

LANDSCAPES OF MARITIME COMPLEXITY:
PREHISTORIC SHELL WORK SITES
OF THE TEN THOUSAND ISLANDS, FLORIDA

Thesis Submitted for the degree of
Doctor of Philosophy
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by

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ABSTRACT
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Landscapes of Maritime Complexity:
Prehistoric Shell Work Sites of the Ten Thousand Islands, Florida

The Ten Thousand Islands (TTI) region of southwest Florida contains extensive prehistoric shell middens and mounds called shell works. Though shell work sites comprise some of the largest and most complicated prehistoric shell constructions in the world, prior to this study, none had been thoroughly examined in their spatial, temporal and functional contexts, and shell work sites remain very poorly understood.

This thesis aims to define the archaeological characteristics of shell work sites within the TTI region, including their spatial patterns, function, geographic extent, and temporal affiliation. Though shell work sites are complex, complicated sites that are analogous to palimpsests, I argue that shell work sites are more than just large shell midden accumulations, amalgamations of shell mounds, or assemblages of features; they are distinct, socially constructed prehistoric landscapes. In order to understand these complex histories, I contend that they need to be examined on several complementary temporal and spatial scales, and I incorporate a multi-scalar landscape approach. This includes examining shell work sites as individually constructed features and sites, as human centered social landscapes, and within a larger, regional settlement pattern context.

Central to my thesis is the hypothesis that shell work sites reflect changes in social complexity. I posit that shell work sites throughout the region are arranged in spatially similar patterns, ranging from small, simple shell midden rings, to massive islands completely constructed out of complex arrangements of shell. I test the theory that similarity or diversity in site layouts, and the presence or absence of certain architectural features reflects changes in community and social organization over time, and thus, social complexity.

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This study was envisaged out of the wake of a devastating hurricane (Wilma), which damaged much of Florida's southwest coast in 2005. It was with this opportunity that allowed me to visit some of the most impressive, and important prehistoric coastal shell midden sites in the world. After stepping foot for the first time on the awe-inspiring Russell Key site, I decided to devote five years of my doctoral studies to investigating these incredible sites. It has been an extraordinarily rewarding experience, and I am grateful to a multitude of people for helping to make this study possible.

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CHAPTER 1 INTRODUCTION

The south Florida environment has a diverse subtropical system of marshes, swamps, rivers, and estuaries. The central feature is the Everglades, a unique, vast wetland that spans the southern half of Florida, and constitutes the largest subtropical wetland in North America. The southwest Florida coast contains two distinct, highly productive estuaries: Charlotte Harbor to the north, and further south, the Ten Thousand Islands (TTI) (Figure 1).

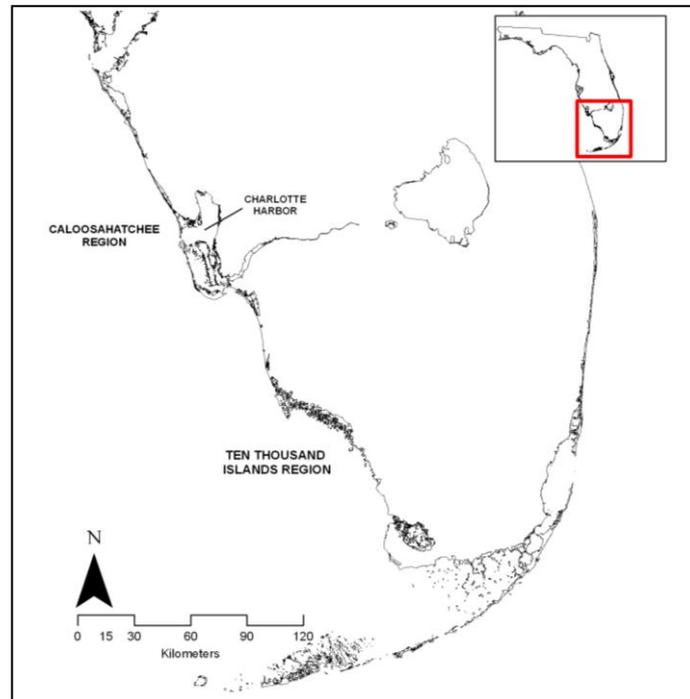


Figure 1. South Florida Caloosahatchee and Ten Thousand Islands (TTI) regions.

The two estuaries are considered to have supplied an unusually rich, estuarine resource base favorable to human adaptation and exploitation (Widmer 1988:114), marked by numerous shell midden and mound sites (Figures 2-4). In fact, many view the highly prolific aquatic ecosystem of Charlotte Harbor and the greater Caloosahatchee culture region as so productive, stable, and predictable that it rivaled agricultural systems, and was instrumental in the emergence of the Calusa, a non-

agricultural complex chiefdom (Goggin and Sturtevant 1964; Marquardt 1986, 1987, 1988, 1991, 1992; Patton 2001; Russo 1991; Sears 1982; Walker 1992a, 1992b; Widmer 1988).

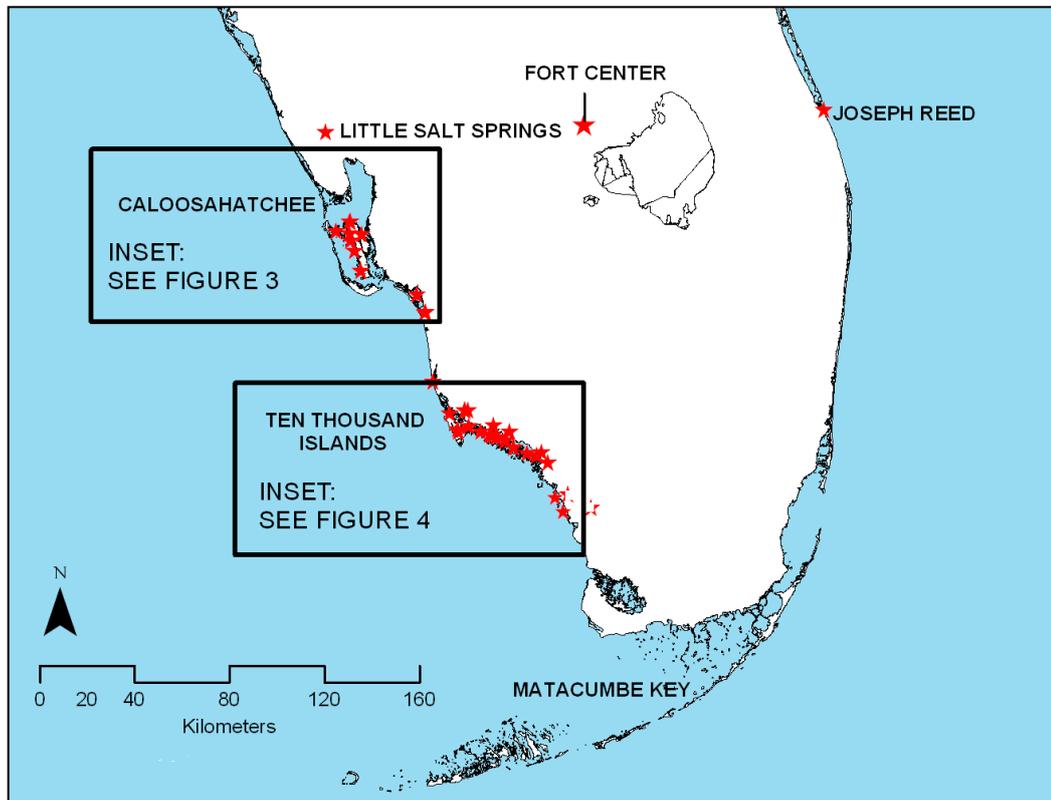


Figure 2. South Florida sites and site regions mentioned in text.

Further south, the TTI region is characterized by a remote archipelago of mangrove islands stretching for some 80 kilometers along the coast, forming a dense coastal forest several kilometers wide. This extensive maze of lagoons, mangrove swamps, marine meadows and shallow, protected embayments permitted the development of very productive estuaries, providing abundant fish and shellfish to prehistoric native populations over millennia, the vestiges of which remain marked by the numerous shell midden sites found throughout the region (Figure 4).

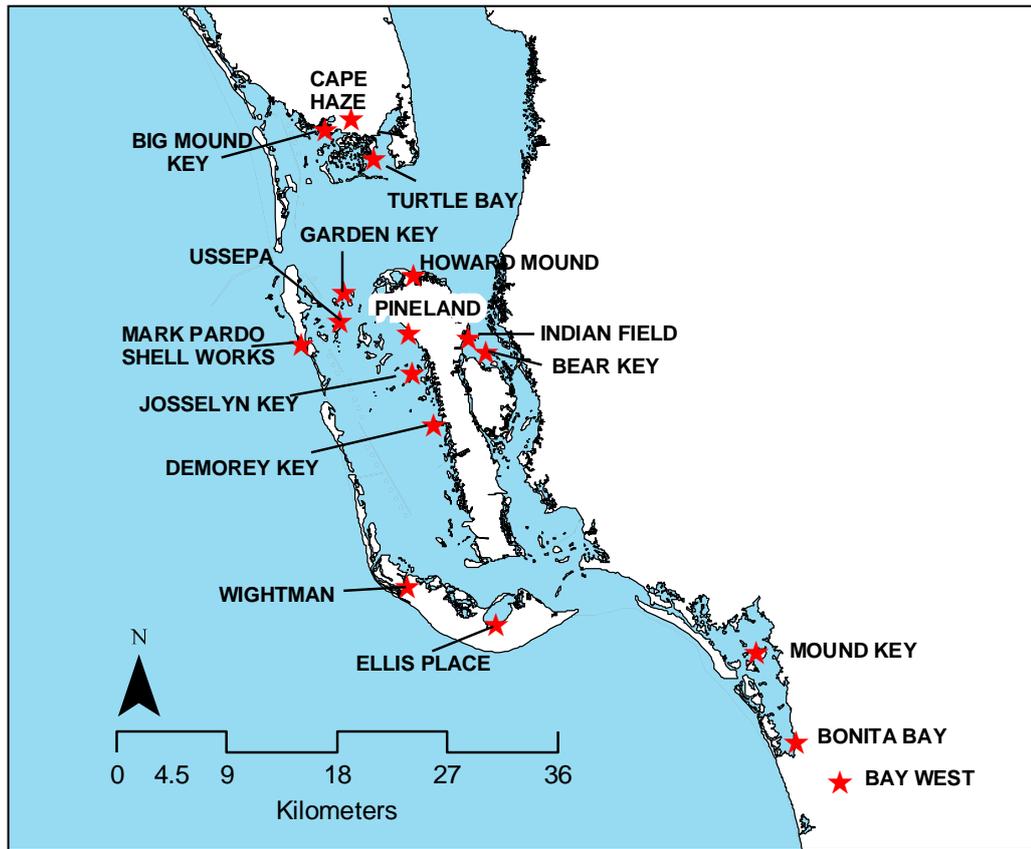


Figure 3. Caloosahatchee sites mentioned in text.

Like many coastal shell midden sites around the world, TTI sites are articulated in a variety of forms, including small, isolated or undulating piles, and linear, curvilinear and ring-shaped middens. Other, more unusual shell midden sites found within the TTI and Charlotte Harbor are massive, complex groupings of shell midden features called “shell work sites,” which include mounds, ridges, crescents, raised platforms, canals, and water courts (see Chapter 2).

TTI shell work sites comprise some of the largest and most complicated prehistoric shell constructions in the world. Prior to this study, shell work sites in the TTI had never been thoroughly examined within their spatial, temporal and functional contexts, and as a result they remained poorly understood. For example, little was known regarding site functions, formation processes, and temporal and spatial patterning.

This study aims to answer several fundamental questions about shell works, mainly, 1). how did shell works form?; 2). what were their function?; and, 3). how did they relate to one another in time and space throughout the region? These questions will help to test my hypothesis that there are distinct spatial and temporal characteristics of shell works that reflect changes in community organization, and thus social complexity, over time.

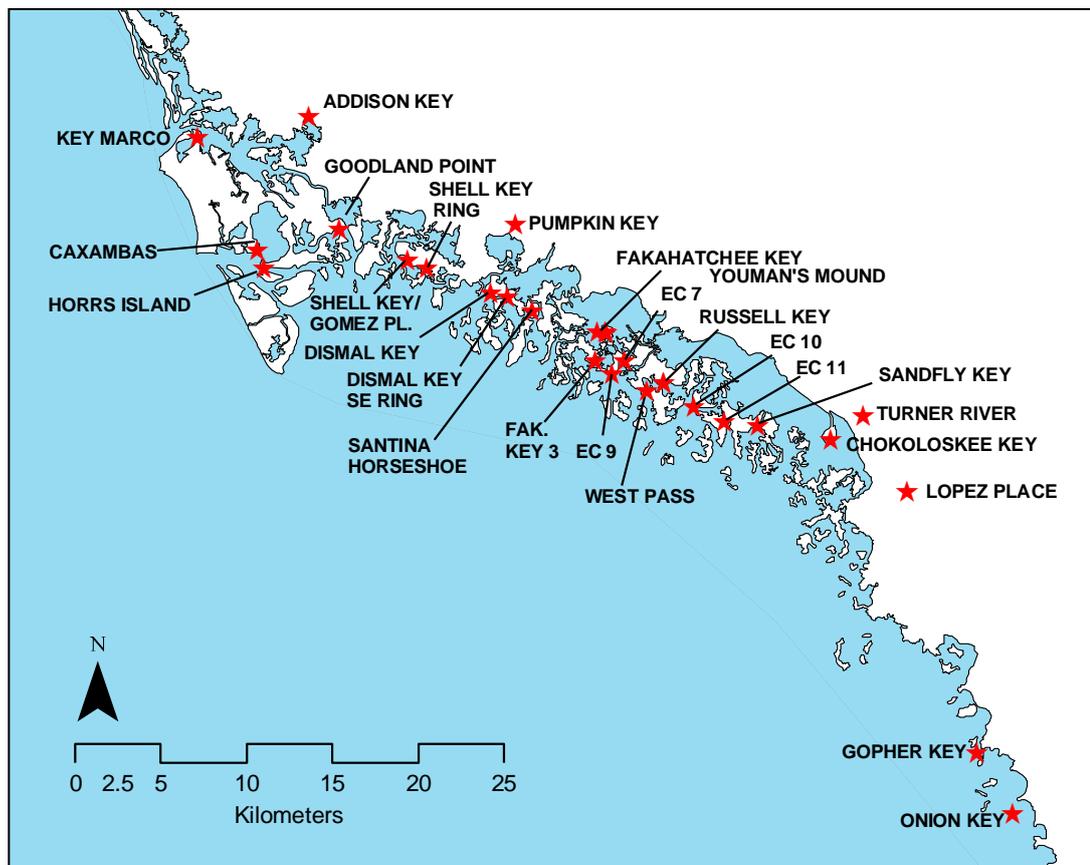


Figure 4. Ten Thousand Island (TTI) sites mentioned in text.

My research approach incorporates a framework of archaeological landscape theory, and examines the local community as a social unit to establish regional settlement patterns. Central to this study is the argument that changes in community organization reflect changes in social complexity, which may support the contention that the TTI groups were trans-egalitarian, or complex hunter-gatherers, perhaps related in social structure to the neighboring Calusa.

The following provides a brief introduction to the theoretical research approaches taken. Chapter 3 provides a detailed discussion and assessment of the theoretical framework used to test this hypothesis.

RESEARCH APPROACH TO SHELL WORKS

Shell works are a type of shell midden site, and thus, their study has broad relevance to a wide range of anthropological and archaeological research interests. Research approaches to studying shell middens vary, and have changed considerably over the last 170 years, from emphases on determining relative chronology, paleo-environmental change, and quantitative analyses, to determining culture histories and social aspects of shell midden sites (Claassen 1998).

Quantitative shell midden archaeology embodies a distinct methodological and theoretical orientation (e.g., Ambrose 1967; Claassen 1998; Stein 1992; Waselkov 1982), mainly focusing on midden constituents to determine subsistence and diet, to infer ecological and resource exploitation changes, as markers of seasonality, in understanding paleo-environment and site formation processes, and in marking the locations of former coastlines (Bailey and Parkington 1988).

Paleo-environmental, dietary and subsistence data from shell midden studies can contribute greatly to the understanding of prehistoric economy and social organization of maritime hunter-gatherers, coastal foragers and specialized maritime adaptations (e.g., Bird and Bird 1997; Ceci 1984; Clark and Yesner 1981; Erlandson 1988; Erlandson and Fitzpatrick 2006; Erlandson and Moss 2001; Glassow and Wilcoxon 1988; Jones 1991; Lightfoot and Cerrato 1988; Moss 1993; Waselkov 1984). In turn, studies focusing on coastal foragers have helped to build models to understand the rise of social complexity among non-agricultural coastal foragers throughout the world (Ames 1981, 1994; Arnold 1992, 1995, 1996a, 1996b, 1996c; Bacus and Lucero 1999;

Earle 1987, 1989, 1997; Erlandson 2001; Feldman 1980, Glassow and Wilcoxon 1988; Koyama and Thomas 1982; Johnson and Earle 2000; Kushner 1969; Miller and Boxberger 1994; Moseley 1974; Price and Brown 1985; Quilter and Stocker 1983; Raymond 1981; Rick *et al.* 2005; Sandweiss *et al.* 1998; Sassaman 2004; Widmer 1988; Wilson 1981).

Though once viewed as a marginal dietary resource, shellfish and coastal resources are increasingly recognized for their importance in human evolution and maritime adaptations throughout human history (e.g., Aberg 2000; Bailey 1975; Bailey and Parkington 1988; Bailey and Milner 2003; Erlandson and Fitzpatrick 2006; Finamore 2004; Milner *et al.* 2007; Pye 2000). Once thought of as relatively recent developments (see Erlandson and Fitzpatrick 2006 for a critique), world examples of coastal adaptations are now recognized to have occurred much earlier within the course of human evolution (Bailey and Craighead 2003; Johnson and Stright 1992; Kennett and Kennett 2006; Moseley 1974; Nolan 1986; Rick and Erlandson 2000; Rick, Erlandson and Vellanoweth 2001; Sloan 1993).

While studies of shell midden sites have been used to study myriad aspects of diet and subsistence, human evolution and paleo-environmental studies, the normative and long-standing view of shell middens are that they are domestic, quotidian refuse, the remains of daily meals discarded in garbage piles. Recent important developments in shell midden research have expanded interpretations of shell midden sites beyond strictly quotidian contexts, with a growing number of shell midden sites suggesting symbolic, mortuary, ceremonial, monumental and feasting contexts (e.g., Aten 1999; Claassen 1991, 1992, 1996; Gaspar 1998; Leventhal 1993; Luby 2004; Luby *et al.* 2006; Luby and Gruber 1999; Russo 1991, 1994, 2002, 2004; Russo and Heide 2002; Saunders 2002).

Central to this thesis is my contention that while shell work sites are indeed formed from shell midden, shell works equal more than just the sum of their parts— and are much more than just massive shell midden accumulations, amalgamations of shell mounds, or assemblages of midden features. Shell works are complex sites, akin to palimpsests, and were socially constructed landscapes that reflect a unique maritime hunter-gatherer adaptation and tradition of terra-forming with shell. I assert that in order to understand the complex construction histories, temporal and spatial patterns, functions, and possible symbolic, mortuary and ceremonial contexts of these sites, a theoretical landscape approach is needed (see Chapter 3).

Landscape theory allows researchers to overcome the single site focus (Thomas 2001:165), transcending the view of the ‘site’ as a fixed location where people simply lived, discarded items, and constructed; to consider instead (or perhaps equally) how they interacted with and experienced the wider world of everyday social life (Johnson 2005:156). As Sassaman (2005:81) eloquently states, landscape archaeology provides insight into “how places, pathways and resources are imbued with meaning through histories of movement, settlement, collective identities, group fissioning, and subsistence practices.” I argue that shell works need to be viewed as landscapes in order to advance our understanding of TTI socio-cultural structure and change.

In lieu of following strictly quantitative approaches focusing on midden constituents and employing bio-archaeological or archaeo-faunal methods, this synthetic study will incorporate a landscape perspective, using a multi-scalar, synchronic and diachronic investigation of shell works as individually constructed features and sites, as human centered social landscapes, and as a reflection of community organization on a regional scale. Using the concept of the local community as a social unit, I argue that distinct spatial and temporal characteristics of shell work landscapes reflect changes in community organization, and thus social complexity, over time.

SETTLEMENT PATTERNING AND SPATIAL ANALYSIS

A general definition of settlement pattern is “The spatial distribution of human activity over the geographic landscape, reflected in archaeological remains and their location to one another” (Mignon 1993). Settlement pattern studies can focus on a variety of scales from single loci such as activity areas or household units, to larger areas such as communities, hamlets, villages, towns, and regions.

Throughout the TTI region, shell work sites appear to be arranged in spatially similar patterns, ranging from small, simple, non-complex linear and curvilinear shell midden ridges, to massive complete islands constructed with complex arrangements of shell. Does this suggest a hierarchical settlement pattern? Does similarity or diversity in site layouts, and the presence or absence of certain architectural features indicate changes in site functions, or social organization over time?

A major goal of this thesis is to define the settlement pattern for TTI shell work sites, using a multi-scalar approach: examining single loci and activity areas, defining local community organization, and eliciting trends in regional settlement patterns. To achieve this a variety of methods is employed (see Chapter 4) such as archaeological sampling of shell work features; artifact, feature and site distribution mapping; and site form analysis, in order to determine significant spatial and temporal patterns of shell work sites, in order to interrogate, test and refine the hypothesis that distinct spatial and temporal characteristics of shell work landscapes reflect changes in community organization, and thus social complexity, over time.

HUNTER-GATHERER COMPLEXITY

Most south Florida prehistoric cultures are viewed as part of the Glades Tradition (see Chapter 2), the most ubiquitous trait being an entirely marine-based subsistence, with no evidence for agriculture (Cockrell 1970; Cumba 1971; Fradkin

1976; Goggin 1949a:28, Goggin and Sturtevant 1964:183; Griffin *et al.* 1985; Hale 1989; Olsen 1971; Swindell 1974; Walker 1992a,1992b; Wing 1965, 1983, 1984). Goggin noted a secondary dependence on hunting and gathering, mostly wild plant foods, but he stressed that a marine subsistence was primary (1949a:17). This would define the Glades culture as hunter-gatherers, or more aptly, fisher-hunter-gatherers.

Hunter gatherers are traditionally viewed in anthropological theory as those deriving their livelihood from non-agricultural pursuits, and are characterized by a seasonally-driven mobile foraging economy. These groups are usually described as small, egalitarian bands that occasionally aggregated in larger groups for feasting and social exchange.

Complex hunter-gatherers are more difficult to define (see Sassaman 2004), but certain markers include: high population density; territoriality; sedentism; a delayed-return economy; intensive subsistence practices; storage; elaborate technology; exchange; and long distance trade (Price 1995:141; Sassaman 2004:233). Some include institutionalized labor and hereditary inequality as organizational characteristics (Arnold 1996c; Marquardt 1988), while others argue that there is no evidence for hunter-gatherer hereditary inequality outside of the Pacific Northwest (Price 1995:141), with the Calusa as one exception (see below).

An ancillary argument of this thesis is that changes in shell work landscapes reflect changes in community organization, and thus *social complexity*, over time. While not making the concluding argument that shell works of the TTI represent chiefdom-level organizations, I do argue that at certain points in time shell works represent a level of community organization that in turn reflects increased social complexity. This will be demonstrated by a regional examination of temporal and spatial changes and similarities in site structure that support the markers of complexity.

CALUSA AND TEN THOUSAND ISLAND (TTI) TRIBES

One of the rare examples of complex hunter-gatherers outside of the Pacific Northwest is the Calusa. At the time of first European contact in 1513, Spanish explorers in the Caloosahatchee area north of the TTI describe a thriving native population dominated by the Calusa who ruled over all of south Florida, extracting tribute from over fifty to seventy towns (Escalante Fontaneda 1944; Goggin and Sturtevant 1964:187). Ethnohistoric accounts describe the Calusa as a sedentary, highly socially stratified and complex chiefdom led by Calos, a cacique or chief, with a hereditary elite group of “principal men” consisting of nobles, captains, status warriors, priests and sorcerers. A second group consisted of vassals and commoners. Accounts describe the Calusa as completely dependent on coastal resources, with fish and shellfish constituting almost all of their diet, and with no evidence of any agricultural practice of any kind.

Many researchers have been intrigued by the Calusa’s hegemonic dominance over all of south Florida, and the apparent anthropological paradox of a non-agriculturally based socio-political hierarchy and hereditary chiefdom. The question of how such a hunter-gatherer-fisher / non-agrarian culture could have developed such complexity in the subtropical wetlands of south Florida has dominated much work in south Florida archaeology (Dietler 2008; Goggin and Sturtevant 1964; Marquardt 1986, 1987, 1988, 1991, 1992; Patton 2001; Sears 1982; Walker 1992a, 1992b; Widmer 1988), with no consensus as to the exact processes or mechanisms that led to emergent complexity.

It remains unknown if the TTI groups were part of this chiefdom, or a separate tribe that were possibly tributary to the Calusa. If the Ten Thousand Island region were separate but tributary to the Calusa, when and how did this relationship occur, and what is the archaeological evidence for this?

While not the main focus of this study, the question of ‘relatedness’ between the TTI groups and Calusa remains an important question that will be considered in terms of comparison to existing models of south Florida settlement patterns, social organization, and emergent complexity within the Caloosahatchee region. A corollary of this study will be a new body of data that has the potential to shed crucial light upon this important question.

SHELL WORKS HYPOTHESIS

The coastal foragers of the TTI engineered a complex landscape of massive shell work sites, containing a variety of complex, spatially arranged features that represent a unique, prehistoric architectural tradition of terra-forming with shell. Central to my thesis is the hypothesis that these complex shell work sites emerged and developed as a result of demonstrable changes in community organization and social complexity over time. Specifically, I will test the theory that the gradual, and distinct, development of discrete sizes, shapes and layouts reflected changing community organization on a regional level. Further, similarity or diversity in site layouts, and the presence or absence of certain architectural features can be taken to indicate regional changes in community organization.

Ultimately, this study strives to define the archaeological characteristics of TTI shell work sites, their spatial patterns, geographic extent, temporal affiliation, and what they may indicate about site function, activities, population and social organization. This is achieved through a combination of systematic archaeological testing - to determine site structure, chronology and temporality - and Geographic Information Systems (GIS) mapping - for data visualization and spatial analysis of site patterns - conducted on a sample of shell work sites in order to build regional settlement patterns and track social movements over time.

CHAPTER 2

SOUTH FLORIDA CULTURE HISTORY

INTRODUCTION

In order to begin building a model of Ten Thousand Islands (TTI) shell works settlement patterns, this chapter presents an overview of south Florida prehistory, highlighting major trends and gaps in research, and evaluating the current state of understanding for the region. Prior to this study, very little archaeological work in the TTI was conducted beyond basic reconnaissance (see below); so much of the following discussion is derived from work performed throughout south Florida, from a variety of site types.

This chapter begins with a brief overview of south Florida pre-glades sequences, a discussion of the Glades Tradition, and south Florida culture areas. An overview of previous settlement pattern research and models of Calusa complexity are then presented, followed by a definition and overview of shell works as a site type, descriptions of their major features, and how they have previously been interpreted in regards to formation processes, purposes, functions, and their temporal and spatial associations.

PREVIOUS TTI INVESTIGATIONS

Previous to this study, archaeological investigations of TTI shell work sites were very limited in scope, characterized by sporadic salvage-type work conducted on several sites to recover data prior to, or after large-scale site destruction (e.g., Addison Key, Chokoloskee Key, Horr's Island, Key Marco, and Turner River, see Figure 4). While work at many of these sites has been invaluable in developing our current understanding of south Florida cultural sequences and prehistory (e.g., McMichael 1982; Russo 1991; Sears 1956; Widmer 1988), research was generally too limited in

time and opportunity to develop in-depth, diachronic research designs and sampling strategies, or was limited to sampling small remaining portions of sites. Projects at Horr's Island and Turner River are two exceptions.

While work at Horr's Island was extensive and included major excavations, research focused on the Archaic components of the site, with the goal of defining Late Archaic settlement patterns, in lieu of examining the subsequent Glades period components present in some of the shell work features. Research at Horr's Island also failed to address how the two seemingly different prehistoric populations were historically connected (they were not, and were vastly different, Russo concludes 1991:500, 503), or how the broader shell work landscape developed over time.

Sears' work at Turner River remains the most complete shell work site investigation prior to this study. Limited work included publishing a topographic site map, and excavation of five test units in one area of this 10-hectare site; however, no radiocarbon dates resulted from his work (Sears 1956), and temporal data are lacking.

Prior to this study, very few radiocarbon dates existed for systematically investigated shell work sites within the TTI. The current study greatly enhances our spatial and temporal understanding of TTI shell work sites by providing a systematically planned, diachronic study of various shell works, contributing 123 new radiocarbon dates from systematically excavated contexts, sampling multiple shell work features and sites, and providing a major contribution towards building TTI shell work settlement patterns (see Chapter 5).

PRE-GLADES SEQUENCES

Paleoindians, the first human inhabitants of North America, are the earliest documented inhabitants of Florida. Although the times and routes by which the earliest Paleoindians arrived in the New World are matters of ongoing debate (see Dillehay

1989, 1997), current archaeological evidence indicates that by 10000-9500 BC, Paleoindian populations had migrated to most areas of the New World (Anderson 1990a:164; Bense 1994:39), including Florida. Although fewer than 100 Paleoindian sites are currently known in Florida (Florida Department of State 1993), many more undoubtedly exist, and are likely located offshore on the continental shelf (Cockrell and Murphy 1978), in terrestrial wet areas, or are deeply buried.

The Archaic period in Florida is characterized by increasing sedentism and reliance on shellfish and coastal marine resources, dependence on hunting, fishing and gathering, and an egalitarian form of social organization (Anderson and Sassaman 1996; Bense 1994; Carr and Beriault 1984; Russo 1991; Sassaman 1996). Key cultural developments of the Archaic period include the first construction of mounds and earthworks; the formation of large settlements and sites; the development of long-distance trade; and the first pottery making.

In Florida, the Archaic period is divided into three broad temporal divisions, based mainly on stylistic changes in projectile points and the introduction of fiber-tempered pottery in the Late Archaic period. These divisions are Early Archaic (8000-5000 BC), Middle Archaic (5000-2000 BC) and Late Archaic (2000-500 BC) (Milanich 1994). Some archaeologists include a Transitional Period (Bullen 1959, 1969), a sub-period of the Late Archaic period, also called the Terminal Archaic (1200-500 BC). This sub-period is thought of as a “bridge” between the fiber-tempered ceramic archaic and later Woodland cultures, and is defined by the presence of “semi-fiber-tempered” ceramics. However, the idea of a Transitional Period has recently been called into question (Milanich 1994:88; Russo and Heide 2000).

During the Middle Archaic period, elaborate burial practices expanded. In south Florida, a distinctive mortuary pattern developed that included interment of the dead in water, muck, shallow ponds or sloughs (Widmer 1988:67), such as the Bay West site,

dated to 5000-3500 BC (Beriault *et al.* 1981). Other Middle Archaic mortuary pond burials in south Florida include Republic Groves and Little Salt Springs.

Pottery first appears in the Late Archaic period around 2000 BC, in the form of fiber-tempered and limestone tempered wares (Milanich 1994: 86; Russo 1991; Widmer 1988:68). Late Archaic material culture in southwest Florida included a well-developed bone and shell tool industry, though lithic tools seem to have been scarce, no doubt a result of the lack of chert sources.

Prior to this study, there was scant evidence for any substantial Archaic period occupation within the TTI, with the exception of a cluster of sites located near Marco Island within the northern end of the TTI. At the Horr's Island site is Florida's largest known Archaic coastal village site, dating as early as 3959 BC (McMichael 1982; Russo 1991). Extensive shell middens, numerous hearths, post molds, and four shell/sand mounds were identified, suggesting the first evidence of Archaic sedentary village life. On Marco Island, the Key Marco site has the largest assemblage of Late Archaic Orange series pottery currently known in southwest Florida (Griffin 1988). Outside of the Marco Island area, only a few other sites in south Florida have produced any fiber-tempered pottery, including Useppa Island, Turtle Bay, Howard Mound, several sites on the Cape Haze Peninsula, and one isolated ceramic sherd recovered from Onion Key in Everglades National Park (Widmer 1988:72). Widmer (1988) proposed that the lack of Archaic sites within the Everglades was due to the area's dryness at this time (3500 - 2500 BC), maintaining that the region could not support anything beyond sporadic utilization of interior areas.

