl.	5	St Johns	Check Stamped	sponge	buff					check stamped	
Blk. D	Tpsl.	5	St Johns	Check Stamped	sponge	buff/black					check stamped	
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/black						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	

Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					linear check stamped	
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	buff/dark gray						
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					linear check stamped	
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	buff/dark gray						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	5	Sand Temp.	Plain	sand	buff/dark gray						
Blk. D	Mdn.	3	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/gray						
Blk. D	Mdn.	8	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	7	St Johns	Check Stamped	sponge	buff/dark gray	X				check stamped	
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown/black	X					2 pieces analyzed as 1 sherd
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray	X				check stamped	

Blk. D	Mixed (W/FC)	7	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/black					check stamped	
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown/black	X					
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	6	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	6	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	5	Pinellas	Plain	sand	buff	X					
Blk. D	Mdn.	6	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	8	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	6	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown/black						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	brown					check stamped	
Blk. D	Mdn.	9	Sand Temp.	Plain	sand	buff/brown						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray	X				check stamped	
Blk. D	F8	9	Sand Temp.	Plain	sand	buff/brown						

Blk. D	F8	6	St Johns	Check Stamped	sponge	buff/dark gray	X				check stamped	
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown/black					lightly burnished/smoothed exterior	
Blk. D	Mdn.	12	Sand Temp.	Plain	sand	brown/black					lightly burnished/smoothed interior and exterior	
Blk. D	F8	7	Sand Temp.	Plain	sand	brown/black					lightly burnished/smoothed exterior	
Blk. D	F8	12	Sand Temp.	Plain	sand	brown/black					lightly burnished/smoothed interior and exterior	
Blk. D	Mdn.	8	Sand Temp.	Plain	sand	brown						
Blk. D	F8	8	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray						
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	brown					check stamped	
Blk. D	Mixed (W/FC)	6	Sand Temp.	Plain	sand	brown/black						

Blk. D	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
Blk. D	Mdn.	9	Sand Temp.	Plain	sand	buff/black						
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
Blk. D	Mdn.	6	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	8	Sand Temp.	Plain	sand	brown/black						
Blk. D	Mdn.	8	Pinellas	Plain	sand	black	X	X				
Blk. D	Mdn.	10	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	9	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	9	Pinellas	Plain	sand	black	X					
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff					check stamped (faint)	
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						

Blk. D	Mdn.	10	St Johns	Plain	sponge	buff/dark gray						
Blk. D	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	buff/dark gray						
Blk. C	F20	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped (faint)	
Blk. C	Mdn.	11	Pinellas	Plain	sand	buff/black	X		X			
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff/black	X	X				
Blk. C	Mdn.	10	Pinellas	Plain	sand	buff/red/dark gray	X					
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff	X					
Blk. C	Mdn.	7	Pinellas	Plain	sand	buff/black	X					
Blk. C	Mdn.	9	Pinellas	Plain	sand	buff/brown	X	X				
Blk. C	Mixed (W/FC)	6	Pinellas	Plain	sand	black	X	X				
Blk. C	Mdn.	6	Sand Temp.	Plain	sand	brown						
Blk. C	Mdn.	10	Pinellas	Plain	none	dark gray	X					
Blk. C	Mdn.	9	Pinellas	Plain	none	buff/black	X					

Blk. C	Mdn.	6	Pinellas	Plain	none	buff/black	X				
Blk. C	Mdn.		Pinellas	Plain	none	dark brown	X				
Blk. C	Mdn.	9	Sand Temp.	Plain	sand	buff					
Blk. C	Mdn.	5	Sand Temp.	Plain	sand	buff/dark gray					rounded on one edge (shaped or worn?)
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	buff					
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	brown				smoothed/lightly burnished exterior	
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown	X				
Blk. C	Mdn.	9	Sand Temp.	Plain	sand	brown					
Blk. C	Mdn.	6	Pinellas	Plain	sand	brown	X				
Blk. C	Mdn.	7	Pinellas	Plain	sand	brown	X				
Blk. C	Mdn.	9	Pinellas	Plain	sand	brown	X				
Blk. C	Mdn.	8	Pinellas	Plain	sand	buff	X				
Blk. C	Mdn.	9	Pinellas	Plain	sand	brown	X				
Blk. C	Mdn.	13	Pinellas	Plain	sand	buff/dark gray	X				
Blk. C	Mdn.	12	Pinellas	Plain	sand	buff/dark gray	X				
Blk. C	Mdn.	12	Pinellas	Plain	sand	buff/dark gray	X				
Blk. C	Mdn.	7	Pinellas	Plain	sand	red-brown/dark gray	X				

Blk. D	Mdn.		Pinellas	Plain	sand	brown	X					interior too eroded to measure thickness
Blk. D	Mdn.		Pinellas	Plain	sand	brown	X					interior too eroded to measure thickness
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	8	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	5	St Johns	Plain	sponge	brown/dark gray						
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	9	St Johns	Check Stamped	sponge	brown/gray					check stamped	
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown	X				brushing (?) on exterior	
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	buff/dark gray						rounded on one edge (shaped? worn?)
Blk. D	Mdn.	9	Sand Temp.	Plain	sand	brown/black			X		smoothed interior (with marks)	
Blk. D	Mdn.	7	Pinellas	Plain	sand	brown						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray						
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown/black						

Blk. D	Mdn.	6	Pinellas	Plain	sand	brown						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray						
Blk. D	Mdn.	9	Pinellas	Plain	sand	brown	X					
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	8	Sand Temp.	Plain	sand	brown/black						
Blk. D	Mdn.	6	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	7	Pinellas	Plain	sand	buff/brown	X					
Blk. D	Mdn.	9	Sand Temp.	Plain	sand	brown/black						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Sbsl.	8	Grog Temp.	Plain	grog/sand	orange-brown						
Blk. D	Sbsl.	8	Grog Temp.	Plain	grog/sand	orange-brown						
Blk. D	Mdn.	9	Sand Temp.	Plain	sand	orange-brown						oval shaped end--eroded or shaped?
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	orange-brown						very eroded
Blk. D	Mdn.	5	Sand Temp.	Plain	sand	orange-brown						very eroded
Blk. D	Sbsl.	9	Sand Temp.	Plain	sand	orange-brown						eroded
Blk. D	Sbsl.	7	Sand Temp.	Plain	sand	buff-brown						

Blk. D	Sbsl.	9	Sand Temp.	Plain	sand	brown/black						
Blk. D	Sbsl.	7	Sand Temp.	Plain	sand	brown/black						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped? (eroded)	
Blk. D	Mdn.	8	Sand Temp.	Plain	sand	dark gray/buff						2 broken pieces analyzed as 1 sherd
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	dark gray/buff						
Blk. D	Mdn.	3	Sand Temp.	Plain	sand	dark gray						
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge/sand	buff/dark gray					check stamped	
U	Tpsl.	8	Pinellas	Plain	none	brown	X					
U	Mdn.	9	Pinellas	Plain	none	brown	X					
U	Mdn.	5	St Johns	Plain	sponge	buff/dark gray						
U	Mdn.	11	Pinellas	Plain	none	brown	X					
U	Mdn.	8	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown/dark gray					smoothed exterior	
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mdn.	6	Pinellas	Plain	sand	brown/black	X					
Blk. D	Mdn.	7	Pinellas	Plain	none	brown	X					
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	

Blk. D	Mdn.	8	St Johns	Check Stamped	sponge	brown/dark gray					check stamped	
Blk. D	Mdn.	5	St Johns	Plain	sponge	brown/dark gray						2 pieces analyzed as 1 sherd
Blk. D	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
Blk. D	Mixed (W/FC)	5	St Johns	Plain	sponge	brown/black						
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	8	Sand Temp.	Check Stamped	sand/none	buff	X				check stamped	
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	buff		X				
Blk. D	Mdn.	6	St Johns	Plain	sponge	buff/gray						
Blk. D	Mdn.	6	Sand Temp.	Plain	sand	brown						
Blk. D	Mdn.	5	Pinellas	Plain	none	dark brown	X					
Blk. D	Mdn.	12	Sand Temp.	Plain	sand	brown/dark gray						
Blk. D	Mdn.	7	Sand Temp.	Plain	sand	brown						some abrasion wear on one edge (?)
Blk. D	F15	6	Sand Temp.	Plain	sand	brown						
Blk. D	F15	6	Sand Temp.	Plain	sand	buff						
Blk. D	Mdn.	4	St Johns	Check Stamped	sponge	brown/dark gray						
Blk. D	Mdn.	3	St Johns	Plain	sponge	buff						

Blk. D	Sbsl.	7	Sand Temp.	Plain	sand	orange						
Blk. D	Sbsl.	6	Sand Temp.	Plain	sand	orange						
Blk. D	F16	5	Sand Temp.	Plain	sand	buff						
Blk. D	F16	6	Pinellas	Plain	sand	black	X					
Blk. D	F16	6	Sand Temp.	Plain	sand	buff/black						black residue on interior/sides
Blk. D	F17	4	Sand Temp.	Plain	sand	gray						
Blk. D	F17	8	Sand Temp.	Plain	sand	gray						
Blk. C	Mdn.	8	Pinellas	Plain	none	brown	X					
Blk. C	Mdn.	8	Sand Temp.	Plain	sand	brown/black						
Blk. C	Mdn.	8	Pinellas	Plain	none	brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	none	brown	X					
Blk. C	Mdn.	7	Pinellas	Plain	none	brown	X					
Blk. C	Mdn.	6	Pinellas	Plain	none	brown	X					
Blk. C	Mdn.	6	St Johns	Plain	sponge	buff/orange						
R	Tpsl.	6	Sand Temp.	Plain	sand	brown/black	X					
R	Tpsl.	7	Sand Temp.	Plain	sand	brown/black						
R	Mdn.	7	Pinellas	Plain	sand	gray/black	X		X			2 pieces analyzed as 1 sherd

R	Mdn.	8	St Johns	Plain	sponge	buff/orange/black		X				
R	Mdn.	6	St Johns	Check Stamped	sponge	black					check stamped	
R	Mdn.	6	Sand Temp.	Plain	sand	brown/black	X					
R	Mdn.	8	St Johns	Check Stamped	sponge/sand	buff/dark gray					check stamped	
R	Mdn.	9	Sand Temp.	Plain	sand	red-brown/black						
R	Mdn.	11	St Johns	Check Stamped	sponge	gray/dark gray					check stamped	
V	Tpsl.	8	Pinellas	Plain	none	brown	X					
V	Tpsl.	6	Sand Temp.	Plain	sand	buff						
V	Tpsl.	3	St Johns	Plain	sponge	buff/dark gray						
V	Tpsl.	6	St Johns	Plain	sponge	buff/dark gray						
V	Tpsl.	10	Pinellas	Plain	sand	brown	X					
V	Tpsl.	8	Sand Temp.	Plain	sand	black						
V	Tpsl.	5	St Johns	Plain	sponge	buff/dark gray			X			
V	Tpsl.	7	St Johns	Check Stamped	sponge	red-buff					check stamped	
V	Tpsl.	10	Pinellas	Plain	sand	brown						
V	Tpsl.	6	Sand Temp.	Plain	sand	black						
V	Tpsl.	5	St Johns	Plain	sponge	buff/dark gray						
V	Tpsl.	7	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	9	Pinellas	Plain	none	black/brown	X					

V	Mdn.	8	Pinellas	Plain	sand	dark brown	X					
V	Mdn.	6	Sand Temp.	Plain	sand	black						
V	Mdn.	7	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	2 pieces analyzed as 1 sherd
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	6	St Johns	Check Stamped	sponge	red-buff					check stamped	
V	Mdn.	6	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	4	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	6	Sand Temp.	Plain	sand	black						
V	Mdn.	5	Sand Temp.	Plain	sand	black						
V	Mdn.	8	Sand Temp.	Plain	sand	black						
V	Mdn.	6	Sand Temp.	Plain	sand	black						
V	Mdn.	7	Pinellas	Plain	sand	black	X					
V	Mdn.	4	St Johns	Check Stamped	sponge	brown					check stamped	

V	Mdn.	7	Wakulla	Check Stamped	sand	dark brown					check stamped	
V	Mdn.	7	Grog Temp.	Plain	grog	brown/gray/red						
V	Mdn.	8	Pinellas	Plain	sand	black	X					
V	Mdn.	7	Grog Temp.	Plain	grog	brown/gray/red						
V	Mdn.	9	Pinellas	Plain	sand	brown	X					
V	Mdn.	9	Grog Temp.	Plain	grog	brown/gray/red						
V	Mdn.	8	Sand Temp.	Plain	sand	dark brown						
V	Mdn.	7	Sand Temp.	Plain	sand	red-buff/gray						
V	Mdn.	7	Sand Temp.	Plain	sand	dark gray						
V	Mdn.	8	Sand Temp.	Plain	sand	brown/black	X					
V	Mdn.	7	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	10	Pinellas	Plain	none	brown	X					
V	Mdn.	6	St Johns	Plain	sponge	gray/dark gray						
V	Mdn.	7	Pinellas	Plain	none	buff	X					
V	Mdn.	5	St Johns	Plain	sponge	gray/dark gray						
V	Mdn.	11	Pinellas	Plain	none	red-brown	X					
V	Mdn.	6	Sand Temp.	Plain	sand	brown						
V	Mdn.	6	Pinellas	Plain	none	buff	X					
V	Mdn.	6	Sand Temp.	Plain	sand	dark brown						
V	Mdn.	5	Sand Temp.	Plain	sand	dark brown						

V	Mdn.	8	Sand Temp.	Plain	sand	brown/dark brown						
V	Mdn.	7	Sand Temp.	Plain	sand	brown						
V	Mdn.	6	Sand Temp.	Plain	sand	brown						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	9	Sand Temp.	Plain	sand	dark brown						2 broken pieces analyzed as 1 sherd
V	Mdn.	7	Sand Temp.	Plain	sand	brown/dark brown						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/dark brown						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/dark brown						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/dark brown						
V	Mdn.	10	Sand Temp.	Plain	sand	brown						
V	F21	5	Pinellas	Plain	none	black	X					
V	F21	7	Pinellas	Plain	none	black	X					
V	F21	8	Pinellas	Plain	none	black	X					
V	F21	10	Sand Temp.	Plain	sand	brown						
V	F21	6	Sand Temp.	Plain	sand	brown						
V	F21	7	Sand Temp.	Plain	sand	brown/black						
V	F21	5	Sand Temp.	Plain	sand	brown/black						

V	F21	10	Sand Temp.	Plain	sand	brown/black						
V	F21	7	Sand Temp.	Plain	sand	brown/black						
V	F21	6	Sand Temp.	Plain	sand	brown/black						
V	F21	7	Sand Temp.	Plain	sand	brown-red/black						
V	F21	5	Sand Temp.	Plain	sand	brown/black						
V	F21	6	Sand Temp.	Plain	sand	brown/black						
V	F21	8	Sand Temp.	Plain	sand	brown/black						
V	F21	6	Sand Temp.	Plain	sand	brown/black						
V	F21	7	Sand Temp.	Plain	sand	brown/black						
V	F21	6	Sand Temp.	Plain	sand	black						
V	F21		Sand Temp.	Plain	sand	buff/black						
V	F21	8	Sand Temp.	Plain	sand	brown/black						
V	F21	10	Sand Temp.	Plain	sand	red-brown/black						
V	F21	7	Sand Temp.	Plain	sand	brown/gray						
V	F21	7	Sand Temp.	Plain	sand	brown/gray						
V	Mdn.	8	Pinellas	Plain	none	brown/black	X	X				

V	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
V	Mdn.	9	Pinellas	Plain	none	brown/black	X	X				
V	Mdn.	8	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	6	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	7	Sand Temp.	Plain	sand	brown/black						
V	Mdn.	6	Sand Temp.	Plain	sand	red-brown/black						
V	Mdn.	6	Sand Temp.	Plain	sand	buff/black						
V	Sbsl.	9	Sand Temp.	Plain	sand	buff/dark gray						
V	Sbsl.	5	Sand Temp.	Plain	sand	brown/black						
V	Sbsl.	6	Sand Temp.	Plain	sand	brown/black						
V	Sbsl.	6	Sand Temp.	Plain	sand	buff/black						
V	Sbsl.	6	Sand Temp.	Plain	sand	gray/black						
V	Sbsl.	6	Sand Temp.	Plain	sand	brown/black						
V	Sbsl.	6	Sand Temp.	Plain	sand	brown/black						2 broken pieces analyzed as 1 sherd
V	Sbsl.	6	Sand Temp.	Plain	sand	brown/black						