Also during the Late Archaic in the Southeast, a distinct shell ring cultural tradition emerged (around the lower coastal Southeast states, including South Carolina, Georgia, Florida, and Mississippi), so called after the large ring-shaped shell midden structures that were formed during this time (Russo 2006; Russo and Heide 2002). The

shell ring cultural tradition included the massive consumption of shellfish and fish, the deposition of shell refuse in the distinct form of rings, and coincided with the first manufacture and use of pottery (Russo and Heide 2002:145). Known shell rings in south Florida include the Joseph Reed Shell Ring (Russo and Heide 2002), Horr's Island (McMichael 1982; Russo 1991), and Bonita Bay (Dickel 1992).

GLADES SEQUENCES

The end of the Archaic, around 500 BC, is marked by the development of regional cultures with unique ceramic assemblages, cultural traits and lifeways that were specifically adapted to particular geographic areas and environments (Milanich 1994), such as the Caloosahatchee and Glades cultures (Table 1). During this period, the semi-fiber-tempered ceramics of the Late Archaic period were gradually replaced by new ceramic traditions or trajectories. In south Florida, a distinct tradition developed called the Glades Tradition (Stirling 1936:355), that some have argued encompassed all south Florida cultures.

Many researchers in south Florida continue to accept the paradigm of the Glades Tradition. This maintains that prehistoric south Florida was populated by a single homogenous group that strongly maintained similar traditions over a wide geographic area, and who persisted from about 500 BC to AD 1500. In light of this study, I suggest that this paradigm needs to be re-evaluated to better account for regional variations seen in various south Florida cultures, as well as temporal shifts in settlement patterning present throughout the region (see Chapters 7 & 8).

Table 1. Abbreviated Regional Culture Sequence (After Anderson and Sassaman 2004; Marquardt 1992; Milanich 1994).

SOUTHEAST	CALOOSAHATCHEE	GLADES
AD 1500-1800 Protohistoric	AD 1500-1750 Caloosahatchee V	AD 1513-1700 Glades IIIc
AD 1000-1500 Mississippian	AD 1350-1500 Caloosahatchee IV	AD 1400-1513 Glades IIIb
	AD 1200-1350 Caloosahatchee III	AD 1200-1400 Glades IIIa
		AD 1100-1200 Glades IIc
	AD 800-1200 Caloosahatchee IIb	AD 900-1100 Glades IIb
650 BC -AD 1000 Woodland		AD 750-900 Glades IIa
	AD 500-800 Caloosahatchee IIa	AD 500-750 Glades I (Late)
	500 BC-AD 500 Caloosahatchee I	500 BC- AD 500 Glades I
	1200-500 BC Terminal Archaic	1200-500 BC Terminal Archaic
3750-650 BC Late Archaic	2000-1200 BC Late Archaic	2000-1200 BC Late Archaic
6950-3750 BC Middle Archaic	5000-2000 BC Middle Archaic	5000-2000 BC Middle Archaic

South Florida is commonly viewed as a single culture area (the Glades Area); though more recently archaeologists have moved away from the concept of one large culture area towards defining several distinct culture regions or areas (Carr and Beriault 1984; Griffin 1988, 2002; McGoun 1984; Milanich 1994; Milanich and Fairbanks 1980; Sears 1966; Widmer 1988:79). I support this development, and consider the TTI a distinct culture area, for reasons explained below.

While the Glades Area has traditionally been called one of the best defined culture areas in Florida (Goggin 1948:105, 1949b:28), and is considered to have one of the best documented ceramic chronologies in North America (Widmer 1988:75), an understanding of the timing, duration and characteristics of settlement patterns, subsistence adaptations and economies, and changes in socio-political organization over time throughout the greater south Florida region is greatly lacking.

One other problem continues to pervade south Florida archaeology: the tendency to view prehistoric cultures and areas as either associated with the Calusa or Tekesta. These were the two dominant proto-historic Indian tribes inhabiting south Florida at the time of first European contact in the 16th and 17th centuries (Figure 5). While ethnographic accounts provide invaluable descriptions of these and other south Florida

tribes at the time of contact, they do not provide much utility for understanding prehistoric cultures in the area, millennia before contact. It is also inaccurate to assume that proto-historic tribes necessarily equate with prehistoric cultures, especially in view of how dynamic cultural groups and boundaries may have been over time.

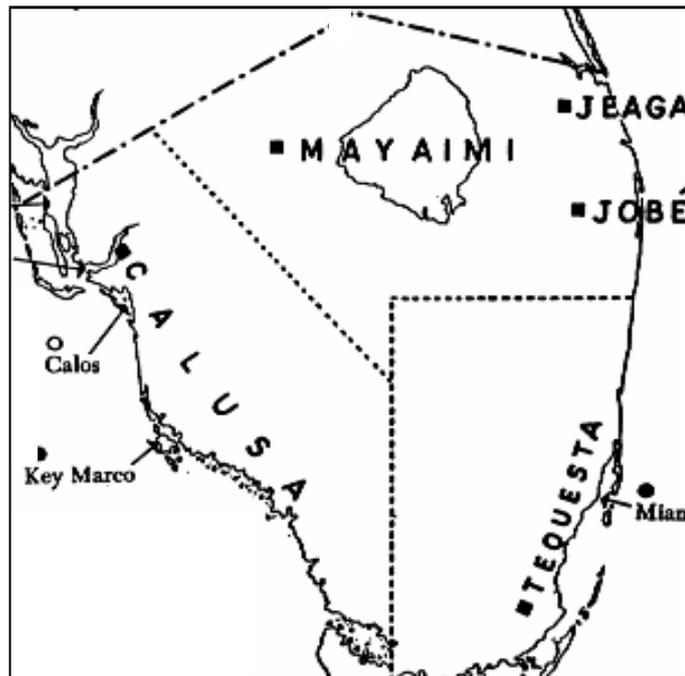


Figure 5. Proto-historic south Florida Calusa and Tequesta culture areas (Goggin and Sturdevant 1964).

GLADES TRADITION AND CULTURE AREAS

Since Stirling (1936) first defined the Glades Tradition, Florida archeologists have largely focused on re-defining archaeological culture area names and regions. Stirling first described south Florida as the Calusa region (1935), but by the next year he had wisely abandoned that term and proposed a scheme based on ceramic distributions and variations found throughout the state, establishing four distinct archaeological areas for the Florida peninsula (1936:354). One of these, the Glades Area, named after the dominating wetland ecosystem of south Florida (the *Everglades*), was geographically based, and encompassed all of south Florida. The central cultural feature of the Glades were the occurrence of a poorly fabricated, “inferior grade of pottery,” perforated shell

tools; plummets; antler adze sockets; and bone projectile points (Stirling 1936:355). Stirling thought that the Calusa's ancestors had migrated into the peninsula from the north and represented "the first important cultural invasion of the peninsula" (Stirling 1936:351).

Goggin (1939:37) provided the first published reference to the inferior grade of pottery that was supposedly diagnostic of the Glades Area, called "Glades Gritty Ware." He emphasized the low-grade quality of the pottery, as well as its ubiquity and wide distribution within the culture area, concluding that this was a good marker for the Glades culture. Kroeber (1939:67-70) provided a critical view of south Florida cultures, concluding that south Florida was a distinctive environmental and cultural area, but was an "inferior" part of the greater southeastern culture.

Based on substantial stratigraphic testing, seriation and cross-checking of ceramic sequences from multiple sites throughout the Glades area, Goggin revised the Glades Area to include three sub-areas: Tekesta, Calusa, and Okeechobee (Goggin 1947:120). With this new culture area scheme, Goggin envisioned the Glades Area as one distinct cultural unit encompassing all of south Florida, reflecting an adaptation to the unique south Florida environment (Goggin 1947:119). Sub-areas developed where some areas were isolated enough within the area to allow for the development of regional variants (Goggin n.d.). These isolated areas were thought to be bounded by natural barriers such as the Everglades interior, an area that is not completely impenetrable but is difficult enough to travel through, so that it would have presented an impediment to groups living around it, and would presumably have restricted easy interaction.

Goggin only briefly considered the question of how and when south Florida first became settled, focusing on the arrival of the Glades culture, and not on the possibility of earlier groups. After finding small amounts of fiber-tempered and semi-fiber-

tempered pottery in the region (Late Archaic types which pre-date the Glades period, and which did not fit into his newly established Glades pottery series), Goggin considered the possibility that there may have been an earlier, outside Archaic group present in small numbers within the region, which he named the Pre-Glades (1948:106). He viewed this group as unassociated with the subsequent Glades people.

One of Goggin's most influential papers followed in 1949, introducing his concept of archaeological tradition, defined as a "distinctive way of life" that had persistent themes embedded in all aspects of a culture, present over a long period of time and demonstrating a strong cultural unity (Goggin 1949a:17). He defined the Glades Tradition as non-agricultural and marine-oriented, with broad, adaptive strategies for the tropical coastal waters of south Florida and showing a great diversity of artifact forms present over a long period of time (Goggin 1949a:17, 29). A secondary dependence was on hunting and gathering, mostly wild plant foods, but a marine-based subsistence was primary. He noted very little change in material culture over time, giving the Glades Tradition a conservative, "Archaic cast" (Goggin 1949a:28). Goggin later established a Glades Tradition chronology based on seriated ceramics, introducing three main temporal periods (Table 2) (Goggin 1949a:31).

Table 2. Chronology of the Glades Tradition in Relation to Diagnostic Ceramic Types. (Adapted from Goggin 1949a; Milanich 1994; and Milanich and Fairbanks 1980:234).

PERIOD	DATES	DISTINGUISHING CERAMICS
Glades IIIc	AD 1513-1700	Same as period IIIb; appearance of European artifacts
Glades IIIb	AD 1400-1513	Almost no decorated ceramics; Glades Tooled rims.
Glades IIIa	AD 1200-1400	Appearance of Surfside Incised (parallel incised lines below rim); some lip grooving.
Glades IIc	AD 1100-1200	Almost no decorated ceramics; some grooved lips; Plantation Pinched (finger-pinched indentations below rim).
Glades IIb	AD 900-1100	Key Largo Incised still majority decorated type; some incision on rims and some lip-grooving; Matecumbe Incised appears (cross-hatched incisions below rim).
Glades IIa	AD 750-900	Appearance of Key Largo Incised (loops or arches incised below rim); Sanibel Incised (ticking to form running lines of inverted V's below rim); Opa Locka Incised (half-circles or arches incised in vertical rows with open sides down below rim); Miami Incised (diagonal parallel incised lines below rim).
Glades I (late)	AD 500-750	Appearance of decorated pottery (less than 10% of ceramics at sites); Cane Patch Incised (incised looping line with stab-and-drag type punctations, below rim); Fort Drum Incised (vertical or diagonal ticking on lip or rim); Fort Drum Punctated (punctations around vessel below rim).
Glades I	500 BC-AD 500	First appearance of sand-tempered pottery (Glades Plain); no decoration.

There has since been much debate and many revisions offered over the names and boundaries of specific sub-areas (see Carr and Bériault 1984; Griffin 1988, 2002; Milanich and Fairbanks 1980; Sears 1966:17-18; Widmer 1988:79). Although no single south Florida culture area scheme prevails, many researchers do agree on certain points. While at times the TTI have been considered to be associated directly with the Calusa (Goggin and Sturtevant 1964:179), or part of the Caloosahatchee area (Milanich and Fairbanks 1980), most researchers disagree and consider it a separate region or sub-region (Bériault 2003:13; Carr and Bériault 1984:3; Goggin n.d.; Griffin 1988, 2002; Torrence 1996; Wheeler 1996; Widmer 1988). Most recognize the Caloosahatchee and Okeechobee regions as separate culture areas as well, basing their arguments on evidence for different ceramic trajectories (Austin 1987; Carr and Bériault 1984:3; Pepe 1999; Widmer 1988). Based on the results of this study, and in comparison with the neighboring Caloosahatchee region, I agree: major differences in ceramic types, shell

tool traditions (see Dietler 2008), site types, and distinct and separate estuarine systems support separate regional culture areas for the TTI and Caloosahatchee regions.

GLADES SETTLEMENT AND SUBSISTENCE PATTERNS

While the spatial and temporal boundaries of Glades cultures appear to have been a major focus of discussion over the last seventy years, many researchers developed and tested other more substantive lines of inquiry designed to better define south Florida cultures. These include questions related to understanding material culture, settlement patterns, subsistence adaptations, and the development of socio-social complexity within the region.

The first major shift away from solely defining culture areas and boundaries involved subsistence and settlement pattern studies. These two themes tended to be explored mutually in most studies, suggesting an emphasis on site settlement in relation to availability of food resources, perhaps an ecologically determinist trend. All of these studies confirmed a marine-based subsistence within the marine zone, with no evidence of agriculture (Cockrell 1970; Cumba 1971; Fradkin 1976; Griffin *et al.* 1985; Hale 1989; Olsen 1971; Swindell 1974; Walker 1992a,1992b; Wing 1965, 1983, 1984). Systematic subsistence studies (e.g., Wing 1965) indicate that inshore fishes, including bottom-dwellers and schooling fishes such as mullet were usually the targeted species, also implying the use of fine-meshed fishing nets.

Other studies focused on defining site types, locations and settlement patterns for the region (Athens 1983; Carr 1974, 1985; Cockrell 1970; Goggin 1949b; McMichael 1982; Russo 1991; Sears 1956, 1966, 1982; Widmer 1974). In one of the first studies to address patterns of Glades settlement, Goggin (1949b:86) noted that Glades period sites were located most prevalently along the coast, and that shell middens appeared to have moved laterally over time towards the water's edge. He noted

this from the Goodland Point site, and used a seriation of surface-collected artifacts to argue that site settlement had continually moved horizontally towards the water over time. He also argued that south Florida coastal middens were more commonly formed by discarding artifacts along the peripheries of a site than on the top, once a certain optimal elevation was reached (*ibid.*).

Sears (1956) noted a Glades settlement pattern similar to Goggin's (1949b) from his work at the Turner River site, a large shell work site located in the TTI. He concluded that the site initially began with an occupation over a low, tidal mud flat, and that midden was dropped from pile-supported structures above the water. He also argued that like Goodland Point, evidence suggested that the site grew over time horizontally towards the water, presumably so the occupants could be closer to the marine food resources as the site continued to grow. Sears also argued for the possibility of over-water habitation, citing other examples at Key Marco, Goodland Point and Matecumbe Key.

Although Goggin (1948:106, 1950:15, 1951:65) first introduced the idea of a pre-ceramic, Pre-Glades horizon within south Florida, Cockrell (1970) provided the first evidence for deeply stratified, radiocarbon-dated Pre-Glades sites as small campsites occurring on the tops of sand dunes. He concluded that the area was settled first by Archaic peoples who resided in small, temporary campsites, and who were viewed as inefficient towards a marine adaptation. These people were supplanted by the Glades culture, who successfully learned how to adapt to and exploit the marine environment, which led to their long occupation of the area and eventual achievement of socio-political complexity. Cockrell's interpretation of subsistence patterns have since been challenged by evidence that indicates both Pre-Glades and Glades occupations shared an equally marine-based subsistence (Russo 1991).

McMichael (1982) identified seven significant sites on Horr's Island, including a curvilinear shell midden, a small shell scatter, a horseshoe-shaped shell midden, and four separate mounds dated to the Late Archaic period. Subsequent fieldwork by Russo (1991) determined that McMichael had misidentified some of the site features. Although McMichael determined that a large portion of the site was pre-ceramic, he interpreted the Archaic component of the site to be a minor seasonal camp, with the surrounding mounds dating to the later, Glades period. To McMichael, this fitted conventional southeastern models that maintained Archaic peoples were nomadic, only held small, seasonal camps, were non-sedentary, and lacked any socio-political organization capable of building mounds.

More importantly, McMichael's radiocarbon dates indicated that the mounds in fact dated to the Late Archaic, and not the Glades period. However, at the time, this was interpreted to be anomalous for the region, as there were no known Archaic mounds, and he concluded that the subsequent Glades people had borrowed previous Archaic period midden to construct the mounds, and were therefore Glades period constructions.

Russo's 1991 study determined that McMichael overlooked evidence of *in situ* Late Archaic-dated features within the mounds, such as fire pits, hearths, burials, post-holes and living floors, indicating that they were in fact primary, Late Archaic period constructions, and not secondary Glades period constructions borrowing Late Archaic midden material.

McMichael's inaccurate interpretation occurred, Russo (1991) argued, because conventional models for settlement and cultural evolution in southwest Florida held that before 500 BC, the environmental features of southwest Florida were not yet favorable to the development of extensive areas of mangrove and freshwater swamps. Without extensive productive estuaries, large sources of coastal resources were not yet available, and therefore large villages and sedentary populations could not have occurred (Widmer

1988). The following year, deeply buried pre-ceramic Middle and Late Archaic shell mounds were identified on Ussepa Island, adding further evidence to support the possibility that a stable coastal environment was in place at an earlier time and that Archaic cultures fully targeted marine resources (Milanich *et al.* 1984, see also Marquardt 1999; Torrence 1996).

In one of the most cited books on Glades culture, Widmer (1988:256-257) offers an interpretation of Glades settlement patterns, establishing three site types for the region: large nucleated villages; smaller villages; and small fishing hamlets or collection stations. Widmer (1988:363) was also the first to suggest that there was sufficient evidence of early occupation in south Florida to demonstrate an *in situ* cultural development of the Glades Tradition, challenging earlier views that earlier Pre-Glades sites were from a separate, earlier group predating the subsequent Glades Tradition (Cockrell 1970; Goggin 1948; Sears 1982).

In another often-cited synthesis of Glades culture, Griffin (2002:278) generally agreed with Widmer's site typology and noted that within the Everglades, shell work sites corresponded to his category of large nucleated villages, and shell middens corresponded to collecting and fishing stations. Small villages could be represented by either smaller shell work sites or by shell middens, putting forth the idea of a settlement hierarchy of sites.

With the goal of eventually answering questions about how the proto-historic, sedentary and tributary Calusa tribe had achieved social complexity without the benefit of agriculture, Marquardt (1992) presented an excellent synthesis of the Caloosahatchee archaeological region. Marquardt offers the possibility that complexity was not solely the result of the environmental richness of the Charlotte Harbor estuary, as Widmer (1983, 1988) had argued, but was the result of recent developments stimulated by the sudden contact and introduction of Europeans and their goods (Marquardt 1992:2).

Environmentally, the greatest determinant of settlement and cultural history was viewed by Torrence (1996:30) to have been the hydrostatic relationships between sea level and the fresh water tables. His work and that of others on Ussepa Island (Marquardt 1992:4, 428; 1999; Torrence 1996) also documented the existence of a Middle to Late Archaic shell tool manufacturing site. These appear to have focused on the inner columellas of large conchs and whelks, to construct hammers and adzes. The Archaic shell manufacturing site on Ussepa, as well as Horr's Island (Russo 1991) strongly suggests that some Glades period shell tools may have their antecedents in the Middle and Late Archaic.

MODELS OF CALUSA COMPLEXITY

Of particular interest to south Florida prehistory has been the proto-historic Calusa's hegemonic dominance over all south Florida tribes, and the apparent anthropological paradox of a socio-political hierarchy and hereditary chiefdom that were non-agriculturally based. The question of how such a non-agrarian culture could have developed such high levels of social and political complexity in the subtropical wetlands of south Florida became the focus of several new models and theories, providing the most recent and important advances in interpreting south Florida cultures (Goggin and Sturtevant 1964; Marquardt 1987, 1988, 1991, 1992; Patton 2001; Sears 1982; Walker 1992a, 1992b; Widmer 1988).

Goggin and Sturtevant (1964) offered the first explanation for the emergence of non-agricultural chiefdoms in south Florida, suggesting that the extremely high productivity of the estuarine coast and intensive fishing provided enough sustenance to essentially equal the role of agriculture in other cultures, providing a dependable, surplus of marine food (Goggin and Sturtevant 1964:207). They explained that this highly favorable marine environment afforded the Calusa a competitive edge over their

neighbors, allowing them to develop into a complex chiefdom, as evidenced by large, organized public works displayed in shell works, canals and earthworks; and evidenced by social stratification and warfare.

Widmer (1983, 1988) offered an ecological, cultural-materialist model for Calusa development. Key to his diachronic model is that around 500 BC, south Florida sea level became stable, with the first development of extensive, highly-productive estuaries. Widmer argues that environmental change, not cultural innovations or shifts (Widmer 1983:361), led to foraging groups shifting focus to aquatic resources, allowing for sedentism, increased carrying capacity and population growth. He theorized that large settlements and nucleated villages would have been established first in the most convenient location for access to the most productive resources.

With sedentism, Widmer argued, population rapidly increased, and critical carrying capacity was reached around AD 800. This allowed for population size and density to be sufficient for the development of ranking and a chiefdom level of social organization. This occurred because of an increased need to implement coordinated labor activities to manage fresh water, control access to and use of fishing grounds, and to maintain fishing technologies. This, he argued, may have led to the need for the centralization of authority to manage economic stability and minimize conflict.

Following Widmer's model, as populations grew, village fissioning occurred. Smaller fissioned groups moved to new locations, and as the most productive areas had been settled first, the newer settlements may have been located near less productive fishing grounds. Differential access to the most productive fishing grounds over less productive grounds may have given some groups a productive edge, allowing for the development of higher power and status, the development of reciprocal obligations and relationships, and a political edge over other groups.

Marquardt (1988) assessed Widmer's model as incomplete and lacking in its attention to socio-historical questions, and suggests that both an ecological and socio-historical approach is necessary (Marquardt 1984:22). Subsequently, Marquardt suggested that the development of Calusa complexity may have been a recent and rapid process, stimulated by the sudden arrival of sixteenth-century Europeans and their goods (1987:103-110, 1988, 1991, 1992:2). In this theory, sudden contact and introduction of European goods into the Calusa culture may have disrupted extant socio-political organization, resulting in rapid political intensification and intensified tributary relationships.

One of Widmer's (1983, 1988) major ideas has since been disproved (Marquardt 1992:426). While he had recognized the presence of a few possible sites in the area that pre-dated his predicted date of 500 BC for the stabilization of sea level, he argued that the environment was not productive *enough* at the time to support large, sedentary fishing villages (Widmer 1983:359), and therefore, large sedentary villages would not occur before 500 BC. Russo (1991) argued that previous researchers (e.g., Widmer 1983, 1988; McMichael 1982) had erred in identifying sedentism and complexity in Late Archaic settlements, and that as early as 3959 BC, evidence at Horr's Island suggested the presence of a large, sedentary Late Archaic coastal village and ceremonial mound complex. Seasonality studies of zooarchaeological data, examination of structural complexity of the village site and mounds, and artifact and paleo-environmental data indicated that some level of complex social organization and sedentism had been established, much predating Widmer's predicted date of 500 BC for the region.

A recent addition to the growing interest in the timing and development of the Calusa chiefdom is Patton's (2001) dissertation. He attempts to establish a more accurate timing of southwest Florida settlement, socio-political structure, evolution and the rise of social complexity among the Calusa. Using archaeological data from thirty-

eight coastal Charlotte and Lee County sites, Patton suggested that changes in socio-political structure and complexity can be demonstrated by changes in site forms, size and arrangements through time, and that a chiefdom level society was extant in southwest Florida by AD 800.

Using established correlates of ranked societies, Patton considered whether archaeological data from his sample of thirty-eight Caloosahatchee sites indicated when Calusa complexity emerged. Some of the correlates of ranked societies Patton considered include mortuary data that demonstrate ascribed ranking; a hierarchy of settlement types and sizes; settlements located in areas of high subsistence sufficiency; and evidence of corporate labor transcending basic household units.

His study concluded that many of the 38 sites do demonstrate evidence of these correlates, such as the presence of mortuary mounds indicating status and elite grave goods; hierarchical site settlement patterns; locations of sites in the most productive areas; and evidence of corporate labor through the construction of mounds, canals and fish impoundments. He suggested that these features were in place by AD 800, and therefore, as Widmer (1983, 1988) had proposed, Calusa chiefdoms had arisen by this time.

Most recently, Dietler's dissertation (2008) examines the role of craft specialization in the emergence of Calusa complexity. He concludes that elite-organized production, distribution, and use of shell woodworking tools were key to the Caloosahatchee becoming a primary production center, and thus a complex chiefdom.

Given this overview, the question remains, does the TTI region fit into the current models of south Florida prehistoric settlement patterns and social organization? Based on divergent ceramic trajectories and distinct shell tool styles, I argue that the TTI should be regarded as a distinct and separate region from the Caloosahatchee to the north. Can current models that argue increased social complexity, evidenced by the

increase in shell work mounding around AD 800, also be applicable to the TTI? Is Widmer's (1988) contention that the appearance of hierarchical occupations and substantial population aggregates is an indicator for the development of sociopolitical complexity after AD 800, supported in this region?

Although early on a few researchers saw formal and structural similarities between the shell work sites within Charlotte Harbor and the TTI (see discussion on *Early Shell Works Investigations*, below), since these initial observations were made, no comparative data have been presented to support or refute this possibility. While some early researchers noted that large shell work sites represented monuments (Moore 1905:304) or great public works reflecting organized labor (Cushing 2000:84, 85, 86), shell works have not been thoroughly examined in their spatial, temporal and functional contexts, in either region. The following section provides a definition and historical overview of shell works prior to this study.

SHELL WORKS: INTRODUCTION

This section examines the history and development of the shell works concept, beginning with the earliest descriptions of shell works. While the term was not commonly used until more recently (following Goggin 1947:120), an examination of early site descriptions is valuable in tracing the origins of the term, as well as in characterizing how shell work sites have been viewed and interpreted over time. This is followed by a discussion on the definition of shell works, and how researchers have since interpreted these sites.

ETHNOGRAPHIC ACCOUNTS OF SHELL WORKS

Long before the term shell works became established, ethnohistoric records and early explorer's accounts provided the first detailed descriptions of these sites. Beginning in the 16th century, ethnographic records offer important accounts of

aboriginal features, structures, and village plans, and provide some indication of how certain shell work features may have functioned.

Several accounts of south Florida shell mounds indicate that they often served as the bases for domestic and religious structures. In the 16th century, Cabeza de Vaca described aborigines dwelling in houses of mats built on heaps of oyster shells (in Brinton, 1872:356). A 16th century Calusa structure was described as a very tall and wide house situated on top of a mound, enclosed by reed mats that contained benches around its walls (Hann 1991:42; Marquardt 1987:109). Hann summarized other south Florida ethnographic sources, concluding that houses were typically located on the tops of large shell mounds or shell middens (Hann 2003:36).

Not much is known about what type of materials or architectural methods were used to construct south Florida aboriginal structures, but one account described the Calusa Chief's house as being constructed out of palm thatch, leaving many holes that "allowed sun, rain, and dew to enter the hut" (Hann 1991:42, 194, 195). Others suggest round, thatched wooden structures (López de Velasco 1894:161), pile supported structures or platforms on piers, as suggested by a description of south Florida aborigines who "... lodge themselves for the most part at the entrance to the sea, in huts built on piles or pillars" (de Rochefort 1666:291). In the 18th century, a few accounts described some southeast Floridian natives as non-sedentary, migrating from place to place with portable structures, carrying their houses and storage buildings wherever they moved (Hann 1991:330, 386, 396, 397).

Hann (2003:35-36) conjectured that south Florida residences typically consisted of large, communal structures. In the 16th century, the Calusa Chief Carlos' residence was described as a massive, walled structure with windows that housed himself, multiple wives, and was capable of holding 2,000 people (*ibid.*; Solís de Merás 1923:145). Other accounts describe a Calusa population of a thousand that lived within

a village containing sixteen structures; an entire Uzita village near Tampa Bay that consisted of seven to eight structures (Hann 2003:35-36); and a village at the mouth of the Miami River housing 180 Calusa, Keys and Boca Raton Indians living within a total of five huts (Hann 1991:420; 2003:35-36).

Other features of shell work sites are only briefly mentioned. Cemeteries were often situated away from the main villages due to a fear of the dead (Hann 1991:329). At the capital Calusa settlement of Mound Key (Lewis 1978:19, Milanich 1994:2, Widmer 1988:5), a religious procession was described as proceeding down a hill that held the village houses, across a low valley in which they publicly promenaded in ceremony, and up another large hill (Goggin and Sturtevant 1964:183; Hann 1991:288). This suggests the use of a public plaza to hold religious or civic events, located between raised mounds that held structures. The “hills,” no doubt large shell mounds, must have been steep-sided, as descriptions suggest the inhabitants had to “climb” up and down to access these different areas (Hann 1991:288).

EARLY INTERPRETATIONS OF FLORIDA SHELL MIDDENS

Early accounts of shell work sites provide an important record of how they have been viewed and interpreted, and in some cases, offer the only record of their appearance before large-scale modern disturbances or total destruction greatly altered the south Florida landscape. The first investigations were limited in nature, but provide descriptions of site layouts and features, as well as theories on site formation and function (Brinton 1872; Conklin 1875; Douglass 1885a, 1885b; Hallock 1875; Kenworthy 1883; Le Baron in 1884; Simons 1884; Thomas 1891; Walker 1880; Wyman 1870).

Most early researchers focused on categorizing shell mounds either as simple, domestic refuse heaps or as burial mounds. Many considered shell mounds to be similar

to “kjökkenmödding” following after the popular Danish concept of shell heaps equaling “kitchen middens” (Brinton 1872, Le Baron 1884). Brinton (1872:356) considered many of the shell heaps of Florida to be “monuments,” but contradictorily argued that the majority were mere refuse heaps, “the debris of villages of an ichthyophagous population, showing no indications of having been designedly collected in heaps.” However, he was the first researcher to note the possibility that some shell heaps showed purposeful collection and construction into artificial mounds, examples of which he found particularly in south Florida. Similarly, Le Baron (1884) saw most shell mounds as examples of “kitchen middens,” though he did recognize a few examples of non-kitchen midden mounds that he thought were constructed for ceremonial or burial purposes.

In Tampa Bay, Walker (1880:416) also interpreted shell heaps as simply the debris of former feasts, but he provided an interesting example of their formation process. Walker’s diachronic model (Figure 6) illustrates successive feasting episodes, with the building up of piles of shell and debris in a circle around a central activity area (e.g., a cooking hearth), subsequently moving around the growing shell heaps to accommodate new spaces for hearths and areas to deposit refuse.

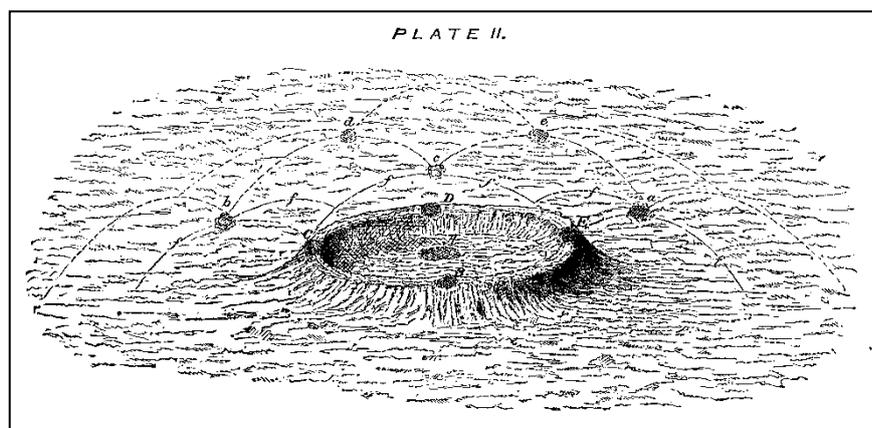


Figure 6. Diachronic view of shell midden formation (Walker 1880).

Kentworthy (1883) described a series of shell heaps and mounds around the Caloosahatchee River, as well as inland sites of the Okeechobbe basin. He was the first researcher to recognize a series of canals that he argued were definite aboriginal constructions (Kentworthy 1881).

Exploring twenty-five large shell mounds around the Port Charlotte area, Simons (1884) offered the first detailed description of shell work sites, offering interpretations on the purposes of some features. Simons describes massive sites which comprised banks topped with shells; conical mounds; raised plateaus with sloping sides; and raised ridges with open, flat areas. Sloping causeways and ridges leading to mounds were thought to have functioned as landing areas for canoes. On Ussepa Island, he conjectured that a twenty-foot square area may have been used as a well, and at Garden Key, he noted two parallel, oblong embankments, with a “spring hole or garden” half an acre in extent (Simons 1884:795). On a regional scale, he noted that many sites consisted of similar groupings of mounds and ridges sharing comparable layouts, notably, parallel shell ridges or mounds flanking a “spring hole.” On Pine Key, he described a canal or ditch that he thought may have functioned for canoe travel.

Simons concluded overall, however, that shell mounds were slowly accumulated constructions, and had functioned mainly as elevated living areas to avoid floods and to increase access to breezes to reduce exposure to mosquitoes. He also thought that shell mounds would “make splendid gardens” (Simons 1884:796), and argued the fact that none of the mounds were full enclosures suggested that they were not used as fortifications. Simons saw a difference between the shell mounds of the Caloosahatchee area and outside the region to the north in the Mosquito Lagoon and Tampa Bay areas, suggesting that the former were more complex and that the later two regions consisted of simple mounds which were mainly oblong, flat-topped and “solitary.”

EARLY INVESTIGATIONS OF SHELL WORKS

The first substantial archaeological investigations of southwest Florida shell work sites were conducted in the late 19th and early 20th century by Cushing (1897, 2000), Moore (1900, 1903, 1905, 1907) and Hrdlička (1922). While Moore's work mainly focused on obtaining museum quality artifacts, he offered a few useful observations on site types and layouts. Hrdlička conducted a more comprehensive survey of TTI sites, proposing a general site typology, and recording a detailed catalog of shell work sites. Cushing's work in particular provides important descriptive and comparative data on shell work site layouts and features in the Caloosahatchee and TTI regions, offering some remarkable interpretations on their purpose and function, as well as the first explanatory models of shell work site formation.

CUSHING, CALOOSAHATCHEE REGION

Frank Hamilton Cushing first became interested in south Florida archaeology in 1895, after hearing about the discovery of unusually well-preserved prehistoric wooden artifacts recovered from a muck pond in Key Marco, the northernmost key in the TTI. Cushing led an expedition there, where he proceeded to conduct excavations at the site, recovering many rare and unusual prehistoric artifacts such as wood bowls; mortars and pestles; cups; benches; clubs; and ceremonial wooden masks (Cushing 2000; Gilliland 1975). Unfortunately, the excitement over Cushing's astounding recovery of rare and usually highly-perishable artifacts from Key Marco greatly overshadowed the rest of his explorations, and the valuable observations he offered on other southwest Florida shell work sites have not been fully appreciated.

Cushing intensively explored a ninety-mile stretch of the south Florida coast from Charlotte Harbor to the TTI, recording in vivid detail many of the complex features of shell work sites. He was the first to describe these as complex, human-constructed "ancient keys" and "artificial shell islands" (Cushing 2000:3), some he

argued were islands built entirely of shell. Cushing's descriptions and interpretations are of particular historical importance, as his observations probably encompass the most comprehensive exploration of shell work sites in both regions ever made by one investigator.

Beginning his southwest coast exploration in Charlotte Harbor, at the first key he randomly choose to examine (Cayo del Oso or Bear Key), Cushing was astonished to find extensive shell midden constructions deeply hidden within the mangrove-fringed key. Cushing first wondered whether these were simply accumulations, "...primarily stupendous shell heaps, chiefly the undisturbed refuse remaining from ages of intermittent aboriginal occupation" (Cushing 2000:5), but he quickly concluded otherwise, that they indicated a "general design—a structural origin" (*ibid.*) of the entire key, reflected through purposefully constructed features, including multiple long, linear and radiating ridges of shell; enclosures, basins, depressions and water courts; channels and canals; flat-topped "benches" or platforms of shell; graded ways, walkways and causeways (Cushing 2000:4).

Shell ridges were described as "long, nearly straight, but ruinous embankment(s) of piled-up conch shells," some forming enclosures as "other banks, less high, not always regular, but forming a maze of distinct enclosures of various sizes and outlines, nearly all of them open a little at either end or at opposite sides, as if for outlet and inlet" (*ibid.*) (Figure 7).



Figure 7. Shell midden ridges at Bear Key or Cayo Del Oso site (Cushing 2000:90).

A typical water court feature was described as “... a deep open space or quadrangular court more than an acre in extent, level and as closely covered with mangroves and other tidal growths at the bottom as were outer swamps” (Cushing 2000:5-6). Cushing thought that this water court had served as a “central court of some kind” and was divided from other courts “by deep narrow gaps that appeared as though left open between them to serve as channels” (*ibid.*).

Numerous platform mounds and elevated shell benches were portrayed as “rising terrace-like, but very irregularly from the enclosures below to the foundations of great, level-topped mounds” (Cushing 2000:4), heavily obscured by tropical vegetation. After climbing a high-point on the key and being able to view the entire site from above, Cushing concluded that the site was an “...elbow-shaped foundation, crowned at its bend by a definite group of lofty, narrow and elongated mounds, that stretched fan-like across its summit like the thumb and four fingers of a mighty outspread hand” (Cushing 2000:5).

Over several days, Cushing explored numerous other shell work sites in the Charlotte Harbor area, including Josselyn Key, Demorey Key, Ellis Place, and sites

around Pine Island (see Figure 3). He concluded that in Charlotte Harbor, Pine Island Sound, Caloosa Entrance and Matlacha Bay alone, over seventy-five ancient, artificial shell islands were found, “Forty of this number gigantic, the rest were representative of various stages in the construction of such villages and reefs” (Cushing 2000:19). He adds that thirty sites were small, exhibiting only low central banks, platforms and ridges, and had site shapes that were either rounded and perfectly level-topped or elongated and curved in form. The smallest sites ranged from one-quarter acre up to four acres in area. Forty sites were considered to be very extensive, ranging in height from five to thirty-five feet, with twenty-five of these sites described as “gigantic,” ranging in height from twelve to forty feet (Kolianos and Weisman 2005:42).

On Josselyn Key, Cushing described a central water court as small, less than half an acre in extent, but remarkably regular in its form. Interestingly, he noted that “The court was so deep and regular that it resembled the cellar of an enormous elongated square house” (Cushing 2000:9). The central court was surrounded on its western and southern end by five very tall, steep mounds, divided by deep, straight canals that led from the inland side of the site out to the sea. The opposite side of the court was surrounded by two extensive, steep and tall platforms, also divided by canals (Cushing 2000:9). After excavating in the water court and finding potsherds and a hafted shell tool with a preserved wooden handle, he concluded that such rounded or square-shaped water courts occurred at all shell settlements, and that they had all been surrounded by platforms on which stood dwellings (Kolianos and Wesiman 2005:57).

Demorey Key was considered by Cushing to be in some regards, “the most remarkable key encountered during the entire reconnaissance” (Cushing 2000:10) (Figure 8). The key formed an elongated curve 500 yards long, with typical shell work features of basins, courts, canals, ridges, benches, and platform mounds. Cushing excavated within one of the canals or channels, and found that shell extended at least

four feet below water, indicating that the tops of many of the above-ground features were merely the top crests of the features (Cushing 2000:12).

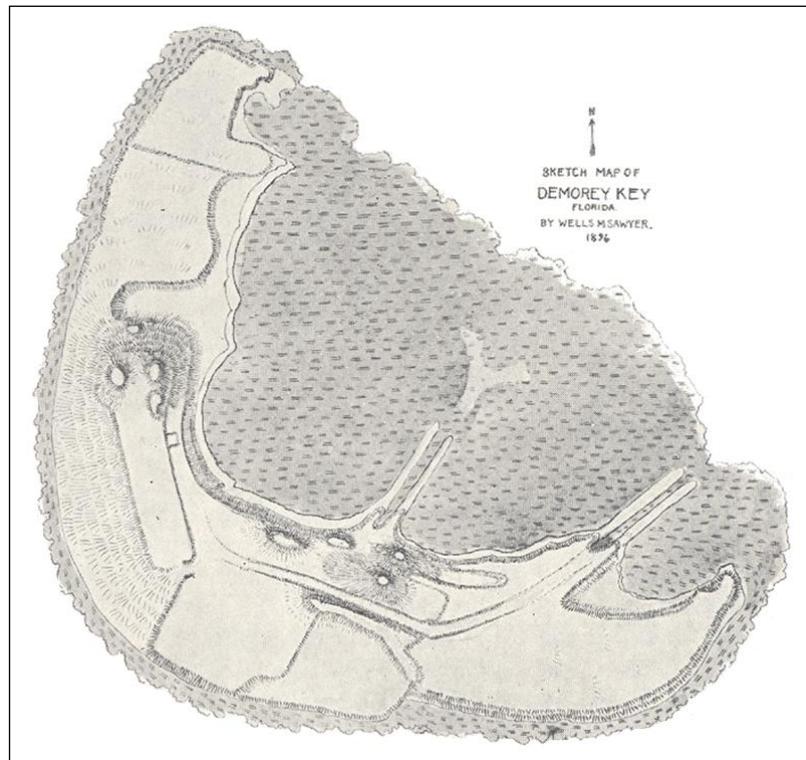


Figure 8. Site plan of Demorey Key shell works (Cushing 2000:91).

Throughout Cushing's expedition, he described numerous varieties of depression features, including water courts, basins and enclosures. After examining some very low enclosures, Cushing concluded that they may have served as fish ponds, noting that

... they, too, had been built up from an equal depth, as though to serve rather as fish-ponds than as breakwaters or as courts to the quays and houses, for the crests of these enclosures so slightly protruded above the surface of the muck and weedy carpeting of the mangrove swamp in which they occurred, that I quite failed to observe them. Thus it appeared that this half-enclosed swamp, no less than the swamps surrounding the first key I had examined, contained similar sorts of enclosures, only these had been lower originally, or else had since been more filled in with muck, vegetal growth and tide-wash. (Cushing 2000:12)

In one of the “deep places north of the central mounds” on Ussepa Island, he noted a clear spring-like pool of fresh water that he interpreted as a rain reservoir (Kolianos and Wesiman 2005:50). The last theory that Cushing offered on basin features were that they were possibly catch-basins for rain, places for water storage, artificial cenotes, or spring or sink-holes, similar to ones found on the mainland of the Yucatan. He concludes,

... finally I now observed, that in small spaces occurring midway up among the platforms, were deep, round hollows, which I had previously judged to be filled in water-courts, but which now seemed to have served some other purpose. The discovery of one of these, partially filled with water, which had resulted from the recent rains, but was nevertheless quite salty as though touched by the tide, indicated that they had originally been designed as cisterns. (Kolianos and Weisman 2005:122-123)

Although he noted only one instance of extant fresh-water found within a water court, he still concluded that they had all functioned as fresh-water reservoirs. He noted that the one remaining water court that still held fresh water must have been better preserved, evidenced by a compacted bottom and sides that functioned to keep tidal sea water from rising in (*ibid.*).

At Battey’s Place (now Pineland), he described an incredibly complex site with many canals, graded-ways, platforms, terraces, artificial pools or lakes, and enormous mounds and water courts (Kolianos and Wesiman 2005:62-70). In a canal excavation, Cushing recovered the remains of wooden posts or piles that he thought could have been part of a gate (Kolianos and Wesiman 2005:66), which may have functioned as a fish weir or water control device.

Upon reaching Pine Island, Cushing thought that the “foundations, mounds, courts, graded ways and canals here were greater, and some of them even more regular, than any I had seen yet” (Cushing 2000: 13). He described the site as containing many enclosures, flanked by wide benches and channels connecting inland towards higher

terraces and mounds, with enormous inner or central courts. In the main part of the site, Cushing counted nine great foundations, and five large, rectangular courts, followed by a long series of lesser benches, courts and enclosures southward of the main site (Cushing 2000:13). He estimated the site totaled approximately 75 to 80 acres, and covered nearly three-quarters of a mile.

CUSHING, TEN THOUSAND ISLANDS (TTI)

Cushing briefly explored the northern TTI and states that within a fifteen to twenty-mile radius of the Key Marco Site, on average, one in five islands contained an ancient shell settlement similar to Key Marco (Cushing 2000:21). Upon reaching Key Marco, he described the key as being an isolated island situated out in the open water, containing complex arrangements of shells, including numerous mounds; canals; court-like landings; water courts and ponds; elevated walkways; and a quarter-mile long protective seawall (Kolianos and Wesiman 2005:103). On the east, bayside of Key Marco, erosion had worn away part of the edge of the site, exposing “sectional views of its structure,” indicating that the building up of shell had started at sea level. He observed several canals leading into the site towards an eighteen foot tall, flat-topped mound that he thought probably housed a temple of chiefly residence.

The site contained a central canal dividing the site, as well as central courts and canals that had subsequently been filled in, as well as

...the same central mound, not nearly so high as those of the more northern Key, yet impressive. There were even more numerous canals with their fringes of enclosures of watercourts leading up into graded ways... (Kolianos and Wesiman 2005:103)

Cushing noted that in several of the “broad, flat, canal-seamed extensions, might be seen still two or three remarkably regular and deep circular tanks or cenotes, as I have called them” (Cushing 2000:22). Many of these prehistoric features were depicted in a

detailed topographic map of the site (Figure 9) produced by cartographer and artist Wells Sawyer, a member of Cushing’s team.

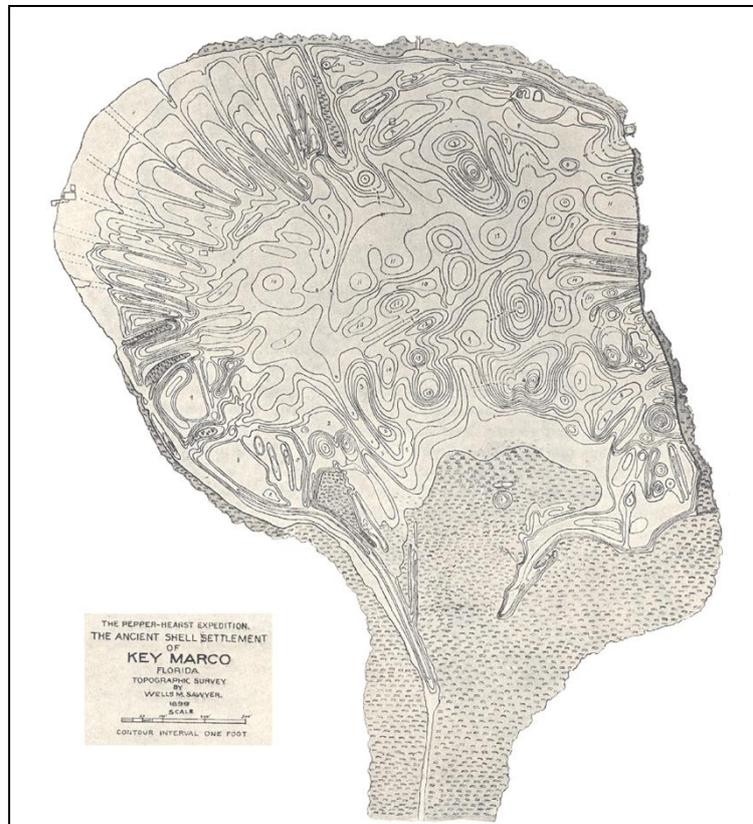


Figure 9. Topographic map of the Key Marco site, 1896 (Cushing 2000:93).

Over a two-season investigation, Cushing excavated the central muck pond of the site that had produced preserved wooden artifacts. He named this area of the site the “Court of the Pile Dwellers” after having recovered the remains of wooden pilings, and timbers or piers situated around a series of shell benches extending into the muck pond (Figure 10).

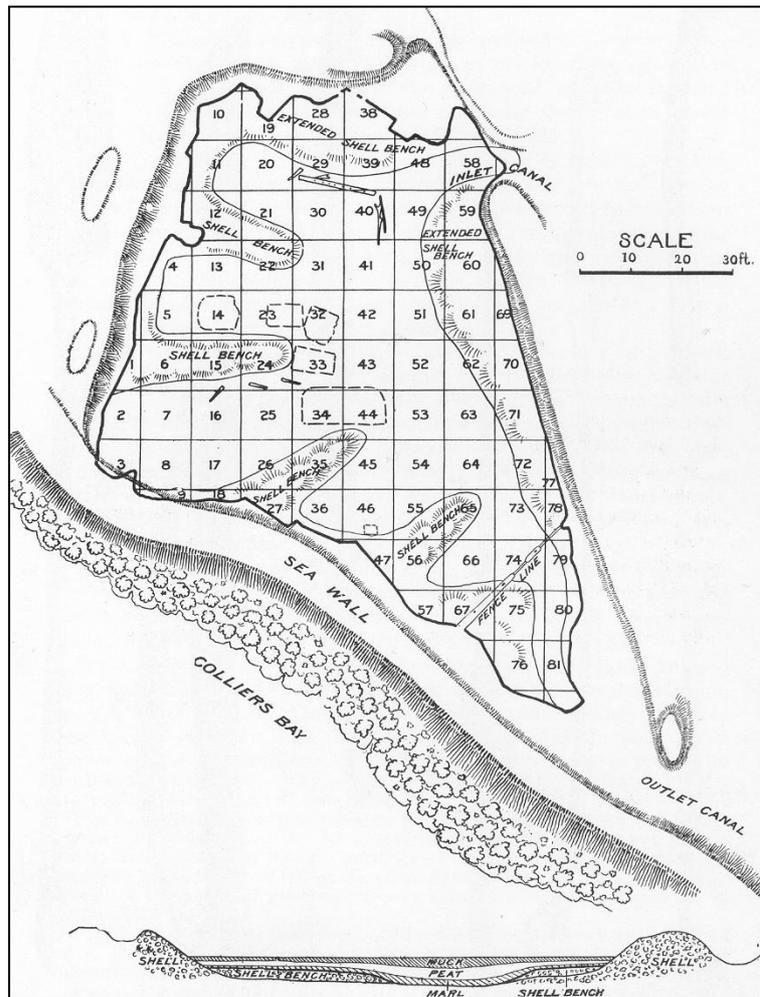


Figure 10. Key Marco, plan of Cushing's "Court of the Pile Dwellers." (Cushing 2000:94).

Cushing considered that the piers suggested evidence of structures such as scaffold dwellings or foundations for pile-supported quays that held long, narrow, low thatched houses. He thought that the central muck pond of the site represented a water court that was purposefully kept filled with water, through an inlet canal, and that the numerous "shell benches" surrounding the water court functioned as canoe landings, docks, or bases for structures related to scaffold dwellings. It was over and around these shell benches that Cushing recovered many household articles, as well as other construction material, such as thatch roofing or siding material and "short-piles, of slight timbers, of a long, beautifully finished spruce-wood spar" (Cushing 2000:22).

Based on finding groups of utilitarian artifacts together, bundles of ceremonial objects and housing material deposited in the muck, Cushing thought that scaffold buildings must have collapsed into the pond during a destructive storm or fire, devastating the site and depositing most of the materials in one catastrophic event. He concluded that the discovery of the “Court of the Pile Dwellers” was a unique find, and that it would probably never be duplicated.

MOORE, CALOOSAHATCHEE AREA

At the end of the nineteenth century, Clarence B. Moore visited and excavated hundreds of sites in the Southeast via his large, flat-bottomed steamer, *the Gopher*. After hearing about Cushing’s discovery at Key Marco, he conducted a series of trips to south Florida, mostly concentrating on the southwest Gulf coast. Hoping that he could duplicate the incredible artifacts discovered at Key Marco, Moore focused many of his excavations in water courts and muck ponds, as well as sand mounds and shell middens. Having found nothing comparable to Cushing’s great finds, he soon became dissatisfied with the dearth of artifacts found within the region, and concluded that “archaeological opportunities were more for the surveyor than for the excavator” (Moore 1900:380), and that “while the shell deposits of the southwestern coast of Florida are of great interest as monuments of the aborigines, their contents offer little reward to the investigator” (*ibid.*:304). He concluded, like Cushing, that the discoveries at Key Marco must have been a unique, isolated case, perhaps explained by a catastrophic event, such as a hurricane, that had collapsed a group of dwellings in one particular spot (*ibid.*:380).

On Pine Island, Moore thought that a low but long sand mound situated on a sandpit that occasionally flooded was located in a “curious” place, when solid land was available everywhere else (Moore 1900:362). Near the sand burial mound was the eastern terminus of an aboriginal canal that extended across Pine Island for about two

miles, ending at enormous shell works and sand mounds (Moore 1905:305), now known as the Pineland archaeological site complex.

The Josselyn Key site was the first shell work site described in detail by Moore, containing courts, canals, mounds and platforms. Moore made multiple excavations within the muck of various courts and canals, but reportedly found nothing (Moore 1900:363).

He considered Mound Key to be “the most typical of all Key-dweller islands” (Moore 1900:366), describing the shell features to be 128 acres in extent, consisting of numerous graded ways, courts, small canals, a “hooked-shaped” breakwater at the mouth of a canal, and a tidally influenced great canal bisecting the center of the island. He noted a “highway” for canoes that passed by the burial mound for the island and through embankments of shell exceeding twenty feet in height.

It was noted that the Mound Key burial mound was located away from the main village area, within a dense mangrove swamp. Moore states that the mound contained sand, loamy material and some shell, and contained European material (Moore 1900:367). He also excavated within several muck-filled canals and courts, but he reported to have found little. Moore complained that he had already done so much fruitless digging into the shell middens of the west coast that he could no longer justify taking time away from exploring a richer district he thought lie further to the south (*ibid.*:363).

MOORE, TEN THOUSAND ISLANDS (TTI)

Moore thought that an “insignificant proportion of the TTI were utilized by the Key-dwellers,” and that “artificial harbors, basins and canals abound among such keys of the TTI” and “were selected by the pile-dwellers as places of residence” (Moore 1905:310). He called Marco, on the northernmost end of Key Marco, to be “by far the most important of the Ten Thousand Islands” (Moore 1900:369). Unfortunately, he did

not provide any descriptions of features other than a mention of canals, courts, shell mounds and shell ridges.

Three of the largest TTI shell work sites were visited by Moore, describing Dismal Key as un-surveyed, but containing a “great shell deposit with the usual mounds and the like” (*ibid.*). He described Fikahatchee Key (Fakahatchee Key) as also un-surveyed, but perhaps 150 acres in extent with extensive shell deposits, and Russell’s Key as 60 acres with large aboriginal shell deposits (*ibid.*). Wiggin’s Key (now Sandfly Key) was reported to have extensive shell deposits and two small burial mounds constructed out of sand and shell, which Moore tested, but in which he said he was “unrewarded” (*ibid.*).

Moore provides a valuable description of Chokoloskee Key before the shell work island was almost completely destroyed by development. He described the key as roughly circular, over half-mile in diameter, and almost entirely covered with great shell deposits, including “lofty peaks,” “graded ways” and canals. One mound was reported to rise abruptly to over twenty-seven feet, with two graded ways enclosing a canal, terminating in a pair of mounds facing each other, both about eighteen feet in height (Moore 1900:379). Moore also described an artificial harbor, protected from open water by an embankment of shell except for a narrow entrance, which he thought had served as a shelter for canoes (Moore 1905:313).

HRDLIČKA, TEN THOUSAND ISLANDS (TTI)

Between 1916 and 1922, Smithsonian Anthropologist Aleš Hrdlička conducted research throughout Florida (Hrdlička 1922), describing in detail many shell work sites along the southwest coast of Florida’s TTI Region. He concluded that the shell heaps and ridges of the TTI were deliberately constructed habitation sites, “the majority of which served undoubtedly for elevated platforms for habitations” (Hrdlička 1922:31). Trough-like depressions between shell heaps were interpreted as canals to facilitate

canoe travel connecting the interiors of sites to the open water (*ibid.*:22, 24, 25, 27, 36, 37, 44, 49). River margin sites typically consisted of multiple rows of mounds with “elevated platforms,” some of which were conical in shape, such as at the Pumpkin Key and Turner River sites.

Key Marco was thought to be “undoubtedly an important and extensive Indian site, though as learned later on by no means the most important of the western coast, except for Cushing’s discoveries” (Hrdlička 1922:21). He estimated Dismal Key to be 60 acres in extent, and clearly the site of a large, aboriginal settlement (Hrdlička 1922:31-32). He described Fakahatchee Key as an extensive Indian site with shell heaps, mounds and other accumulations, including a twenty foot tall, steep-sided conical mound (with burials), and a 200-foot-long, eighty-foot-wide and twelve-to fifteen-foot-tall oyster shell ridge.

Hrdlička thought that a fifteen mile region around the Allen River may have been “one of the most important centers of Indian settlements on the southwestern coast of the peninsula...” showing “site after site of Indian occupation, and some of these are of great extent as well as of evident importance” (Hrdlička 1922:35). Chokoloskee Key was thought to be the center of the region, “a metropolis of the Indians” (*ibid.*) consisting of eighty acres of shell ridges, mounds and other accumulations. On the southwestern edge of the island and close to the water’s edge, Hrdlička noted a remarkable, steep-sided, extensive shell mound over twenty-five feet in height. The base was described as oval in outline, with a platform at the top of the mound measuring ninety feet by twenty-five feet. He noted that the mound was constructed of oyster shell, but that the flat top of the mound was covered with sand, muck, and ashes. He thought that the mound may have been “used for some special habitation; but whether or not, it made a fine point for observations and possibly also for ceremonies, as well as signaling” (*ibid.*).

Towards the southwest edge of the mound, a canal was noted that led from the bay towards a pond in the interior of the island, with possibly other channels leading through other shell heaps. On the west end of the island, locals had reportedly excavated human remains from an area containing black soil.

Located directly northeast of Chokoloskee Island, the Turner River complex covers over ten hectares and extends for .40 kilometers along the river (Figure 11).

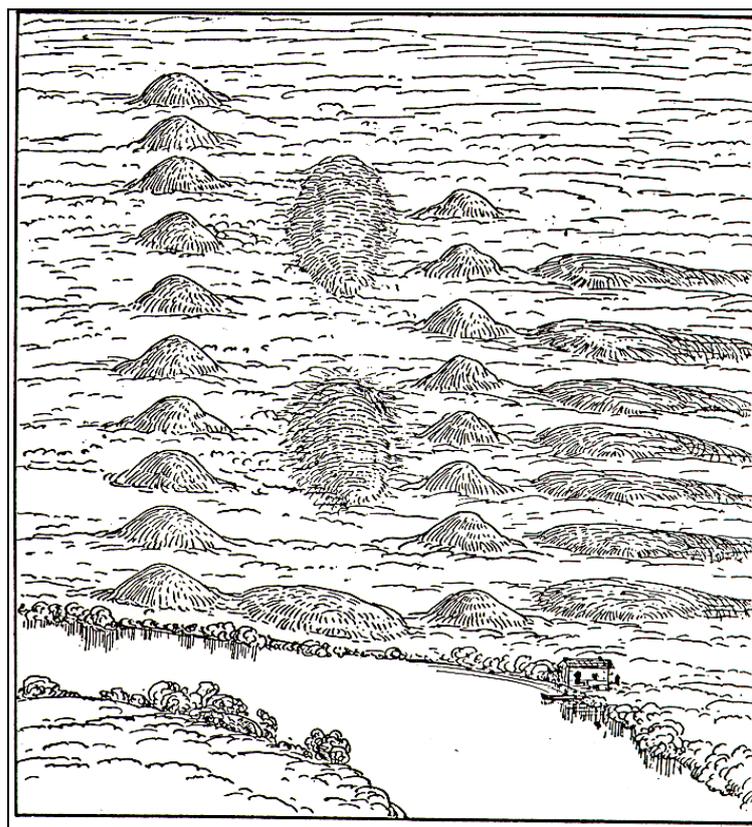


Figure 11. Plan of the Turner River site (Hrdlička 1922:38).

Hrdlička considered the site to be “the most noteworthy group of shell heaps and mounds to be found in the entire region” (Hrdlička 1922:36), calling the features “works” (*ibid.*:39).

He described the site as containing a row of seven low, conspicuous shell ridges and two parallel rows of eight or nine large conical shell mounds running along the side of the river. Hrdlička estimated that the large conical mounds were twelve to fifteen feet

in height and sixty to seventy feet in diameter at their bases (*ibid.*:37), and noted that the shell heaps were very regular, but “isolated, i.e., not connected with each other, about equal distance apart and quite uniform in character” (*ibid.*). He viewed the mounds as functioning as structures, arguing

These various structures--and they seem fully to deserve that name--begin close to the bank of the river, and the depressions between them may have been used originally for approach by canoes. (Hrdlička 1922:37)

There were reportedly two other rows of conical mounds, one of them running over a quarter mile in extent, as well as a broad depression (possibly a water court) with three additional large, but irregular shell heaps.

He concluded that the coastal region extending from Charlotte Harbor southward was dense with Indian remains, but was particularly dense in the TTI from Key Marco to Gopher Key (Hrdlička 1922:48), and that the shell keys were likely village sites (*ibid.*:21). He argued that the sites in the region exhibited a considerable uniformity, indicating a definite system of construction, maintaining that shell heaps and shell-ridge platforms were not simply kitchen middens, but purposefully built constructions that served as elevated bases or platforms for habitations (*ibid.*:21, 29, 31, 48), or to avoid flooding during high tides and storms (*ibid.*:48). Canals or troughs connecting to outer depressions provided canoe access to habitation sites, and artificial ponds or small inland harbors were thought to have been constructed to serve as shelters for canoes (*ibid.*:49).

Hrdlička concluded that the Ten Thousand Island shell works “resemble closely some of those existing on the keys south of Charlotte Harbor and evidently belonged to people of the same culture” (*ibid.*:26), and that the archaeological remains in the TTI region “appear to connect directly with those of Charlotte Harbor, and represent according to all indications the same culture, people and period” (*ibid.*:50).

SHELL WORKS: ARCHAEOLOGICAL DEFINITION

The concept of shell works has its origin in the late nineteenth century, first used by Cushing [c.1897] (2000:20; Kolianos and Weisman 2005) as a complementary term to earthworks (Cushing 2000:13, 15, 16, 17), having two connotations: as a collective category to describe the large sites that contain complex arrangements of purposefully constructed shell features; and as a term describing the individual construction features themselves (e.g., mounds, embankments, graded ways, courts, etc.). Since Cushing's initial use, many south Florida researchers have adopted the term (Almy and Deming 1992:22; Austin 1987:15; Carr 1974:14, 1988:37; Carr and Beriault 1984:5; Carr *et al.* 1995; Cushing 2000:20; Dickel 1991:16; Goggin 1947:120, 1948a:114, 1949a:28, n.d.:396; Goggin and Sturtevant 1964:194; Griffin 2002; Kolianos and Weisman 2005; Luer 1989:99; Milanich 1994:314, 318, 320; Patton 2001:40, 301, 305; Sears 1966:4; Taylor 1985; Torrence *et al.* 1994:13; Walker and Mattick 1996a:25; Widmer 1974:20, 39). However, a few researchers note problems regarding an unclear or inconsistent definition of shell works (Dickel 1991:125; Taylor 1985:14; Walker and Mattick 1996a:25), and others seem to prefer using different terminology, such as shell midden / mound complex (Fradkin 1976; Gilliland 1975; Goggin 1949b; Luer 2007; Marquardt 1984, 1992; Sears 1956; Walker 1994; Wheeler 1996). Most researchers agree, however, that many southwest Florida archaeological sites demonstrate evidence of large-scale, purposeful terra-forming with shell to create features and structures that reflect consistent regional patterns, architectural planning, coordinated labor activities, and monumentality.

While Cushing first used the term "shell works" (2000:20), it was not formally used in archaeology until Goggin used it in his discussion of the Glades Area (1947:120). Though he did not thoroughly define it, he also viewed shell works as a counterpart to earthworks, comprising complex arrangements of mounds, ridges, plazas,

water courts and canals leading to or connecting various areas of a site (Goggin 1948a:114). With the exception of the Hopewell Mound groups in Ohio, Goggin thought that there were no other mound sites in eastern North America that were as complex and extensive as the shell work sites of south Florida (*ibid.*:115).

Goggin distinguished shell middens from shell works, as unplanned deposits of shells and other quotidian refuse (Goggin n.d.:389). He stressed that the term shell midden only pertains to the “casual accumulation” of shell and refuse, and when shell is used to construct ramps, causeways and mounds, it is not midden, but construction material. He noted that many sites may contain both midden and shell works, such as at Turner River and Chokoloskee sites (*ibid.*). He concluded that shell works were probably deliberately constructed following a preconceived plan (Goggin n.d.:397). Elaborate ridges and mounds were most likely formed, he thought, to serve as pediments for houses or temples (*ibid.*).

Shell works were defined by Carr (1988:37) as large coastal sites and shell islands characterized by complexes of mounds, black earth and shell middens, and linear embankments composed of shell refuse (*ibid.*). Many were noted to have radiating ridges with parallel burrows or canals extending from the interior of sites out to the open water. Carr’s (1988: Appendix B) definition of shell work site types includes crescent, curvilinear, horseshoe or “U”-shaped shell middens.

Griffin recognized shell works as a type of site consisting of marine shells in complex arrangements of mounds, ridges, and flat areas (Griffin 1988:274). He thought shell work sites probably represented large, nucleated villages, as opposed to smaller shell middens, which probably served as collecting or fishing stations. Noting that settlement site plans were not yet known because only a few of the larger shell work sites had ever been mapped, Griffin concluded that shell works typically contained a series of “mound-shaped” structures or platforms of shell, associated with level, lower

areas suggestive of plazas. Griffin cautioned against the assumption that large shell work sites were necessarily associated with the Calusa, or with a late Glades III occupation (Griffin 2002:291).