V	Sbsl.	6	Sand Temp.	Plain	sand	brown/black						
V	Sbsl.		Sand Temp.	Plain	sand	buff/black						
V	Sbsl.		Sand Temp.	Plain	sand	gray						
V	F21	7	Sand Temp.	Plain	sand	gray						
R	Mdn.	7	Sand Temp.	Plain	sand	buff/gray						
R	Mdn.	10	Sand Temp.	Cord Marked	sand	orange-brown		X				
R	Mdn.	8	Pinellas	Plain	none	black	X					
R	Mdn.	7	Sand Temp.	Check Stamped	sand	buff/gray		X			check stamped	
R	Mdn.	5	St Johns	Plain	sponge	light gray/gray						
R	Mdn.	10	Sand Temp.	Plain	sand	orange-brown/gray						
R	Mdn.	4	Pinellas	Plain	none	black	X					
R	Mdn.	8	St Johns	Plain	sponge	light gray/orange/gray		X				
R	Mdn.	6	Sand Temp.	Plain	sand	orange-brown/black						
R	Mdn.	7	Pinellas	Plain	none	orange-brown/black						
R	Mdn.	5	Sand Temp.	Plain	sand	orange/gray						
R	Mdn.	10	Sand Temp.	Plain	sand	buff/orange/black						
R	Mdn.	7	Sand Temp.	Plain	sand	buff/brown						

R	Mdn.	5	Sand Temp.	Plain	sand	orange-brown/black						
R	Mdn.	6	Sand Temp.	Plain	sand	orange-brown/gray						
R	Mdn.	5	Safety Harbor	Incised	sand	black					incised line + punctations	
R	Mdn.	7	Sand Temp.	Check Stamped	sand	brown/dark gray					check stamped	
R	Mdn.	6	St Johns	Plain	sponge	buff/dark gray					lightly burnished interior/exterior	
R	Mdn.	8	Sand Temp.	Check Stamped	sand	brown					check stamped	
R	Mdn.	7	Pinellas	Plain	none	gray/black	X					
R	Mdn.	5	St Johns	Check Stamped	sponge	buff/dark gray					check stamped	
R	Mdn.	5	Pinellas	Plain	none	gray/black	X					
R	Mdn.	8	St Johns	Check Stamped	sponge	buff/black	X				check stamped	
R	Mdn.	7	Sand Temp.	Plain	sand	black/brown						
R	Mdn.	7	Sand Temp.	Check Stamped	sand	orange/gray					check stamped	
R	Mdn.											
R	Mdn.	9	Grog Temp.	Plain	grog	buff						
R	Mdn.	4	Weeden Island	Plain	sand	light brown/gray					burnished interior	possible mica inclusions

R	Mdn.	7	Sand Temp.	Plain	sand	buff/black						
R	Mdn.	6	Sand Temp.	Plain	sand	orange						
R	Mdn.	7	Sand Temp.	Plain	sand	black						
R	Mdn.	7	Sand Temp.	Plain	sand	brown						
R	Mdn.	8	Sand Temp.	Plain	sand	gray						
R	Mdn.	6	Sand Temp.	Plain	sand	dark gray						
R	Mdn.	6	Sand Temp.	Plain	sand	brown/black						
R	Mdn.	7	Sand Temp.	Plain	sand	orange/black						
R	Mdn.	5	Sand Temp.	Plain	sand	orange/black						
R	Mdn.	7	Sand Temp.	Plain	sand	brown						
R	Mdn.	6	Sand Temp.	Check Stamped	sand	brown					check stamped	
R	Mdn.	5	Weeden Island	Plain	sand	light brown/gray					burnished interior	possible mica inclusions
R	Mdn.	6	Sand Temp.	Plain	sand	brown						
R	Mdn.	9	Sand Temp.	Plain	sand	buff/black						
R	Mdn.	7	Sand Temp.	Plain	sand	brown						
R	Sbsl.	9	Sand Temp.	Plain	sand	orange						

Table C.3 - All body sherds, 2014-2015 UM-WIAP Excavations

Appendix D – Stone Artifacts

Appendix D includes inventories of stone artifacts and data from the analysis of chipped stone artifacts (by Martin Menz). Methods of analysis are described in Chapter 7.

FS#	Item Type	Description	Count	Weight (g)
1	iron concretion		5	22.35
7	iron concretion			15.28
10	iron concretion		1	
12	iron concretion		14	17.58
16	iron concretion			2.24
18	iron concretion		3	3.09
24	iron concretion		1	45.68
27	iron concretion			1.1
30	iron concretion		>20	38
34	iron concretion			54.97
36	iron concretion		3	3.13
38	iron concretion		3	17.35
39	iron concretion			.9
41	iron concretion		2	14.08
43	iron concretion		8	33.24
44	iron concretion		4	6.27
47	iron concretion		>20	45.23
48	iron concretion			11.9
53	iron concretion			10.37
54	iron concretion		1	0.58
56	iron concretion		1	4.87
58	iron concretion			58.54
60	iron concretion		6	2.37
61	iron concretion		1	0.06
63	iron concretion		7	4.92
64	iron concretion			3.01
66	iron concretion		1	<.1
71	iron concretion		4	0.87
72	iron concretion			0
74	iron concretion		1	0.11
76	iron concretion		1	<.1
80	iron concretion		3	2.08

FS#	Item Type	Description	Count	Weight (g)
85	iron concretion		1	0.03
91	iron concretion			0.26
92	iron concretion		>20	78.2
94	iron concretion			42.67
95	iron concretion			8.73
99	iron concretion			51.87
100	iron concretion			2.1
102	iron concretion			61.82
103	iron concretion		5	0.4
104	iron concretion		1	0.81
109	iron concretion		1	1.61
110	iron concretion		>20	183.72
113	iron concretion		1	16.27
116	iron concretion			45.49
117	iron concretion		2	2.02
119	iron concretion		2	8.15
121	iron concretion		1	0.2
123	iron concretion			48.35
132	iron concretion		4	12.53
136	iron concretion		2	0.36
139	iron concretion		1	.4
141	iron concretion		3	3.15
142	iron concretion		2	2.82
144	iron concretion		1	0.48
145	iron concretion		6	9.54
148	iron concretion		1	1.04
149	iron concretion			39.97
150	iron concretion			3.45
153	iron concretion		2	2.77
155	iron concretion		1	0.56
157	iron concretion		2	0.42
158	iron concretion			4.01
161	iron concretion		4	52.26
168	iron concretion			2.4
170	iron concretion			23.5
171	iron concretion			146.75
173	iron concretion			19.91
175	iron concretion			24.28
176	iron concretion		3	4.41
177	iron concretion		9	5.79
182	iron concretion		2	4.72
183	iron concretion		1	0.12

FS#	Item Type	Description	Count	Weight (g)
185	iron concretion		3	0.82
187	iron concretion		2	0.45
190	iron concretion		2	1.82
199	iron concretion		2	1.87
200	iron concretion			15.31
208	iron concretion		1	7.49
210	iron concretion		>20	115
213	iron concretion		1	0.51
217	iron concretion		1	0.32
218	iron concretion		3	5.65
220	iron concretion		5	6.78
224	iron concretion		1	0.16
226	iron concretion		16	8.54
227	iron concretion			2.8
228	iron concretion		7	8.99
229	iron concretion		>20	36.15
230	iron concretion		2	12.39
231	iron concretion		>20	154.78
234	iron concretion			3.34
235	iron concretion			3.82
236	iron concretion			25.56
237	iron concretion			1.71
240	iron concretion		1	0.34
244	iron concretion			
247	iron concretion		3	1.74
248	iron concretion		2	2.88
251	iron concretion		>20	42.45
254	iron concretion			105.64
255	iron concretion			.4
257	iron concretion			24.93
258	iron concretion		2	0.11
259	iron concretion			12.04
260	iron concretion			69.08
263	iron concretion			8.14
265	iron concretion			12.73
266	iron concretion		4	0.49
272	iron concretion		1	.09
282	iron concretion		1	2.4
283	iron concretion		1	2.6
285	iron concretion			13.2
297	iron concretion		1	5.9
298	iron concretion		1	.8

FS#	Item Type	Description	Count	Weight (g)
304	iron concretion		1	1.0
306	iron concretion		8	46
312	iron concretion			1.0
320	iron concretion			17.6
324	iron concretion		1	1.3
336	iron concretion			6.0
339	iron concretion		1	.1
340	iron concretion		1	4.4
342	iron concretion		1	4.7
372	iron concretion		4	2.9
375	iron concretion		2	16.1
378	iron concretion		2	8.4
381	iron concretion		2	.5
388	iron concretion		1	50.3
7	lithic debitage		1	<.1
10	lithic debitage		1	8.92
19	lithic debitage		1	1.0
21	lithic debitage		1	0.81
38	lithic debitage		3	0.43
39	lithic debitage		1	.9
40	lithic debitage		2	2.7
41	lithic debitage		4	2.01
43	lithic debitage		7	3.53
47	lithic debitage		7	6.1
50	lithic debitage		1	1.14
53	lithic debitage		35	5.09
54	lithic debitage		>20	67.92
57	lithic debitage		3	0.7
58	lithic debitage		6	15.07
60	lithic debitage		1	0.05
63	lithic debitage		1	0
64	lithic debitage		>20	6.91
72	lithic debitage		1	0.11
77	lithic debitage		3	0.21
78	lithic debitage		2	6.82
90	lithic debitage		1	0.1
92	lithic debitage		3	0.7
94	lithic debitage			0.93
95	lithic debitage		2	1.14
96	lithic debitage		1	0.86
99	lithic debitage		1	.4
100	lithic debitage		1	3.0

FS#	Item Type	Description	Count	Weight (g)
103	lithic debitage		2	1.08
106	lithic debitage		17	3.7
111	lithic debitage		50	25.22
113	lithic debitage		2	12.07
116	lithic debitage		8	4.05
119	lithic debitage		11	2.92
120	lithic debitage		1	0
122	lithic debitage		1	0.52
125	lithic debitage		>20	7.17
129	lithic debitage		5	1.02
132	lithic debitage			13.6
133	lithic debitage		4	2.36
135	lithic debitage			22.78
136	lithic debitage		1	1.0
141	lithic debitage		3	0.44
142	lithic debitage		1	0
144	lithic debitage		2	0.28
145	lithic debitage		1	4.26
152	lithic debitage		1	2.16
153	lithic debitage		1	16.49
155	lithic debitage		1	0.25
158	lithic debitage		1	1.09
163	lithic debitage		12	2.5
166	lithic debitage		1	0.61
170	lithic debitage			0.34
171	lithic debitage		3	4.31
173	lithic debitage		1	0
175	lithic debitage		6	1.28
176	lithic debitage	utilized	1	2.71
176	lithic debitage		11	1.09
177	lithic debitage		12	1.62
180	lithic debitage		2	0.37
181	lithic debitage		4	1.28
182	lithic debitage		6	0.6
185	lithic debitage		10	0.53
186	lithic debitage		1	0.37
187	lithic debitage		1	0.26
189	lithic debitage		3	0.12
193	lithic debitage		2	0.29
194	lithic debitage		2	43.38
199	lithic debitage		1	0
200	lithic debitage			0.28

FS#	Item Type	Description	Count	Weight (g)
206	lithic debitage		1	2.1
210	lithic debitage		1	0.2
211	lithic debitage		1	0
212	lithic debitage		1	0
214	lithic debitage		1	0
220	lithic debitage		1	0
221	lithic debitage		5	0.25
224	lithic debitage		2	0.08
226	lithic debitage		14	2.21
228	lithic debitage		2	0.1
229	lithic debitage		1	1.63
231	lithic debitage		2	8.61
234	lithic debitage		5	0.03
237	lithic debitage		7	0.9
238	lithic debitage		>20	2.46
249	lithic debitage		3	2.29
250	lithic debitage		1	1
254	lithic debitage		1	0
255	lithic debitage		1	<.1
260	lithic debitage		1	0.42
263	lithic debitage		3	1.26
265	lithic debitage		8	0.67
267	lithic debitage		13	2.05
268	lithic debitage		10	
270	lithic debitage		2	.15
271	lithic debitage		>20	15.65
272	lithic debitage		1	23.18
273	lithic debitage		>20	28.36
274	lithic debitage		3	1.58
275	lithic debitage		>20	10.51
279	lithic debitage		>20	10.77
281	lithic debitage		2	1.4
282	lithic debitage		3	4.6
283	lithic debitage		5	10.2
285	lithic debitage		7	.4
288	lithic debitage		23	4.7
293	lithic debitage		1	.1
294	lithic debitage		12	4.8
295	lithic debitage		61	5.1
296	lithic debitage		1	.1
297	lithic debitage		2	2.3
298	lithic debitage		22	7.0

FS#	Item Type	Description	Count	Weight (g)
299	lithic debitage		3.4	4.6
300	lithic debitage		33	2.8
301	lithic debitage		20	20.6
302	lithic debitage			0.1
304	lithic debitage		1	21.4
306	lithic debitage		1	.2
307	lithic debitage		13	2.1
310	lithic debitage		9	2.8
311	lithic debitage		44	10.0
312	lithic debitage		1	.1
314	lithic debitage		12	1.1
316	lithic debitage		3	1.8
320	lithic debitage		7	2.3
324	lithic debitage		6	.8
325	lithic debitage		17	238.7
329	lithic debitage		3	4
332	lithic debitage		9	1.1
335	lithic debitage		19	3.7
337	lithic debitage		30	41.2
338	lithic debitage		14	3.8
339	lithic debitage		1	.3
340	lithic debitage		2	.6
342	lithic debitage		3	.7
344	lithic debitage		11	13.9
346	lithic debitage		15	5.2
348	lithic debitage		25	3.7
349	lithic debitage		1	.5
350	lithic debitage		1	.2
358	lithic debitage		1	11.0
359	lithic debitage		5	.9
361	lithic debitage		10	4.3
362	lithic debitage		1	13.01
365	lithic debitage		1	10.4
372	lithic debitage		3	49.6
373	lithic debitage		1	.2
375	lithic debitage		4	5
376	lithic debitage		14	4.0
377	lithic debitage		>20	36.5
378	lithic debitage		>30	24.8
380	lithic debitage		25	28.7
381	lithic debitage		12	22.4
383	lithic debitage		1	0.2

FS#	Item Type	Description	Count	Weight (g)
385	lithic debitage		2	21.9
386	lithic debitage		1	.3
388	lithic debitage		2	2.0
390	lithic debitage			2.8
392	lithic debitage		1	.2
393	lithic debitage		2	3.0
395	lithic debitage			
34	stone	limestone		2.4
43	stone		2	6.88
63	stone		3	11.66
78	stone	potential grinding stones	3	2975
79	stone		1	2.6
153	stone		1	1.28
226	stone	Possible fire cracked rock	1	43.64
240	stone	limestone	1	7.9
244	stone	Possible fire cracked rock	1	131.17
276	stone		2	30.82
319	stone			154.3
326	stone		1	78.2
350	stone		1	43.8
360	stone		1	101.1
367	stone		1	5.0
372	stone	sandstone		
377	stone		3	22.6
378	stone		6	14.8
388	stone	limestone	1	.5
16	stone tool	Pinellas Point	1	1.97
38	stone tool	Pinellas Point	1	1.77
80	stone tool	Pinellas Point	1	1.23
171	stone tool	utilized lithic flake	1	1.96
185	stone tool	Pinellas point	1	2.96
201	stone tool	utilized lithic flake	1	15.41
255	stone tool	Pinellas point	1	4.09
272	stone tool	Pinellas point	1	1.42
336	stone tool	utilized lithic flake	1	3.3
342	stone tool	utilized lithic flake	1	5.6
344	stone tool	utilized lithic flake	2	11.7
378	stone tool	ambiguous grooves	1	7.9

Table D.1 - All Stone Artifacts, 2014-2015 UM-WIAP Excavations

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	A	F1	grey fossil packstone	chert	biv/pen	lower HRQC		1	8.8	1							1											
x	A	F1	grey wackestone	chert				1	1		1				1						1							1
	A	F1	coral boundstone	coral				1	0.7		1				1						1							1
	A	Mdn.	grey packstone	chert				1	0.05								1											
	A	Mdn.	grey fossil packstone	chert	pen	lower HRQC		1	0.8		1					1						1						1
x	A	Mdn.	white grainstone	chert				1	2.3	1					1						1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
x	A	Mdn.	grey packstone	chert				1	0.4		1					1					1						1	
	A	Mdn.	coral boundstone	coral				1	0.3			1				1					1							1
	A	Mdn.	white grainstone	chert				3	1.7	1	1	1		1	2						3						1	2
	A	Mixed (W/FC)	grey packstone					1	0.05			1		1							1							1
	Blk. C	F200	grey wackestone	chert				1	0.4		1						1											
	Blk. C	F200	pelletal packstone	chert	pen	bay bot/low HRQC		1	0.5		1			1								1						1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
x	Blk. C	Mdn.	coral boundstone	coral				1	0.5		1					1					1						1	
x	Blk. C	Mdn.	grey wackestone	chert				1	42.1	1							1											
	Blk. C	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		1	15.7	1									1			1						1
x	Blk. C	Mdn.	coral boundstone	coral				1	11	1							1											
x	Blk. C	Mdn.	white wackestone	chert				1	13	1							1											
	Blk. C	Mixed (W/FC)	coral boundstone				?	1	10.3	1							1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. C	Sbsl. A	white wackestone					1	0.1			1				1					1							1
	Blk. C	Sbsl. A	coral boundstone					3	0.7		2	1					3											
	Blk. C	Sbsl. A/B	white wackestone					10	6.6	1	8	1		1	5	2	2				6	2						8
	Blk. C	Tpsl.	white packstone	chert				1	0.2			1				1					1							1
	Blk. C	Tpsl.	white wackestone	chert				3	0.1			2	1	1	2													
	Blk. C	Tpsl.	grey fossil packstone	chert	pen	lower HRQC		1	0.05				1				1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	F12	grey wackestone	chert				1	1.4	1	1					1	1					1						1
	Blk. D	F15	tan mudstone	chert				1	4.4	1									1		1							1
	Blk. D	F15	white wackestone	chert			1	1	0.3		1				1						1							1
	Blk. D	F16	white wackestone	chert				1	0.7		1			1							1							1
	Blk. D	F17	grey wackestone	chert			1	1	0.3			1			1						1							1
x	Blk. D	F9	white wackestone	chert				2	0.2			2			1	1					2							2

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	misc wackestone	chert				2	0.3		1		1	1		1					2					1	1	
x	Blk. D	Mdn.	white wackestone	chert				1	0.05			1		1							1							1
	Blk. D	Mdn.	white wackestone	chert				1	0.05				1			1					1							1
	Blk. D	Mdn.	white wackestone	chert				1	0.1			1			1						1							1
	Blk. D	Mdn.	white wackestone	chert				1	0.05				1			1					1							1
	Blk. D	Mdn.	tan wackestone	chert				1	0.05			1				1					1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	white wackestone	chert				2	0.05			1	1		1	1					2							2
	Blk. D	Mdn.	coral boundstone	coral				2	1		2						2											
	Blk. D	Mdn.	white wackestone	chert				12	1.1		3	9		1	7	4					11	1					1	11
	Blk. D	Mdn.	coral boundstone	coral				1	0.05			1				1					1							1
	Blk. D	Mdn.	white wackestone	chert				1	0.1			1			1						1							1
	Blk. D	Mdn.	grey grainstone	chert				1	1.7	1				1								1				1		

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	grey wackestone	chert				2	8.3	1	1						2											
	Blk. D	Mdn.	coral boundstone	coral				1	0.05				1	1							1							1
	Blk. D	Mdn.	white wackestone	chert				4	0.2			2	2	1	1	2					4					1		3
	Blk. D	Mdn.						7	0.8		2	4	1	2	1	3	1				5	2				1		5
x	Blk. D	Mdn.	white wackestone	chert				2	0.05				2		2						2							2
x	Blk. D	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		1	2.3		1						1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	white wackestone	chert				2	0.05			1	1	1	1						2							2
	Blk. D	Mdn.	white packstone	chert				1	0.05			1				1					1							1
	Blk. D	Mdn.	grey fossil packstone	chert	biv	tampa limestone		1	4	1										1	1							1
	Blk. D	Mdn.	pink packstone	chert			1	1	0.2			1				1					1							1
	Blk. D	Mdn.	white wackestone	chert				2	1		1	1			1	1					2					1		1
	Blk. D	Mdn.	grey wackestone	chert				1	0.2			1					1											

¼”+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.						8	0.6		3	4	1	3	1	4					8						2	6
x	Blk. D	Mdn.	white wackestone	chert				4	0.6		2	2		1	2	1					4							4
x	Blk. D	Mdn.	grey wackestone	chert				1	9.6	1									1			1						1
	Blk. D	Mdn.	white wackestone	chert				7	0.3			6	1	2	2	2	1				6						2	4
	Blk. D	Mdn.	grey wackestone	chert				1	0.05			1			1						1							1
x	Blk. D	Mdn.						3	2.3		1	2			2		1				2							2

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
x	Blk. D	Mdn.	grey packstone	chert				1	0.1			1			1							1						1
x	Blk. D	Mdn.	grey packstone	chert				1	0.3			1					1											
x	Blk. D	Mdn.	white wackestone	chert				1	0.2		1					1					1							1
	Blk. D	Mdn.	white wackestone	chert				12	2.2		2	8	2	4	5	2	1				11							11
	Blk. D	Mdn.	grey fossil packstone	chert	pen	lower HRQC		1	0.2			1					1											
	Blk. D	Mdn.	white wackestone	chert				1	0.1			1					1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	white wackestone	chert				2	0.3		1	1		1		1					2							2
	Blk. D	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		1	1.5	1						1					1							1
	Blk. D	Mdn.	coral boundstone	coral				2	0.6		1	1					2											
	Blk. D	Mdn.	grey packstone	chert				2	0.2			2				2					1	1						2
	Blk. D	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		2	1.4		2			1			1				1							1
	Blk. D	Mdn.	white wackestone	chert				5	0.7		1	4		1	1	3					4	1						5

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		1	0.1			1				1					1							1
	Blk. D	Mdn.	grey fossil packstone	chert	pen	lower HRQC		17	30.1	2	4	11		2	4	5	6				11							11
x	Blk. D	Mdn.	white wackestone	chert				3	4.1	1	1	1			1		2					1						1
	Blk. D	Mdn.	white wackestone	chert				9	0.9		4	5		2	1	6					8	1						9
	Blk. D	Mdn.	white wackestone	chert				2	0.5		1	1			1	1					2							2
	Blk. D	Mdn.	coral boundstone	coral			1	1	0.1			1				1					1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Mdn.	white wackestone	chert				2	0.5			2				2					1	1					1	1
	Blk. D	Mdn.	pelletal packstone	chert		bay bot/low HRQC		1	5.6	1									1		1							1
	Blk. D	Mixed (W/FC)	white wackestone					1	0.2			1				1					1							1
	Blk. D	Mixed (W/FC)	coral boundstone	coral				1	1.2		1					1							1				1	
	Blk. D	Mixed (W/FC)	grey packstone	chert			2	2	3.3	1	1			1	1						1	1						1
	Blk. D	Sbsl. A	white wackestone					45	2.2		5	18	22	6	24	13	2				43	2				5	1	37

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. A	coral boundstone					1	0.05			1			1						1							1
	Blk. D	Sbsl. A	white wackestone					10	0.5		1	8	1	1	6	3					10						2	8
	Blk. D	Sbsl. A	white wackestone					132	12.4	3	11	77	41	35	31	59	7				129	3			1	2	14	115
	Blk. D	Sbsl. A	black wackestone			peace river QC?		2	0.1			2		1		1					2						1	1
	Blk. D	Sbsl. A	pelletal packstone			bay bot/low HRQC		2	2.9	1		1			1			1			2							1
	Blk. D	Sbsl. A	grey wackestone				1	1	0.2			1						1			1							

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. A	white wackestone					19	0.9		1	15	3	4	9	4	2				17	2					2	15
	Blk. D	Sbsl. A	tan mudstone					1	5.9	1									1		1							1
	Blk. D	Sbsl. A	coral boundstone					1	0.1			1				1					1							1
	Blk. D	Sbsl. A	white wackestone					19	3.7	1	5	11	2	3	10	5	1				14	4						18
	Blk. D	Sbsl. A/B	white-grey fossil packstone		biv	tampa limestone		8	7.9	2	6			2	2	3	1				6	1						7
	Blk. D	Sbsl. A/B	white wackestone					10	1.6		3	7		1	6	3					10						1	9

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. A/B	misc wackestone					98	4.7		6	29	63	25	31	37	4				98							98
	Blk. D	Sbsl. A/B	grey packstone				1	1	4.4	1										1	1							1
	Blk. D	Sbsl. A/B	grey fossil packstone		biv	tampa limestone		8	2.1		1	3	4	1	1	4	2				7	1					2	4
	Blk. D	Sbsl. A/B	coral boundstone					2	3.6	1			1	1				1			2						1	1
	Blk. D	Sbsl. A/B	white wackestone					22	4.6		9	10	3	6	7	9					22						3	19
	Blk. D	Sbsl. A/B	white fossil wackestone		gast/biv	tampa limestone		1	0.1			1				1					1						1	

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. A/B	white wackestone					36	5	1	8	21	6	9	12	13	2				32	1	1				1	33
	Blk. D	Sbsl. B	white wackestone					92	4.7	1	4	58	29	28	28	34	2				88	4				2	13	77
	Blk. D	Sbsl. B	grey wackestone					8	16.5	4	2	2		3	1	2	2				1	5	1	1	1		1	4
	Blk. D	Sbsl. B	grey fossil packstone		biv/pen	lower HRQC	2	2	0.1			2				1	1					1	1					1
	Blk. D	Sbsl. B	coral boundstone				2	2	6.8	1	1					2						2				1		1
	Blk. D	Sbsl. B	white wackestone					2	0.1			2		1		1					2							2

¼”+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. B	blu-grey wackestone					1	1.4		1				1								1				1	
	Blk. D	Sbsl. B	misc wackestone					75	10.4	2	12	36	25	9	19	42	5				70					1	14	60
	Blk. D	Sbsl. B	grey fossil packstone		biv/pen	bay bot/low HRQC		1	0.05			1		1							1							1
	Blk. D	Sbsl. B	white wackestone					14	2		1	7	6	1	7	4	2				12					1	4	7
	Blk. D	Sbsl. B	white wackestone					65	4.8		9	34	22	11	29	22	3				58	4				3	7	52
	Blk. D	Sbsl. B	grey wackestone				6	6	5.8	1	1	5			4	3					7							7

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. B	white wackestone					61	5	1	8	39	13	17	18	25	1				60						2	58
	Blk. D	Sbsl. B	white wackestone					32	2.7		7	17	8	10	10	11	1				31					1	3	27
	Blk. D	Sbsl. B	grey fossil packstone		pen	lower HRQC		1	0.05			1			1						1							1
	Blk. D	Sbsl. B	white wackestone					19	2.4	1	2	13	3	6	5	7	1				15	3						18
	Blk. D	Sbsl. B	grey mudstone					1	18.1	1							1											
	Blk. D	Sbsl. B	white wackestone					43	9.9	2	13	23	5	10	12	16	5				36	2						38

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. B	white wackestone					12	2		2	9	1	2	6	4					12							12
	Blk. D	Sbsl. B	white wackestone					30	41	5	12	10	3	6	6	13	5				20	5					1	24
	Blk. D	Sbsl. B	white wackestone					14	3.6		8	6		4	5	5					13	1					1	13
	Blk. D	Sbsl. B	grey packstone			poss bay bot		2	11.6	2				1	1						2							2
	Blk. D	Sbsl. B	white wackestone					8	2.5	1	3		4		3	5					8							8
	Blk. D	Sbsl. B	pelletal packstone			bay bot/low HRQC		2	11.7	2									2		2							2

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Sbsl. B	uid					1	0.05			1				1					1						1	
	Blk. D	Sbsl. B	grey wackestone					13	2.9	1	5	6	1	3	3	6	1				10	2						12
	Blk. D	Sbsl. B	grey fossil packstone		uid	peace river QC?		1	0.6		1			1							1							1
	Blk. D	Sbsl. B	coral boundstone					1	1.5	1				1								1						1
	Blk. D	Sbsl. B	white wackestone					25	3.6		7	16	2	4	11	10					22	3					2	23
	Blk. D	Tpsl.	tan wackestone	chert			1	1	2.6	1									1		1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Tpsl.	white mudstone	chert			12	12	1.1	1		4	7	5		7					12						5	7
	Blk. D	Tpsl.	coral boundstone	coral				1	0.1			1				1					1							1
	Blk. D	Tpsl.	white wackestone	chert				11	1.4		2	7	2	5	4	1	1				9	2				1	9	
	Blk. D	Tpsl.	white wackestone	chert				4	1		1	1	2	1	1		2				4					1	1	1
	Blk. D	Tpsl.	white wackestone	chert				6	0.5		3	3		2	2	2					6						1	5
	Blk. D	Tpsl.	white wackestone	chert				9	0.3		1	5	3	4	2	3					8	1					5	4

¼”+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	Blk. D	Tpsl.	grey packstone	chert				1	3.1	1										1		1						1
x	Blk. D	Tpsl.	grey packstone	chert				1	2		1						1											
	Blk. D	Tpsl.	white wackestone	chert				1	0.05			1				1					1							1
	Blk. D	Tpsl.	white wackestone	chert				1	0.05				1			1					1							1
	Blk. D	Tpsl.	white wackestone	chert				5	0.3		1	3	1		2	3					5						1	4
	C	Mdn.	white packstone	chert				1	2.4		1						1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	C	Mdn.	grey packstone	chert				2	0.5		1	1				1	1				1		1					1
	C	Mdn.	white packstone	chert				6	3.5		2	1		1		3	2				4	2						4
x	C	Mdn.	misc wackestone	chert				11	2.9		3	6	2		4	3	4				10	1				1		6
	C	Mixed (W/FC)	misc wackestone					5	0.9		5			1		2	2				4	1				1		2
	C	Mixed (W/FC)	misc wackestone				1	12	2.5		2	10		1	3	5	3				10	1	1				4	5
	C	Sbsl. A	misc wackestone					42	7		12	19	11	8	8	18	8				38	4				2	6	26

¼”+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	C	Sbsl. A	misc wackestone					75	22.5	2	18	33	20	9	17	24	23				65	4	3	1		2	15	34
	D	Mdn.	white grainstone	chert				1	2.4	1						1						1					1	
	D	Mdn.	tan fossil wackestone	chert	pen	tampa limestone	1	1	1.1		1			1							1							1
	D	Mdn.	grey wackestone	chert				1	1.1		1					1					1							1
	D	Mixed (W/FC)	tan packstone				1	1	2.9	1						1						1					1	
	D	Tpsl.	grey fossil packstone	chert	pen	lower HRQC		1	2		1									1		1						1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	E	Mixed (W/FC)	grey wackestone					3	0.7		1	2		1			2				1							1
	E	Mixed (W/FC)	grey wackestone					2	0.7		2					1	1				1	1						1
	E	Mixed (W/FC)	grey wackestone				1	1	0.2			1			1						1							1
	E	Sbsl. A	coral boundstone				1	1	0.05			1			1						1							1
	E	Sbsl. A	grey fossil packstone		orbitoids	ocala?		2	0.4			2				1	1				1							1
	E	Sbsl. A	grey packstone				1	1	1.7	1										1	1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	E	Sbsl. A	grey wackestone				6	6	2		2	4		1	1		4				2						1	1
	E	Sbsl. A	coral boundstone				1	1	4	1							1											
	E	Sbsl. A	grey packstone					3	2.1		3			1		1	1				2						1	1
	E	Sbsl. A	misc wackestone					29	3		4	16	9	5	3	15	7				21	1				5	6	12
	E	Sbsl. A	grey wackestone					2	17.6	2				1		1						1	1					2
	E	Sbsl. A	tan mudstone					2	6.7	1	1			1		1					1		1				1	1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	E	Sbsl. A	blu-grey wackestone					7	19.7	4	3			1			6					5	1	1				1
	E	Sbsl. A	misc wackestone					41	23.4	1	21	16	3	4	6	11	19				34	6	1			1	7	15
	E	Sbsl. A	coral boundstone					1	0.1			1				1					1						1	
	E	Sbsl. B	white wackestone					27	6.3		10	6	11	4	7	8	8				18	1					4	15
	E	Sbsl. B	coral boundstone					1	0.3		1				1						1							1
	H	Mdn.	grey packstone	chert			1	3	12.2	2	1			2			1					3						2