South Florida aboriginal canals are viewed as evidence of routes of tribute and exchange among the Calusa (Luer 1989). The Indian Field shell work site contains a central, bisected valley; elevated shell mound areas; linear ridges; breakwaters; canals; and water courts and basins (*ibid.*:103). Luer hypothesized that the Indian Field site was intimately linked to the Pineland site, and probably served as a way-station along a longer east-west canoe route connecting Pine Island sound with the interior Lake Okeechobee region (*ibid.*:105). The site may have served to monitor and control access to and from the canal and to other sites in Pine Island sound. Canals were seen then as funnels or conduits for interregional trade or exchange (*ibid.*).

In an overview of Collier County sites, Dickel (1991) defined shell works as an “ill-defined though often used category” (*ibid.*:125). These features include shell mounds; ridges; water courts; enclosed courts; and “J”-shaped ridges. Dickel argued that shell works were clearly culturally formed features, and that because they occurred in an environmental zone with no known source of fresh water, that shell work features such as water courts and “J”-shaped features may have functioned as cisterns, ponds or other water impoundment features (*ibid.*:144).

While the term “shell works” is not specifically used by Marquardt, he clearly differentiates between casual shell midden accumulations and shell constructions:

While some middens are haphazard accumulations of detritus, others are something more—midden materials heaped up according to preconceived plans, for purposes only dimly understood. (Marquardt 1992:423)

Milanich (1994) considered shell works to be complex structures, comparable to the complex earthworks of the interior Okeechobee region (1994:312-314). He

interpreted large platform mounds as intentional constructions (as opposed to accumulated midden), which probably served as civic and ceremonial structures, reflecting a complex form of social and political organization (*ibid.*:313, 314). Shell works and mound building were viewed as a reflection of power, the remains of villages ruled by pre-Columbian chiefs (*ibid.*:318), and possibly reflecting a period of political intensification (*ibid.*:320).

Milanich offered the possibility that shell work features may have formed as combinations of both intentional construction and gradual accumulation, and noted that while some shell works appeared to be intentionally constructed features, they often contained both accumulated midden strata and construction fill (Milanich 1994:314).

Torrence (1996:29) attributed the elevated architectural features of shell works (mounds and ridges), courts and canals to the Caloosahatchee III period (AD 1200 to 1350), and possibly to the latter half of the Caloosahatchee II period (AD 800 to 1200). These were viewed as labor intensive constructions requiring centralized coordination.

SUMMARY OF SHELL WORK FEATURES

Shell work features constitute three major types: those that are viewed as constructed, mounded-type features; “negative space” or excavated features; and flat, open areas. Constructed or mounded-type features are the largest category and have the most variety of forms, which can be divided into mound-type and ridge-type features. Mound-type features include individual to multiple small to large mounds of many shapes (conical, flat-topped, oval, etc.), sometimes arranged in straight or curvilinear rows, other times with low areas (channels or canals) in-between them. These features sometimes have single, central access ramps or gradually inclining ramps that encircle and lead up the sides of mounds. Other mounded features include constructions viewed as shell benches and platforms. Ridge-type features include single and multiple linear

and curvilinear shell midden ridges. These can be simple, singular features, or comprise complex sets of multiple ridges that may radiate out of a central location, form sets of parallel ridges, or may lead to and from various other shell work features.

Negative or excavated features include canals, basins and depressions created by either excavating through existing substrate to create a concavity, or by mounding shell around other areas either purposefully or inadvertently creating “negative space” and topographic low and high spots. Many water courts, depressions and canals, though viewed as “negative space” or concavities when compared to mounded features, are still constructed with shell to create, outline, line and maintain their forms.

The last category of shell works are flat, open areas, sometimes called “shell fields.” These features, like mounded and “negative space” features also comprise shell, though these areas seem to have been purposefully kept clear, open and relatively flat. While many of these features do appear as flat, many contain very subtle, undulating topographic features.

SHELL WORK FORMATION PROCESSES

Shell work sites were at first thought to be mere accumulations, the results of simple kitchen middens (Brinton 1872; Conklin 1875; Douglass 1885a, 1885b; Hallock 1875; Kenworthy 1883; Le Baron in 1884; Simons 1884; Thomas 1891; Walker 1880; Wyman 1870). Walker (1880:416) added that accumulations were the results of feasting and moving around growing refuse piles.

Most other researchers have since agreed that many shell work sites are not mere accumulations, but purposefully planned and conceived constructions. Many differ, however, on explaining shell work site formation processes. These can be divided into three main theories: sites formed by accumulation; sites formed by borrowing and filling or mounding; and a combination of the two.

Cushing (2000:7-8, 16-17) presented the first theory on shell work site formation, a unilineal evolutionary model that presents shell work sites as progressively being built and evolving in phases into larger, more complex sites over time. Cushing's first phase of site formation begins with simple refuse accumulation over open water, which eventually progresses into purposeful site formation and functional features, such as protective seawalls, canals, fish traps, and water courts. The final phase of Cushing's site formation model is viewed as reaching a cultural climax, evidenced by the construction of mounds for chiefly residences and temples to support a permanent occupation. The smaller, earlier phase sites were viewed as not "fully developed," which he thought must have been abandoned due to some natural catastrophe (Cushing 2000:16).

Cushing's model views shell works as having formed by a combination of processes, but he does not fully elaborate on this theory. He believes that sites began as simple accumulations below and following the outlines of pile-dwelling structures positioned over water, and subsequently, sites expanded and grew, when humans "learned" how to make use of shell midden refuse, purposefully depositing material in beneficial patterns to create functional features. The final phase of site formation is the creation of features such as flat-topped mounds for house structures, but Cushing did not specify whether these features were created by accumulated midden or by borrowing, filling and mounding activities.

Goggin disagreed with Cushing's theory, stating that he had never convincingly demonstrated the use of pile dwelling structures, and that his "elaborate theory" did not account for the full history of shell work site formation process (1948a:115). He saw shell works as purposeful constructions, different from accumulated midden, however, noting that sometimes accumulated middens had purposeful constructions imposed on top of them (Goggin n.d.:389). Although Goggin was convinced that shell works were

“deliberately constructed following a preconceived plan,” he remained uncertain as to whether shell works formed by gradual accumulation, or if midden were borrowed, filled, moved and/or mounded to create new features (Goggin n.d.:397).

Bullen (*Tampa Sunday Tribune* 1955:C1) thought that shell work sites were formed as refuse accumulations, evidenced at the Turner River site by the progressive, upward and vertical growth of mounds with residences constantly moving to stay on top of the ever increasing mound heights. Sears (1956) argued that shell mounds formed by the accumulation of oyster shell dropped over platform dwellings into the water. Neither of these theories provides a plausible explanation for how the very steep-sided and tall (almost eight meter) mounds formed with dwellings positioned atop the growing mounds, or along the sides of these growing, massive accumulations.

Marquardt (1984) suggested that mounds, platforms and ridges at some sites may have been deliberately mounded with the borrowing, filling and rearranging of midden (*ibid.*:12, 14, 16-17), as opposed to simple accumulations. He found evidence of this at several Charlotte Harbor sites, arguing that increased mounding occurred in the region sometime after AD 500 (Marquardt 1992:48, 49, 52-53).

Others have argued that mixed strata and chronologically out-of-sequence radiocarbon dates suggest intentional mounding (Fradkin 1976:51, 101-102), as do strata consisting of whole shell with little evidence of compaction, sparse sediments and few artifacts (Luer 2007:32; Patton 2001:313). Milanich thought that shell work sites may evidence combinations of gradual accumulation and intentional constructions (1994:314). Walker and Mattick (1996a:23) argued similarly, that mounds sometimes were accumulations, and other times, demonstrated evidence for borrowed and mounded midden fill.

Luer (2007) examined mound building and subsistence patterns at Big Mound Key shell works. Luer discusses processes of shell midden formation, recognizing three

main methods of formation. The first two are primary and secondary refuse, and the third, called “tertiary refuse” is fill from either primary or secondary refuse that was used to form mounds (*ibid.*:32).

SHELL WORK PURPOSES AND FUNCTIONS

Some researchers conclude that the function and purpose of most shell work features remain largely unknown (Austin 1987:50; Carr 1988:38; Goggin n.d.:398). Others attribute the main purpose of shell works to simply creating elevated ground to support structures for habitations (Cushing 2000; Gilliland 1975:39; Hrdlička 1922:31), or to function as flood escape mounds (Patton 2000:44). Most mounds, especially flat-topped mounds, are generally viewed as having served as bases or pediments for domestic structures (Brinton 1872:42; Carr 1974:14; Dickel 1991:125; Goggin n.d.:397; Hann 2003:36; Luer 2007; Torrence *et al.* 1994:29, 32-33), to have housed religious structures such as temples, the residences of shamans or chiefs (Beriault *et al.* 2003:17; Goggin 1948a:114; Patton 2001:44), or to have been platforms to hold ceremonies (Hrdlička 1922:35). Other ideas are that they could have functioned for signaling and as observation points (Hrdlička 1922:35).

Others view shell works as ceremonial in nature (Goggin 1947, 1949a:28; Goggin and Sturtevant 1964:194); religious centers (Bullen, in *Tampa Sunday Tribune* 1955:C1; Goggin n.d. 398); as representing major site complexes, settlements or large nucleated villages (Carr *et al.* 1995; Goggin n.d.:398; Griffin 1988:70, 250; Hrdlička 1922:21, 31-32; Widmer 1988:256); the residences or villages of paramount chiefs or chiefdoms (Beriault *et al.* 2003:26-27; Milanich 1994:318; Patton 2000:111); and even cities and metropolises (Hrdlička 1922:35; Kolianos and Weisman 2005:49).

Shell works have been viewed by some to represent monumental constructions (Brinton 1872:356; Cushing 2000:14; Hrdlička 1922; Moore 1900:304; Patton 2000:38,

110-111); public works (Goggin and Sturtevant 1964:196, 207-208); and major engineering projects requiring the centralization of authority, organized labor and/or complex social and political organization that may reflect a shift in political intensification and power (Cushing 2000; Goggin 1949a:30, 31; Milanich 1994:313, 314, 318; Torrence 1996:29). Some see a potential hierarchy in settlement site types (Cushing 1897:413, 2000:85; Beriault *et al.* 2003:26; Patton 2000:36, 111; Widmer 1988:256), suggesting a chiefdom level of social organization. Several researchers argue that increased social complexity is directly reflected by increased mounding of shell work features after AD 800 (Beriault *et al.* 2003:18-19, 77; Fradkin 1976:51; Luer 2007:25; Marquardt 1984, 1992:48; Patton 2000:59-62, 2001:121; Widmer 1988:93).

Basins and depressions are commonly interpreted as water courts, springs, or ponds, and to have functioned for some type of water impoundment, such as cenotes or cisterns to capture and store fresh drinking water. Others noted that some of these features were tidally influenced (Beriault *et al.* 2003; Moore 1900:366, 377), and these features probably functioned as some type of fish trap (Beriault *et al.* 2003:26-27; Cushing 2000; Dickel 1991:144; Goggin n.d.:398; Kolianos and Weisman 2005:122-123; Patton 2000:20-22). Others considered some entire shell work sites, not just the individual basin-type features, to have functioned as one large tidal fish catchment (Beriault *et al.* 2003:100; Luer and Archibald 1988; Patton 2000:44).

Other interpretations of basins and depressions suggest they were access ponds, surrounded by homes or supported pile-dwelling structures (Cushing 2000:6-7), or were the cellars of large long-house structures (Cushing 2000:9). Others thought basins supported gardens and may have been related to agriculture (Beriault *et al.* 2003:26-27; Carr 1988:37; Cushing 2000:5, 13; Hrdlička 1922:22, 49).

Canals are viewed as serving basic, practical functions, such as accessing the interiors of sites from open water (Cushing 2000:5; Hrdlička 1922), accessing certain

interior mounds (Cushing 2000:5, Moore 1900:367, 1905:305), and as functioning as fish weirs or water control devices (Kolianos and Weisman 2005:66). Others view canals as ceremonial in nature (Goggin and Sturtevant 1964:194-195), conduits to support tribute, interregional trade and exchange (Luer 1989:105, Patton 2000:44).

Open, flat areas may have functioned as plazas (Griffin 1988:250; Patton 2000:20-22), served as dance grounds (Goggin n.d.398), or as designated areas for public gatherings or civic ceremonies (Beriault *et al.* 2003; Goggin and Sturtevant 1964:183; Hann 1991:288). Long, outer shell midden ridges may have functioned as protective breakwaters (Beriault *et al.* 2003:46; Cushing 2000; Kolianos and Weisman 2005:103; Luer 1989:103; Moore 1900:367), or may be natural features (Upchurch *et al.* 1992). Burial mounds are often noted to have been located away from the central village areas (Hann 1991:329; Moore 1900:367).

Until recently, only a few shell work sites have been systematically mapped, and not much is known about shell work site plans and layouts. Some have noted that several large shell work sites show an overall bilateral symmetry, sometimes separated by a central canal leading into and dividing the site (Beriault *et al.* 2003:46; Marquardt 1992:47; Torrence *et al.* 1994:13). Bifurcated mounds are thought by some to be a distinct and defining site form for the Calusa (Patton 2000:111).

SHELL WORK TEMPORALITY AND SPATIALITY

Hrdlička thought the TTI was the most important center of Indian settlement on the southwest coast (1922:35), and that the shell work sites demonstrated a definite system of uniformity (*ibid.*:21). Goggin viewed shell works as Glades period constructions, mostly found within the Calusa sub-area, but sometimes occurring as far north as Tampa Bay (Goggin n.d.398). Cushing (2000:22-23) and Hrdlička (1922:26) thought that the shell work sites in both the Caloosahatchee and TTI regions were

similar and similarities in both regions have been noted by other researchers (Austin 1987; Carr and Beriault 1984:4, 5).

Goggin argued that shell works were Glades III period constructions (n.d.:398), and represented the climax of the Glades ceremonial complex (1949a:28). Later, Carr (1988:37) thought that shell works potentially dated from Glades I through Glades III periods. Griffin warned against assuming that shell work sites were necessarily Calusa or Glades III period constructions (2002:291), and similarly, Marquardt (1984) cautioned against the assumption that shell works were to be automatically associated with the Calusa. Torrence (1996:29) attributed shell work constructions to the later Caloosahatchee II to III period (AD 800 to 1350), as did Patton (2001). The chronology of the shell work sites is still, however, very poorly known. Widmer (1988) noted that there had yet to be any large-scale excavations in southwest Florida of an archeological site over 10 hectares (25 acres) in area. Since then, work in the Caloosahatchee region has provided some excellent temporal data on Charlotte Harbor shell work sites (Luer 2007; Marquardt 1992; Torrence 1996).

Although temporal data for the shell work sites in the TTI are scarce, a few sites have yielded diagnostic pottery and chronological evidence suggesting the possibility that shell work sites may span the entire history of the Glades Tradition, perhaps as early as ca. 1000 BC. (Taylor 1985). Based on the finding of fiber-tempered and semi-fiber tempered ceramics in the lower portions of some sites (Fradkin 1976; Luer and Archibald 1988; Patton 2000:59-62; Torrence 2003), it appears that earlier Late-Archaic components to shell work sites may have been overlooked. This is significant, because the full settlement pattern and history of the region, the developmental history of shell work sites, and the very timing and formation of the Glades Tradition would be significantly altered based on this finding.

Horseshoe, crescent, ring, “U” and “C”-shaped shell middens within the region have been noted by several researchers (Beriault *et al.* 2003:92; Carr 1988:32; Carr and Beriault 1984; Fradkin 1976; Taylor 1985; Patton 2000:59-62), and while some dismiss these as later Glades, Calusa or Belle Glade-related site forms (Fradkin 1976:51; Patton 2000:59-62, 2001:53), none have considered the possibility that these could be Late Archaic period constructions. It is my hypothesis that shell ring sites are present throughout the TTI, as both isolated sites, and conjoined with (and perhaps obscured by) larger shell work complexes. It is my contention that the earliest extant shell midden sites in the region began in the form of crescents and rings, reflecting similar social arrangements of settlements, potentially reflecting small, egalitarian groups. As populations expanded over time throughout the region, the smaller crescent and ring sites were abandoned, and/or these earlier settlements or new settlements grew in size and complexity to eventually become massive shell work sites. Sea-level rise may also have been a factor, perhaps inundating and obscuring earlier ring sites, and compelling occupants to move to higher ground (see Chapters 5 & 6).

CONCLUSION

Despite over a century of interest in south Florida shell work sites, the number of systematically investigated, surveyed, mapped, excavated and dated shell work sites is scarce. While shell work sites have generally been viewed as significant, there is little consensus as to their formation process, what functions they may have served, their chronology, and their relationship to one another and to other features, such as shell rings.

I argue that shell work sites are clearly more than just large shell midden complexes – many are purposefully constructed features that suggest architectural planning and landscape terra-forming to construct functional features, and to define

public, domestic and ceremonial spaces. Their complexity and size suggests a level of organized labor, community planning, and in some cases, monumentality and ceremonialism.

Shell works are complex sites, akin to palimpsests, that require investigation on several different scales, such as within a larger settlement pattern perspective of the region; a landscape perspective; and on an individual site level. It is important to determine the construction histories of features and the site as a whole, how features were integrated into a dynamic landscape, and how various components of the site may have functioned, changed, and fallen into disuse throughout a site's history. These perspectives will be used in the following chapters to examine a sample of TTI shell work sites, to begin to define common patterns and characteristics, and to compare similarities and differences in shell work site designs, layouts, features, and developmental histories. These data will be used as the structure to help test my hypothesis that changes in shell work site forms over time within the region reflect changes in sociopolitical complexity.

CHAPTER 3 THEORETICAL FRAMEWORK

As outlined in the previous chapter, the Ten Thousand Islands (TTI) contain numerous shell midden sites articulated in a variety of forms, ranging from linear, curvilinear and ring-shaped middens, to immense and complex shell works. How did shell work sites relate to one another in time and space throughout the region? What does similarity or diversity in site layouts, and the presence or absence of certain architectural features indicate about site settlements? Do changes in site settlements reflect changes in social organization over time?

Some archaeologists have suggested that the spatial patterning of shell work sites does not appear to be random, and many sites replicate internal and regional site patterns (Beriault *et al.* 2003). Is this evidence for the development of a hierarchical settlement pattern? Do the large shell work sites represent, as some have suggested, the centers of political chiefdoms (*ibid.*; Griffin 2002:321; Widmer 1988)?

In order to answer these key questions, a testable research design incorporating a rigorous, systematic investigation program is needed (see Chapter 4), oriented within a theoretical framework to guide the research questions and approach. As this study comprises the first comprehensive, systematic investigation of TTI shell works, it is designed to answer a number of wide-ranging questions about site histories and settlement patterns, and I endeavor to apply an integrated approach that will best address these inquiries. Core to this study is a multi-scalar, synchronic and diachronic landscape perspective, examining shell work sites as individually constructed features and sites, as human centered social landscapes, and as a reflection of community organization on a regional scale.

The following chapter presents the theoretical framework of the study, beginning with a definition and explanation of landscape theory, and why I argue that

this perspective offers significant insights towards interpreting shell works settlement patterns. I also raise some of the major problems inherent in some divisions of landscape theory, and suggest ways to integrate conventional landscape theory with some of the ideas offered in phenomenological approaches. This is followed by a brief discussion of architecture and social space, with examples of some site layouts and features (particularly Southeastern) that may serve as comparative examples for interpreting similar TTI shell work features. Finally, archaeological views of social complexity are presented, with particular consideration given to the challenge of defining hunter-gatherer complexity. Archaeological correlates for social complexity are presented, as they may be considered as possible supporting evidence for changes in social complexity seen within shell work sites.

LANDSCAPE THEORY

While it can be argued that archaeologists are fundamentally interested in the past lives of people as evidenced by artifacts and sites located at distinct locales (and therefore, are primarily concerned with the geography of place, and thus, landscape); not all archaeological approaches necessarily employ a landscape perspective. The difference is one of discernment, where some view sites as a *location* of past activity, or a geographic node with a set of environmental values that tied people to a particular place; while others view sites as part of a wider, interactive landscape. The difference is that the former views people as living *on* a landscape, while the latter views people living *within* a landscape.

Archaeological landscape theory is a relatively recent discipline, stemming from work in the 1970s (e.g., Aston and Rowley 1974), and is still undergoing multiple permutations. It does not have one prime definition, and continues to encompass a multitude of explanations and meanings (David and Thomas 2008a; Knapp and

Ashmore 1999). As summarized by Johnson (2005:157-158), landscape theory has traditionally employed one of three main perspectives: an ecological / economic view of landscape as a resource; a socio-political view of landscape as a cultural manifestation; or a cognitive view of landscape, which views it as expressive of a system of cultural meaning.

The ecological / economic perspective views landscape as an aggregation of resources (e.g., food, soils, raw materials, water) that affords opportunities and limitations for human development (David and Thomas 2008b:25). This perspective has long been utilized in site catchment and territory studies, and was influential in the development of the fields of environmental archaeology and subsistence studies (e.g., Butzer 1982; Jochim 1976), settlement pattern studies and spatial analysis (e.g., Binford 1978, 1980; Chang 1977; Clarke 1968; Crumley 1994; Willey 1953). Most of these studies viewed landscape as a set of environmental variables to which people adapted over time, the responses of which can be seen as variations in subsistence adaptations and changes in settlements on the landscape.

The socio-political view of landscape contrasts with that of the ecological / economic view. Where the ecological view holds that people *adapt to* their environment, with an emphasis on research focusing on behavioral adaptations, the socio-political perspective argues that people *interact with* their environment, engaging with their surroundings in various ways, with an emphasis on recognizing the social dimensions of landscapes (David and Thomas 2008b:32). Of interest is the way in which people differentially use, conceptualize, categorize, value, and sub-divide space (Darvill 2008). Social relations and inequality may be materialized in spatial patterns (Bender 1993, 1998; Bourdieu 1971; Foucault 1970), as well as differences in settlement types, which may be related to variations in the modes of production (Hingley 1984; in Darvill 2008).

The cognitive perspective, also sometimes called the phenomenological perspective, focuses on human experience, and on the contexts and meaning of landscape (Tilley 1994). This perspective contrasts with the previous two, in that the focus on landscape moves from one of environmental affordance, or function, to one of cognition and meaning. This perspective centers on the human experience of “being-in-the-world,” from a purely sensory embodied perspective.

The phenomenological perspective employs a present-day experience of landscape to explore how past peoples may have perceived, interacted and moved about monuments and the landscape (e.g., Thomas 1990; Watson 2001), seeing features as “metaphors” (Tilley 2004). Watson (2001) contends that the classification of monuments according to the details of their architecture is limiting and problematic, as monuments were built to elicit experiences and responses from people and their surroundings in ways that traditional fieldwork techniques do not acknowledge. It is argued by some that the discipline must move beyond traditional archaeological evidence (Bender 1998; Thomas 1996), as evidence itself does not deliver an understanding, and evidence remains open to a any number of interpretations (Bender 1998).

One of the key criticisms of this method is that objectivity and scientific verification are held by phenomenologists to be pointless (Fleming 2006). While the phenomenological approach may offer some potential to include more imaginative reinterpretations of architecture, landscapes and monuments, the approach taken has frequently been “hyper-interpretive,” producing highly questionable results (Brück 2005; Fleming 1999, 2005, 2006). Fleming (2006) notes that the understanding of chronological sequences of multi-component and multi-functional sites is critical to interpretation, and while central to conventional archaeological landscape analysis,

would not be possible with the phenomenologist's rejection of "Cartesian analysis" (Fleming 2006).

Phenomenological fieldwork has in particular been criticized as subjective and difficult to test or replicate (Brück, 2005; Chadwick 2004; Fleming 1999, 2005, 2006; Thomas 2008), with some arguing that phenomenology alone as a methodological construct can not be used successfully in landscape archaeology, based as it is on the use of non-subjective techniques and methods (Thomas 2008). Recently, phenomenological methodologies for employing a more structured (if still largely subjective) approach to fieldwork have been offered (Hamilton *et al.* 2006), but it remains to be seen if these "methods" will be accepted and employed by non-phenomenological landscape theorists.

I agree that the phenomenological approach to landscapes is problematic, because it essentially rejects objectivity and scientific verification, and is difficult to test or replicate (Brück 2005; Fleming 1999, 2005, 2006). However, I also concur with Brück's (2005) recognition that the approach does offer some potential to enhance interpretations of landscape. I disagree, however, with the notion that embodied engagement with the landscape cannot provide insight into past experiences and interpretations of place (*ibid.*). While the technique is subjective, in some cases, when combined with tools such as GIS, visualization software and systematic archaeological survey and mapping, it may help to enhance interpretation of visual cues, symbology and embedded social meaning in processional routes, the placement and inter-visibility of monuments, and relationship of natural features within the landscape (e.g., Parker Pearson *et al.* 2006). At the very least it serves as a point-of-departure for beginning to think about the familiar in a very different way. Nevertheless, a phenomenological perspective can never replace objective, systematic and science-based analysis, and is best used as a tool to enhance interpretation of landscape.

Contemporary landscape archaeology builds on many aspects of ecological, socio-political and cognitive perspectives (e.g., Bender 1993; David and Thomas 2008a; Ashmore and Knapp 1999). Recently, the field of landscape archaeology has been lauded as “an outstandingly vibrant aspect of the discipline” (David and Thomas 2008b:25), mainly for its ability to incorporate multi-varied traditions of thought and practice. I agree, and argue that contemporary landscape theory provides the most current and comprehensive framework in which to interpret shell work settlements and changes over time.

A contemporary perspective in landscape archaeology is the recognition that human-environmental interactions constitute a dynamic and recursive relationship (see Marquardt and Crumley 1997), in which people created and interacted with landscape as a collective work in progress (Morphy 1995), with the material landscape as a repository for social memory and history (Kuchler 2003; Read 1996; Schama 1995; Strang 2008; Stewart and Strathern 2003). It also recognizes that natural places in the landscape may be imbued with meaning and significance, and may be connected to a larger system of monuments and ceremonial landscapes (Bradley 1998a).

This modern view of landscape theory enables archaeologists to address human prehistory in all of its contexts, moving beyond a purely environmental perspective that largely views landscape as an environmental backdrop, towards recognizing all aspects of past human lived dimensions (Ashmore and Knapp 1999). These may include social, political, ontological, epistemological, ceremonial, cosmological, monumental, economic and environmental dimensions of social space (Ashmore 2008). Contemporary landscape archaeology can best be described as:

... an archaeology of how people visualized the world and how they engaged with one another across space, how they chose to manipulate their surroundings... It concerns the intentional and the unintentional, the physical and the spiritual, human agency and the subliminal...Landscapes are institutional as space is structured and

behavior normalized through codified social practice...Landscapes are always territorial spaces in that they are controlled and contested in social and political practice. (David and Thomas 2008b:38)

It is this holistic view of landscape theory in which I subscribe, which posits landscapes as socially engaged places (Casey 2008; Fisher and Feinman 2005). I recognize the importance of landscape as an ecological and economic resource, but I do not limit my research questions and interpretations to simply what the environment may, or may not have afforded the past residents of these islands, and how people may have responded to changes in environment. Rather, I endeavor to view shell works landscapes as cultural manifestations, which reflects people's dynamic and recursive relationship with the environment, as well as an expressive system of cultural meaning (see Marquardt and Crumley 1997:7-9 for further on this perspective).

Several related, sometimes overlapping themes of interest to landscape theory are particularly germane to this study, and are discussed, below.

SEASCAPES

Recently, many have expanded the notion of landscape to beyond that of the terrestrial realm, to include seascapes, in an effort to include all settings of human activity and emplacement (e.g., Barber 2003; Breen and Lane 2003; Cooney 2003; Cordell 1989; Crouch 2008; McNiven 2003, 2008; Phillips 2003; Robinson 2007; Torrence 2002; Van de Noort 2003). This is especially appropriate for TTI cultures, where an intensive maritime orientation was pervasive, and was likely central to their identity. Whilst entire islands were constructed out of shell and constitute the most well-preserved material expression of their landscape, the seascape remained the most constant, permeating setting in which people's worlds were centered (*axis mundi*), through which they fished and gathered food and raw resources, traveled by canoe, and which presented a constant, never-ending tidal rhythm.

McNiven defines seascapes as

...the lived sea-spaces central to the identity of maritime peoples. They are owned by right of inheritance, demarcated territorially, mapped with named places, historicized with social actions, engaged technologically for resources, imbued with spiritual potency and agency, orchestrated ritually, and legitimated cosmologically. (McNiven 2008:151)

The boundaries of seascapes and landscapes were often fluid. Some inshore seascapes, such as those of the Maori, were marked on their edges by prominent terrestrial landmarks and important ancestral alignments that defined community fishing grounds controlled by descent groups (Barber 2003:444). As Cooney (2003) contends, recognizing seascapes provides an important new perspective on coastal settlement patterns, and in understanding how coastal people's identity, sense of place and lived history socialized both seascapes and landscapes.

MONUMENTALITY, MEMORY

Monuments are constructed as mnemonic devices, with an ideology of endurance. Worldwide, monuments are associated with all complex cultures, and represent symbolizations of power through the conspicuous consumption of human energy (Trigger 1990). Power is exhibited through the control of large numbers of energy consumers producing the equivalent of high-energy consuming "luxury goods," through non-practical movement and constructions (*ibid.*). As systems of inequality arise, monumental architecture increases, and while some egalitarian societies construct large, multi-family dwellings or tribal forts, monumental architecture is not common among egalitarian groups (*ibid.*).

While monuments are often viewed as symbols of elite power, intra-community rivalry, or competitive emulation between groups, centralized control is another explanation for the construction of monuments (Bonanno *et al.* 1990). Leaders may also have initiated new constructions of monuments to celebrate a renewed world order, or

to cope with waning support or competition (Van Dyke 2004). Concerning ritual structures or monuments, complete replacement of structures may be seen in a centralized society during times of social transformation, with remodeling or embellishment to existing forms seen during cycles of more temporary authority (Bonanno *et al.* 1990:196).

Understanding the intended purpose and meaning of monuments can be difficult, as these are not always visible or inherent. For example, some view conspicuous burial mounds, long barrows and cairns as monuments with an obvious function, for example as repositories for the dead, or perhaps a means to memorialize an individual, family, or population. However, burial monuments may have had multiple meanings and purposes, such as mechanisms to practice or memorialize ritual, perform ceremonies, symbolize spiritual beliefs, provide a community memorialization, store and transmit collective history and memory, and mark sacred locations and processional routes throughout the landscape. Burial monuments may also represent conspicuous displays of wealth or status, fulfillment of social obligations, rivalry, or have functioned to insure inherited rights (Barrett 1990).

Monuments may represent constructions to preserve, politicize, commemorate and empower collective memory and identity (Dietler 1998; Van Dyke 2008; Williams 1998), and may have been reused, altered, or destroyed as part of efforts to manipulate, replace or expunge tangible memory and history for spiritual, social or political advantage (Driscoll 1998; Manning 1998; Newman 1998; Oubina *et al.* 1998; Van Dyke 2008; Williams 1998). Monuments may also have served an important function in marking territories and boundaries (Crumley and Marquardt 1987).

Establishing the temporality of some monuments may be problematic, as they may represent a singular construction built in a short episode that either had a short or long duration of significance and legitimacy, or they may have formed or accumulated

over time, constructed with long histories of collective community production, maintenance, use, alteration, and reuse to maintain group identities and traditions, either maintaining prescribed forms, or incorporating new traditions and practices with each successive generation (Barrett 1990; Bradley 1991; Holtorf 1998; McFadyen 2008; Oubina *et al.* 1998). Monuments may also have fallen into disuse or abandonment for generations, later to be re-used as is, or modified by later populations (Bradley 1998b; Dietler 1998; Newman 1998).

The material expression of memory is most obvious in monuments, but may be present in other forms, such as evidence of artistic representations, objects, ritual behaviors, and places. Ritual behaviors may include procession routes, feasting, mortuary treatments and abandonments (Van Dyke 2008:279). Memory constitutes a selective construction, preservation, and obliteration of ideas of the past, and is closely integrated with place and landscape (Knapp and Asmore 1999; Schama 1995; Van Dyke 2004; 2008:277). Memory may be used to invoke, reference and reconstruct the past to legitimize authority and construct group identity (Van Dyke 2004:413). Place may be defined as the intersection between memory and landscape (Van Dyke 2008), as places and memories become intertwined in a social engagement with landscape.

Places, sites and monuments can evidence a purposeful persistence of memory marked on the landscape. For example, the Poverty Point site, the largest known Middle Archaic earth mound complex in North America, incorporated an earlier mound complex into the five-square kilometer complex, situating the Early Archaic Lower Jackson mound as the alpha datum or anchor for the new complex (Gibson 2006:315-316). This, Gibson argues (*ibid.*), is a “vivid case of material or implicit memory.”