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	H	Mdn.	grey wackestone	chert			3	3	3	1	1	1				1	2				3							1
	H	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		1	10.6	1							1											
	H	Mdn.	grey wackestone	chert			1	1	0.7		1							1			1							
	H	Mdn.	white wackestone	chert				3	0.4		1	2			3						3						1	2
	H	Mdn.	white wackestone	chert				1	2		1						1											
	I	Mdn.	grey grainstone	chert	pen	tampa limestone		1	0.3		1			1								1					1	

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	I	Sbsl. A	grey wackestone					2	0.5		2				1	1					2							2
	I	Sbsl. A	grey packstone				1	1	0.2		1					1					1							1
	I	Sbsl. A	misc wackestone					13	3	1	2	8	2	2	1	5	5				11	2					2	6
	I	Sbsl. A	grey fossil packstone		biv		1	8	3.4	1	2	3	2		2	2	4				6	2					1	3
	I	Sbsl. A	misc wackestone					42	21.6	6	12	18	6	7	8	13	13	1			25	7	7	2		4	10	14
	I	Sbsl. B	grey wackestone					4	2.3		2	1	1				4											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	I	Tpsl.	grey fossil packstone	chert	orb/pen	crystalriv/ocala?	1	1	1.2		1									1	1							1
	M	Mixed (W/FC)	grey wackestone					1	0.05			1		1							1							1
	M	Sbsl. A	grey packstone					1	0.4		1					1					1							1
	M	Sbsl. A	tan packstone					1	0.1			1			1						1							1
	M	Sbsl. A	blu-grey wackestone					1	0.4		1				1						1							1
	M	Sbsl. A	grey wackestone					1	1		1						1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	M	Sbsl. A	white wackestone					1	0.1			1				1						1					1	
	M	Sbsl. A/B	white wackestone					2	1		2				1	1					2							2
x	M	Tpsl.	grey packstone	chert				1	0.1		1				1							1						1
	M	Tpsl.	white wackestone	chert			1	1	0.2		1			1								1					1	
	M	Tpsl.	grey packstone	chert				1	0.05				1	1							1							1
	M	Tpsl.	grey-brown mudstone	chert				1	0.4		1						1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
x	N	F3	coral boundstone	coral			1	1	1		1						1											
x	N	F3	tan packstone	chert			1	1	5.6	1				1								1						1
x	N	F3	white wackestone	chert				1	0.8		1			1							1							1
	N	Mdn.	grey packstone	chert				1	4.9	1					1						1							1
	N	Mdn.	blu-grey wackestone	chert				1	3.2	1				1								1						1
	N	Mdn.	grey wackestone	chert			1	1	4.6		1						1											

¼”+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	N	Mdn.	limestone cortex	chert				2	2.4		2	1					3											
	N	Mdn.	grey wackestone	chert			1	1	0.05			1					1											
	N	Mixed (W/FC)	white wackestone					1	0.05			1		1							1							1
	N	Sbsl. A	white wackestone					1	0.05			1		1							1							1
	N	Sbsl. A	grey packstone					1	0.2		1					1							1				1	
	N	Sbsl. A	white wackestone				1	1	0.05				1		1						1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	R	Mdn.	grey fossil packstone	chert	biv/pen	lower HRQC		2	2		1	1				1	1					1					1	
x	R	Mdn.	white wackestone	chert				2	2.7		2						2											
	R	Mdn.	coral boundstone	coral				1	0.4		1						1											
	R	Sbsl. A	grey wackestone					1	1		1						1											
	R	Sbsl. A	coral boundstone					1	1.9		1						1											
	R	Tpsl.	grey packstone	chert			1	1	0.1			1				1						1						1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	R	Tpsl.	pink packstone	chert			1	1	0.2			1					1											
x	R	Tpsl.	white wackestone	chert				1	4.3	1							1											
	S	Sbsl. A	spheroid w/chalc				1	1	1.5	1						1					1							1
	S	Tpsl.	grey packstone	chert				1	16.4	1							1											
	S	Tpsl.	coral boundstone	coral				1	0.2		1					1					1							1
	surface	surface	grey fossil packstone		pen	lower HRQC		1	275.9	1							1											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	T	Mdn.	white packstone	chert				1	0.4		1				1							1						1
	T	Mdn.	white mudstone	chert			2	2	9.3	1			1	1		1					1		1				2	
	T	Mdn.	grey fossil packstone	chert			1	1	2.2	1									1		1							1
	T	Sbsl. A	white wackestone					1	0.05				1			1					1							1
	T	Sbsl. A	white wackestone					5	0.7		2	3		1	3	1					5					1	4	
	T	Sbsl. A	coral boundstone				1	1	0.6		1							1			1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	T	Tpsl.	white fossil wackestone	chert	pen	tampa limestone		1	0.5		1						1											
	U	Sbsl. A	white wackestone					1	0.1			1				1					1							1
	U	Sbsl. A	white fossil wackestone		pen	lower HRQC		13	4.8	1	1	9	2		4	7	2				9	1	1				1	10
	U	Sbsl. A/B	white packstone					9	2.9		3	6				1	8				1							1
	V	F21	brown coral boundstone	coral				16	10.2	1	8	7		1	3	1	11					3	2			2	2	1
	V	F21	pelletal packstone	chert				1	2.2	1					1						1							1

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	V	F21	grey fossil packstone	chert	biv/pen	lower HRQC		6	16.5	3	3			1		2	3				1	2						3
	V	F21	misc wackestone	chert				4	0.8		2	2				1	3				1							1
	V	F22	brown coral boundstone	coral				1	0.5		1					1						1						1
	V	Mdn.	coral boundstone	coral				1	0.2		1			1								1						1
	V	Mdn.	brown coral boundstone	coral				5	5.1		4	1		1	1		3					1	1			1	1	
	V	Mdn.	brown coral boundstone	coral				13	3.9		4	9				4	9					3	1				1	3

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	V	Mdn.	white wackestone	chert				1	0.2		1					1					1							1
	V	Mdn.	coral boundstone	coral				55	23.2	1	29	25			3	11	40					9	5			2	6	7
	V	Mdn.	grey fossil packstone	chert	pen	lower HRQC		1	2.6	1								1										
	V	Mdn.	misc wackestone	chert				26	5		7	15	4		6	6	13	1			7	4	1			2	4	6
	V	Mdn.	pelletal packstone	chert		bay bot/low HRQC		1	2.5	1							1											
	V	Mdn.	brown coral boundstone	coral				70	18.1		22	47	1	1	5	18	46					13	6	5	5	4	8	7

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	V	Mdn.	misc wackestone	chert				25	5.9		7	16	2	2	5	7	11				10	4			2	1	3	8
	V	Mdn.	grey fossil packstone	chert	gast/biv	HRQC		1	8.1	1							1											
x	V	Mdn.	brown coral boundstone	coral				6	1.8		2	4		1	1	1	3				1	1		1	1	1		1
x	V	Mdn.	grey fossil packstone	chert	pen	lower HRQC		2	1.5		2			1		1					1	1						2
x	V	Mdn.	grey mudstone	chert				2	18.6	2							2											
x	V	Mdn.	tan wackestone	chert				2	0.5		1	1					2											

¼"+ sampled	Unit	Strat. Zone	Description	Coral/chert	Fossils	Quarry Cluster	Thermal Alt.	Count	Weight	Size 1	Size 2	Size 3	Size 4	Flake	Proximal	Fragment	Angular	Biface	Flake Tool	PP/K	DC 0%	DC DC 0-50%	DC 50-99%	DC 100%	DF 0	DF 1	DF 2	DF 3
	V	Mdn.	pelletal packstone	chert		bay bot/low HRQC		1	21.6	1							1											
x	V	Sbsl. A	grey wackestone				1	1	0.2			1					1											
	V	Sbsl. A	white wackestone					1	0.2		1			1								1					1	
	V	Tpsl.	white wackestone	chert				3	49.5	3						1	2					1					1	

Table D.2 - All chipped stone artifacts, 2014-2015 UM-WIAP Excavations

Appendix E – Shell Artifacts

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. D	F16	Lightning Whelk	Columnella Hammer	none			X	X	X		84.3	18.3	4.0	1	20.7
Blk. D	Tpsl.	Lightning Whelk	Columnella Hammer	none			X	X			52.7	20.7	4.6	1	14.8
Blk. D	Tpsl.	Lightning Whelk	Columnella Hammer	none			X	X			82.0	29.7	4.9	1	35.9
Blk. D	Mdn.	Lightning Whelk	Columnella Hammer				X	X		fragment	56.8	22.6	7.8	1	17.9

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. C	Mdn.	Lightning Whelk	Columnella Hammer				X			fragment	36.3	17.8	5.4	1	7.8
I		?	Columnella Sinker							Form suggests sinker	79.1	17.1		1	25.4
Blk. D	Mdn.	Lightning Whelk (?)	Columnella Sinker		grooved						92.0	12.7		1	19.6
V	F21	Lightning Whelk	Cutting-Edged Tool	2 holes + notch			X	X		Beveled at base. Small portion of lower body whorl removed to accommodate that bevel/cutting edge (?). Hole is up on shoulder	150.1	97.6	5.4	1	450
R	Mdn.	Lightning Whelk	Cutting-Edged Tool (Type H?)	2 holes		X	X	X		significant portion of body whorl broken or removed. Type unclear: working edge is beveled but also blunted. Hole is up on shoulder. Hole on body whorl obscured by haft failure breakage of whorl to aperture	175.1	97.8	5.7	1	520

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. D	Mdn.	Gastropod	Gastropod Pounder/Hammer	notch			X	X	X		76.2	52.4	7.3	1	61.7
Blk. D	Sbsl.	Lightning Whelk	Gastropod Pounder/Hammer	notch		X	X	X	X	potentially used un-hafted at end of life	90.9	72.8	5.7	1	155.1
Blk. C	Mdn.	Oyster	(Natural?) Perforated Bivalve								28.1	30.3	2.1	1	2.4
T	Tpsl.	Quahog clam	Net Gauge							rectangle, eroded on back	35.9	27.1	10.2	1	14
U	Mdn.	Quahog Clam	Net Gauge							Broken, or notched on top	47.1	35.9	7.2	1	22.4
V	Mdn.	Quahog Clam	Net Gauge							long rectangle	39.8	19.6	7.8	1	10.2

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. D	Mdn.	Quahog Clam	Net Gauge							post-depositional breakage	37.4	34.5	9.9	1	19.4
Blk. D	Tpsl.	Oyster	Perforated Bivalve							perforation could be natural but looks drilled; heavy sponge boring	63.3	26.5	7.9	1	10.5
R	Mdn.	Ponderous Ark	Perforated Bivalve		perf. by umbo					probable net weight	39.2	52.4	4.3	1	16.9
Blk. D	Mdn.	Lightning Whelk	Perforator	2 holes	sharpened end of column.	X					94.4	41.9	2.9	1	28.3
R	Mdn.	Lightning Whelk	Shell tool							Debitage, perhaps utilized for scooping (?)	0.0	0.0	0.0	0	0
U	Mdn.	Gastropod	Tool							Long body whorl fragment with beveled edge (?)	0.0	0.0	0.0	1	20

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
H	Mdn.	Lightning Whelk	Type A Hammer	hole + notch		X	X	X	X	large portion of body whorl removed, and columnella evidently shortened from use. Looks like 2 notches now but one may have been a hole.	84.8	74.2	4.4	1	93.7
Blk. D	Mdn.	Lightning Whelk	Type A Hammer	hole + notch		X	X	X			129.5	88.7	3.9	1	162.1
Blk. D	Mdn.	Lightning Whelk	Type F Hammer	2 notches		X	X	X	X		112.9	50.3	8.3	1	89.9
Blk. D	F17	FL Fighting Conch	Type G Hammer	2 holes			X	X	X		88.8	51.8	3.7	1	116.3
Blk. C	F20	Crown Conch	Type G Hammer			X	X	X	X	haft modification unclear because of whorl damage; at least 1 hole	75.5	55.3	2.9	1	50.3
Blk. C	F20	Crown Conch	Type G Hammer	2 holes			X	X	X		63.8	39.8	3.5	1	33.7

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. C	Tpsl.	Crown Conch	Type G Hammer	1 hole		X	X	X	X	haft failure unclear	62.6	41.6	4.6	1	34.2
Blk. D	Tpsl.	Lightning Whelk	Type G Hammer	notch		X	X	X	X	apex missing and a lot of body whorl damage; notch might have been a hole	81.6	64.6	3.2	1	52.8
Blk. D	Mdn.	Crown Conch	Type G Hammer	2 holes						apex missing	70.3	36.3	3.8	1	27.5
Blk. D	Mdn.	Crown Conch	Type G Hammer	2 holes		X	X	X	X	whorl missing near shoulder	75.2	36.3	3.0	1	28.6
C	Mdn.	Crown Conch	Type G Hammer	2 holes			X	X	X		81.3	56.2	3.5	1	70.7
D	Mdn.	Crown Conch	Type G Hammer	1 hole		X	X		X	may have been a notch, now missing	100.7	43.0	3.6	1	63.4

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
H	Mdn.	Crown Conch	Type G Hammer	hole + notch		X	X	X	X		60.9	41.7	2.0	1	21.7
I	Mdn.	Crown Conch	Type G Hammer	2 holes			X	X	X		77.8	54.1	4.2	1	50.8
Blk. D	Mdn.	Lightning Whelk	Type G Hammer	hole + notch		X	X	X			59.6	39.4	3.2	1	28.1
R	Mdn.	Crown Conch	Type G Hammer	2 holes			X			Substantial portions of body whorl removal	114.8	57.4	5.6	1	111.9
R	Mdn.	Crown Conch	Type G Hammer								0.0	0.0	0.0	0	0
Blk. C	Mdn.	Crown Conch	Type G Hammer	hole + notch		X	X	X			71.3	40.0	3.6	1	46.3

Unit Name	Strat. Zone	Taxa	Type	Hafting Modification	Other Modification	Evidence of Haft Failure	Use Wear: Blunt	Use Wear: Spalling	Use Wear: Body Whorl Damage	Additional Description	Length (mm)	Width (mm)	Thickness (mm)	Count	Weight (g)
Blk. D	Mdn.	Crown Conch	Type G Hamme r	2 holes			X	X	X	possible notch before whorl damage	81.7	55.8	3.0	1	52.4
R	Mdn.	Crown Conch	Type G Hamme r	3 holes			X		X		76.6	50.1	3.8	1	73.6
T	Mdn.	Crown Conch	Type G Hamme r	hole + notch		X	X	X	X	possible notch obscured by whorl damage	77.4	53.9	3.8	1	72
D	Mdn.	Gastropo d	UID							Columnella fragments, burned (?)	0.0	0.0	0.0	8	21.7
Blk. D	Mdn.	Quahog Clam	UID		triangle shape					Net gauge, ornament, or something else?	49.5	29.8	9.0	1	15.4
Blk. C	Mdn.	Gastropo d	UID		several holes, natural?					Small whorl fragment	0.0	0.0	0.0	1	1.9

Table E.1 - All shell tools, 2014-2015 UM-WIAP Excavations

Unit Name	Stratigraphic Zone	Taxa	Type	Other Modification	Additional Description	Count	Weight (g)
Block C	Mdn.	Gastropod	Bead Blank		Possible bead blank, rounded rectangle	1	1.8
Block C	Mdn.	Gastropod	Bead Blank		irregular circle shape	1	1
Block C	Mdn.	UID	Bead blank		Possible bead blank, rectangle	1	1.2
Block C	Tpsl.	Gastropod	Bead Blank		Possible bead blank, rectangle	1	0.7
Block D	Mdn.	Gastropod	Bead Blank		Possible bead blank, rectangle	1	1
Block D	Mdn.	Gastropod	Bead Blank		Possible bead blank, rectangle	1	3.7
Block D	Mdn.	Gastropod	Bead Blank		Possible bead blank	0.4	1
C	Mdn.	Gastropod	Bead Blank		irregular circle shape	2.4	1
H	Mdn.	Gastropod	Bead Blank		Possible bead blank	0	1
R	Mdn.	Gastropod	Bead Blank		Possible bead blanks, rounded rectangle	2	2.8
R	Mdn.	Gastropod	Bead Blank		Possible ornmanent blank, triangular	1	1.5
S	Mdn.	Gastropod	Bead Blank		irregular circle shape	3.2	1
T	Tpsl.	Gastropod	Bead Blank		Possible bead blank, rounded rectangle	1	1.6
V	F21	Gastropod	Bead Blank		Possible bead/ornament blanks, 1 rounded rectangle & 1 irregular	2	20.7
V	Mdn.	Gastropod	Bead Blank		Possible bead blanks, irregular shapes	5	11.4
V	Mdn.	Gastropod	Bead Blank		Possible bead blanks, 1 rectangle & 2 irregular	3	5.7
V	Mdn.	Gastropod	Bead Blank		Possible bead blanks, 2 round & 1 rectangular	3	15.9
V	Mdn.	Gastropod	Bead Blank		Possible bead blank, rounded rectangle	1	0.9
Block C	Mdn.	Lightning Whelk	Debitage		Whorl fragment	1	12.1
Block C	Mdn.	Lightning Whelk	Debitage	Utilized as scraper? Possible wear on one side	Whorl fragment	1	65.2
Block C	Mdn.	Lightning Whelk	Debitage		Shoulder fragment	1	47.4
Block C	Mdn.	Lightning Whelk	Debitage		2 shoulder fragments	2	97.9
Block C	Tpsl.	Lightning Whelk	Debitage	Rectangular cut at bottom	Whorl fragment	1	32.3
Block D	F17	Lightning Whelk	Debitage		body whorl fragments, 1 with shoulder	4	55.6

Unit Name	Stratigraphic Zone	Taxa	Type	Other Modification	Additional Description	Count	Weight (g)
Block D	Mdn.	Gastropod	Debitage		Columnella fragment	1	44.5
Block D	Mdn.	Gastropod	Debitage		Small whorl fragments	3	14
Block D	Mdn.	Gastropod	Debitage		small eroded fragment	1	2.1
Block D	Mdn.	Light. Whelk	Debitage	Rounded section cut from one	Whorl fragments	2	170.56
Block D	Mdn.	Light. Whelk	Debitage	Rectangular cut at bottom	Shoulder/whorl fragment	1	18.3
Block D	Mdn.	Light. Whelk	Debitage		Shoulder and portion of whorl removed	1	138.9
Block D	Mdn.	Light. Whelk	Debitage	possible broken hafting aperture on whorl fragment	Whorl + columnella fragments	2	53.3
Block D	Mdn.	Light. Whelk	Debitage		3 body whorl fragments + 1 columnella/whorl	4	191.5
Block D	Mdn.	Light. Whelk	Debitage		columnella fragment, broken in 2	2	21.4
Block D	Mdn.	Light. Whelk	Debitage		Small body whorl fragment	1	6.5
Block D	Mdn.	Light. Whelk	Debitage	Possible hafting aperture on shoulder	Columnella/whorl/shoulder fragment	1	67.7
Block D	Mdn.	Light. Whelk	Debitage	rectangular cut or former hafting aperture present	body whorl fragment	1	19.1
C	Mdn.	Light. Whelk	Debitage		Whorl fragments	4	91.9
D	Mdn.	UID	Debitage		Whorl fragment	1	5.9
H	Mdn.	Gastropod	Debitage		Whorl and shoulder fragments	3	86.2
H	Mdn.	Light. Whelk	Debitage	Possible hafting aperture at top	Shoulder fragment	2	100.2
R	Mdn.	Light. Whelk	Debitage		body whorl fragment	1	4
V	F21	Light. Whelk	Debitage		1 shoulder, the rest body whorl fragments [possible blanks from same FS]	13	105.1
V	Mdn.	Light. Whelk	Debitage		2 shoulder fragments, 1 body whorl	3	21.2
V	Mdn.	Light. Whelk	Debitage		1 columnella, 1 shoulder frag, 2 smaller whorl fragments	4	95
V	Mdn.	Light. Whelk	Debitage		5 large whelk columnella and one whorl/shoulder fragment, 5 smaller fragments	11	233.4
V	Mdn.	Light. Whelk	Debitage		2 body whorl fragments	2	33.5

Table E.2 - Bead blanks and debitage, 2014-2015 UM-WIAP Excavations

REFERENCES CITED

Abrams, Elliot M., and Le Rouge, Mary F.

2008 Political complexity and mound construction among the Early and Late Adena of the Hocking Valley, Ohio. In *Transitions: Archaic and Early Woodland Research in the Ohio Country*, edited by Otto, Martha P and Redmond, Brian G, pp. 214–231. Ohio University Press, Athens.

Adler, Michael A.and Richard H.Wilshusen

1990 Large-Scale Integrative Facilities in Tribal Societies: Cross-Cultural and Southwestern US Examples. *World Archaeology* 22:133–46.

Ames, Kenneth M.

1985 Hierarchies, Stress, and Logistical Strategies among Hunter–Gatherers in Northwestern North America. In *Prehistoric Hunters-Gatherers*, pp. 155–180. Elsevier.

1994 The Northwest Coast: Complex hunter-gatherers, ecology, and social evolution. *Annual Review of Anthropology* 23(1):209–229.

2010 On the Evolution of the Human Capacity for Inequality and/or Egalitarianism. In , edited by Price, T. Douglas and Feinman, Gary M., pp. 15–44. Fundamental Issues in Archaeology. Springer, New York.

Anderson, Benedict R.

1983 *Imagined communities: reflections on the origin and spread of nationalism*. Verso, London.

Anderson, David G.

1994 *The Savannah River chiefdoms: political change in the late prehistoric Southeast*. University of Alabama Press, Tuscaloosa.

1996 Chiefly Cycling and Large-Scale Abandonments as Viewed from the Savannah River Basin. *Political Structure and Change in the Prehistoric Southeast*:150–191.

Arnold, Jeanne

1992 Complex Hunter-Gatherer-Fishers of Prehistoric California: Chiefs, Specialists, and Maritime Adaptations of the Channel Islands. *American Antiquity* 67:50–84.

1996 The Archaeology of Complex Hunter-Gatherers. *Journal of Archaeological Method and Theory* 3(2):77–126.

Arnold, Jeanne E, and Ann Munns
1994 Independent or attached specialization: the organization of shell bead production in California. *Journal of Field Archaeology* 21(4):473–489.

Ashley, Keith H.
2012 Early St. Johns II Interaction, Exchange, and Politics. In *Late prehistoric Florida: archaeology at the edge of the Mississippian world*, pp. wo. University Press of Florida, Gainesville.

2002 On the Periphery of the Early Mississippian World: Looking Within and Beyond Northeastern Florida. *Southeastern Archaeology* 21(2):162–177.

Ashley, Keith H., and Nancy Marie White
2012a *Late prehistoric Florida: archaeology at the edge of the Mississippian world*. University Press of Florida, Gainesville.

2012b Late Prehistoric Florida: An Introduction. *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*:1–28.

Ashley, Keith, and Vicki Rolland
2014 Ritual at the Mill Cove Complex. In *New Histories of Pre-Columbian Florida*, edited by Neill J. Wallis and Asa R. Randall, pp. 262–282. University Press of Florida, April 29.

Aspinall, Arnold, Chris Gaffney, and Armin Schmidt
2009 *Magnetometry for archaeologists*. Vol. 2. Rowman Altamira.

Aten, Lawrence E
1981 Determining seasonality of Rangia cuneata from Gulf Coast shell middens. *Bulletin of the Texas Archaeological Society* 52:179–200.

Austin, Robert J
1995 *Yat Kitischee: A Prehistoric Coastal Hamlet 100 BC-AD 1200*. Janus Research, Tampa.

1995 Life in a Coastal Hamlet: A Summary of What We Have Learned. In *Yat Kitischee: A Prehistoric Coastal Hamlet 100 BC-AD 1200*, edited by Robert J Austin, pp. 219–229. Janus Research, Tampa.

2013 Lithic acquisition and use at Pineland. In *The Archaeology of Pineland: A Coastal Southwest Florida Site Complex, A.D. 50-1710*, pp. 657–718. Institute of Archaeology and Paleoenvironmental Studies, University of Florida Gainsville.

Austin, Robert J, and Estabrook, Richard W
2000 Chert Distribution and Exploitation in Peninsular Florida. *The Florida Anthropologist* 53(2–3):116–130.

Austin, Robert J, and Jeffrey M Mitchem

2014 Chronology, site formation, and the Woodland-Mississippian transition at Bayshore Homes, Florida. *Southeastern Archaeology* 33(1):68–86.

Austin, Robert J, Jeffrey M Mitchem, Arlene Fradkin, John E Foss, Shanna Drwiega, and Linda Allred
2008 Bayshore Homes archaeological survey and National Register evaluation. *Report prepared for the Bureau of Historic Preservation, Florida Department of State. On file, Florida Division of Historical Resources, Tallahassee, FL*.

Austin, Robert J., Jeffrey M. Mitchem, and Brent R. Weisman
2014 Radiocarbon Dates and the Late Prehistory of Tampa Bay. In *New Histories of Pre-Columbian Florida*, edited by Neill J. Wallis and Asa R. Randall, pp. 94–120. University Press of Florida.

Bandy, Matthew S., and Fox, Jake R.
2010 Becoming Villagers. In *Becoming Villagers: Comparing Early Village Societies*, pp. 1–16. University of Arizona Press, Tuscon.

Bardolph, Dana N.
2014 Evaluating Cahokian Contact and Mississippian Identity Politics in the Late Prehistoric Central Illinois River Valley. *American Antiquity* 79(01):69–89.

Barrier, Casey R., and Megan C. Kassabaum
2018 Gathering in the Late Woodland. In *Investigating the Ordinary: Everyday Matters in Southeastern Archaeology*, edited by Price, Sarah E. and Carr, Philip J., University Press of Florida, September 20.

Beck Jr, Robin A, and James A Brown
2011 Political Economy and the Routinization of Religious Movements: A View from the Eastern Woodlands. *Archeological Papers of the American Anthropological Association* 21(1):72–88.

Beck Jr., Robin A., Douglas J. Bolender, James A. Brown, and Timothy K. Earle
2007 Eventful Archaeology: The Place of Space in Structural Transformation. *Current Anthropology* 48(6):833–860. .

Beck, Robin A.
2003 Consolidation and Hierarchy: Chiefdom Variability in the Mississippian Southeast. *American Antiquity* 68(4):641–661.

Bettinger, Robert L
1980 Explanatory/predictive models of hunter–gatherer adaptation. In *Advances in Archaeological Method and Theory, Volume 3*, pp. 189–255. Elsevier.

1987 Archaeological approaches to hunter-gatherers. *Annual Review of Anthropology* 16(1):121–142.

Betts, Matthew W, and T Max Friesen
2004 Quantifying hunter–gatherer intensification: a zooarchaeological case study from Arctic Canada. *Journal of Anthropological Archaeology* 23(4):357–384.

Binford, Lewis R
1983 *In Pursuit of the Past: Decoding the Archaeological Record*. Thames and Hudson, New York.

1978 *Nunamiut Ethnoarchaeology*. New York: Academic Press.

Bird, Douglas W, and James F O'Connell
2006 Behavioral ecology and archaeology. *Journal of Archaeological Research* 14(2):143–188.

Bissett, Thaddeus G, and Cheryl P Claassen
2016 Portable x-ray fluorescence in sourcing prehistoric whelk shell artifacts: A pilot study from Eastern North America. *North American Archaeologist* 37(3):143–169.

Blanton, Richard E.
1994 *Houses and households: a comparative study*. Springer.

Blitz, John H.
1993 Big pots for big shots: Feasting and storage in a Mississippian community. *American Antiquity* 58(1):80–96.

1999 Mississippian Chiefdoms and the Fission-Fusion Process. *American Antiquity* 64(04):577–592.

2010 New perspectives in Mississippian archaeology. *Journal of Archaeological Research* 18(1):1–39.

Blitz, John H, and Karl G Lorenz
2006 *The Chattahoochee Chiefdoms*. University of Alabama Press.

Boehm, Christopher
1999 *Hierarchy in the forest: the evolution of egalitarian behavior*. Harvard University Press, Cambridge, Mass.

Bourdieu, Pierre
1977 *Outline of a theory of practice*. Cambridge University Press, Cambridge; New York.

1998 *Practical reason: on the theory of action*. Stanford University Press, Stanford.

Brown, James A.
1976 The Southern Cult Reconsidered. *Midcontinental Journal of Archaeology* 1(2):115–135.

1997 The Archaeology of Ancient Religion in the Eastern Woodlands. *Annual Review of Anthropology* 26:465–485.

2007 On the Identity of the Birdman within Mississippian Period Art and Iconography. In *Ancient objects and sacred realms: interpretations of Mississippian iconography*, edited by F. Kent Reilly and James Garber, pp. 56–106. 1st ed. University of Texas Press, Austin.

Brown, James A, Richard A Kerber, and Howard D Winters
1990 Trade and the Evolution of Exchange Relations at the Beginning of the Mississippian Period. *The Mississippian Emergence*:251–280.

Bullen, Ripley P
1952 *Eleven archaeological sites in Hillsborough county, Florida*. Published for the Florida Geological Survey.

1978 Tocobaga Indians and the Safety Harbor culture. *Tacachale: Essays on the Indians of Florida and Southeastern Georgia during the Historic Period*:50–57.

Bushnell, Frank
1962 The Maximo Point Site—1962. *The Florida Anthropologist* 15:89–101.

1966 A Preliminary Excavation of the Narvaez Midden, St. Petersburg, Florida. *The Florida Anthropologist* 19:115–124.

Childe, Gordon V.
1950 The Urban Revolution. *The Town Planning Review* 21:3–17.

Claassen, Cheryl P
1991 Gender, shellfishing, and the shell mound archaic. *Engendering archaeology: women and prehistory*:276–300.

Clark, John E
1995 Craft specialization as an archaeological category. *Research in Economic Anthropology* 16:267–296.

2007 In craft specialization’s penumbra: things, persons, action, value, and surplus. *Archeological Papers of the American Anthropological Association* 17(1):20–35.

Clark, John E, and William J Parry
1990 Craft specialization and cultural complexity. *Research in Economic Anthropology* 12:289-346.

Cobb, Charles

2000 *From quarry to cornfield: the political economy of Mississippian hoe production*. University of Alabama Press.

Cobb, Charles R.
2003 Mississippian Chiefdoms: How Complex? *Annual Review of Anthropology* 32:63–84.

Cobb, Charles R, and Patrick H Garrow
1996 Woodstock culture and the question of Mississippian emergence. *American Antiquity* 61(1):21–37.

Colaninno, Carol E
2011 Examining ichthyofaunal remains for evidence of fishing technologies employed in Georgia estuaries during the Late Archaic period. *Southeastern Archaeology* 30(2):337–350.

Colley, Sarah M
1987 Fishing for facts. Can we reconstruct fishing methods from archaeological evidence? *Australian Archaeology*(24):16–26.

Connaway, John M
2007 *Fishweirs: a world perspective with emphasis on the fishweirs of Mississippi*. Archaeological Report No. 33, Mississippi Department of Archives and History, Jackson.