CEREMONIAL AND CIVIC LANDSCAPES

Landscapes may have formed, functioned, been used, valued or conceptualized in different ways. One development in landscape theory has been an increasing interest

in recognizing ceremonial and ritual landscapes (e.g., Ashmore 2008; Richards 1996; Stein and Lekson 1992), sacred landscapes and spiritscapes (e.g., Bradley 1998a; Buikstra and Charles 1999; Crumley 1999; McNiven 2003, 2008; Oubina *et al.* 1998), as well as civic or public landscapes (Ashmore 2008). Not all forms of ceremonial landscapes are easy to recognize, or distinguishable from mundane landscapes (*ibid.*).

Ashmore (2008:167) defines ceremonial landscapes as an interactive setting where ritualized movements to and among cosmologically imbued features are a means to evoke and reinforce understandings of cosmic order. Certain features, such as monuments, architecture and rock art, for example, may constitute a material reflection of conceptions of the cosmos. “Cosmivision” (Ashmore 2008:168; Broda 1987), a structured view of cosmology that relates time and space into a systematic whole, may be reflected in spatial order, more often seen in the larger scale of ceremonial and civic plans (e.g., Van Dyke 2004). Ceremonial landscapes are instilled with cosmivision, and form from repeated ritual, movement, use, and practice (Ashmore *ibid.*).

Others see ceremonial landscapes as landmarks of “cosmic mapping and ritual practices,” meant to evoke a sense of awe, power, and respect (Tacon 1999). These ceremonial landscapes are likely to be located in places of great natural formations (e.g., mountains, waterfalls, rock outcrops); at places of abrupt natural transitions; unusual natural elements; and vantage points with dramatic views (Ashmore 2008). Natural features, such as water, may have been imbued with sacredness, and viewed as a supernatural barrier or portal to another world (Brady and Ashmore 1999).

As mentioned previously, mortuary landmarks such as burial mounds, barrows and cairns may at once be monuments, but also part of a larger, ceremonial landscape. These landscapes may be destinations for prescribed visitation, or places of avoidance or taboo, and movement towards them may take the form of a ritualized procession that

may tie together larger ceremonial landscapes (*ibid.*; Bradley 1991, 1993; Parker Pearson *et al.* 2006).

The nature of public ritual within ceremonial landscapes may help to maintain social stability over long periods of time (Bradley 1991), or may be used and controlled by elites who manage the use of ceremonial sites, events and monuments to manipulate kinship ties, residential patterns, land use rights, and trade and alliance (Dillehay 1990).

Civic landscapes are arrangements of public works, structures and space that function as public arenas or places for public interaction among sedentary societies (Ashmore 2008:167). These landscapes may also reflect conceptions of cosmovision in spatial patterns, and/or efforts by leaders or aggrandizers to publicly display divinity, power and authority, which may make it difficult to distinguish between ceremonial and civil landscapes.

TEMPORALITY

Sauer (1963) championed the idea of the landscape as palimpsest (also see Aston and Rowley 1974; Bailey 2007; Fisher and Feinman 2005:65; Kantner 2008:46), seen as a complex and richly layered record of human activity. He aptly stated that “We cannot form an idea of landscape except in terms of its time relations as well as its space relations” (Sauer 1963) (see also Bailey 2007). One of the most valuable aspects of landscape theory is its ability to support diachronic studies, in which the changing structure, use, and settlement of sites within a region can be studied over time (David and Thomas 2008b:25). I agree, and contend that temporality and chronology is a critical component to landscape theory, and for making accurate observations about shell work settlement patterns and social change through time.

Different conceptions of time, and different time scales exist (Bradley 1991; Ingold 1984); this is sometimes called “time perspectivism”(Bailey 2007). Archaeologists should be aware of the different ways in which the scale of time can be

implemented to interpret the palimpsest nature of the material world, and how the increased time depth and time resolution of archaeological data allows us to examine processes not usually visible in smaller scales (*ibid.*).

A useful construct of time perspectivism was proposed by Braudel (1980), which encompassed three time-scales. The *longue durée* (long duration), or deep social time (Van Dyke 2008:278), equates with “geographical time,” operating on the scale of environmental change, and is the closest equivalent to archaeological chronologies (Bradley 1991). “Social time” measures the history of a group of people, and individual time is called the “history of events.”

Returning to the concept of palimpsest, Bailey (2007) notes four different types of archaeological palimpsests: true, cumulative, spatial, and temporal. A true palimpsest is a condition in which all former traces of earlier activities are completely erased. Cumulative palimpsests retain evidence of earlier activities, but are superimposed over one another and re-worked or mixed to a degree that they are very difficult to separate. These are common, and good examples are shell middens, which generally by nature are mass accumulations consisting of many discrete episodes of shell dumping. Bailey (2007) points out that individual dumping episodes become mixed together and rarely become possible to distinguish individually (though some can be), and therefore require examination on a coarser scale, such as in “time-averaged accumulations” (*ibid.*).

Spatial palimpsests occur when activities become spatially segregated and merge into a much larger-scale palimpsest (*ibid.*). Spatially discrete episodes of activity can be difficult for chronological correlation, as in the absence of high resolution dating techniques it is impossible to discern whether they were contemporaneous or not. Temporal palimpsests comprise deposits of different ages. A fifth type is a palimpsest of meaning, which describes a site as having not material accumulation but multiple successions of meanings that change over time (*ibid.*).

For this multi-scalar study, I will employ different time scales, looking at sites as they existed and changed from both synchronic and diachronic perspectives. Mindful of the concepts of time perspectivism and the complex nature of archaeological palimpsests, I argue that looking at multiple spatial and temporal scales will be most productive for beginning to elicit settlement patterns for the region.

SETTLEMENT PATTERNING AND SPATIAL ANALYSIS

Settlement pattern studies concern the spatial distribution of sites across the landscape, their relationship to one another and their ecological surroundings, and social relationships to one another (e.g., Willey 1953). Settlement patterns seek to define observable regularities, relationships, rules or structures in a settlement system (Flannery 1976). These may include socio-cultural tenets, such as residence rules, and how these may affect location, size and density of settlements (Mignon 1993), and their distribution patterns (e.g., nucleated, linear, or dispersed). Settlement pattern studies operate on a hierarchy of scales, from an individual activity area to the distribution of sites within an entire region.

Much like archaeological landscape theory, a focus of settlement pattern studies has been on ecological determinants for settlement locations, such as found in site catchment analyses and central place theory. Other settlement pattern studies focus on socio-political organization of societies, with the notion of a community pattern referring to the strictly social aspects of settlement patterns (Chang 1958; Sears 1961).

The community as a human social unit is considered to be universal (Murdock 1949), and is an important social unit for understanding economic and social integration within small-scale societies (Feinman 1995; Johnson and Earle 1987). However, the very concept of community and its definition can be difficult to agree upon (see Canuto and Yaeger 2000; Kolb and Snead 1997), but it is generally agreed that it is a social unit intermediate between the family group and a larger segment of society, a “conjunction

of people, place and premise” (Canuto and Yaeger 2000:5), as well as a group of interacting people living in a common location with defined geographical or political boundaries (Chambers and Young 1979:46).

Chang (1968) considers the primary social group in settlement patterns to be that of the community, but argues that the community itself is not visible archaeologically, only what remains located at its settlement. In order to determine if there is an historical relationship between separate communities, comparisons of settlement types, artifacts, etc., can be made, and if similar, it can be presumed that they may be of common origin or are connected. Chang argued that the microstructure of a settlement comprises social and cultural structures that relate between a community (intra-site), and macrostructure is how communities relate to one another within a larger region (inter-site). Communities therefore each have their individual microstructure, but belong to larger macrostructures (Chang 1968).

This settlement pattern study of TTI shell work sites follows the conceptual groundwork formulated by Kolb and Snead (1997), who also view the fundamental unit of society as that of the community. They contend that although human social systems occur on a multitude of different scales (such as a family unit, or larger social networks), that all members of society belong to a community. They argue that community-centric studies in archaeology have a significant potential to inform cross-cultural comparative studies of small-scale and local societies, so defining the community with clear archaeological correlates is fundamental (Kolb and Snead 1997). They contend that the community perspective requires a particular methodological approach incorporating a micro-regional analysis, to include intensive surface surveys, spatial analysis and analytical strategies to investigate labor investment and boundary maintenance (*ibid.*).

Kolb and Snead (1997) define the community as a “minimal, spatially defined locus of human activity that incorporates social reproduction, and self-identification” (*ibid.*). Three fundamental elements of the community are recognized, the first being social reproduction, with the community serving as a node of social interaction and a sphere in which sociopolitical relationships are negotiated. Second, subsistence production within the community serves as a central element of community life, with the community functioning as arbiters of access to productive resources and to focus efforts on subsistence labor. The third element of community structure is self-identification and social recognition by its members, with creation and maintenance of local identity rooted in economic practice and social reproduction, and manifested in the manipulation of both physical and symbolic boundaries.

Self-identification and group recognition by community members is an important element of community structure, which is usually rooted in economic practice and social reproduction, and manifested in physical and symbolic boundaries, to create a sense of “place” (*ibid.*). A socio-geographic cultural landscape develops as an expression of the community, through direct modification of the landscape and construction of architectural components (*ibid.*).

It is this aspect of community that I argue provides the greatest potential for understanding each shell work site as a distinct community reflecting a human-centered social landscape, and I therefore consider each geographically separate island site a potentially distinct community. However as Rainbird (2007:166) points out, maritime communities may incorporate symbolic markers and boundaries tied to an identity with the sea, and may comprise “communities of communication” acting as networks. These communities may be more abstract and have less visibility, and so may present a challenge to defining communities in the archeological record. Even though shell work sites may be geographically distinct islands bounded and separated by water, and are

considered distinct communities within this study, these sites were likely part of a larger macro-community (Chang 1968).

An archaeological analysis of community examines the structure of space and the variety of activities that were undertaken, and is best done on a micro-regional scale. Analytical strategies recommended by Kolb and Snead (1997) include examination of differences in labor investments, community spatial elements, and boundary maintenance. In looking for indications of labor differences, they argue the key is to look for different organizational levels of human labor invested into cooperative agricultural projects, architecture, or monument construction, such as that which can occur on a family level, as low-end festive projects, or as centrally controlled *corvée* projects (Kolb and Snead 1997; Peebles and Kus 1977).

The concept of “landesque capital” (Brookfield 1984) fits well with Kolb and Snead’s (1997) concern with defining different organizational levels of labor projects. Landesque capital is landscape manipulation designed for long-term gains in productivity (Fisher and Feinman 2005), originally defined as “any investment in land with an anticipated life well beyond that of the present crop, or crop cycle” (Brookfield 1984). These constructed investments have the ability to increase productivity for generations after their construction, as long as they are maintained (Fisher and Feinman 2005). Originally included in the definition were investments related to agriculture, including irrigation canals, agricultural terraces, improvement of agricultural soils, and land clearing. However, I argue that landesque capital is a useful construct that should extend beyond agricultural societies, and may be evidenced in complex fisher-hunter-gatherer societies as well.

Changes in architecture, spatial patterning, and community organization may reflect changes in social organization. Differences in structures within a community may reflect socio-political differences, such as differences in wealth, rank, and social

equality (Trigger 1968). Economic equality in egalitarian communities is thought to be reflected in consistently sized and shaped structures, often uniformly situated on the landscape. With increasing societal complexity, they become increasingly differentiated (*ibid.*), with elite structures increasing in size, prominence and elaboration. In complex societies, there is also an increase in the variety of special-purpose structures, with increases in specialized production or workshops, storage places, and public structures (*ibid.*), as well as monuments (Trigger 1990).

Spatial analysis is focused on patterns in distributions of artifacts, features, and sites, and also operates on a variety of scales, from single activity areas macro-regional patterns. Spatial analysis is usually done in conjunction with settlement pattern studies. Though a Geographic Information System (GIS) is usually considered a heuristic tool for analyzing spatial data, it has been employed with success in archaeological landscape studies to explore human-landscape relationships (e.g., Bevan and Conolly 2002-2004; Llobera 1996; Van Hoove 2003). GIS has the potential to allow us to observe sites beyond the traditional two-dimensional, static and disembodied view (Gillings and Goodrick 1996), as well as provide a systematic analysis of landscape contexts, such as intervisibility, symbolical links, and the relationship of monuments to topographic features (Brück 2005).

ARCHITECTURE AND SOCIAL SPACE

There is an immense body of interdisciplinary literature examining how societies structure social space, construct buildings, and even what constitutes architecture (e.g., Crouch and Johnson 2001; Hillier 1996; Hillier and Hanson 1984; Kent 1984, 1990; Grøn *et al.* 1991; Holl and Levy 1993; Parker Pearson and Richards 1994; Rapoport 1969; Watanabe 1977). Of primary interest to this study is an examination of the organizational principles behind the structure of social space, and

what this may reflect about relationships between the built environment, activity areas, community patterns, and how changes in these patterns may reflect changes in social organization at shell work sites.

Architecture is almost universally defined as the design or construction of buildings and physical structures for human use, however, architecture is not limited to individual constructions, and includes the total built environment and how it integrates with surrounding contexts. Some view architecture as a means to create boundaries out of unbounded space, and the use of space as a means to organize that unbounded space (Kent 1990:2). Others see the order of space as a result of practice, and that the meanings behind places and spatial order are not necessarily fixed in time when they are created, but are invoked through practice and recurrent usage (Parker Pearson and Richards 1994:5). I agree with this latter perspective, and the notion that structures reflect both the medium, and the outcome of social practices (*ibid.*).

Several ideas central to the theories of social space and architecture are adopted for this study. The first is that the organization of social relations may be imprinted on the landscape (Chang 1958; Douglas 1972). This may be reflected in the organization of social space and architecture, and structured in a variety of ways (e.g., gender, kinship, cosmology, age, rank, etc.) (Parker Pearson and Richards 1994:28). The second is that the use of space becomes increasingly segmented, differentiated and complex among increasingly complex societies (Kent 1990:129-130; Rapoport 1990:17-18; Whitelaw 1991:158).

There are numerous ways of recognizing, and interpreting the structure of social space at a settlement. One is to examine evidence for spatially distinct territories, or differences in domains, as evidenced by physical boundaries, such as entrances, walls, gateways and earthworks (Parker Pearson and Richards 1994:24). These may reflect spatially distinct activity areas with restricted control or access, perhaps indicating

differences in purpose or function (e.g., sacred vs. profane, elite vs. commoner, etc.). Another way to elicit the structure of social space is by looking for changes in spatial patterns of activity areas and in settlements, such as changes in the sizes, locations and shapes of house structures, which may reflect changes in social conceptions of order (Richards 1996), or social organization. Analysis of sacred architecture and the use of public space can also provide valuable insights into social organization and religion (Brown 1997; Flannery and Marcus 1993).

Village or community layouts reflect the social structure of the group (Chang 1958:304-307; Grøn 1991; Watanabe 1986:489-493), with the placement and orientation of dwellings, and the spatial configuration of the entire settlement reflecting rules of social structure. Grøn (1991:100-101) argues that there are both culture specific and universal rules for social space structure. Universal rules are basic to human nature and found within all societies, and include rules such as where people sit within a group in relation to their social position; how small groups spatially orient themselves around a common center of attention (e.g., a hearth); the physical spatial positions within a group that are viewed as higher and lower in prestige; and that physical positions of household groups reflect social positions and relatedness between relatives.

As summarized by Grøn (1991), some universal rules are evident in village layouts, such as ring-shaped communities. The distinct ring shape of these communities reflects an egalitarian social structure, as the circular layout of the community affords every individual relatively equal access for communication with one-another, with no one individual taking a visually dominating position over any other. In contrast, “U”-shaped settlements are seen as examples of hierarchical settlements, with the group leader positioned at the most visually dominant position, opposite the end of the opening, and with two rows of subordinate groups located at right angles from the leader’s position (Grøn 1991:108).

With ring-shaped communities, the sizes of the ring and the interior space it enclosed appear to have been dictated by the maximum number of individuals that met or lived there at the time of planning (Brown 1997:477; Yellen 1977:127), since any accretion in the size of the group would not allow for additional space in the interior. However, additional rings may have been added on to outer rings to accommodate additional participants or growing populations.

In some linear settlements, particularly those that front river settings such the Haida of the Pacific Northwest, the highest-ranking house in the village is the largest, and is situated in the front and center of the community (Whitelaw 1994:234-235). In other cases, the leader's dwelling may be located at either end of the settlement (Grøn 1991:106).

In this study, I seek to elicit patterns of architecture and social space reflected in shell work sites (see Chapter 5), and offer interpretive comparisons to similar known archaeological and ethnographic studies. The following provides a brief overview of relevant prehistoric architectural site features and forms that may serve as analogies for some TTI shell work features.

CIRCULAR AND RING-SHAPED SITES

Circular and ring-shaped sites are common around the world, reflecting what are construed as universal rules of social space (Grøn 1991:108), and fundamental principles of concentricity, reflecting cosmological ideologies, orientations with cardinal points or social status (Parker Pearson and Richards 1994:12). In the Southeast, ring-shaped communities are established as early as the Paleoindian, where large groups of mobile hunter-gatherers established large, ring-shaped aggregation sites (Robinson *et al.* 2009).

In the Middle Archaic, ring, semi-circular and elliptical-shaped mound complexes become more common (see Kidder 1991; Sassaman and Heckenberger 2004;

Saunders *et al.* 1997), and are interpreted as part of a planned, wide-ranging regional landscape of monument construction (Clark 2004; Sassaman 2005:91-92). In the Late Archaic, multiple coastal shell ring cultures appear throughout the Southeast coastal area (Russo 2006:52), with ring-shaped shell middens interpreted as evidence of community plans reflecting egalitarian, or trans-egalitarian social structure (e.g., Russo 2002, 2006, 2008; Russo and Heide 2001; Trinkley 1985). Later Woodland period Gulf coastal sites also tend to be ring-shaped (Bense 1998:257; Milanich 1994:168; Sassaman 2005:93).

Numerous communities in Lowland South America and the West Indies also formed circular to semi-circular arrangements, with central, cleared and open public plazas (Siegel 1996). The circular or concentric plans of these communities are interpreted as reflecting cosmological and social structures, with each community village center representing an *axis mundi*.

In central Brazil, most residential ceramic period villages are arranged in circular, elliptical or semicircular rings enclosing a central plaza, sharing a consistent, traditional layout that reflects a similar world-view (Wüst and Barreto 1999). Villages with two or three rings occur in about ten percent of villages, and are due to household splitting (*ibid.*). Variations in ring sizes and shapes occur, and range from open horseshoe-shaped rings to fully enclosed rings.

Some have viewed equidistant placement of houses around rings as reflective of an egalitarian social organization (e.g., Trinkley 1985). Others note that ethnographic data suggest differently, with privileged positions within the ring providing differential access and views, for chiefly residents, feasting locations or to manifest cosmological ideas within the structure of the village (Wüst and Barreto 1999).

Valdivia Ecuadorian coastal lowlands also evidence ring-shaped villages, such as at the site of Real Alto, which consists of a ceremonial center with houses and two

mounds arranged around a central plaza (Damp 1984). At Lomo Alta, a horseshoe shaped village up to 175 by 115 meters also contained a central plaza. Houses were situated along the outer part of the ring, and refuse was deposited adjacent to structures, while the inner, central portion of the ring remained clear of debris. Damp (1984) interprets these patterns as reflecting an organized community structure incorporating dualistic spheres: that of the domestic, and that of ritual. Others see the prevalence of U-shaped villages in South America as evidence of mapping an ideological structure of the community into a U-shaped configuration (Isbell 1978).

MOUNDS AND PLAZAS

Mound building clearly began in the Southeast in the Middle Archaic (see Russo 1996; Saunders 1994; Saunders *et al.* 1997) and persisted throughout the Archaic, Woodland, and Mississippian periods (Brown 1997:475). Mounds take many different forms, were created through different cycles of use and construction, and served a variety of functions, such as the foci of ritual activity; burial repositories; communal facilities; public architecture; and chiefly residences (Brown 1997:475).

In Florida's Woodland period, Weeden Island ceremonial mound complexes often contain multiple platform mounds, with one typically having served as the residence for a religious specialist; others for mortuary preparation and feasting; and low, circular platform mounds having served as charnel houses (Milanich 1994:178). At other sites in south Florida, such as Fort Center, charnel ponds replace charnel mounds (Sears 1982). Mounds constructed with sand in the Caloosahatchee region tend to date from after AD 900 (Patton 2001:48), and typically have mortuary contexts.

During the Mississippian period (AD 900 to AD 1700), the largest and most complex villages, towns, and mound centers were created. Many prehistoric groups in the Southeast participated in the Mississippian cultural tradition, which included a

shared socio-political chiefdom-level structure, an ideology manifested in artistic motifs, styles, ceremonies and a similar architectural grammar (Lewis and Stout 1998).

Mississippian settlements formed a hierarchy of sites consisting of social, political, and religious mound centers and associated towns, with the most ubiquitous architectural features consisting of platform mounds and large, open public plazas (Morgan 1999). The consistent design of Mississippian mound centers and towns is thought to be ritually prescribed (Lewis and Stout 1998), and includes towns, mound centers, and ceremonial centers. Mississippian towns are defined as habitation areas that include defined public space, such as plazas (see below), usually flanked by mounds.

Mound centers are planned mound complexes that lack evidence of habitation. Ceremonial centers are problematic by definition, as they may have served more functions than strictly ceremonial ones (Lewis *et al.* 1998). Mississippian settlement patterns suggest that mounds, when present at a site, are usually aligned along the edges of a central plaza, and multiple mounds are usually aligned with their axis parallel to the plaza's axis (*ibid.*:8).

Flat-topped mounds commonly served as platforms for temples, or residences of chiefs or leaders (Brown 1997:479; Morgan 1999:20). Conical or domed-shaped mounds in the Caloosahatchee region are often burial mounds (Patton 2001:44, 50), and may have served as mortuary facilities, perhaps like those found at Cahokia (Demel and Hall 1998:207). High-status or mortuary-specialist residence mounds in the Caloosahatchee region are predicted to be bifurcated, in contrast to a rectangular shape found in Weeden Island cultures (Patton 2001:52).

Plazas are common architectural components in the Mississippian period (Brown 1997:478; Morgan 1999), and are defined as a flat, open space usually with adjacent buildings or surrounded by structures that usually functioned as publicly defined areas for a community (Kidder 2004). Kidder (2004) argues that plazas should

not be viewed as merely empty space enclosed or surrounded by mounds and other architectural elements, but part of a central design element of community planning.

Archaeologically, plazas are usually devoid of midden or material, as they were not places for refuse dumping, but functioned as shared community space, and they served multiple purposes, such as sacred, secular, ritual, economic, political and social functions and contexts. Plazas may also delineate special ritual spaces for communities to be used at designated times, are often connected with the creation of large earthwork enclosures (Brown 1997:478), and may have functioned as ceremonial spaces or for gaming.

AQUACULTURE ARCHITECTURE

Aquaculture, or sea farming, is the cultivation of animals or vegetables in water, which may be fresh water, sea water, or brackish water, and may include seaweeds, mollusks, crustaceans, fish, and large marine animals (Kikuchi 1973). Intensive fisher economies investing in landesque capital (Brookfield 1984), such as the construction of elaborate fishweirs, fishtraps and dam systems, are considered practices of aquaculture. Aquaculture is clearly an ancient practice, with the earliest known examples of fishponds from Egypt and China dating from 2500-2000 BC (Marr *et al.* 1966:7), and fishweirs dating back to 4450 BC in Europe (Connaway 2007:26-27).

Archaeological remains of aquaculture structures and systems are found throughout the world, and take a variety of forms such as fishponds, fishtraps, and fishweirs (see Connaway 2007 for a thorough overview; also see Johnston and Cassavoy 1978; Lutin 1992; O'Sullivan 2003; Rostlund 1952). Fishweirs functioned to obstruct the passage of fish in order to facilitate their capture, where a fishtrap functioned to impound fish so that they could not escape (Rostlund 1952:101). The functions of fishtraps and weirs were often combined into single structures (Johnston and Cassavoy 1978:706), such as a tidal fishweirs, which also act as traps when fish are

caught behind obstructions as the tide falls (Rostlund 1952:101). While there is great diversity in the shapes and materials used to construct fishweirs and fishtraps, most conform to three basic designs: tidal fishweirs, mazelike traps, and walls (Lutin 1992). Connaway (2007:5-11) presents a typology of fishweirs, including flowing stream weirs, tidal weirs, and long-shore weirs.

Kikuchi (1973) observed that fishtraps in Hawaii were usually associated with small enclosures that functioned as holding ponds to store excess fish for a very brief time. Artificial ponds or impoundments were also constructed to hold and grow aquaculture yields, usually fish (Costa-Pierce 1987; Jones 1999:325-326; Kikuchi 1973, 1976). Maar *et al.* (1983:13) describe three architectural forms for fishponds in East Africa: contour, barrage, and paddy ponds. Each have their own construction design and work best in differing circumstances, but paddy fishponds were especially designed to work in the flat, dambo wetlands of East Africa.

The construction and maintenance of fishponds have several logistical concerns, but maintaining adequate water inputs is central (Maar *et al.* 1966:18). Fishponds need to be constructed to allow for enough water to maintain impoundment, while assuming that water can frequently circulate and not stagnate, by either draining and adding new inputs of water (either sea, brackish or fresh water), or by tidal action. Strategic locations for building fishponds are on, or adjacent to, springs with good infiltration, and streams, rivers, and dams. Water loss is a concern, through either seepage or evaporation, and ponds must be constructed to counteract such inevitable water loss. New ponds are likely to seep more than older ponds, as established ponds build natural silt and mud layers along their bottoms which help to retain water. In East Africa, areas with swamp soils are particularly beneficial to fishpond construction (*ibid.*).

Architecturally, earth-built fishponds are recommended to be constructed with gently sloping walls to keep substrate from collapsing, with wall crests 4 to 5 feet in

width, and should not be smaller than .02 hectares (200 square meters) (Maar *et al.* 1966:21-23). Fishponds are usually constructed by borrowing substrate out of the center of the proposed fishpond site, and piling up the substrate to make the surrounding walls (*ibid.*:37).

Fish kept in fishponds need to be fertilized, and in Hawaii, shellfish such as mussels and clams, and seaweeds were often used (Costa-Pierce 1987). An important innovation in the evolution of Hawaiian fishponds was the invention of a sluice gate, which allowed for the more efficient flow of water in and out of fishponds, and free passage of only smaller fish (Kikuchi 1973, 1976). Fish could be harvested by hand or net at any time, providing a constant, dependable source of food.

Fishweirs, fishtraps and fishponds imply that fish will be caught in large quantities, and would need to be consumed or processed quickly to avoid spoilage. Prehistoric techniques for the preservation of large amounts of fish may have included drying by sun or fire, smoking, and salting.

Evidence for aquaculture in North America begins in the Late Archaic (Decima and Dincauze 1998; Johnson 1942; Moss *et al.* 1989; Petersen *et al.* 1994), and is found throughout the Southeast (Ames 2001; Cleland 1982:768; Connaway 2007; Crook 1986; Fairbanks 1946:259; Hann 1996:100; Johnston and Cassavoy 1978; Jones 1999:327; Milanich 1996:142; Patton 2001:98, 193, 207, 252-254; Weisman and Dunbar 1993; Wheeler *et al.* 2003:544).

HUNTER-GATHERER COMPLEXITY

Social organization describes the inherent rules of how groups of people are structured, or socially organized. Societies are usually seen as either having some form of social complexity, through the presence of social distinctions (e.g. status differences such as classes, ranks, gender, age differentiation in roles, etc.), or not (egalitarian).

Social organization ranges from small groups that are simply organized along kinship lines, to organization based on achieved rank, or groups that have complex organizations based on many various levels of differentiation, such as inherited social inequalities (rank, class), power, wealth and skills.

Anthropologists generally tend to view social organization in a cultural, evolutionary perspective, with societies seen as developing progressively from simple groups to ones with increasing complexity, such as bands, tribes and chiefdoms. However many anthropologists argue that social processes and organization are not always unilineal, with societies having dynamic and variable social trajectories that include cycles of growth and integration alternating with periods of fragmentation and even collapse (see Anderson 1990b; Johnson and Earle 2000; Parkinson 2002b). Anthropological literature on social organization is immense (e.g., Chapman 2003; Earle 1984; Flannery 1972; Johnson and Earle 2000; Kirch 1984; Pluciennik 2005; Sahlins and Service 1960; Service 1962; Tainter 1988; Widmer 1988), and for the purposes of this study, I will use the basic definition of band, tribe and chiefdom as a point of departure for discussing hunter-gatherer complexity.

Bands are seen as the simplest social organization, consisting of small, family-based nomadic groups that lack any formal leadership. Archaeologically, evidence of bands is seen in small, temporary campsites. Tribes are more difficult to identify (Anderson 2002; Braun and Plog 1982; Parkinson 2002a), but they are viewed as larger groups than bands, also organized along kinship lines and are egalitarian. Tribes lack any formalized status differences between group members, except for perhaps a group leader or “Big Man” who are thought to have achieved leadership through demonstrated skills, charisma, or self-aggrandizing. Tribes may be semi-nomadic with seasonal migrations, with no permanent, sedentary villages. Other terms, such as “middle-range

societies” or “trans-egalitarian” (Hayden 1995) describe groups that are neither strictly egalitarian nor politically stratified.

Chiefdoms have hereditary, organized economic and political leadership through an individual or a lineage group, controlling wealth through access to important resources or trade with outside groups (Earle 1984, 1987, 1989, 1997; Chapman 2003; Johnson and Earle 1987; Kirch 1984; Peebles and Kus 1977; Service 1962; Tainter 1988; Widmer 1988). Power is passed on to the next generation through ruling lineage groups, and with many ranked levels of differentiation or hierarchies within each group. Chiefdoms are associated with relatively large permanent settlements with substantial investments in infrastructure, storage facilities and monuments. They are visible archaeologically as a hierarchy of communities with one principal center at its apex (and usually occur in environments that are capable of supporting intensive resource production and surpluses) (Hayden 1995).

Hunter-gatherers are traditionally seen as small, band-level groups pursuing a mobile, seasonal foraging economy (Bettinger 1980; Kelly 1995; Lee and DeVore 1968) based on an immediate-return system (Woodburn 1982). This is in contrast to delayed-return societies which hold rights over and control valuable resources, have delayed yields on labor, and invest in technical facilities for production, such as fishweirs, boats, nets, and food storage (*ibid.*). However, not all hunter-gatherers are necessarily egalitarian (Kent 1993) or strictly mobile, with many known examples of larger, more socially complex, sedentary groups with delayed-return economies, some of which are considered complex hunter-gatherers.

While complex hunter-gatherers are more difficult to define (Sassaman 2004), these are usually explained as the exception to the normative view of hunter-gatherer groups, occurring as specialized examples of extraordinarily affluent foragers. For example, some complex hunter-gatherers (e.g. Calusa, Chumash, Jomon, Tlingit, etc.)

have inherited leadership, and highly-stratified chiefdoms that are based on foraging economies (see Arnold 1991, 1995, 1996a, 1996b, 1996c; Emmons 1991; Fitzhugh 1996, 2003; Fitzhugh and Habu 2002; Habu 2001; Hayden 1992; Kim and Grier 2006; Koyama and Uchiyama 2006; Marquardt 1992; Price and Brown 1985; Price and Feinman 1995; Sassaman 2004; Widmer 1988). The non-agriculturally based complex hunter-gatherers of the Northwest Coast differed from chiefdoms in several regards: Northwest Coast societies were small relative to classic chiefdoms, though populations were dense; they had no clearly marked central place; and the fishing ecosystem was probably more stable than agriculture (Ames 1981:790).

The concept of social complexity is somewhat problematic in that it is not well-defined (see Chapman 2003; Sassaman 2004), and is a comparative term used to describe cultural behavior along a continuum of scale, as a relative measure of structural differentiation (Fitzhugh 2003:2). It can generally be agreed to mean “a movement toward greater organization, greater differentiation of structure, increased specialization of function, higher levels of integration, and greater degrees of energy concentration” (White 1949:367). Others see social complexity as a trend towards the more socially complex in terms of interconnectedness and “unequalness” (Chapman 2003:7). Some argue that the materiality of social complexity is expressed by an overall tendency towards creating larger, more internally differentiated and more complexly articulated structures requiring more energy to create and maintain (Trigger 1998:10). It is important to consider that social complexity may be defined in many different ways, and the way that complexity is materialized between different societies may be manifest materiality in many different ways (Chapman 2003:7).

Complexity is seen when changes in social interaction bring about enduring socioeconomic and social organization changes, such as new control hierarchies, additional levels of political structures, social statuses and ranks. These are often

viewed of terms of archaeological correlates, or traits (Peebles and Kus 19977), often exemplified by intensified agriculture; economic redistribution; craft specialization; long-distance trade networks; hereditary status; wealth; and burial differentiation.