Costin, Cathy Lynne
1991 Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production. *Archaeological Method and Theory* 3:1–56.

2005 Craft production. *Handbook of archaeological methods* 2:1034–107.

Pinellas County Department of Environmental Management
2005 *The Weedon Island Story*. Pinellas County Parks Department, St. Petersburg, Florida.

Crumley, Carole L.
1995 Heterarchy and the Analysis of Complex Societies. *Archaeological Papers of the American Anthropological Association* 6:1–5.

Cusick, James G. (editor)
2015 *Studies in culture contact: interaction, culture change, and archaeology*. Occasional paper / Center for Archaeological Investigations, Southern Illinois University, Carbondale no. 25. Southern Illinois University Press, Carbondale.

Dalan, Rinita A.
2006 A geophysical approach to buried site detection using down-hole susceptibility and soil magnetic techniques. *Archaeological Prospection* 13(3):182–206.

Dearing, J.

1999 Magnetic susceptibility. *Environmental magnetism: A practical guide*, edited by John Walden 35–62.

deFrance, Susan D., and Karen J. Walker
2013 Zooarchaeology. In *The archaeology of Pineland: a coastal southwest Florida site complex, A.D.. 50-1710*, pp. 305–348. Institute of Archaeology and Paleoenvironmental Studies, University of Florida Gainsville.

Deter-Wolf, Aaron, and Tanya M Peres
2014 Embedded: Five Thousand Years of Shell Symbolism in the Southeast. In *Trends and Traditions in Southeastern Zooarchaeology*, pp. 161–185. University Press of Florida, Gainesville.

Deur, Douglas, and Nancy J. Turner (editors)
2005 *Keeping it living: traditions of plant use and cultivation on the Northwest Coast of North America*. University of Washington Press ; UBC Press, Seattle : Vancouver.

Durkheim, Émile
1997 *The division of labor in society*. 1st paperback ed. Free Press [u.a.], New York.

Earle, Timothy K
1981 Comment. *Current Anthropology*, pp. 230-231.

1987 *Archaeological field research in the Upper Mantaro, Peru, 1982-1983: Investigations of Inka expansion and exchange*. Vol. 28. Cotsen Institute of Archaeology.

2000 Archaeology, Property, and Prehistory. *Annual Review of Anthropology* 29:39–60.

Edwards, Wendy
2015 Weedon Island: Determining Seasonal Occupation with Micromorphic Gastropods. In . Sarasota.

Evans, Robert K
1978 Early craft specialization: an example from the Balkan Chalcolithic. *Social archaeology: beyond subsistence and dating*:113–129.

Eyles, Eric C
2004 Prehistoric Shell Artifacts from the Apalachicola River Valley Area, Northwest Florida.

Fewkes, Jesse Walter
1924 Preliminary Archeological Explorations at Weeden Island, Florida.

Flad, Rowan K, and Zachary X Hruby
2007 "Specialized" production in archaeological contexts: rethinking specialization, the social value of products, and the practice of production. *Archeological Papers of the American Anthropological Association* 17(1):1–19.

Flanagan, J G
1989 Hierarchy in Simple “Egalitarian” Societies. *Annual Review of Anthropology* 18(1):245–266.

Flannery, Kent
2012 *The creation of inequality: how our prehistoric ancestors set the stage for monarchy, slavery, and empire*. Harvard University Press.

1972 *The origins of the village as a settlement type in Mesoamerica and the Near East: a comparative study*. Warner Modular Publications.

1976 *The early Mesoamerican village*. New York: Academic Press.

2002 The origins of the village revisited: from nuclear to extended households. *American Antiquity* 67(3):417–433.

Flannery, Kent V, and Joyce Marcus
2014 *The creation of inequality: how our prehistoric ancestors set the stage for monarchy, slavery, and empire*. Harvard University Press, Cambridge, Massachusetts.

Flannery, Kent V, and Marcus C Winter
1976 Analyzing household activities. *The early mesoamerican village*:34–44.

Fletcher, Roland
1995 *The limits of settlement growth: a theoretical outline*. New studies in archaeology. Cambridge University Press, Cambridge ; New York, NY, USA.

Fowles, Severin
2002 From social type to social process: placing “tribe” in a historical framework. In *The Archaeology of Tribal Societies*, pp. 13–33. International Monographs in Prehistory, Ann Arbor.

Fradkin, Arlene
2008 Preliminary Analysis of Faunal Remains from Bayshore Homes Site, St. Petersburg, Florida. In *Bayshore Homes archaeological survey and National Register evaluation*, pp. 138–147. Tallahassee, FL.

2016 Pre-Columbian estuarine fishing along the lower St. Johns River, Florida, USA. *Environmental Archaeology* 21(2):161-171

Gaffney, Chris F, and John Gater
2003 *Revealing the buried past: geophysics for archaeologists*. Tempus.

Gardner, Peter M.
1991 Foragers’ Pursuit of Individual Autonomy. *Current Anthropology* 32(5):543–572.

Gell, Alfred
1998 *Art and agency: an anthropological theory*. Clarendon Press, Oxford ; New York.

Gibson, Jon L.
2001 *The ancient mounds of Poverty Point: place of rings*. Native peoples, cultures, and places of the southeastern United States. University Press of Florida, Gainesville.

Gibson, Jon L, and Philip J Carr
2004 Big mounds, big rings, big power. *Signs of Power: The Rise of Cultural Complexity in the Southeast*:1–9.

Giddens, Anthony
1979 *Central problems in social theory: action, structure, and contradiction in social analysis*. University of California Press, Berkeley.

1984 *The constitution of society: outline of the theory of structuration*. Polity Press, Cambridge.

Goggin, John Mann
1949 *Cultural traditions in Florida prehistory*. University of Florida Press.

Goring-Morris, Nigel, and Belfer-Cohen, Anna
2010 "Great Expectations," or the Inevitable Collapse of the Early Neolithic in the Near East. In *Becoming Villagers: Comparing Early Village Societies*, edited by Jake R. Fox and Matthew Bandy, pp. 62–80. University of Arizona, Tuscon.

Gould, Richard A
1968 Living archaeology: the Ngatatjara of western Australia. *Southwestern Journal of Anthropology* 24(2):101–122.

Grier, Colin
2017 Expanding Notions of Hunter-Gatherer Diversity: Identifying Core Organizatinoal Principles and Practices in Coast Salish Societies of the Northwest Coast of North America. In *The diversity of hunter-gatherer pasts*, edited by Bill Finlayson and Graeme Warren, pp. 16–33. Oxbow Books, Oxford ; Philadelphia.

Griffin, James B
1952 Culture periods in eastern United States prehistory. *Archaeology of the Eastern United States. University of Chicago Press, Chicago*:325–364.

Griffin, John W
1949 Florida Indian and his neighbors. In . Inter-American Center, Rollins College.

Hally, David J

1993 The territorial size of Mississippian chiefdoms. *Archaeology of Eastern North America: Papers in Honor of Stephen Williams*:143–168.

Harris, Oliver J. T.
2014 (Re)assembling Communities. *Journal of Archaeological Method and Theory* 21(1):76–97.

Hayden, Brian
1995 Pathways to power. In *Foundations of social inequality*, pp. 15–86. Springer.

1998 Practical and prestige technologies: The evolution of material systems. *Journal of archaeological method and theory* 5(1):1–55.

2001 Rich Man, Poor Man, Beggarman, Chief: The Dynamics of Social Inequality. In *Archaeology at the Millennium: A Sourcebook*, edited by Feinman, Gary M. and Price, T. Douglas, pp. 231–272. Kluwer Academic/Plenum, New York.

1981 Research and Development in the Stone Age: Technological Transitions among Hunter-Gatherer. *Current Anthropology* 22(5):519–548.

Helms, Mary W
1993 *Craft and the kingly ideal: Art, trade, and power*. University of Texas Press.

Henry, Edward R.
2013 Working Out Adena Political Organization and Variation from the Ritual Landscape in the Kentucky Bluegrass. In *Early and Middle Woodland Landscapes of the Southeast*, edited by Alice P. Wright and Edward R. Henry, pp. 219–234. University Press of Florida, October 8.

Hirth, Kenneth G
1993 The household as an analytical unit: Problems in method and theory. *Prehispanic domestic units in Western Mesoamerica: studies of the household, compound, and residence*:21–36.

Horsley, Timothy, Alice Wright, and Casey Barrier
2014 Prospecting for new questions: integrating geophysics to define anthropological research objectives and inform excavation strategies at monumental sites. *Archaeological Prospection* 21(1):75–86.

Hrdlička, Aleš
1940 Catalog of human crania in the United States National Museum collections: Indians of the Gulf States. *Proceedings of the United States National Museum* 87(3076):315–464.

Hutchinson, Dale L
2006 *Tatham Mound and the bioarchaeology of European contact: disease and depopulation in central Gulf Coast Florida*. University Press of Florida.

Hutchinson, Dale L, Clark Spencer Larsen, Margaret J Schoeninger, and Lynette Norr
1998 Regional variation in the pattern of maize adoption and use in Florida and Georgia. *American Antiquity* 63(3):397–416.

Hutchinson, Dale L, and Lynette Norr
1994 Late prehistoric and early historic diet in Gulf Coast Florida. *In the Wake of Contact: Biological Responses to Conquest*:9–20.

Ingold, Tim
1999 On the Social Relations of the Hunter-Gatherer Band. In *The Cambridge Encyclopedia of Hunters and Gatherers,* edited by Lee, Richard B. and Daily, Richard, pp. 399–410. Cambridge University Press, Cambridge.

Jackson, Kendal, Elizabeth Southard, Sharlene O'Donnell, and John Arthur
2018 Estimating crown conch (*Melongena corona*) tissue weight from archaeological shell measurements: An allometric methodology for coastal historical ecological research. *Journal of Archaeological Science: Reports* 21:107–116.

Johnson, Gregory A.
1982 Organizational Structure and Scalar Stress. In *Theory and Explanation in Archaeology: The Southampton Conference*, edited by Colin Renfrew, Michael J. Rowlands, and Barbara Abbott Segraves, pp. 389–419. Academic Press, New York.

Julie Hruby
2013 Crafts, Specialists, and Markets in Mycenaean Greece. The Palace of Nestor, Craft Production, and Mechanisms for the Transfer of Goods. *American Journal of Archaeology* 117(3):423.

Keeley, L.H.
1988 Hunter-gatherer Economic Complexity and "Population Pressure": A Cross-Cultural Analysis. *Journal of Anthropological Archaeology* 7:373–411.

Kelly, Raymond Case
2000 *Warless societies and the origin of war*. University of Michigan Press.

Kelly, Richard S
1990 Recent research on the hut group settlements of north-west Wales. *Conquest, Co-existence and Change: Recent Work in Roman Wales, Trivium* 25:102–11.

Kelly, Robert L.
1995 *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Smithsonian Institution Press, Washington, D.C.

2010 A Good Start. *Current Anthropology* 51(1):109–110.

Kent, Susan
1987 Understanding the use of space: an ethnoarchaeological approach. *Method and theory for activity area research: An ethnoarchaeological approach*:1–60.

Kidder, Tristram R
2007 Contemplating plaquemine culture. *Plaquemine Archaeology*:196–205.

2010 Hunter-gatherer ritual and complexity: New evidence from Poverty Point, Louisiana. *Ancient complexities: New perspectives in precolumbian North America*:32–51.

2011 Transforming hunter-gatherer history at Poverty Point. *Hunter-gatherer archaeology as historical process*:95–119.

Kidder, Tristram R., and Gayle J. Fritz
1993 Subsistence and Social Change in the Lower Mississippi Valley: The Reno Brake and Osceola Sites, Louisiana. *Journal of Field Archaeology* 20(3):281.

King, Adam, and Maureen S. Meyers
2002 Exploring the Edges of the Mississippian World. *Southeastern Archaeology* 21(2):113–116.

Knight, James D
1976 Manufacturing Techniques of Maximo Point Microliths. *Florida Anthropologist* 29:84–92.

Knight, Vernon J.
2001 Feasting and the emergence of platform mound ceremonialism in eastern North America. *Feasts: archaeological and ethnographic perspectives on food, politics, and power*:311–333.

Kohler, Timothy A., and Michael Ernest Smith (editors)
2018 *Ten thousand years of inequality: the archaeology of wealth differences*. Amerind studies in anthropology. The University of Arizona Press, Tucson.

Kolb, Michael J
1997 Labor mobilization, ethnohistory, and the archaeology of community in Hawai'i. *Journal of Archaeological Method and Theory* 4(3–4):265–285.

Kolb, Michael J., and James E. Snead
1997 It's a Small World after All: Comparative Analyses of Community Organization in Archaeology. *American Antiquity* 62(4):609.

Kolianos, Phyllis E., and Austin, Robert J
2012 *Report on the Excavation and Preservation of a Prehistoric Dugout Canoe, Weedon Island Preserve Gateway Tract, Pinellas County, Florida*. Florida Division of Historical Resources, Tallahassee, FL.

Koyama, S., and D.H. and Thomas
1981 Affluent Foragers. *Senri Ethnological Studies*. National Museum of Ethnology, Osaka.

Kozuch, Laura
1986 An overview of faunal lists from selected safety Harbor sites. *Manuscript on file. Gainesville: Department of Anthropology, Florida Museum of Natural History*.

Kozuch, Laura, Karen J. Walker, and William H. Marquardt
2017 Lightning whelk natural history and a new sourcing method. *Southeastern Archaeology* 36(3):226–240.

Kroll, Ellen M, and T Douglas Price
1991 *The interpretation of archaeological spatial patterning*. Springer.

Kvamme, Kenneth L
2006 Magnetometry: Nature's gift to archaeology. *Remote sensing in archaeology: An explicitly North American perspective*: 205–233.

Larson, Lewis H.
1980 *Aboriginal subsistance technology on the southeastern coastal plain during the late prehistoric period*. Ripley P. Bullen monographs in anthropology and history no. 2. University Presses of Florida, Gainesville.

Lawson, Ariana S
2005 Vertebrate Fauna from the Refuge Fire Tower Site (8WA14): A Study of Coastal Subsistence in the Early Woodland Period. *Unpublished MS thesis, Florida State University, Tallahassee*.

Lee, Richard B.
1988 Reflections on primitive communism. In *Hunters and gatherers*, 1:pp. 252–268. Berg, Oxford.

Lemke, Ashley K.
2015 Anthropological Archaeology Underwater: Hunting Architecture and Foraging Lifeways Beneath the Great Lakes. Unpublished Dissertation, University of Michigan, Ann Arbor, MI.

Lepofsky, Dana, and Megan Caldwell
2013 Indigenous marine resource management on the Northwest Coast of North America. *Ecological Processes* 2(1):12.

Lightfoot, Kent G, Antoinette Martinez, and Ann M Schiff
1998 Daily practice and material culture in pluralistic social settings: an archaeological study of culture change and persistence from Fort Ross, California. *American Antiquity* 63(2):199–222.

Lindauer, Owen, and John H Blitz
1997 Higher ground: The archaeology of North American platform mounds. *Journal of Archaeological Research* 5(2):169–207.

Luer, George, Allerton, David, Hazeltine, Dan, Hatfield, Ron, and Hood, Darden
1987 Whelk Shell Tool Blanks from Big Mound Key (8CH10), Charlotte County, Florida: With Notes on Certain Whelk Shell Tools. *Florida Anthropologist* 39(3):92–124.

Luer, George M.
1986 Some Interesting Archaeological Occurrences of Quahog Shells on the Gulf Coast of Central and Southern Florida. *Florida Anthropologist* 39(3):125–159.

1992 Boylston Mound: A Safety Harbor Period Shell Midden; with Notes on the Paleoenvironment of Southern Sarasota Bay. *Florida Anthropologist* 45(3):266–279.

2014 New Insights on the Woodland and Mississippi Periods of West-Peninsular Florida. In *New Histories of Pre-Columbian Florida*, edited by Neill J. Wallis and Asa R. Randall, pp. 74–93. University Press of Florida, April 29.

Luer, George M., and and Marion M. Almy
1981 Temple Mounds of the Tampa Bay Area. *Florida Anthropologist* 34(3):127–155.