Herein, I adopt Fitzhugh's (2003:2) definition of social complexity, which states that relative complexity is "a condition in which a system is composed of greater internal differentiation (of component parts) than another system to which it is being compared." This can be evidenced socially in horizontal differentiations (e.g. clans, moieties, families, or households) or vertically (rank and hierarchical differentiations). I also recognize that while the materiality of social complexity may be variable between different societies, increased social complexity should be reflected materially with an overall tendency towards creating larger, more internally differentiated and more complexly articulated structures requiring more energy to create and maintain (Trigger 1998:10). It may be difficult, if not impossible, however, to differentiate between expanding community populations simply building larger and more complicated communally-constructed features, from those which are executed under politically organized leadership that reflects hierarchy and differentiated, organized labor. As Johnson and Earle (2000) argue, societies are not necessarily locked into some kind of linear, evolutionary trajectory, but are engaged in continuous societal change, with variables such as changes in population; food production; exchange; warfare and power influencing the scale and complexity of each group, manifested in overall cycles of growth or fragmentation.

Several theories explain the driving forces behind the emergence of social complexity: specialized exploitation of local resources or micro-environments coupled with increased sedentism; an increase in population; the expansion of and increased importance of redistributive networks leading to hierarchical systems (Ames 1981:792);

and self-aggrandizement, individual power and wealth accumulation (Hayden and Gargett 1990).

ARCHAEOLOGICAL CORRELATES OF COMPLEXITY

Some archaeological correlates of complexity (see Peebles and Kus 1977) that will be examined for in this study include a hierarchy of settlement types and sizes; settlements located in highly productive areas; organized labor beyond the household group; evidence for resource intensification; the presence of storage facilities; and the development of a procurement technology indicative of specialized tools or devices supporting corporate production. Other correlates include segregation of elite from residential habitations, and the presence of isolated elite mortuary areas with major ritual displays. Lastly, complex chiefdoms often contain a paramount center that is larger and architecturally more complex than those of lesser chiefly centers (Anderson 1994; Wright 1984).

Simple chiefdoms are thought to include at least two levels of hierarchical control, demonstrated at the site level by arrangements of contemporaneous, culturally related communities (Anderson 1994; Steponaitis 1978). Often differences in site forms demonstrate differing site features that reflect corporate food production, surplus and storage activities. Johnson and Earle (2000) characterize chiefdoms by their coordinative scale, extending beyond a village or local group to many villages in a given area.

In south Florida, an increase in mound building activities in the Caloosahatchee region after AD 500 is viewed as evidence of the formation of Calusa complexity (see Dietler 2008; Marquardt 1992:48; Patton 2001; Widmer 1988). In particular, the presence of flat-topped platform mounds is often cited as evidence for elevated temples or high-status residences (Patton 2001:51).

Other south Florida landscape modifications, or I argue landesque capital (*sensu* Brookfield 1984), such as the construction of canals, are seen as evidence of increased social complexity (Goggin and Sturtevant 1964; Luer 1989). These are thought to have been complex engineering projects requiring coordinated leadership, to support high levels of inter-regional transportation and trade. Fishweirs, traps and impoundments should also be considered landesque capital (Brookfield 1984), investments in landscape construction to support increased efforts in corporate fishing strategies (Patton 2001:56).

Changes in mortuary traditions and burial mound forms in south Florida may also indicate changes in social complexity, with evidence of regional changes occurring around AD 900 (Luer 1989). In the Caloosahatchee area, isolated sand mounds become common after AD 900 (Patton 2001:50), and high-status residence mounds are expected to be bifurcated in shape (*ibid.*:52).

An increase in cutting-edged shell tools sometime around AD 800 is viewed as an increase in craft specialization (Dietler 2008; Patton 2001), an argued correlate of social complexity (Arnold 1987, 1992; Peebles and Kus 1977). Another potential correlate is the presence of *Busycon* shell drinking vessels, which are thought to correlate with the consumption of ceremonial teas in high-status mortuary contexts throughout Florida and the Southeast (see Brown 1976:20; Milanich 1994:135, 179, 220, 227, 398; Patton 2001:35).

Lastly, Widmer's argument that chiefdoms were extant in south Florida post AD 800 is widely accepted (see Dietler 2008; Patton 2001). Patton argues that "almost all south Florida sites have components dating from after AD 800, while only some have earlier components" which is viewed as evidence of social complexity via fissioning and the rapid establishment of new villages (Patton 2001:121).

CONCLUSION

In this chapter, I have outlined the major theoretical framework in which I orient this study, which includes consideration of a wide-ranging and complex inspiration of theoretical perspectives, including landscape theory; architecture and social space; and hunter-gatherer complexity. At the heart of the study, and acting as a unifying theme is the notion of landscape. This study first and foremost presents a multi-scalar, diachronic settlement pattern study, centered within an integrated landscape perspective.

Concomitantly, a major goal of this study is to characterize temporally and spatially a sample of TTI shell work sites to begin modeling a settlement pattern for the region. My goal is not simply to date landscape features throughout the region, but to examine shell work settlements as communities, and demonstrate how distinct shell work features formed, may have been used and re-used, imbued with meaning, abandoned, and evolved over time within the region. This reflects how community structures may have changed, how communities interacted with one another, and how changes evident in community organization reflect changes in social complexity over time.

CHAPTER 4 METHODS

INTRODUCTION

As outlined in previous chapters, many researchers have been intrigued by the massive size and complexity of shell work sites, and have offered a variety of untested interpretations as to their possible formation processes, spatial patterns, temporal affiliations, functions and purpose. One common assumption about shell work sites is that they represent the zenith of Glades culture and are therefore probably Glades III (Goggin n.d.:398, 1949a:28, Goggin and Sturtevant 1964) or Caloosahatchee II to III period constructions (Patton 2001; Torrence 1996:29). Others presume that by virtue of their complexity and large size, shell work sites may represent secondary chiefdoms that were somehow influenced or related to the Calusa chiefdom (Griffin 1988:309, 2002:322). Others suppose that the largest sites represent nucleated villages, and the smaller sites articulated with these, but served as specialized collecting or fishing stations (Griffin 2000:278; Widmer 1988:256-257). This presumes a hierarchical site settlement pattern, without the benefit of any supporting temporal data to determine how the differently sized (and shaped) sites related to one another through time.

Another assumption is that “the maximal extent of the site was utilized at a single point in time” (Widmer 1988:256), necessitating that all shell work features were coeval, and that the total shell work landscape was constructed and used simultaneously. Widmer recently proffered a similar interpretation for the Key Marco shell work site, contending that the entire site was comprised of three coexistent districts, including separate ceremonial, elite, and non-elite residential precincts (Widmer 2009). Lacking in Widmer’s argument is any supporting temporal data to determine what the different features and areas of this large site actually dated to, and if, and how, they were related to one another through time.

HYPOTHESIS

Throughout the TTI region, shell work sites appear to be arranged in spatially similar patterns, ranging from small, simple, non-complex linear and curvilinear shell midden ridges and rings, to massive, complete islands constructed with complex arrangements of shell (see Chapter 5). Does this suggest a hierarchical settlement pattern, as previously assumed? Does similarity or diversity in site forms and layouts, and the presence or absence of certain architectural features indicate changes in site functions, or social organization, over time? What do changes in site inter-relationships suggest over time?

The primary goal of this study is to test the hypothesis, that similarity or diversity in site layouts, and the presence or absence of certain architectural features will indicate changes in site functions, or social organization over time.

While forming the research design, two additional questions arose. The first is, throughout the region, are the differently shaped and sized shell work forms, such as small shell rings and large shell work islands, contemporaneous? The second question is whether particular features present at certain shell work sites (e.g. finger ridges) are likewise coeval, further are similar features found at multiple shell work islands built synchronically throughout the region, or at different times at different sites?

It is expected that investigation of shell work sites will demonstrate distinct temporal and spatial patterns over time, and that these patterns will be evident on two scales: site-specifically (intra-site), and regionally (inter-site).

RESEARCH DESIGN

As outlined in Chapter 1, this study aims to answer several fundamental questions about shell works, mainly:

- 1). How did shell work sites form?

2). What were their functions?

3). How did they relate to one another in time and space throughout the region?

Data resulting from these questions will help to test my hypothesis that distinct spatial and temporal characteristics of shell works reflect changes in community organization, and thus social complexity, over time.

In order to answer these questions, diachronic spatial and temporal data from multiple sites is critical, and a multi-scalar approach integrating a variety of methods was designed to study shell work characteristics within their various spatial, temporal and archaeological contexts. The following research design is organized into four main components to begin defining the spatial, temporal, archaeological and interpretive constituents of shell works. It should be noted that this settlement pattern study may be missing especially small, archeologically invisible sites (e.g. shell scatters, temporary camps, etc.), and is biased towards the sites that are presently visible within the region.

SPATIAL CHARACTERISTICS OF SHELL WORKS

The first priority of this study is spatially to define the characteristics of shell work sites. Though Caloosahatchee region shell work sites are a peripheral interest to this research, the area of investigation for this study is confined to the TTI. Following Parkinson (1989), the TTI can be divided into two distinct physiographic provinces, the Northern Province (NP), and the Southern Province (SP). Both provinces are separated from the mainland and open water by an extensive chain of interconnected bays and rivers, and are characterized by a dense mangrove island complex (Figure 12). The NP is situated between Cape Romano and the Lopez River, and contains a very dense concentration of mangrove islands. The SP is located south of the Lopez River to Cape Sable, and differs physiographically from the NP, with much larger islands and a much less dense concentration of mangroves.

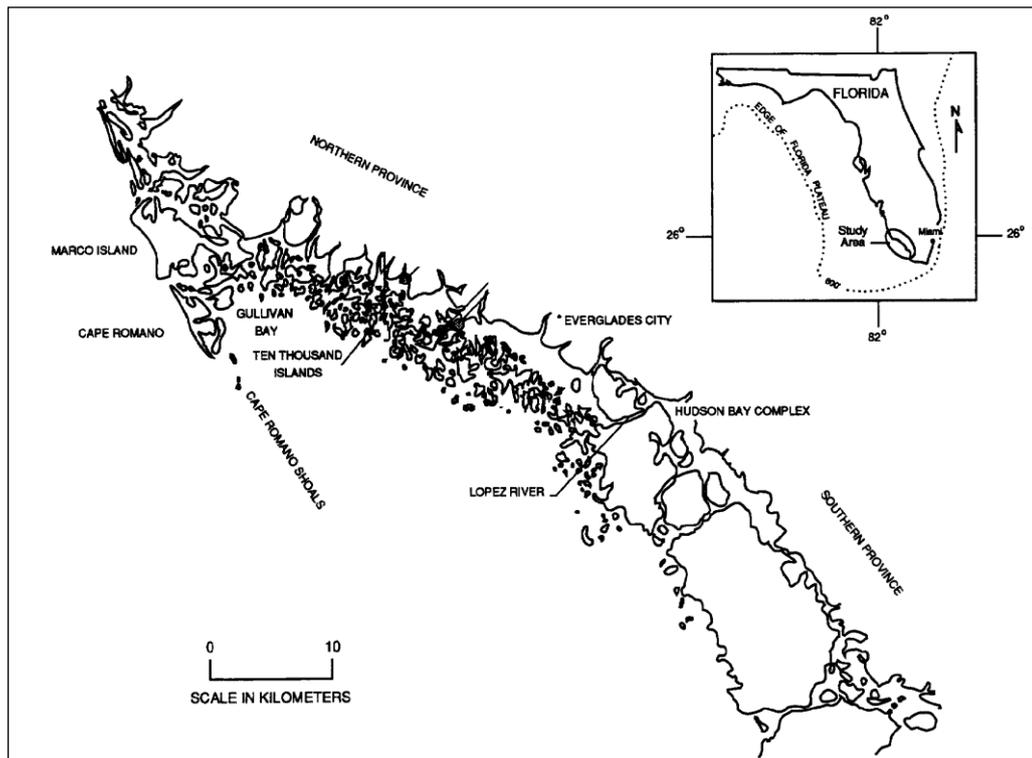


Figure 12. Ten Thousand Island (TTI) North (NP) and South Provinces (SP) (adapted from Parkinson 1989:961).

Others have also noted a difference in the concentration of sites between the two provinces (Hrdlička 1922:35, 50; Moore 1905:315, 1907:463). Calculating the density of known sites in both provinces, the NP contains 44 shell work sites along a 59 kilometer stretch, with a site density of one shell work site every 1.34 kilometers. Conversely, the SP contains only five known shell work sites within a 36 kilometer expanse, with a site density of one shell work site every 7.2 kilometers. With major physiographic and considerable site density differences occurring between the two provinces, it can be argued that the two provinces should be considered two distinct sub-regions. Since site density is greater in the NP, shell work sites within the NP of the TTI will be the focus of this study.

DIGITAL DATA INTEGRATION AND GIS

The first step in defining the spatial characteristics of shell work sites was to assemble, generate and incorporate a digital library of shell works data and graphics

into a regional Geographic Information Systems (GIS) coverage of the region. The first step was to acquire appropriate baseline spatial data, including all known archeological site locations, land use coverages, and background imagery. A set of USGS orthophoto quarter quadrangle digital raster graphic (DRG) imagery was chosen as the primary imagery data. All digital data was then incorporated into an ArcMap™ Geodatabase.

A thorough archaeological site file and literature review was conducted for each known site within the region, and existing descriptions, sketches, maps, photographs, and data were compiled into digital format. From these data, archaeological site maps were generated for all shell work sites with existing spatial data. Maps were scanned and electronically digitized in AutoCAD LT 2005[®] and when possible, converted into 3-D contour maps within Surfer 8.5 and ArcMap™ 9.3.1 Spatial Analyst.

Available aerial imagery was acquired, which included a series of black and white aerials from 1940, 1962, and 1963. These were particularly useful images, taken two to five years after major hurricanes had affected the area, greatly reducing vegetation cover and so enhancing the visibility of shell work features. The aerial images were imported into ArcMap™, and digitally geo-referenced, which helped to identify spatial signatures of shell work features at various sites.

The digital data integration and GIS served as the foundation for beginning spatial analysis of the shell work sites. When completed, all site images of known shell work sites were studied to determine spatial signatures and characteristic of shell work features. GIS was also employed for data visualization to help interpret spatial features, and conduct a comparative spatial analysis of shell work locations, features, site layouts and their geographical extents (Chapter 5). Descriptive categories and characteristics of shell work site types, sizes and their features were developed, which greatly assisted with defining spatially visible diversities and similarities between site types within the region.

SURVEY AND MAPPING

The second main component for defining the spatial characteristics of shell work sites was to conduct archaeological survey and mapping of selected sites that lacked prior or insufficient map data. Recognizing that successful survey techniques are critical for regional settlement studies (Kantner 2008), full-coverage surveys are usually impractical because of the time and expense involved in conducting such intensive studies. Refined survey methods have greatly improved the efficiency of conducting large-scale regional surveys, and methods such as remote-sensing, aerial imagery, GIS, predictive modeling, and improved sampling strategies offer immense efficiencies. A combination of these and other methods were used for the archaeological survey and mapping of shell work sites, an approach designed to allow for the maximum examination of multiple sites within the region.

The sample of sites to be surveyed and mapped was informed by completion of the digital data integration and GIS compilation. This helped to identify gaps in data, and guided in the selection of sites as higher priorities for investigation. I decided to sample a series of the larger and smaller sites that were grouped together in the NP of the TTI, in anticipation that examination of a variety of differently sized and shaped sites in close proximity would provide the best sample for potentially answering questions about the temporal relatedness between shell work settlements.

Two main types of mapping method incorporating different techniques and scales of accuracy were used. The first method was used to produce archaeological base maps of entire sites. Since shell work sites are extremely large (ten to fifty hectares), complicated, and densely vegetated, it is not feasible to systematically survey entire sites using high-resolution, gridded survey techniques, such as with digital Total Station technology. As an alternative, shell work site maps were created using a combination of

aerial imagery interpretation, field reconnaissance, site plan illustration, and Global Positioning System (GPS).

This method begins with the generation of a series of scaled, high-resolution field maps of each site in GIS, consisting of digitally ortho-rectified aerial imagery, with a superimposed UTM grid overlaying each map. These were each printed out and incorporated into a field map book. Visible spatial characteristics of shell work features identified in aerial imagery and GIS, and which were targeted for field verification, were also noted on the field maps.

Using the GIS field map book with gridded coordinates, each site was systematically surveyed by field walking. All sites mapped had near complete survey coverage, with large sites divided into quadrants for survey, usually taking several days to cover each quadrant. Mapping was conducted by field walking and drawing visible features on the pre-printed aerial maps of each site, by referencing coordinates on the maps, and by taking live, Trimble™ ProXR sub-meter accuracy global positioning system (GPS) readings. Elevations of features were estimated and noted on the field maps, and were based on known general elevations, reference measurements, and comparison to nearby survey benchmarks with known elevations.

During this stage of the field survey, each evening the day's map notations were translated into a digital version of the map in progress, and a new, draft version of the map was printed out and brought into the field the following day. This technique allowed for the generation and field checking of multiple draft site maps to verify accuracy. Edits gained from field verification were re-drafted into final maps, which were later digitized into AutoCAD LT 2005® and converted into 3-D contour maps using Surfer 8.5 and ArcMap™ 9.3.1 Spatial Analyst.

The second mapping method was used to produce detailed topographic maps of select areas and features of shell work sites using a Leitz Sokkia Laser Total Station.

This was done to create high-precision DEM (digital elevation models) and to create measured digital maps of features, and to provide a means of comparison for checking differences in the accuracy and scales employed between the two field mapping techniques.

At Russell Key, two types of shell work features were mapped with the Laser Total Station: a 0.28 hectare portion of a flat, open shell fields feature; and a 0.21 hectare portion of a series of water courts. For mapping the flat, open shell fields feature, a systematic 2-meter interval grid was established and over 2,000 individual points taken.

As has been suggested by Chapman (2006:64), earthworks (and by analogy, shell works) are complex features to map, and are usually most efficiently mapped using non-gridded techniques. For the area of the three water courts, this method was chosen. Several site datums were established, and multiple transects were mapped that cross-cut through the water court features.

A third mapping technique included producing measured sketch maps of several water court features. These were generated using expedient drawing and elevation measuring techniques, using gridded metric pull tapes, line levels, and stadia rods to measure and map topographic elevations. These were collected as point elevation data (X, Y, and Z values) in the field, and later, plotted in 3-D topographic software.

Employing a variety of survey and mapping techniques in this way allowed for efficiency and flexibility in recording multiple sites, and worked well to characterize the spatial characteristics of shell work sites. While using a Laser Total Station is preferable for the level of accuracy it provides, it is extremely time-consuming. For example, where it took 2 weeks to laser transit map 0.28 ha of shell fields (that were already relatively free of vegetation), it took 5-days to produce a generalized base map of the entire 28 ha. Russell Key site. While the Russell Key site map does not have the level of

detail and accuracy that a Laser Total Station topographic map may provide, the methods employed to map entire sites were found to be practical, reasonably accurate, and preferable in order to generate complete site maps. Detailed results of the survey and mapping are presented in Chapter 5.

ARCHAEOLOGICAL TESTING OF SHELL WORKS

Following analysis of shell works and shell ring spatial characteristics, it is critical to determine the temporal associations of when and how sites were formed, occupied, re-used, and abandoned. Systematic archaeological testing of a sample of sites is conducted in order to determine the nature, composition, formation processes, and temporal association of various shell work features and sites. This will help to determine how shell work and shell ring sites relate to one another in time and space throughout the region; if similarity or diversity in site layouts is temporally significant; if the presence or absence of certain architectural features indicate changes in site functions or social organization over time; and if inter-site and intra-site variability among differently shaped and sized shell work forms and features is temporally significant.

SAMPLING STRATEGY

In order to sample a variety of site forms, sizes, and features, spatial analysis is used to help categorize sites into three main types, based on overall size and form (see Chapter 5). These are categorized as major shell works, small shell works, and potential shell ring sites. Types of shell work features were also determined using spatial analysis, which helped guide sampling strategies for the study.

Table 3 presents a summary of the sites investigated; the level of testing; number of excavation units completed; number of controlled surface collection points collected; and radiocarbon dates obtained from each site. Intensive testing consisted of placing

multiple excavation units throughout each site that sampled a number of different shell work features. Limited testing consisted of one excavation unit per site, along with several radiocarbon samples taken from different areas of a site. At some sites, no excavation units were excavated, but multiple radiocarbon samples were taken from small, hand excavated units from the upper portions of shell work features.

Table 3. Summary of Sites Investigated.

SITE NAME	SITE TYPE	LEVEL OF TESTING	TEST UNITS	CSC ARTIFACTS	RC DATES
Fakahatchee Key	Major Shell Works	Intensive	11		25
Dismal Key	Major Shell Works	Intensive	6		20
Russell Key	Major Shell Works	Intensive	14	3396	40
Sandfly Key	Major Shell Works	RC Only	--		7
West Pass	Small Shell Works	Intensive	6	3962	12
Fakahatchee Key 3	Small Shell Works	Limited	1		5
Dismal Key SE Ring	Potential Ring	Limited	1		3
Everglades City No. 7	Potential Ring	RC Only	--		4
Everglades City No. 9	Potential Ring	RC Only	--		4
Everglades City No. 10	Potential Ring	RC Only	--		3
		TOTAL	39	7358	123

The sampling strategy prioritized intensive testing at major shell work sites for a number of reasons. First of all, since major shell work sites are much larger than small shell work and ring sites, and they contain many more types of complex shell work features, more excavation units were needed in order to test the diversity of shell work features, to adequately cover spatially diverse areas of each site, and to establish phasing and areal growth through time. Secondly, if major shell work sites represent a hierarchical settlement system as some argue, in order to support or refute this possibility intensive testing at multiple sites of the same size for adequate comparison is needed.

Intensive and limited testing of small shell work sites, particularly those in close proximity to major shell work sites, was the second priority. Testing of these sites was conducted in order to test Widmer's (1988:256) and Griffin's (2000:278) contention that smaller sites are components of a hierarchical settlement system, and are either

subservient settlements or are special use sites that are contemporaneous and articulated with their closer, larger neighbors. Alternatively, as I propose, smaller shell work and ring-shaped sites may represent earlier site forms that represent a different community structure.

Because of limitations in time and issues with accessibility, only limited testing and radiocarbon sampling were conducted on potential ring sites (with the exception of a potential ring at Dismal Key). However, because of the small size and simple forms of shell rings, it is likely that the limited testing and radiocarbon sampling conducted still provides an accurate baseline for temporal site association.

Spatial analysis of shell work sites determined that several distinct shell work features occur frequently within the region. These are discussed in detail in Chapter 5, but generally include shell rings; shell fields; flat-topped mounds; isolated sand and shell mounds; protective sea walls or breakwaters; districts of mounds and ridges; finger ridges; canals and water courts. The sampling strategy attempted to sample all of these feature types at as many sites as possible, in order to establish temporal associations, and to determine if there is any temporally sensitive inter-site and intra-site variability among sites.

EXCAVATION UNITS

Archaeological testing was designed to sample a variety of different shaped and sized shell work features, as well as attempt to sample geographically distinct areas of each site. Excavation unit locations were carefully chosen to meet these criteria, and were based on the results of previous mapping, GIS, and spatial analysis. The main research strategies for archaeological testing include determining archaeological constituents and stratigraphic sequences; recording and interpreting features; recovering

temporally and functionally diagnostic artifacts; and collecting samples for radiocarbon dating.

A major goal of archaeological testing is to address assumptions in the literature about how shell work sites formed, employing systematic testing to determine each feature's constituents and internal characteristics. Of particular importance is establishing stratigraphic sequences; understanding formation processes (e.g. whether midden was slowly accumulated in place, secondarily re-deposited, borrowed and filled, etc.); and determining potential phasing, timing, and accumulation or construction rates of particular features and sites.

For example, there is not much agreement on the definition of "midden," or how shell work sites formed. Widmer states that large shell work sites are "huge accumulations of marine shell" but that these sites "are *not* midden, but instead are composed primarily of clean shell fill, although some areas and mounds within them may include re-deposited midden" (2002:379). It is not clear what exactly Widmer means by "clean shell fill," how (and why) all this shell was collected, processed and deposited, and how this differs from "midden." Is Widmer suggesting that shell work populations harvested shellfish solely for their shells, as construction material, and did not use them as a source of food? I doubt this, and argue that if shellfish were purposefully collected, harvested and deposited, this constitutes a midden. If the same midden is later borrowed, moved, and re-deposited, or used as "fill" for construction material, the material used is still a "midden" (clean, or not), albeit, now within a secondary or tertiary context.

Likewise, Marquardt (2010) offers a recent critique of the use of the term "clean shell" to denote purposeful monument construction, arguing that "evidence of purposeful mound construction is unsubstantiated unless it can be clearly demonstrated that the shell-rich deposits are not middens." According to Marquardt, they are middens

if they contain anything other than pure shell, so by virtue of this definition, purposeful mound construction cannot occur with accumulated midden. I argue that middens, mounds and monuments can be comprised of pure clean shell, organic-rich shell midden, or combinations of these. I also argue that clean shell middens do not necessarily imply monumental construction.

I agree with Marquardt's critique that the term "clean shell" has not been well-defined, however, I still consider it a useful term (Schwadron 2010a; also within this text) to differentiate between shell middens which contain visible deposits of dark, organic refuse, sediments, charcoal, and dense artifacts and ecofacts (suggesting primary or secondary habitation refuse); compared to shell middens which contain primarily whole "clean" shells which lack any (or have *very* scant amounts) of the former constituents. I argue that differentiating between clean shell deposits and organic-rich shell midden is important, as their different characteristics may reflect different behaviors and histories (use and deposition); formation processes (primary, secondary, or tertiary); as well as different timescales (rapidly deposited vs. slowly accumulated).

Clean shell deposits (and organic shell middens) may be the result of a multitude of activities and divergent intentions, for example: some may reflect primary or secondary specialized shellfish processing waste dumps; others may be the results of intensive shellfish feasting episodes (and dumping); some are primary individual household refuse accumulations; others may be a combination of primary or secondary refuse dumping that either unintentionally or opportunistically resulted in the formation of features; and other deposits may have been purposefully shaped and constructed into features, monuments and the greater landscape. All middens, shell work features, and monuments may have a varied formation processes- some may have formed or were constructed slowly over time; or were formed or constructed rapidly; and some may

evidence punctuated use, construction, abandonment and re-use histories. They may be formed from either clean shell midden, organic-rich middens, or combinations of these.

It is commonly held that evidence of mound building with shell fill is evidenced in strata consisting of whole loose shells with little compaction, sparse sediments, and few artifacts, indicating rapid accumulation and construction. Conversely, dark, sandy, compacted strata containing occupational debris are interpreted to indicate *de facto* refuse and living debris (Aten 1999:143; Patton 2001:313).

Luer (2007) classifies the processes of shell midden formation at Big Mound Key into three methods of formation, with the first two as primary and secondary refuse, and the third, called “tertiary refuse,” consisting of fill from either primary or secondary refuse that was used to form mounds (*ibid.*:32).

Marquardt differentiates between casual shell midden accumulations and shell constructions, defining middens as “haphazard” accumulations of discarded materials, and mounds as “purposefully accumulated volumes of earth shaped into preconceived forms” (Marquardt 1984:17, 1992:423). Marquardt argues that sites like Josselyn Island are both middens and a mound, evidenced by accumulated midden formed all over the island that was subsequently rearranged by later prehistoric/proto-historic occupants of the island. He concludes that the complex features of the site were purposefully rearranged constructions built by a later occupation, and not as primary features formed *in situ*.

I argue that it is critical not to assume that all shell work features were formed by the same process, and that it is necessary to evaluate each shell work feature individually to determine its stratigraphic history and formation process. In this study, excavation units were used to help determine the nature and constituents of each shell work feature, to determine their construction and use histories, and to look for internal

features such as post molds; ash pits; hearths; and lenses of crushed shells that indicate former structures, activity areas, and living floors.

Further, in this study I often use the term “constructed” to describe certain shell work features, such as flat-topped mounds, shell finger ridges, and water courts. While some object to this terminology suggesting that it assumes intentionality for what may be simply accumulated midden features (William Marquardt, personal communication), I use the term to denote shell work features that appear to have been created with intention to replicate specific shapes and forms (e.g. flat-topped mounds, water courts, shell finger ridges, etc.). These particular features may indeed have been formed through a variety of processes (e.g. accumulated midden, secondary mounding, etc.), but their similar forms suggest intentionality, and thus, construction.

Excavation units consisted of at least 1-x-1 meter units, and were excavated by hand, using shovels, trowels and potato rakes, and were excavated in 10-cm levels following cultural strata. All excavated material was screened through 0.635 centimeter mesh screen, and all artifacts (e.g., ceramics, lithics, modified bone, modified shell) were collected. Diagnostic bone such as large identifiable pieces, fish vertebra and otoliths were collected, but non-modified food remains, such oyster shell and small bits of unidentifiable bone were not collected. All potential modified shell (non-food) was collected.

TEMPORAL CHARACTERISTICS OF SHELL WORKS

One of the challenges to building chronologies in south Florida is the prevalence of non-diagnostic, plain ceramics found on all sites (Cordell 1992:105; Luer and Almy 1980:207; Sears 1982:23; Widmer 1988:83, 2002:377). While the decorated Glades ceramic chronology defined by Goggin (1949a:31) has proven to be very accurate (types serving as effective time markers since being accurately correlated with many radiocarbon determinations [Griffin 1985, 1988, 2002; Ehrenhard *et al.* 1978, 1979,

1980; Ehrenhard and Taylor 1980; Taylor and Komara 1983]), decorated ceramics are very rare at each site. Plain, un-datable ceramics are in fact so ubiquitous in south Florida sites that they commonly comprise around 97 to 99 percent of all samples, with datable, decorated ceramics sometimes comprising only one percent of all samples (Schwadron 2002:117). For example, a recent analysis from a large sample (35,656) of ceramics from Everglades National Park determined that 97% of ceramics are plain wares (Schwadron 2010b).

Since very few other south Florida artifacts are reliable temporal markers, radiocarbon dating is critical in building accurate site chronologies. For this study, it was determined that radiocarbon dating samples of marine shell would provide the most reliable, accurate material for dating. This is for several reasons, including the fact that shell is amply abundant at all shell work sites, in contrast to charcoal, which is often rare or absent in shell middens. Shell discarded from shellfish subsistence activities also represents one of the best, shortest time-interval events available to date. For example, a fresh, living oyster is likely to have been collected, harvested, and discarded in a very short amount of time, and thus dating a particular oyster shell dates a short time interval event. Since shell midden accumulations are often formed rapidly, a carefully chosen sample from a defined midden stratum can provide an excellent *in situ*, sealed context short time interval event to date.

Another benefit to using marine shell samples is that oyster shell midden, once dumped, discarded, and formed into fairly homogenous strata, are fairly stable constructions, as shells of the same size often become “stacked,” and have less potential for mixing with lower levels. On the other hand, small pieces of charcoal mixed in with large oyster shells may have a higher risk of disturbance, bio-turbation and mixing, as small pieces can move much easily within the voids of larger shells (Thomas 2008:346). Lastly, marine shell is not contaminated by organic carbon from modern vegetation

decay, subject to “old wood effect” (Bowman 1990:51), or rootlet contamination like carbon can be (Thomas 2008:346). Any potential re-crystallization on shell is routinely checked for by labs, and an acid bath is always used to dissolve any potential surface contamination.

Since shell was available at all sites, shell samples were taken from all proveniences for possible radiocarbon dating. Each radiocarbon sample was taken carefully from a defined *in situ* stratum, usually directly from an open excavation unit wall profile from a specific stratum at a measured depth. In all cases, each shell was carefully removed by hand, placed in a separate bag, and labeled with the appropriate provenience information. Radiocarbon samples were taken from every unit sampling all strata in order to date sequences, and to determine temporal ranges and deposition rates of shell work features.

Several radiocarbon samples were not taken from excavation units, but from top samples of shell work features to determine terminal construction or occupation dates. These samples were taken by removing and discarding the top surface 10 cm of material to avoid any recent contamination or mixing, and taking samples from just below this depth.

Since oyster was the most prevalent mollusk at all sites, it was decided that to be consistent with dating, oysters would be chosen, and when possible, the largest, most robust shells were preferred. Other mollusks, such as lightning whelk and Florida fighting conch were also taken as samples, but oysters were most frequently chosen for dating.

After returning from the field, the shell samples were cleaned with water and air dried. All samples were identified as to species, counted and weighed. Clean, whole shells which showed no signs of re-carbonization were selected for dating. Approximately 115 grams of shell were submitted for each radiocarbon sample.

All radiocarbon dates for this study were submitted to two laboratories, Beta-Analytic (BETA) and the University of Georgia Center for Applied Isotope Studies (UGAMS). All marine shell samples were pretreated with diluted HCL acid etches to remove potential surface contaminations. Conventional radiometric analysis techniques synthesized sample carbon to benzene and measured ^{14}C content in scintillation spectrometers, calculating radiocarbon age based on a half life of 5568 years. $^{13}\text{C}/^{12}\text{C}$ ratios were measured separately for each sample using stable isotope ratio mass spectrometers, and used to correct for fractionization effects (Bowman 1990:20-23), normalizing relative to the PDB-1 international standard of -25 per mil, and to derive the conventional ^{14}C Age (Radiocarbon Age), reported as RCYBP (radiocarbon years before present, AD 1950).

Conventional radiocarbon ages were converted to calibrated calendar years through the CALIB 5 online calibration program (Stuiver *et al.* 2005), using the Marine04 curve for the Northern hemisphere. A regional reservoir correction factor (δR) of 33 +/- 16 was used for marine samples, as determined from data published at <http://www.calib.qub.ac.uk/marine>. All dates cited in this study are reported as 2 sigma (95% probability) corrected, calibrated to calendar years and rounded to the nearest ten year of radiocarbon years.

SYSTEMATIC SURFACE COLLECTION

At Russell Key and West Pass, several areas of each site were noted to have exceptionally high surface artifact visibility. These were located in the open, flat shell fields, with dense artifact debris suggesting possible domestic or specialized activity areas. Since Russell Key is one of the largest shell work sites, and West Pass is a small shell work site (and a potential ring site), and they are located very close to one another, it was decided that these two sites would be excellent candidates for comparative inter-site spatial analysis. Coupled with a high-precision Laser Total Station topographic map

of one shell field at Russell Key, this would provide potentially detailed data to elicit a micro-scale spatial analysis of community patterns.

The following methods for systematic, controlled surface collections were employed. In each area to be surface collected, zones were divided into working areas of about 150 square meters. Each area was given a unique site datum and numbering system for collection (e.g., Area 1, artifact 1-1). Areas were thoroughly walked over in 1-meter swaths, and any possible artifact was flagged with a uniquely numbered metal pin flag. The datum position was recorded with a Trimble™ ProXR sub-meter accuracy GPS, and each artifact was then bagged and labeled according to its unique area designation and piece-plot number. If more than one artifact were found within a 1-meter area, they were collected together. Each artifact's position was then mapped using polar coordinate mapping and a metric pull tape, and distance and angles from the datum to the piece-plotted artifact were recorded on the bag and in a field notebook. If time permitted, some piece-plotted artifacts were recorded directly with GPS. During post field processing, positions were calculated and converted to UTM coordinates and plotted in ArcMap™.

Efforts were made to collect all visible artifacts, including ceramics, lithics, bone, whole and broken shell tools, and certain diagnostic shell debitage pieces (all columella fragments, and all portions of outer whorls) that may be instructive as to whether shell tool production or other activities may have taken place at particular locales. However, small broken pieces of shell were not collected, and the surface collection is therefore biased towards larger shell debitage.

INTERPRETIVE CHARACTERISTICS OF SHELL WORKS

Finally, I seek an understanding of the functions, purposes, and possible meanings of shell work sites. As discussed in Chapter 3, I incorporate a multi-scalar, synchronic and diachronic landscape perspective, examining shell work sites as

individually constructed features and sites, as human centered social landscapes, and as a reflection of community organization on a regional scale. I examine shell work settlements as communities, and seek to understand how various shell work features may have been used, re-used, possibly imbued with meaning, abandoned, and evolved over time within the region. This reflects how community structures may have changed, how communities interacted with one another, and how changes evident in community organization reflect changes in social complexity over time. Using some of the constructs of architecture and social space discussed in Chapter 3, shell work site layouts and features, and the results of spatial, temporal and archaeological data are examined to interpret these themes (see Chapter 7). Archaeological correlates for social complexity are examined, as they may be considered as possible supporting evidence for changes in social complexity seen within shell work sites.

CHAPTER 5 SPATIAL ANALYSIS

INTRODUCTION

The following chapter presents the results of the spatial analysis of shell work sites. This includes defining regional observations about geographic placement and extent, and analysis of spatial characteristics and patterns found at a sample of shell work and shell ring sites. Results of survey and mapping are presented, along with graphics that integrate the output of a range of software programs (such as AutoCAD[®], ArcGIS[™] and Surfer) to enhance spatial analysis and data visualization of site patterns.

SPATIAL ANALYSIS OF SHELL WORKS

The first priority of this study is to spatially define the characteristics of shell work sites in the Northern Province (NP) of the TTI. As noted in Chapter 4, the NP has a much higher density of shell work sites than the Southern Province (SP), with 44 shell work sites distributed along a 59 kilometer stretch, compared to the SP, with only five known shell work sites within a 36 kilometer expanse. Physiographic and site density differences between the two provinces suggest that they should perhaps be considered separate sub-regions, and that determining settlement patterns for each area should be conducted separately. The present study focuses on shell work in the NP.

Following Widmer (1988:256) and Griffin's (2000:278) general categorization of sites, shell works were divided into three categories based on size and major attributes. The first category are major shell works, consisting of sites ten hectares and over in size. These sites are thought to represent large, nucleated villages, or perhaps the political or religious centers of local chiefdoms. The second category consists of shell works less than ten hectares, termed small shell works, thought to represent smaller villages (Griffin:*ibid.*; Widmer:*ibid.*). The third category is potential shell ring sites,

which vary in form and size, including curvilinear, crescent, “C”-shaped and circular sites, traditionally interpreted as small fishing hamlets or collection stations (Widmer:*ibid.*).

SHELL WORKS DISTRIBUTION

MAJOR SHELL WORKS

The Northern Province (NP) of the TTI contains thirteen major shell work sites (compared to the SP, with only two), ranging in size from ten to 50 hectares (Figure 13, Table 4). The largest of the major shell work sites are located in a linear succession within the central portion of the mangrove island complex, nestled in-between the open ocean, the inner chain of bays and the mainland shoreline. Measuring a straight lineal distance between each of the largest (non-riverine) sites, the total distance from the northernmost shell works, Key Marco, to the southernmost site, Lopez Place, is 48.4 kilometers.

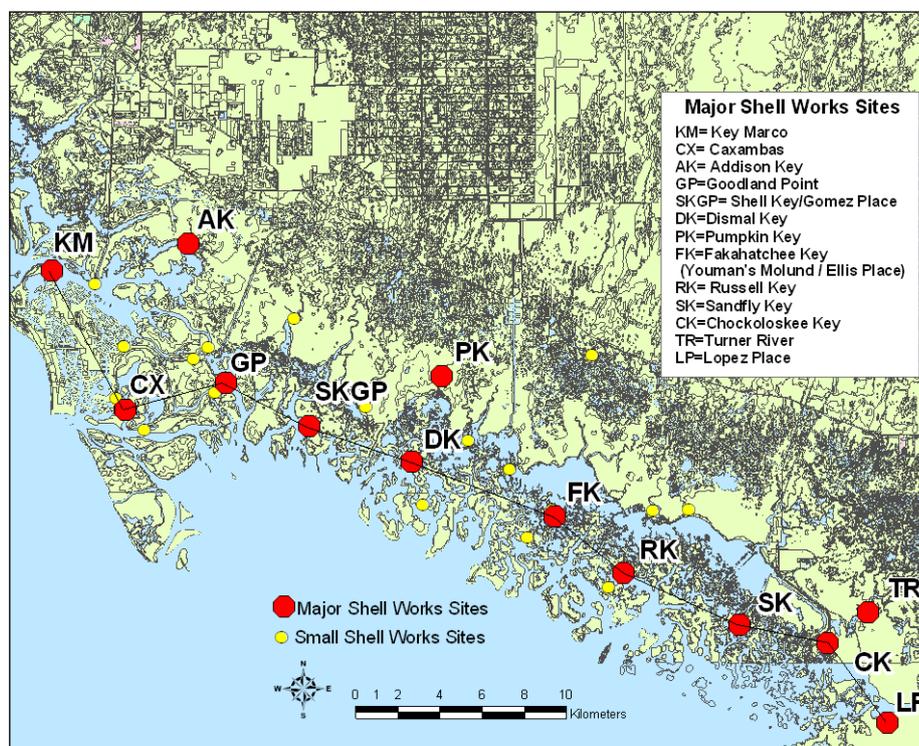


Figure 13. Distribution of major shell work sites in the NP TTI.

It is hypothesized that if major shell work settlements were purposefully located at equidistantly placed intervals in the landscape, sites should be positioned approximately every 5.4 kilometers. Calculating the lineal distance between each major site (Table 5), it is evident that major shell work sites were not randomly situated, but are relatively equidistantly placed. The majority of the sites were within one standard deviation ($s=1.26$) from the mean distance (5.4 km) between sites. This strongly suggests that major shell work settlements were purposefully positioned, and that these settlements may have served as nucleated villages or centers with discrete, defined territories, perhaps related to controlling access to fishing grounds, shell fish beds or other resources; were catchment areas, or were equally divided territories to maintain social or political boundaries.

Table 4. Major Shell Work Sites and Site Sizes in the NP TTI.

SITE NAME	SIZE (HECTARES)
Chokoloskee Key (CK)	50 ha
Fakahatchee Key (FK)	40 ha
Dismal Key (DK)	30 ha
Russell Key (RK)	23 ha
Goodland Point (GP)	22 ha
Caxambas (CX)	20 ha
Sandfly Key (SK)	20 ha
Key Marco (KM)	18 ha
Shell Key/Gomez Place	10 ha
Turner River (TR)	10 ha
Lopez Place (LP)	10 ha
Pumpkin Key (PK)	<10 ha?
Addison Key (AK)	<10 ha?

Distances between major shell work sites in the Caloosahatchee Region are similar, with an average distance between major settlements 4.2 km (Patton 2001:341). Taking average canoe travelling time into account (4 km per hour, Blanchard 1999:41), sites in both the Caloosahatchee Region and the NP of the TTI are located close enough to one another to facilitate close communication and daily interaction. Considering that an effective, daily exploitive range for a single hulled canoe is calculated to be about 16 km (*ibid.*:40), average distances between the largest TTI shell work sites is never greater than 14.5 km, suggesting that daily interaction between most sites was possible.

However, sites on the northern and southern ends of the NP, such as Key Marco and Chokoloskee, are too far apart (40 km) from one another to expect that daily contact between these settlements occurred.

Table 5. Distances Between Each Major Site (Predicted Mean Distance is 5.4 KM, s=1.26).

SHELL WORKS	DISTANCE (KM)	DIFF. FROM PREDICTED MEAN
KM to CX	7.5	2.1
CX to GP	4.9	0.5
GP to SKGP	4.5	0.9
SKGP to DK	5.5	0.1
DK to FK	7.3	1.9
FK to RK	4.2	1.2
RK to SK	6	0.6
SK to CK	4.3	1.1
CK to LP	4.6	0.8
Total Distance	48.8	

Ranking sites in order of size, the four largest shell work sites (Table 4) are located in the southern half of the NP. If the major shell work sites were hierarchically ranked centers, based on size, Chokoloskee Key could be predicted to have been the pinnacle site. Although its position at the southern end of the NP makes it difficult to imagine that it could have maintained influence over sites located as far as 48 kilometers to the north (e.g., Key Marco), by analogy, in the nearby Caloosahatchee region, Mound Key served as the supreme Calusa capital and presumably maintained authority over other major shell work sites within the region such as Pineland, located a distance of 42 kilometers north of Mound Key.

Unfortunately, almost all of the shell work features of Chokoloskee Key have been destroyed by modern development. However, early site descriptions, sketch maps, reports of very limited testing and aerial photographs of the shell work site prior to destruction are used to reconstruct how the site plan and features may have appeared.

The second, third and fourth largest sites within the NP are Fakahatchee, Dismal and Russell Keys. These sites are aligned closely to one another, in an uninterrupted row, and are situated centrally within the NP. Is it possible that these sites may also have functioned as coordinated primary or secondary centers, given their proximity?

Comparing three major Mississippian mound groups in the American Bottom, Cahokia (the largest) is located eight kilometers from the East St. Louis and St. Louis mound groups, which are both in turn a distance of only four kilometers apart from one another. This demonstrates that large mound centers can in fact be situated very close to one another, even in a strongly hierarchical society like the one present during the early Mississippian period of the American Bottom (David Anderson, personal communication).

The smallest of the three major shell work sites are riverine, located up and along the banks of major river margins. Two of these sites, Turner River and Pumpkin Key, have very different site plans than the rest of the major shell work sites. Both are very complex sites, consisting of several linear rows of very large mounds arranged perpendicular to the river. Based on the few sketch maps that exist for the site, Pumpkin Key has as many as 40 individual mounds, ranging in height from one to seven meters. Turner River has 37 large mounds, some reaching 7.6 meters in height, and 30 meters in length. Turner River and Pumpkin Key are also located about the same distance up each of their respective rivers from the river mouth (.8 kilometers), and both are located on the east bank, situated around precipitous bends in the river. Lastly, each of these riverine sites are situated across from two of the largest shell work sites, with Turner River located two kilometers northeast of Chokoloskee Key, and Pumpkin Key located four kilometers north of Dismal Key.

SMALL SHELL WORKS

There are 31 reported small shell work sites within the NP, however, almost all of these sites are unmapped and have never been investigated, so not much detail can be provided with respect to their site plans. All, however, are substantially less than ten hectares in extent, ranging in size from less than one hectare to circa four hectares in extent. Spatially, small shell work sites tend to be located closer inland, along the

mainland shore-face, with the exception of two sites: Fakahatchee 3 and West Pass, which are partially ring-shaped, and are also considered in this study to be potential shell ring sites. Since small shell works sites are much smaller and much less visible than the major shell works sites, there remains a potential for undiscovered small shell works sites, and so calculation of average distance between small shell work sites was not calculated.

POTENTIAL SHELL RINGS

The last category is potential shell rings. Spatial analysis of the entire TTI region identified twelve potential shell rings, ten of which are located within the NP (Table 6). The two shell rings lying outside of the study area include Bonita Shell Works, north of the NP, and House’s Hammock, in the SP. The ten potential NP shell ring sites are all isolated sites and do not include other possible ring-shaped features present and conjoined to other features at major shell work sites (e.g., Dismal Key, Fakahatchee Key, Russell Key and Sandfly Key), or other potential shell rings that have since become inundated by a post-occupational rise in sea level and are no longer terrestrially visible.

Table 6. Potential Shell Ring Sites in the NP TTI, with Estimated Maximum and Minimum Outer Ring Diameters.

SHELL RINGS	MAX. SIZE EST. (M)	MIN. SIZE EST. (M)
*Everglades City No. 11 (EC 11)	n/a	n/a
*Everglades City No. 10 (EC 10)	72	45
**West Pass (WP)	245	230
*Everglades City No. 7 (EC 7)	60	30
*Everglades City No. 9 (EC 9)	70	45
**Fakahatchee Key 3 (FK3)	213	118
Santina Horseshoe (SH)	110	36
Dismal Key Southeast Ring (DKSE)	270	104
Shell Key Ring (SKR)	218	178
Horr’s Island (HI)	160*	100*

*Sites have not been systematically mapped and measurements are based on sketches of extent of visible shell from surface inspection and aerial images. ** Site is also considered to be a small shell works.

As Widmer (1988:256) and Griffin (2000:278) contend, these small ring-shaped shell middens represent a different category of site in their conception of a Glades hierarchical site settlement pattern, and probably represent small fishing hamlets or

collection stations that articulate with the larger shell work sites. I predict otherwise: the size and shape of some of these sites are consistent with Late Archaic period shell rings found throughout coastal Florida, Georgia and South Carolina, and some are likely to be confirmed as such, and therefore related to a greater southeastern Archaic shell ring culture. As recently noted by the National Park Service, at least twelve distinct shell ring culture areas are known for the southeast, but none have yet been identified for the Everglades (Russo 2006:52, 57). I suggest that some of these TTI ring-shaped shell middens are likely to be determined to be Archaic shell ring constructions, and constitute part of a newly recognized Everglades shell ring culture.

The spatial distribution of NP shell rings differs from that of major shell work sites (Figure 14). Most notably, almost all of the shell rings are located further south towards the outer margins of the mangrove island complex, closer to open water. This is consistent with models for earlier site settlement locations, which predict that Archaic period sites would most likely be located in places marking former lower sea level positions that are known to have occurred during that time (Balsillie and Donoghue 2004; Blackwelder *et al.* 1979; Dunbar, Webb and Faught 1992; Fairbridge 1961, 1974; Faught 2004; Goodyear and Warren 1972; Gagliano *et al.* 1982; Garrison 1992:113; Ruppé 1988:59; Stapor *et al.* 1991:815; Warren 1964).

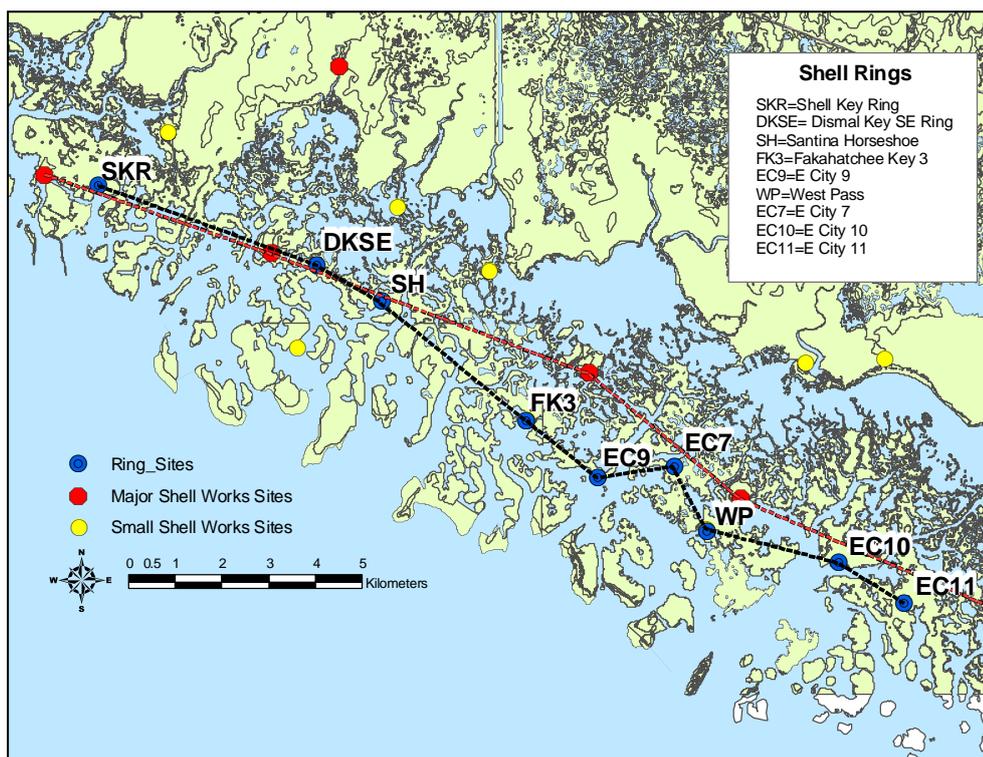


Figure 14. Distribution of shell ring sites in the NP TTI.

One confirmed Archaic shell ring site, Horr’s Island, appears to be an outlier in several regards. First, it is located at a much greater distance away from any other shell ring site, at over 8 kilometers from its nearest neighbor, Shell Key Ring. Horr’s Island is also physiographically atypical from the rest of the TTI, consisting of a remnant Pleistocene sand dune formation rising up to fifteen meters above sea level, making it the highest natural point in southwest Florida (Russo 1991:1). This unique high elevation location is known to have served as an important focal point for prehistoric populations during the Late Archaic (*ibid.*), when sea level was at a much lower position.

Horr’s Island’s position on top of a highly elevated sand dune, and not within the typical low-lying chain of mangrove islands like the remainder of the TTI suggests it may have been preferentially settled, utilized and accessed differently from the rest of the region. Because of its unusual geographic situation, the site’s location was not

calculated in the site distance-density analysis (hence it is not included on Figure 14), and only potential shell ring sites situated within the mangrove island complex proper were considered in this study.

The linear distance of the nine potential shell rings located in the NP mangrove island complex, between Shell Key Ring and Everglades City No. 11 is 19.5 kilometers. If shell ring settlements were purposefully located at equidistantly placed intervals along the mangrove chain, sites would be expected to be positioned at approximately 2.16 kilometer intervals. Spatial analysis determined that in the southern portion of the NP, shell ring sites are spaced from 1.5 to 2.95 km apart (Table 7). In the northern half of the NP, a large gap exists between several sites, most notably, between Shell Key Ring and Dismal Key Southeast Ring. This parallels a similar gap seen with major shell work sites in the vicinity, which may indicate differential resource abundance, and/or reflect how communities may have divided up territories to address differences in resource access. The gap may also indicate the location of a former major inlet or waterway that has since filled in with mangroves.

Table 7. Distances Between Each Shell Ring Site. (Predicted Average Distance is 2.16 KM).

SHELL RINGS	DISTANCE (KM)	DIFF. FROM PREDICTED MEAN
SKR to DKSE	5	2.84
DKSE to SH	1.6	0.56
SH to FK3	4	1.84
FK3 to EC9	2	0.16
EC9 to EC 7	1.6	0.56
EC7 to WP	1.5	0.66
WP to EC 10	2.95	0.79
EC10 to EC 11	1.5	0.66
Total Distance	19.5	

SHELL WORKS SURVEY AND MAPPING

The following presents the results of spatial analysis of individual NP shell work and ring sites. The first section presents data on major shell work sites that were surveyed and mapped in detail as part of this study (Fakahatchee Key, Dismal Key, Russell Key and Sandfly Key), followed by spatial analysis of major shell work sites where minimal forms of existing site map or sketches were utilized and re-interpreted (e.g., Key Marco and Turner River). In some cases, sites such as Caxambas and Addison Key have been almost totally destroyed, and no maps exist for these sites; as a result these sites are not discussed. For other destroyed sites like Chokoloskee Key, early aerial photographs and site sketches do exist, which are used to reconstruct shell work site plans and features prior to their destruction.

MAJOR SHELL WORKS

Fakahatchee Key/Ellis Place/Youman's Mound. Fakahatchee Key is the second largest shell work site in the TTI, encompassing over 40 hectares (Figure 15). The site contains two additional, separately designated sites (Ellis Place and Youman's Mound), considered in this study to be distinct site features, but part of Fakahatchee Key shell works. Historic settlers lived on the island in the 1880s-1940s, mostly on the north end, and used the island as a base for fishing and farming (Tebeau 1957). Their home sites are marked by numerous concrete cisterns.

In 2008, using a previously generated base map (Beriault *et al.* 2003:41), the site was re-surveyed and tested for this study, partially funded by a National Geographic grant (Schwadron 2009a). The current study resulted in minor revisions to the original base map (Figure 16), and the generation of multiple new maps and visualizations, as well as substantial data from intensive archeological testing (see Chapter 6).

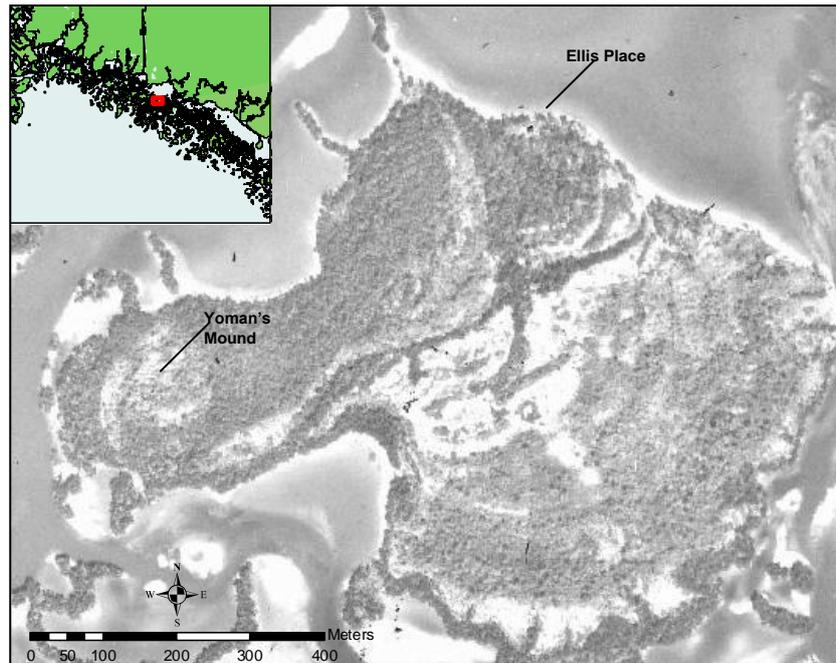


Figure 15. Aerial photograph of Fakahatchee Key, 1963.

The site was first recorded by Moore (1900:377), describing it as un-surveyed, with up to 150 acres of extensive shell deposits. Hrdlička (1922:33) next visited the site, describing Youman's Mound as a six meter tall conical mound from which locals reported recovering human remains. Ellis Place, an isolated oyster-shell mound on the northern end of the island, was described as 60 meters long, 24 meters wide, with a "very regular outline," and 3.6 to 4.5 meters in height. The site received no additional archaeological work until the site was surveyed and mapped in 2003 (Beriault *et al.* 2003:41). Prior to this study, no archaeological testing had ever been conducted at the site.

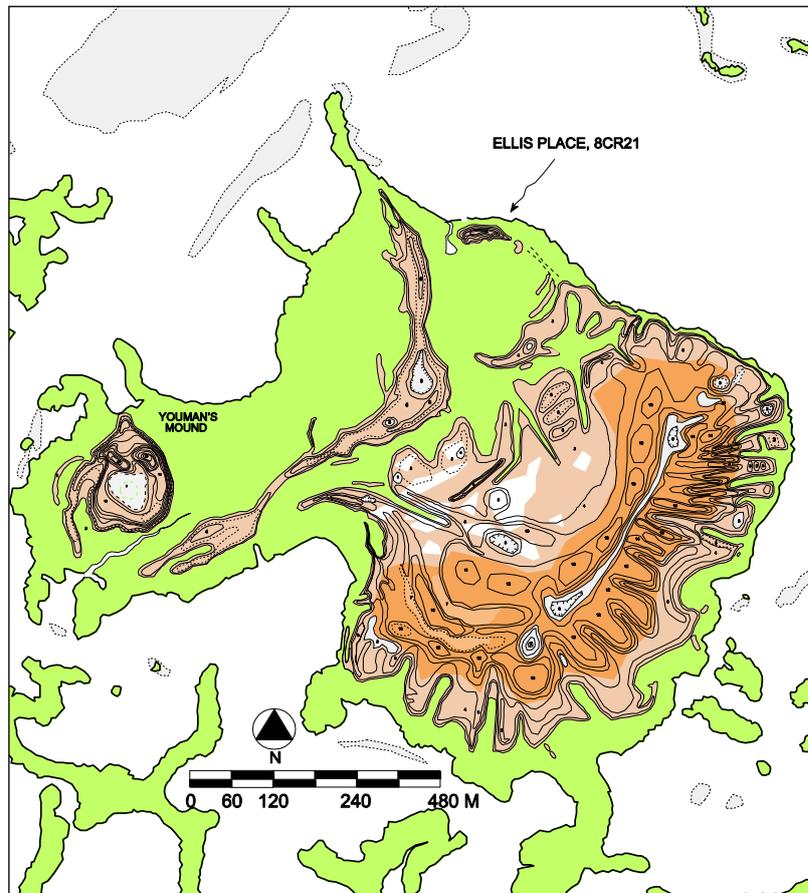


Figure 16. Revised map of Fakahatchee Key (2008) (Adapted from Beriault *et al.* 2003).

The following spatial observations can be made about the site. Several prominent shapes or forms characterize the overall site layout, most notably, the repetition of a series of concentric, curvilinear and ring-shaped features which face northwest. Following this curvilinear orientation, the site appears to be arranged into several spatially and characteristically distinct features and site areas. This includes the Youman's Mound complex; several large curvilinear ridges or shell rings; an expansive area of open, lower shell fields; a concentric chain of mounded ridges and mounds; and a series of finger ridges, shell benches, canals and water courts (Figure 17). Each of these is discussed in detail, below.

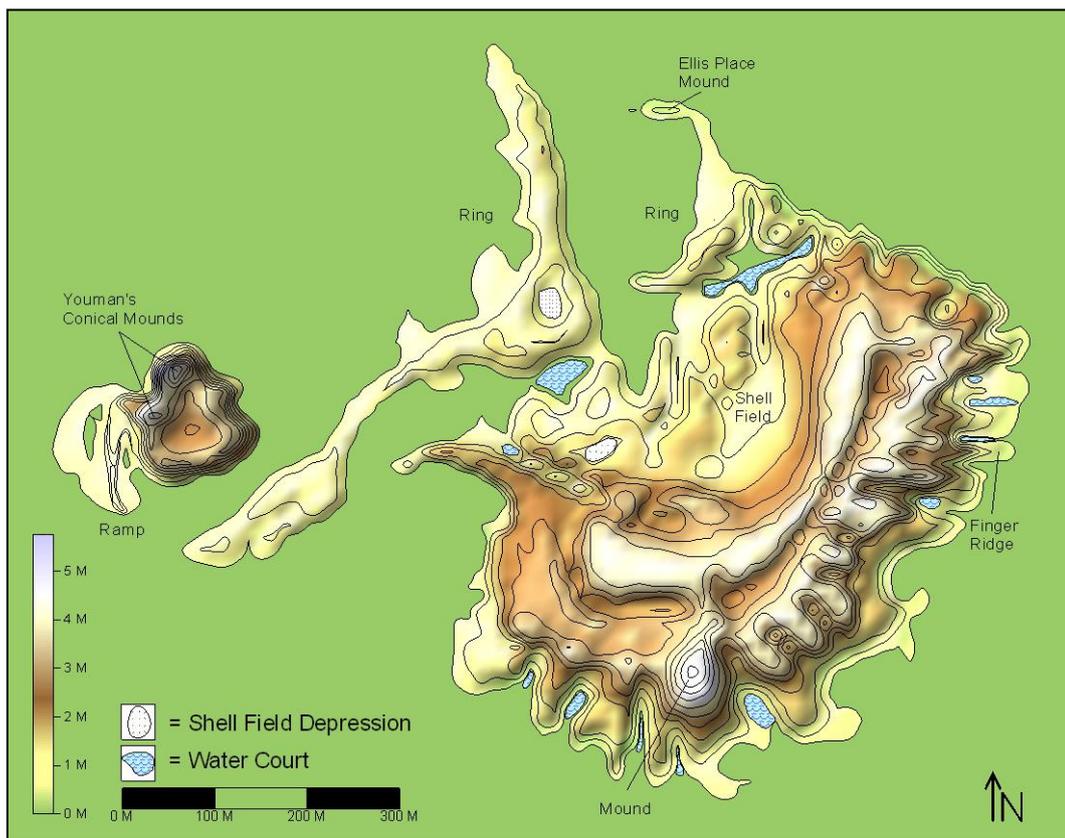


Figure 17. Contour map of Fakahatchee Key.

Youman's Mound. The Youman's Mound complex is located on the western end of Fakahatchee Key Island, encompassing about 1.6 hectares (Figure 18). It is a very complex, impressive site, consisting of a large, slightly rounded-triangular ring enclosure measuring 120 meters by 130 meters. The ring's perimeter is an elevated but slightly flattened ridge about 3.5 to 4.5 meters in height. The central area of the ring is recessed, with a lower, but still elevated plaza about 2.5 meters in height. At the north end of the complex is a pair of very imposing, steep-sided conical mounds nearing 8 meters in height.

Another component to the site is a long, low ramp located on the southwest edge of the site that gradually winds up, and leads into the complex, suggesting the possibility that ritualized movement or a planned processional route was prescribed to gain entrance into the site. The large, open interior suggests a plaza or a public

gathering place, evocative of an arena for civic or ceremonial interaction. The view from the central interior towards the pair of conical mounds is impressive, and the mounds (if not the whole complex) certainly qualify as monumental in stature and position. Though speculative as an interpretation, perhaps the mounds were built as monuments to evoke awe, power or respect, were imbued with sacred or ceremonial meaning, or functioned in some sacred or ritualistic manner.