1982 A Definition of the Manasota Culture. *Florida Anthropologist* 35:34–58.

Luer, George M, and Marion M Almy
1980 The development of some aboriginal pottery of the central peninsular gulf coast. *Florida Anthropology* 33:207–225.

Luer, George Mather
2007 *Mound Building and Subsistence During the Late Weeden Island Period (ca. AD 700-1000) at Big Mound Key (8CH10), Florida*. ProQuest.

Lulewicz, Isabelle H, Victor D Thompson, Thomas J Pluckhahn, C Fred T Andrus, and Oindrila Das
2018 Exploring Oyster (*Crassostrea virginica*) Habitat Collection via Oxygen Isotope Geochemistry and its Implications for Ritual and Mound Construction at Crystal River and Roberts Island, Florida. *The Journal of Island and Coastal Archaeology* 13(3):388–404.

Mahar, Ginessa
2015 Evaluating Mass Capture Fishing Techniques. Paper presented at the 80th Annual Meeting of the Society for American Archaeology in San Francisco, CA.

Marcia-Anne Dobres, and John E. Robb

2005 “Doing” Agency: Introductory Remarks on Methodology. *Journal of Archaeological Method and Theory* 12(3):159-166.

Marquardt, William H
1987 The Calusa social formation in protohistoric South Florida. In *Power Relations and State Formation*, edited by Thomas C. Patterson and Christine W. Gailey, pp. 98–116. American Anthropological Association.

1988 Politics and production among the Calusa of south Florida. *Hunters and gatherers* 1:161–188.

2014 Tracking the Calusa: A Retrospective. *Southeastern Archaeology* 33(1):1–24.

Marquardt, William H., and Laura Kozuch
2016 The lightning whelk: An enduring icon of southeastern North American spirituality. *Journal of Anthropological Archaeology* 42:1–26.

Marquardt, William H.
1992. Shell artifacts from the Caloosahatchee area. In *Culture and Environment in the Domain of the Calusa*, edited by William H. Marquardt, pp. 191–228. Monograph 1. Institute of Archaeology and Paleoenvironmental Studies, University of Florida, Gainesville.

Marquardt, William H., and Karen J. Walker (editors)
2013 *The archaeology of Pineland: a coastal southwest Florida site complex, A.D. 50-1710*. Monograph / Institute of Archaeology and Paleoenvironmental Studies, University of Florida 4. Institute of Archaeology and Paleoenvironmental Studies, University of Florida Gainsville, Gainesville.

Marquardt, William, and Karen Walker
2012 Southwest Florida during the Mississippian Period. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by Keith Ashley and Nancy Marie White, pp. 29–61. University of Florida Press, Gainesville.

Marx, Karl
1977 *Capital: A critique of political economy* (B. Fowkes, Trans.). New York: Vintage.

Matson, RG, and Gary Coupland
1995 The Prehistory of the Northwest Coast Academic Press. *New York*.

Matson, Richard G
1992 The evolution of Northwest Coast subsistence. In *Long-Term Subsistence Change in Prehistoric North America: Research In Economic Anthropology*, edited by DR Cross, RA Hawkins and BL Isaac, pp. 367–428. Research in Economic Anthropology, supplement No. 6. JAI Press, Greenwich, Connecticut

Matthew S. Bandy

2004 Fissioning, Scalar Stress, and Social Evolution in Early Village Societies. *American Anthropologist, New Series* 106(2):322–333.

Meehan, Betty
1982 *Shell bed to shell midden*. Australian Institute of Aboriginal Studies.

Mehrer, Mark
2000 Heterarchy and Hierarchy: The community plan as institution in Cahokia's polity. In *The Archaeology of Communities: A New World Perspective*, edited by Canuto, Marcello and Yaeger, Jason, pp. 44–57. Routledge.

Mehrer, Mark W
2000 Heterarchy and hierarchy: The community plan as institution in Cahokia's polity. *The archaeology of communities: a new world perspective*:44–57.

Menz, Martin
2016 The Use-Life and Times of the Type-G Shell Hammer: A Replicative Experiment and Use-Wear Analysis of Shell Tools from Crystal River (8CI1) and Roberts Island (8CI41). *Southeastern Archaeology* 69(2–3):129–143.

Milanich, Jerald T
1994 *Archaeology of Pre-Columbian Florida*. University Press of Florida, Gainesville.

1995 *Florida Indians and the Invasion from Europe*. University Press of Florida, Gainesville.

Milanich, Jerald T, Ann S Cordell, Vernon J Knight Jr, Timothy A Kohler, and Brenda J Sigler-Lavelle
1997 *Archaeology of Northern Florida, AD 200-900: The McKeithen Weeden Island Culture*. University Press of Florida, Gainesville.

Milanich, Jerald T, and Charles Herron Fairbanks
1980 *Florida archaeology*. Academic Press.

Milanich, Jerald T, and Charles M. Hudson
1993 *Hernando de Soto and the Indians of Florida*. University Press of Florida, Gainesville.

Mitchem, Jeffrey M.
1989 *Redefining Safety Harbor: Late Prehistoric/Protohistoric Archaeology in West Peninsular Florida*. Department of Anthropology, University of Florida, Gainesville.

1996 The Old Okahumpka Site (8LA57): Late Prehistoric Iconography and Mississippian Influence in Peninsular Florida. *Florida Anthropologist* 49(4):225–237.

1998 Ceramics Analysis. In *The Narvaez/Anderson Site (8Pi54): A Safety Harbor Culture Shell Mound and Midden -- AD 1000-1600*, edited by Simpson, Terrance L, pp. 66–84.

2008a Mississippian Influence on Weeden Island: Safety Harbor in the Greater Tampa Bay Region. Paper presented at the 73rd Annual Meeting of the Society for American Archaeology, Vancouver, B.C.

2008b New Information on Nineteenth-Century Archaeologist S.T. Walker. Paper presented at the 60th Annual Meeting of the Florida Anthropological Society, Tampa, FL.

2012 Safety Harbor: Mississippian Influence in the Circum-Tampa Bay Region. In *Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World*, edited by Keith Ashley and Nancy Marie White, pp. 172–185. University Press of Florida, Gainesville.

Meyers, Maureen S
2014 Shell Trade: Craft Production at a Fourteenth-Century Mississippian Frontier. In *Trends and Traditions in Southeastern Zooarchaeology*, edited by Peres, Tanya M., pp. 80–104. University Press of Florida, Gainesville.

Moore, Clarence Bloomfield
1894 *Certain sand mounds of the St. John's River, Florida*. Levytype Company.

1900 *Certain antiquities of the Florida West-coast*. PC Stockhausen.

1901 Certain Aboriginal Remains of the Northwest Florida Coast, Part 1. *Journal of the Academy of Natural Sciences of Philadephia* XI.

1903 Certain aboriginal mounds of the Florida Central west-coast. *Journal of the Academy of Natural Sciences of Philadephia*:350–394.

1918 The northwestern Florida coast revisited. *Journal of the Academy of Natural Sciences of Philadephia*:514–581.

Morrison, Kathleen D
1994 The intensification of production: archaeological approaches. *Journal of archaeological Method and Theory* 1(2):111–159.

Moss, Madonna
2011 *Northwest Coast: Archaeology as Deep History*. Society for American Archaeology, Washington, D.C.

1993 Shellfish, gender, and status on the Northwest Coast: Reconciling archeological, ethnographic, and ethnohistorical records of the Tlingit. *American Anthropologist* 95(3):631–652.

2012 Understanding variability in Northwest Coast faunal assemblages: Beyond economic intensification and cultural complexity. *The Journal of Island and Coastal Archaeology* 7(1):1–22.

Moss, Madonna L., and Erlandson, Jon M.
1998 A Comparative Chronology of Northwest coast Fishing Features. In *Hidden Dimensions, the Cultural Significance of Wetland Archaeology*, edited by Bernick, Kathryn N., pp. 180–198. UBC Press, Vancouver, B.C.

Moss, Madonna L, Jon M Erlandson, and Robert Stuckenrath
1990 Wood stake weirs and salmon fishing on the Northwest Coast: evidence from southeast Alaska. *Canadian Journal of Archaeology/Journal Canadien d'Archéologie*:143–158.

Muller, Jon
1984 Mississippian specialization and salt. *American Antiquity* 49(3):489–507.

1986 Pans and a grain of salt: Mississippian specialization revisited. *American Antiquity* 51(2):405–409.

1987 Salt, chert, and shell: Mississippian exchange and economy. *Specialization, Exchange, and Complex Societies, Cambridge University Press, Cambridge*:10–21.

Nash, Donna J
2009 Household archaeology in the Andes. *Journal of Archaeological Research* 17(3):205–261.

O'Connell, James F, and Kristen Hawkes
1981 Alyawara plant use and optimal foraging theory. *Hunter-gatherer foraging strategies: Ethnographic and archaeological analyses*:99–125.

O'Donnell, Sharlene
2015 The Weedon Island Seascape: Zooarchaeological Findings at Weedon Island Archaeological Site (8Pi1). University of South Florida, St PEtersburg.

Ortmann, Anthony L.and Tristram R.Kidder
2013 Building Mound A at Poverty Point, Louisiana: Monumental Public Architecture, Ritual Practice, and Implications for Hunter-Gatherer Complexity. *Geoarchaeology* 28:66–86.

Ortner, Sherry B.
1984 Theory in Anthropology since the Sixties. *Comparative Studies in Society and History* 26(01):126.

Parry, William J., Kelly, Robert L., Johnson, Jay K., and Morrow, Carol A.
1987 Expedient Core Technology and Sedentism. In *The Organization of Core Technology*, pp. 285–304. Westview Press, Boulder, Colorado.

Parsons, Jeffrey R, Susan Fish, and Stephen Kowalewski
1990 The Archaeology of Regions: A Case for Full-Coverage Survey. *Critical reflections on a decade of full-coverage regional survey in the valley of Mexico*:7–31.

Patton, Robert B
2013 The temporal contexts of Precolumbian shell artifacts from southwest Florida: a case study of Pineland. *The Archaeology of Pineland: A Coastal Southwest Florida Site Complex, AD*:50–1710.

Pauketat, Timothy R.
2001 Practice and history in archaeology: An emerging paradigm. *Anthropological Theory* 1(1):73–98.

2002 A Fourth-Generation Synthesis of Cahokia and Mississippianization. *Midcontinental Journal of Archaeology* 27(2,):149–170.

2004 *Ancient Cahokia and the Mississippians*. Cambridge University Press.

Peacock, David PS
1982 *Pottery in the Roman world: an ethnoarchaeological approach*. Longman Publishing Group.

Pearson, Charles E
1984 Red Bird Creek: late prehistoric material culture and subsistence in coastal Georgia. *Early Georgia* 12(1–2):1–39.

Pearson, Charles E, and Fred C Cook
2012 The Bead Maker’s Midden: Evidence of Late Prehistoric Shell Bead Production on Ossabaw Island, Georgia. *Southeastern Archaeology* 31(1):87–102.

Peregrine, Peter Neal
1992 *Mississippian evolution: A world-system perspective*. Prehistory Press.

Peres, Tanya M., and Deter-Wolf, Aaron
2016 Reinterpreting the Use of Garfish (Lepisosteidae) in the Archaeological Record of the Americas. In *People with Animals: Perspectives and Studies in Ethnozooarchaeology*, edited by Broderick, Lee, pp. 103–114. Oxbow Books.

Phillips, Philip, and James A Brown
1978 Pre-Columbian Shell Engravings from the Craig Mound at Spiro, Oklahoma,(Part 1). *Peabody Museum of Archaeology and Eth-nology, Harvard University, Cambridge*.

Pluckhahn, Thomas J.
2003 *Kolomoki: Settlement, Ceremony, and Status in the Deep South, AD 350 to 750*. University of Alabama Press.

2010a Household archaeology in the southeastern United States: history, trends, and challenges. *Journal of Archaeological Research* 18(4):331–385.

2010b The Sacred and the Secular Revisited: The Essential Tensions of Early Village Society in the Southeastern United States. In *Becoming Villagers: Comparing Early Village Societies*, edited by Jake Fox and Bandy, Matthew, pp. 100–118. University of Arizona Press, Tucson.

Pluckhahn, Thomas J, and Ann S Cordell
2011 Paste Characterization of Weeden Island Pottery from Kolomoki and Its Implications for Specialized Production. *Southeastern Archaeology* 30(2):288–310.

Pluckhahn, Thomas J, Menz, Martin, and O'Neal, Lori
2018 Crafting Everyday Matters int he Middle and Late Woodland Periods. In *Investigating the ordinary: everyday matters in southeast archaeology*, pp. 112–123. Florida Museum of Natural History: Ripley P. Bullen series. University of Florida Press, Gainesville.

Pluckhahn, Thomas J., and Victor D. Thompson
2018 *New histories of village life at Crystal River*. Florida Museum of Natural History: Ripley P. Bullen series. University of Florida Press, Gainesville.

Pluckhahn, Thomas J, and Thompson, Victor D
2018 *New Histories of Village Life at Crystal River*. University Press of Florida.

Pluckhahn, Thomas J, Victor D Thompson, and Alexander Cherkinsky
2015 The temporality of shell-bearing landscapes at Crystal River, Florida. *Journal of Anthropological Archaeology* 37:19–36.

Pluckhahn, Thomas J, Victor D Thompson, and Brent R Weisman
2010 Toward a new view of history and process at Crystal River (8CI1). *Southeastern Archaeology* 29(1):164–181.

Prentice, Guy
1987 Marine shells as wealth items in Mississippian societies. *Midcontinental Journal of Archaeology*:193–223.

Price, Sarah E., and Philip J. Carr
2018 *Investigating the ordinary: everyday matters in southeast archaeology*. Florida Museum of Natural History: Ripley P. Bullen series. University of Florida Press, Gainesville.

Price, T.D.
1981 Complexity in "Non-complex" Societies. In *Archaeological Approaches to the Study of Complexity*, edited by S.E. Van der Leeuw, pp. 55–99. University of Amsterdam Press, Amsterdam.

Price, T.D., and J.A. and Brown
1985 *Prehistoric Hunter–Gatherers: The Emergence of Cultural Complexity*. Academic Press, New York.

Quitmyer, IR
2013 Precolumbian site seasonality and harvest of estuarine resources at the Pineland Site Complex, Charlotte Harbor, Florida. *The archaeology of Pineland: a coastal southwest Florida site complex, AD*:50–1700.

Reitz, EJ, and ES Wing
2008 Zooarchaeology (2nd edition). Cambridge University Press.

Reitz, Elizabeth J
2008 Nonhuman Vertebrate Remains. In *Native American landscapes of St. Catherines Island, Georgia*, 2:pp. 615–665. Anthropological papers of the American Museum of Natural History 88.

Reitz, Elizabeth J, Irvy R Quitmyer, and Rochelle A Marrinan
2009 What are we measuring in the zooarchaeological record of prehispanic fishing strategies in the Georgia Bight, USA? *The Journal of Island and Coastal Archaeology* 4(1):2–36.

Reitz, Elizabeth, and Myra Shackley
2012 *Environmental archaeology*. Springer Science & Business Media.

Renfrew, Colin
1973 Monuments, Mobilization and Social Organization in Neolithic Wessex. In *The Explanation of Culture Change: Models in Prehistory*, edited by Colin Renfrew, pp. 539–559. University of Pittsburgh Press, Pittsburgh, Pennsylvania.

Rice, Prudence M
1980 Trace Elemental Characterization of Weeden Island Pottery: Implications for Specialized Production. In , 22:pp. 29–35.

Rigaud, J, J Simek, EM Kroll, and TD Price
1991 The Interpretation of Archaeological Spatial Patterning.

Robb, John
2010 Beyond agency. *World Archaeology* 42(4):493–520.

Robin, Cynthia
2003 New directions in Classic Maya household archaeology. *Journal of archaeological research* 11(4):307–356.

Rostlund, Erhard
1952 *Freshwater fish and fishing in native North America*. Vol. 9. University of California Press.

Rowley-Conwy, P., and R. Layton

2011 Foraging and farming as niche construction: stable and unstable adaptations. *Philosophical Transactions of the Royal Society B: Biological Sciences* 366(1566):849–862.

Rowley-Conwy, Peter
2001 Time, change, and the archaeology of hunter-gatherers: how original is the "original affluence society"? In *Hunter-gatherers: an interdisciplinary perspective,* pp. 38–72. Cambridge University Press, Cambridge.

Ruhl, Donna
1995 Analysis of Archaeobotanical Remains. In *Yat Kitischee: A Prehistoric Coastal Hamlet 100 BC-AD 1200*, edited by Robert J Austin, pp. 76–87. Janus Research, Tampa.

Russo, Michael
1998 Measuring sedentism with fauna: Archaic cultures along the southwest Florida coast. *Seasonality and Sedentism: Archaeological Perspectives from Old and New World Sites*:143–164.

2004 Measuring shell rings for social inequality. *Signs of power: the rise of cultural complexity in the Southeast*:26–70.

Russo, Michael., Cordell, Ann. S., and Ruhl, Donna. L.
1993 The Timucuan Ecological and Historic Preserve Phase III Final Report. Florida Museum of Natural History. Submitted to National Park Service, Southeast Archeological Center. Copies available from Southeast Archeological Center (SEAC), Accession No. 899, Tallahassee.

Russo, Michael, and Irvy R Quitmyer
1996 Sedentism in coastal populations of south Florida. *Case studies in environmental archaeology*:215–231.

Russo, Michael, and Irvy R. Quitmyer
2008 Developing Models of Settlement for the Florida Gulf Coast. In *Case Studies in Environmental Archaeology*, edited by Elizabeth J. Reitz, Sylvia J. Scudder, and C. Margaret Scarry, pp. 235–254. Springer New York, New York, NY.

Sampson, Christina
2015 Lines and Legacies: Ceramic Complexes from the Weeden Island Site. Paper presented at the 80th Annual Meeting of the Society for American Archaeology in San Francisco, CA.

Sanger, Matthew C., Mark A. Hill, Gregory D. Lattanzi, Brian D. Padgett, Clark Spencer Larsen, Brendan J. Culleton, Douglas J. Kennett, Laure Dussubieux, Matthew F. Napolitano, Sébastien Lacombe, and David Hurst Thomas
2018 Early metal use and crematory practices in the American Southeast. *Proceedings of the National Academy of Sciences* 115(33):E7672–E7679.

Santley, Robert S, and Kenneth G Hirth
1993 Household, compound, and residence: Studies of Prehispanic domestic units in western Mesoamerica.

Sassaman, Kenneth
2004 Complex Hunter-Gatherers in Evolution and History: A North American Perspective. *Journal of Archaeological Research* 12(3):227–280.

Sassaman, Kenneth E.
2010 *The Eastern Archaic, historicized*. Issues in Eastern Woodlands archaeology. AltaMira Press, Lanham, Md.

Sassaman, Kenneth E., Donald H. Holly, and Amerind Foundation (editors)
2011 *Hunter-gatherer archaeology as historical process*. Amerind studies in archaeology v. 7. University of Arizona Press, Tucson.

Saunders, Rebecca, and Michael Russo
2011 Coastal shell middens in Florida: A view from the Archaic period. *Quaternary International* 239(1–2):38–50.

Schiffer, Michael B.
1972 Archaeological context and systemic context. *American antiquity* 37(2):156–165.

Schortman, Edward M
1989 Interregional interaction in prehistory: The need for a new perspective. *American Antiquity* 54(1):52–65.

Schwadron, Margo
2010 Landscapes of maritime complexity: prehistoric shell work sites of the Ten Thousand Islands, Florida.

Sears, William H.
1968 The state and settlement patterns in the New World. *KC Chang*:134–153.

1967 The Tierra Verde Burial Mound. *The Florida Anthropologist* 20:25–73.

1971 The Weeden Island Site, St. Petersburg, Florida. *Florida Anthropologist* 24(2):52–60.

1973 The sacred and the secular in prehistoric ceramics. *Variation in anthropology: essays in honor of John C McGregor*:31–42.

Service, Elman R.
1971 *Primitive social organization: an evolutionary perspective*. 2d ed. Studies in Anthropology. Random House, New York.

Sewell Jr, William H

2005 *Logics of history: Social theory and social transformation*. University of Chicago Press.

Simpson, Terrance L
1998 The Narvaez/Anderson Site (8Pi54): A Safety Harbor Culture Shell Mound and Midden—AD 1000-1600.

Sinopoli, Carla M
1988 The organization of craft production at Vijayanagara, South India. *American Anthropologist* 90(3):580–597.

Smith, Bruce D
2001 Low-Level Food Production. *Journal of Archaeological Research*:43.

Smith, Eric Alden
1991 *Inujjuamiunt Foraging Strategies: Evolutionary Ecology of an Arctic Hunting Economy*. Transaction Publishers.

Smith, Eric Alden, Rebecca Bliege Bird, and Douglas W Bird
2003 The benefits of costly signaling: Meriam turtle hunters. *Behavioral Ecology* 14(1):116–126.

Smith, Eric Alden, Kim Hill, Frank W Marlowe, David Nolin, Polly Wiessner, Michael Gurven, Samuel Bowles, Monique Borgerhoff Mulder, Tom Hertz, and Adrian Bell
2010 Wealth transmission and inequality among hunter-gatherers. *Current Anthropology* 51(1):19–34.

Speth, John D. (editor)
2004 The Henderson Birds. In *Life on the periphery: economic change in late prehistoric southeastern New Mexico*. Memoirs / Museum of Anthropology, University of Michigan 37. Museum of Anthropology, Univ. of Michigan, Ann Arbor, Mich.

Speth, John D, Emslie, Steven, and Olsen, Sarah
2004 *Life on the periphery: economic change in late prehistoric southeastern New Mexico*. Edited by John D. Speth. Memoirs / Museum of Anthropology, University of Michigan 37. Museum of Anthropology, Univ. of Michigan, Ann Arbor, Mich.

Spielmann, Katherine A.
2002 Feasting, Craft Specialization, and the Ritual Mode of Production in Small-Scale Societies. *American Anthropologist* 104:195–207.

Starczak, Victoria, Paula Pérez-Brunius, Hazel E Levine, Joanna Gyory, and Jesús Pineda
2011 The Role of Season and Salinity in Influencing Barnacle Distributions in Two Adjacent Coastal Mangrove Lagoons. *Bulletin of Marine Science* 87(3):275–299.

Steponaitis, Vincas P.

1978 Location Theory and Complex Chiefdoms: A Mississippian Example. In *Mississippian Settlement Patterns*, pp. 417–453. Elsevier.

Steponaitis, Vincas P
1986 Prehistoric archaeology in the southeastern United States, 1970-1985. *Annual Review of Anthropology* 15(1):363–404.

Stirling, Matthew Williams
1936 *Florida cultural affiliations in relation to adjacent areas*. University of California Press.

Stojanowski, Christopher M, and Kent M Johnson
2011 Brief communication: Preliminary radiocarbon dates from Florida crania in Hrdlička's Gulf States catalog. *American journal of physical anthropology* 145(1):163–167.

Strathern, Marilyn
1988 *The gender of the gift: problems with women and problems with society in Melanesia*. Studies in Melanesian anthropology 6. University of California Press, Berkeley.

Swanton, John Reed
1922 *Early history of the Creek Indians and their neighbors*. Vol. 73. Government Printing Office.

Testart, A.
1982 The Significance of Food Storage among Hunter-Gatherers: Residence Patterns, Population Densities, and Social Inequalities. *Current Anthropology* 23:523–537.

Thomas, David Hurst, C Fred T Andrus, Gale A Bishop, Elliot Blair, Dennis B Blanton, Douglas Edward Crowe, Chester B DePratter, Joel Dukes, Peter Francis Jr, and Debra Guerrero
2008 *Native American landscapes of St. Catherines Island, Georgia*. 3 vols. Anthropological papers of the American Museum of Natural History 88.

Thomas, David Hurst, and Elliot Blair
2008 Estimating Shellfish Return Rates on St. Catherines Island. In *Native American landscapes of St. Catherines Island, Georgia*, 1:pp. 85–112. Anthropological papers of the American Museum of Natural History 88.

Thomas, Kenneth D, and Marcello A Mannino
2017 Making numbers count: Beyond minimum numbers of individuals (MNI) for the quantification of mollusc assemblages from shell matrix sites. *Quaternary International* 427:47–58.

Thompson, Victor D, and Faulseit, Ronald K.
2016 Finding Resilience in Ritual and History in the Lake Okeechobee Basin. In *Beyond Collapse: Archaeological Perspectives on Resilience, Revitalization, and Transformation in Complex Societies*, pp. 313–340. Occasional Paper 42. Center for Archaeological Investigations.

Thompson, Victor D, William H Marquardt, and Karen J Walker
2014 A remote sensing perspective on shoreline modification, canal construction and household trajectories at Pineland along Florida's southwestern Gulf Coast. *Archaeological Prospection* 21(1):59–73.

Thompson, Victor D., William H. Marquardt, Karen J. Walker, Amanda D. Roberts Thompson, and Lee A. Newsom
2018 Collective action, state building, and the rise of the Calusa, southwest Florida, USA. *Journal of Anthropological Archaeology* 51:28–44.

Thompson, Victor D., and John E. Worth
2011 Dwellers by the Sea: Native American Adaptations along the Southern Coasts of Eastern North America. *Journal of Archaeological Research* 19(1):51–101.

Tosi, Maurizio
1984 The notion of craft specialization and its representation in the archaeological record of early states in the Turanian Basin. *Marxist perspectives in archaeology*:22–52.

Trigger, Bruce G.
1990 Monumental Architecture: A Thermodynamic Explanation of Symbolic Behavior. *World Archaeology* 22(2):119–132.

Trubitt, Mary Beth
2005 Crafting marine shell prestige goods at Cahokia. *North American Archaeologist* 26(3):249–266.

2000 Mound building and prestige goods exchange: Changing strategies in the Cahokia chiefdom. *American Antiquity* 65(4):669–690.

2003 The Production and Exchange of Marine Shell Prestige Goods. *Journal of Archaeological Research* 11(3):243–277.

Tykot, Robert H, and Terrance L Simpson
1998 Radiocarbon Chronology at the Narvaez/Anderson Site (8Pi54). *The Narvaez/Anderson Site (8Pi54): A Safety Harbor Culture Shell Mound and Midden—AD*:1000–1600.

Upchurch, Sam B., Strom, Richard N., and Nuckels, Mark G.
2008 *Methods of Provenance Determination of Florida Cherts*. Florida Bureau of Historic Sites and Properties.

Van der Leeuw, Sander E
1977 Towards a study of the economics of pottery making. *Ex horreo* 4:68–76.

Vojnovski, Pamela

1995 Zooarchaeology. In *Yat Kitischee: A Prehistoric Coastal Hamlet, 100 B.C. - A.D. 1200,* edited by Austin, Robert J, pp. 56–75. Tallahassee.

Vojnovski, Pamela K, and Simpson, Terrance L
1998 Zooarchaeology. In *The Narvaez/Anderson Site (8Pi54): A Safety Harbor Culture Shell Mound and Midden—AD,* pp. 252–285.

Walker, Karen J
2000 The material culture of Precolumbian fishing: artifacts and fish remains from coastal Southwest Florida. *Southeastern Archaeology*:24–45.

Walker, Karen Jo
1992 The zooarchaeology of Charlotte Harbor's prehistoric maritime adaptation: spatial and temporal perspectives.

Walker, ST
1880 *Preliminary explorations among the Indian mounds in southern Florida*. Smithsonian institution.

Wallis, Neill
2014 Ritualized Practices of the Suwannee Valley Culture in North Florida. In *New Histories of Pre-Columbian Florida,* edited by Wallis, Neill J. and Randall, Asa R., pp. 243–261. University Press of Florida.

Wallis, Neill J.
2013 The Materiality of Signs: Enchainment and Animacy in Woodland Southeastern North American Pottery. *American Antiquity* 78(2):207–226.

Wallis, Neill J., Ann S. Cordell, Erin Harris-Parks, Mark C. Donop, and Kristen Hall
2017 Provenance of Weeden Island "sacred" and "prestige" vessels: implications for specialized ritual craft production. *Southeastern Archaeology* 36(2):131–143.

Wallis, Neill J, Paulette S McFadden, and Hayley M Singleton
2015 Radiocarbon dating the pace of monument construction and village aggregation at Garden Patch: A ceremonial center on the Florida Gulf Coast. *Journal of Archaeological Science: Reports* 2:507–516.

Waselkov, Gregory A
1987 Shellfish gathering and shell midden archaeology. In *Advances in Archaeological Method and Theory, Volume 10,* pp. 93–210. Elsevier.

Weisman, Brent R., Jonathon Dean, Matthew O'Brien, and and Lori Collins
2005 *Comprehensive Cultural Resource Survey of the Weedon Island Preserve, Pinellas County, Florida*.

Welch, Paul D, and C Margaret Scarry

1995 Status-related variation in foodways in the Moundville chiefdom. *American Antiquity* 60(3):397–419.

Whallon, Robert
1973 Spatial analysis of occupation floors I: application of dimensional analysis of variance. *American Antiquity* 38(3):266–278.

White, Nancy Marie
2014 Woodland and Mississippian in Northwest Florida. In *New Histories of Pre-Columbian Florida*, edited by Neill J. Wallis and Asa R. Randall, pp. 223–242. University Press of Florida, April 29.

White, Susan Lynn
1995 Technological and Formal Variability in Ceramics at Yat Kitischee. In *Yat Kitischee: A Prehistoric Coastal Hamlet 100 BC-AD 1200*, edited by Robert J Austin, pp. 88–128. Janus Research, Tampa.

Widmer, Randolph J.
1988 *The evolution of the Calusa: a nonagricultural chiefdom on the southwest Florida coast*. University of Alabama Press, Tuscaloosa.

Wiessner, Polly
1982 Risk, reciprocity and social influences on Kung San economics. *Unknown Journal*:61–84.

2002 The Vines of Complexity: Egalitarian Structures and the Institutionalization of Inequality among the Enga. *Current Anthropology* 43(2):233–269.

Wilk, Richard R, and William L Rathje
1982 Household archaeology. *American behavioral scientist* 25(6):617–639.

Willey, Gordon R, and Richard B Woodbury
1942 A Chronological Outline for the Northwest Florida Coast 1. *American Antiquity* 7(3):232–254.

Willey, Gordon Randolph
1949 Archeology of the Florida Gulf coast.

Williams, J. Raymond
1979 *Excavations at the Maximo Point Site, Pinellas County, Florida*. Division of Archives, History, and Records Management, Florida Department of State, Tallahassee.

Winterhalder, Bruce
1981 Optimal foraging strategies and hunter-gatherer research in anthropology: Theory and models. *Hunter-gatherer foraging strategies: Ethnographic and archaeological analyses*:13–35.

Wolf, Eric R
1982 *Europe and the People Without History*. Univ of California Press.

Worth, John E
2012 An overview of the Suwannee Valley Culture. *In Late Prehistoric Florida: Archaeology at the Edge of the Mississippian World, edited by Keith Ashley and Nancy Marie White*:148–171.

2014 *Discovering Florida: First-contact Narratives from Spanish Expeditions Along the Lower Gulf Coast*. University Press of Florida.

Wright, Alice P.
2017 Local and "global" perspectives on the middle woodland southeast. *Journal of Archaeological Research* 25(1):37–83.

2014 Inscribing Interaction: Middle Woodland Monumentality in the Appalachian Summit, 100 BC – AD 400.

Wright, Henry T
1984 Prestate political formations. *On the Evolution of Complex Societies: Essays In Honor of Harry Hoijer*, pp. 41–77.

Yaeger, Jason, and Canuto, Marcello
2000 Introducing an Archaeology of Communities. In *The Archaeology of Communities*, edited by Yaeger, Jason and Canuto, Marcello, pp. 1–15. Routledge, London.

Yellen, John E
1977 *Archaeological approaches to the present: models for reconstructing the past*. Vol. 1. Academic Press.

Yerkes, Richard W
1989 Mississippian craft specialization on the American Bottom. *Southeastern Archaeology*:93–106.