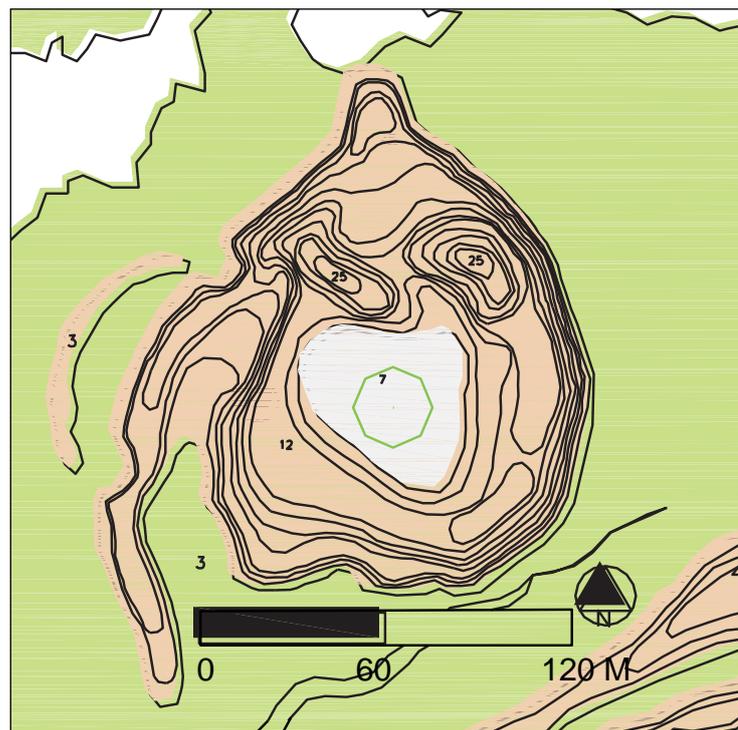


Figure 18. Detail of Youman's Mound complex (Adapted from Beriault *et al.* 2003).

Shell Rings, Ridges and Mounds. Located east of the Youman's Mound complex are several large, open curvilinear midden ridges and smaller ring-shaped middens. The western curvilinear midden ridge is close to 900 meters in length, but the northern, distinctly ring-shaped portion of the midden measures about 400 meters wide at the ring's widest opening. There is a single, large, flat depression in the central, highest portion of the ridge, which may have served as a central plaza.

The next feature is a possible shell ring. Though no longer completely connected, with portions of the ring now inundated by rising sea levels and encroaching mangroves, it appears that this feature may have once been a fully connected shell ring, consistent in shape and size with other known Southeastern shell rings. The ring faces west, measuring approximately 190 meters at the ring's opening. Currently, the ring's interior contains a deep pond filled with water and mangroves.

Superimposed on the north arm of the ring is Ellis Place, a large isolated ridge mound encompassing 0.28 hectares. The feature is about 65 meters long, 20 meters wide, is very steep-sided, and up to 5.5 meters in height. The top of the mound is flattened (suggesting it housed a former structure), and narrows to only 4 meters wide at the top. Its tall height and northern position at the end of Fakahatchee Key provides an impressive vantage point with a panoramic view of the surrounding sea and the interior of the island, and would have made an advantageous lookout.

Shell Fields. Located within the central portion of Fakahatchee Key is an expansive area of low, gently undulating shell fields, encompassing about 6.5 hectares. The shell fields appear to be flat compared to other shell work features, but subtle variations in topography are apparent, which include slight oval depressions, very low curvilinear ridges, and small shell benches. Shell fields appear to have been purposefully kept open, relatively level, and may represent public plazas or communal work areas.

Shell Mound/Ridge District. Along the eastern, outer edge of the island is a concentric chain of mounded ridges and mounds. This area is arranged in a large arc, covering about 6 hectares, partially enclosing the interior shell fields. Most of Fakahatchee Key's mounds are 3.5 meters in height or less, with only one mound reaching a maximum height of five and a half meters. Each mound is separated by a low ridge that may have served as a canoe portal or entrance way to the mounds.

Finger Ridges and Water Courts. The entire eastern perimeter of Fakahatchee Key has a complex arrangement of over a dozen protruding shell finger ridges that radiate out from the site towards the water. Finger ridges vary in shape and size, but all are linear, commonly from 20 to 40 meters in width and 70 to 80 meters in length. The tops of the ridges are level, suggesting that they may have served as platforms or were walked over. Finger ridges may be the equivalent to shell benches commonly described by others (e.g., Carr and Beriault 1984:4-5; Cushing 2000:4).

In-between most of the shell ridges are canal-like troughs, some which are presently filled with water, but most of which are now filled in with sediment and mangroves. Some appear to have extensions or partial enclosures built with shell, suggesting that they could have functioned as fish traps. Some are totally enclosed ponds which may be water courts.

Dismal Key. This is the third largest TTI shell work site, encompassing 30 hectares (Figure 19).

Dismal Key was visited briefly by Moore (1900:377) and Hrdlička (1922:31-32), who both noted its extensive, but then un-surveyed shell works. One settler is recorded to have lived on the island (Hrdlička 1922:32), with a small house site and farmed area on the north entrance to the site. The former historic settlement is marked by a clearing and the remains of a structure. The site received no additional archaeological attention until 2003, when it was first surveyed and an archaeological base map was produced for the site (Beriault *et al.* 2003:49).

In 2008, using the previously generated base map (Beriault *et al.* 2003:49), the site was re-surveyed and archaeologically tested for this study (Schwadron 2009a), resulting in minor revisions to the original base map (Figure 20), the generation of multiple new maps and graphics, and substantial archaeological data (see Chapter 6).

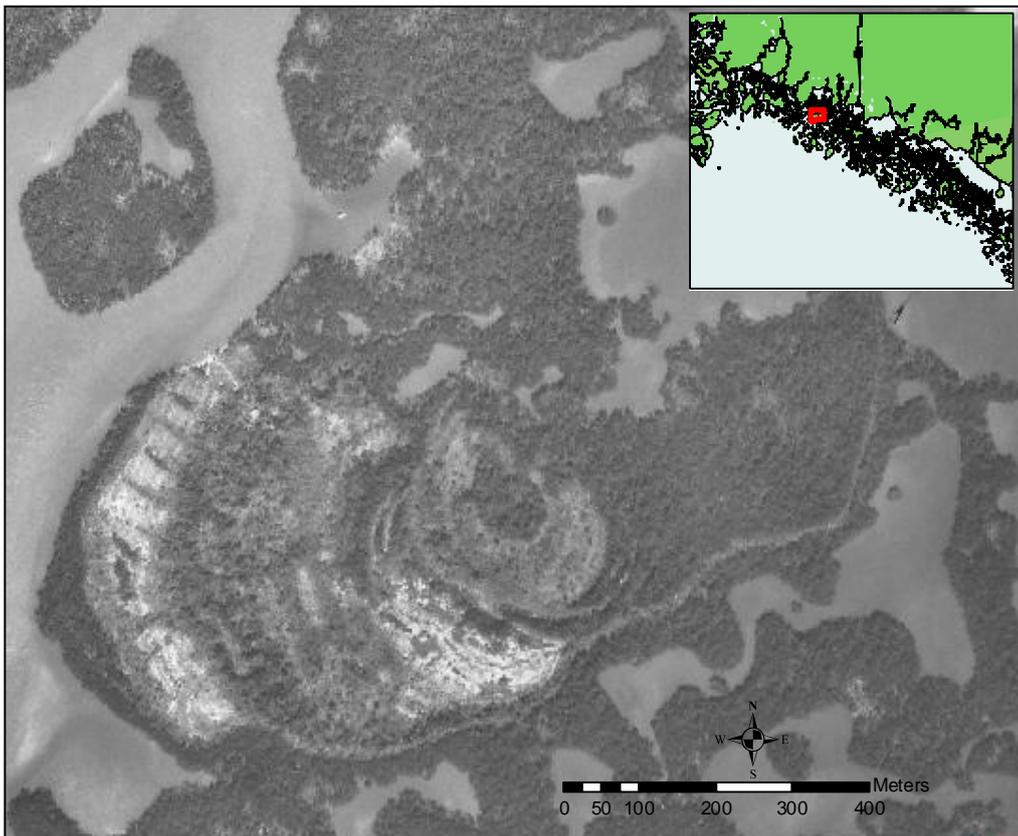


Figure 19. Aerial photograph of Dismal Key, 1963.

The Dismal Key site has an overall bilateral symmetry, and has a similar layout to Fakahatchee Key. This includes an overall concentric, crescent-shaped site form with multiple, nested and expanding arcs or crescents. Much like Fakahatchee Key, the site appears to be arranged into several spatially and characteristically distinct features and site areas, perhaps suggestive of a common plan and design (Figure 21). These are discussed, below.

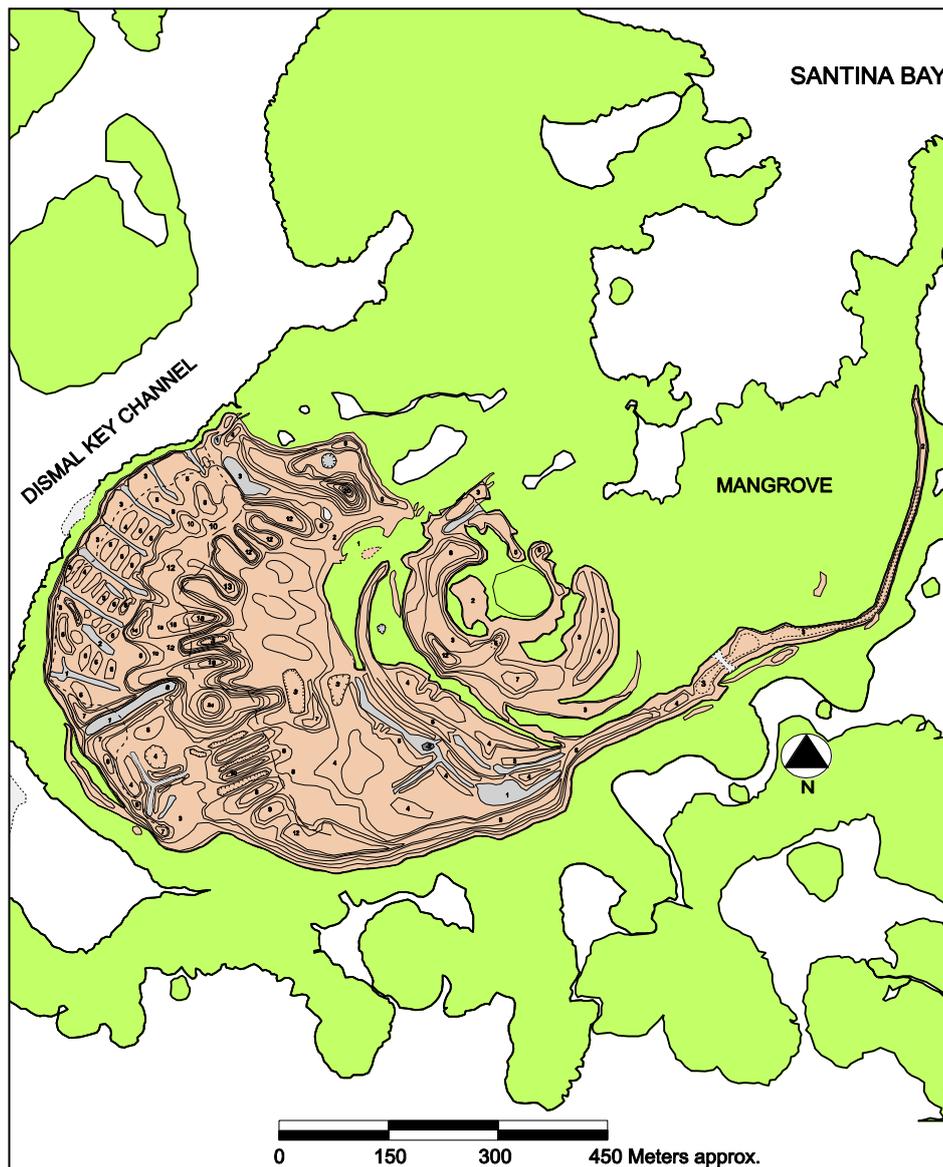


Figure 20. Revised map of Dismal Key (2008) (Adapted from Beriault *et al.* 2003:49).

Shell Ring. A single “C”-shaped shell ring lies at the interior of Dismal Key, with its ring opening facing northeast, measuring approximately 275 meters wide from its outer ends, and about 50 meters wide within its interior. The outer edges of the ring are steep-sided in the highest points, with the highest elevation reaching 4 meters at the center of the ring. The ring encloses a low but raised open plaza, which in turn encircles a deep pond or water court inside the central interior of the ring.

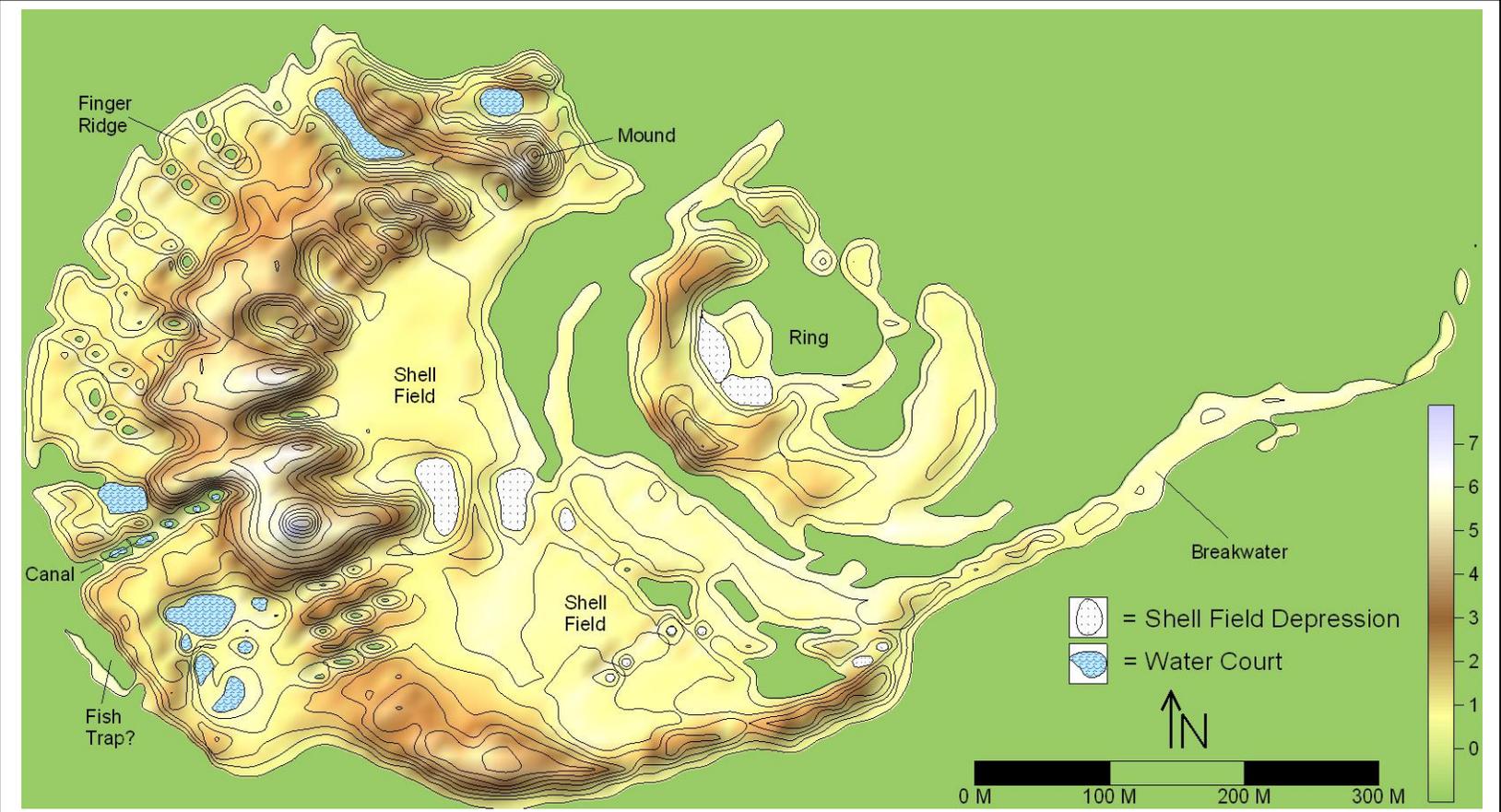


Figure 21. Contour map of Dismal Key.

Shell Fields. Similar to Fakahatchee Key, Dismal Key contains an extensive area of shell fields located within the central portion of the site, encompassing 6.5 hectares. The shell fields are open, continuously connected, and are bounded by mangrove swamp on their northeast side, a very tall ridge of shell on the south side, and are partially enclosed by an arc of tall shell mounds to the west. While shell fields appear to be relatively flat, many oval depressions, very low ridges, and extremely shallow ponds are found throughout this area.

Sparsely vegetated with small scrub, examination of large surface areas of the shell fields determined it was mostly composed of small oyster shell, with occasional conch and whelk containing dense artifact debris, such as shell tools and prehistoric pottery. Distinct topographic variations in some areas of slightly mounded and depressed areas of oyster shells placed sideways into the ground suggest the possibility of oyster roasting pits in this area.

It was noted that many of the shallow ponds appeared to be too shallow to have functioned as any type of water retention structure, and probably represent depressions left from structures, or served as hearths or communal roasting pits.

Shell Mound/Ridge District. Located in a sweeping arc in the center of the island is a district of complex, large shell mounds and ridges, covering 6 hectares. The crescent shape of the district encircles the shell fields, partially enclosing it. The shell mound district contains four massive shell mounds 100 meters or more in length, at least 30 meters wide, and five to 7.5 meters in height. These are surrounded by eight smaller, three to four meter tall ridges or mounds. Each mound is separated by low ridges that may have served as canoe portals or entranceways to the mounds. Three of the largest mounds are centrally placed, with a large canal leading up to the center between the two tallest mounds. The tallest mound contains a long ramp that leads from the interior of the shell fields up to the top of the mound, which has an imposing

position offering a view of the entire site. Next to this mound, the third tallest mound also has a ramp, but this one leads from the opposite side of the site, from the outer district of water courts and shell ridges to the top of the mound.

At the northern edge of the site is the second tallest mound, a steep-sided conical shell mound six meters in height. This mound's height and position at the northern edge of the site affords an advantageous view of the sea.

Finger Ridges and Water Courts. Much like Fakahatchee Key, though located at the opposite side of the island, the entire western perimeter of Dismal Key has a complex arrangement of a dozen or so protruding shell finger ridges that radiate out from the site towards the water. The finger ridges have slight variations, but are much more uniform in size and shape than the finger ridges at Fakahatchee Key. The finger ridges are also similar in size, ranging from 20 to 40 meters in width, and 60 to 70 meters in length. The tops of the ridges are mostly level, though most of the finger ridges at Dismal Key show a series of slight perpendicular depressions and mounded areas, which may represent house depressions, cooking pits, and/or discrete shell dumps. In-between most of the shell ridges are deep, straight, linear canals, most of which are presently filled with small amounts of tidally influenced water, but for which many are partially obstructed as a result of sedimentation and mangrove growth. Several large water courts are present (ranging in shape and size) along with one potential fish trap.

Breakwater. An unusual feature of Dismal Key is the near 640 meter long linear midden ridge. It is similar to the one seen at Key Marco, and is referred to by some as a possible protective sea-wall or breakwater (Beriault *et al.* 2003).

Russell Key. Russell Key is the fourth largest shell work site in the TTI, at 23 hectares (Figure 22). The site was first described by Moore (1900:377) and Hrdlička (1922:34), who briefly mention its extensive shell works. Two historic settler families lived on the island in the 1900s, with the remains of their house sites visibly marked by concrete cisterns and house piers. No previous archaeological work had been conducted at the site until the present study, which included archaeological survey, testing, and the generation of the first archaeological base map of the site (Figure 23).

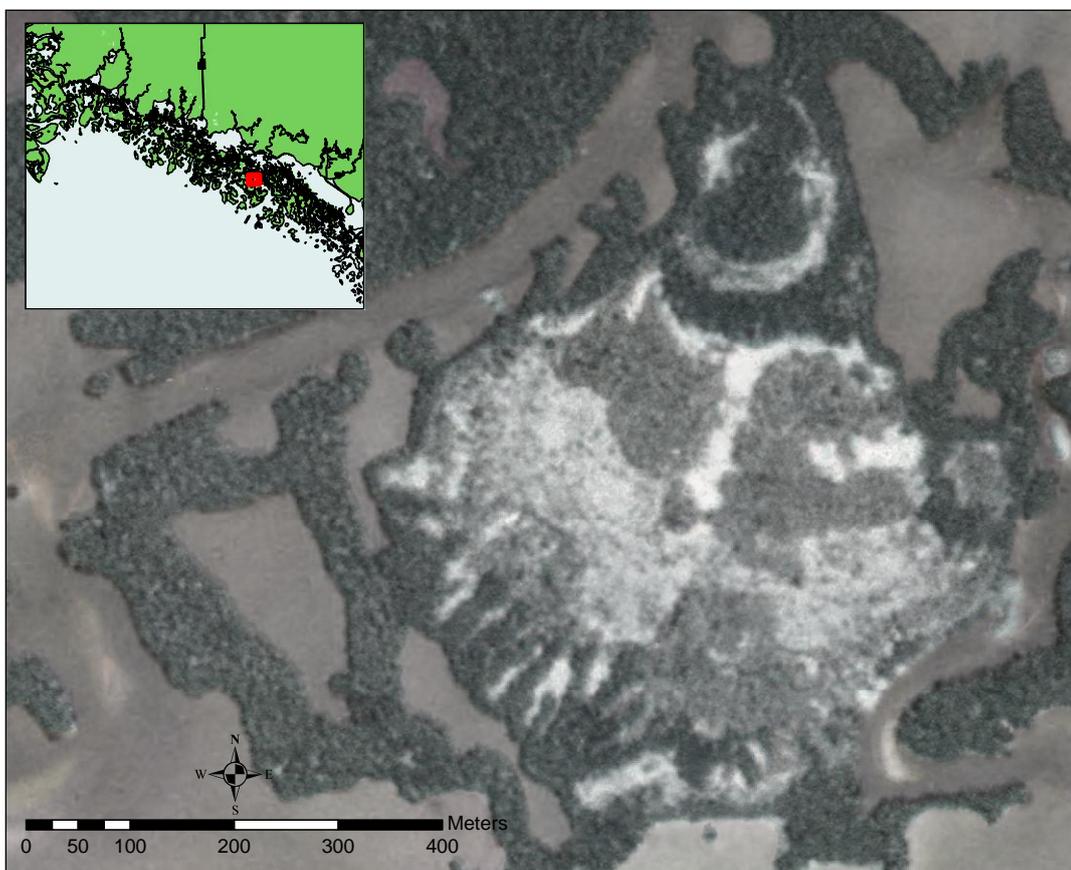


Figure 22. Aerial photograph of Russell Key, 1940.

The overall site shape is roughly hexagonal, though several areas of the site follow the same concentric crescent-shaped forms as Fakahatchee and Dismal Keys. Following a roughly curvilinear, expanding orientation, the site appears to be arranged into several similar spatially and characteristically distinct features and site areas. The site shows strong bilateral symmetry, with a central, depressed area, roughly dividing the site into four quadrants, with the two western quadrants slightly larger than the two eastern quadrants (Figure 24).

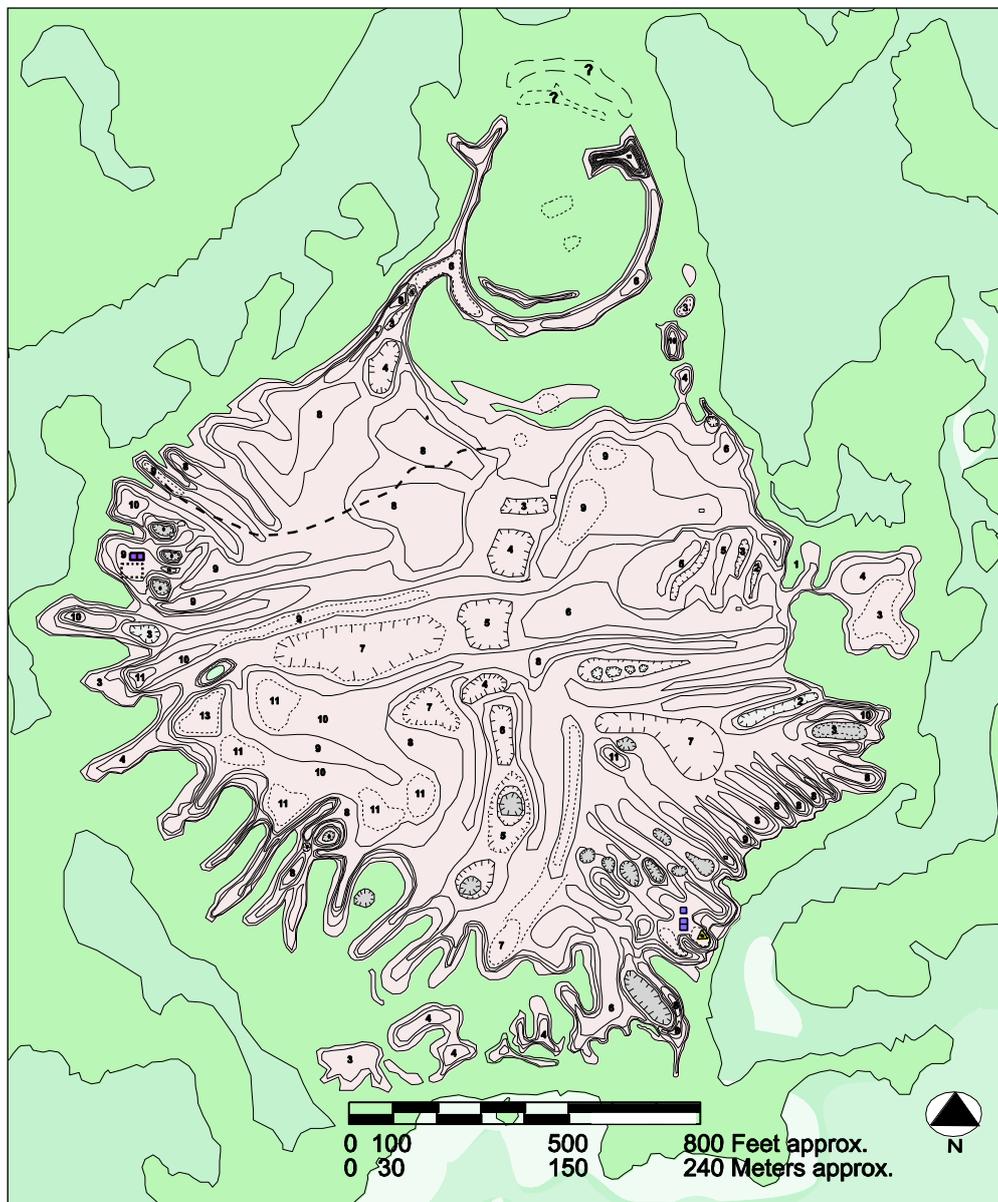


Figure 23. Archaeological base map of Russell Key.

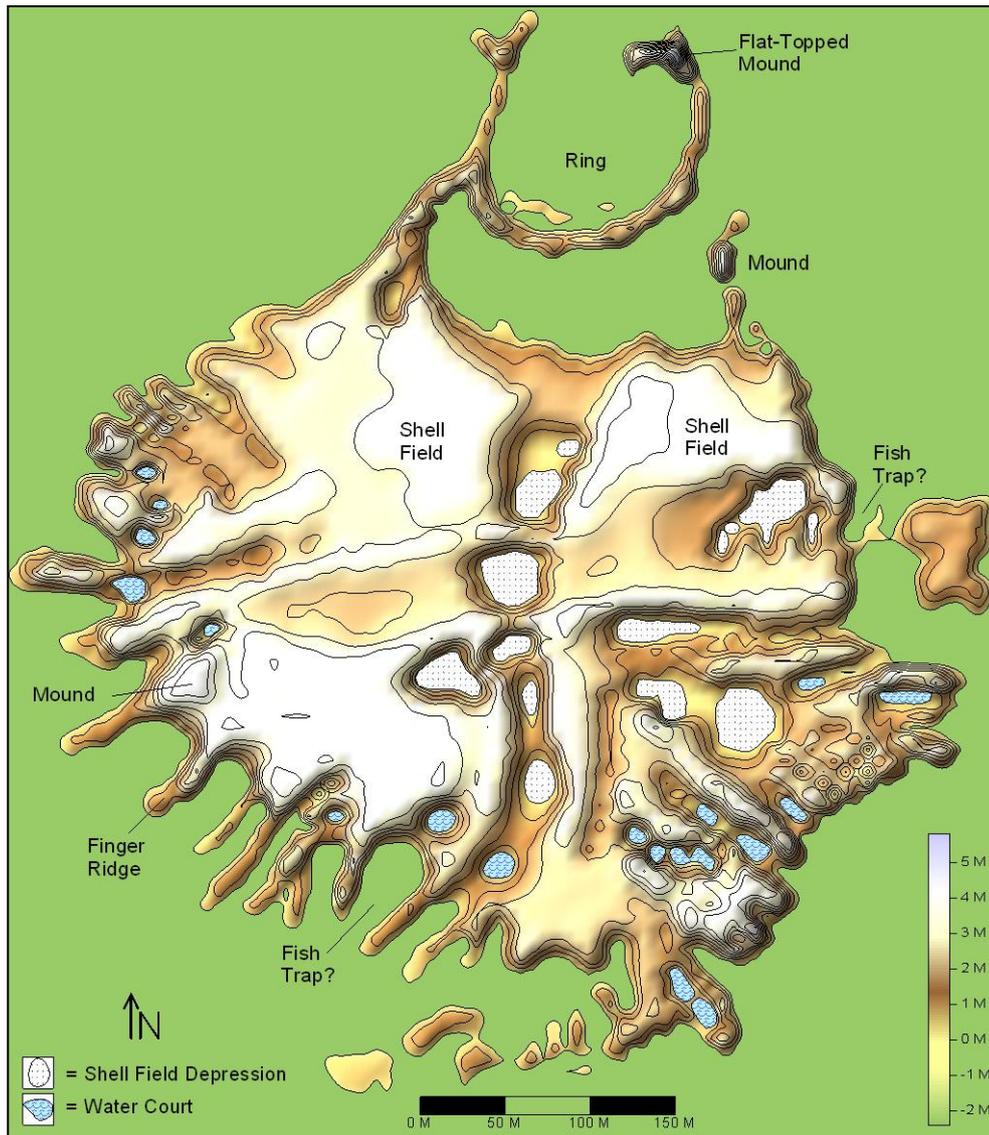


Figure 24. Contour map of Russell Key.

Shell Ring and Mounds. A single “C”-shaped shell ring lies at the northern end of Russell Key, with its ring opening facing north. The ring measures 143 meters in diameter at its widest point, and 115 meters between its two openings. The widths of the ring’s arms are about 12 meters wide, and are extremely low in elevation, ranging from only one to two meters, with sections nearly completely inundated by rising sea level and encroaching mangroves. The center of the ring is filled with a deep, mangrove pond.

At the northeast terminus of the ring is an isolated, quadrilateral-shaped truncated shell mound with a central ramp leading from the interior of the ring up to the top of the mound. The mound measures roughly 15 meters wide by 30 meters long, and is five and a half meters in height, and the ramp extends 20 meters in length. A second, smaller, amorphous-shaped shell mound is located midway between the shell ring and the main portion of the site. This mound measures 25 by 15 meters, and is three meters in height.

Shell Fields. Russell Key, like Fakahatchee and Dismal Keys, contains extensive areas of shell fields, encompassing an approximately six hectare area. These are located in the interior, northern portion of the site, just south of the shell ring. Though the shell fields are mostly contiguous, they appear to be divided into two areas by a central linear feature that contains a series of large, distinct depressions. This feature may have functioned as a central causeway connecting a series of communal plazas, or perhaps it functioned as a residential area.

The shell fields are typical of shell work sites, containing large expanses of open, relatively flat shell midden. Intensive surface inspection indicated that there was a very dense amount of artifact debris, and an intensive controlled surface collection was undertaken in several areas (see Chapter 6). Close surface inspection also noted potential patterns of oval depressions and very shallow, small circular pits. Other features noted include mounded linear ridges or benches that extend into higher hammock areas of the site.

Shell Mound/Ridge District. Russell Key contains an area of shell mounds and ridges arranged in an arc, south of the shell fields. This is reminiscent of the impressive shell mound districts at Dismal and Fakahatchee Keys, but is much less distinct with twelve individual mounds ranging in height from two to four meters. This area of the island is the highest in elevation and is also the area of historic settlement, and some of

the shell work features may have been disturbed by the two families living in the vicinity. In particular, a cluster of rounded ridge mounds on the east and west sides of the island have slightly flattened summits, suggesting that these were altered by the historic residents, possibly by farming. The largest mound measures 25 by 50 meters, and is four meters in height. No mounds are conical, and none show ramps.

Finger Ridges and Water Courts. Russell Key has an impressive array of water courts, with at least eighteen recorded throughout the site. They are clustered in three distinct areas of the site, near, or along the outside perimeter. Each water court is completely enclosed, and varies in shape and size.

A cluster of five water courts is located on the western edge of the site. Some are situated within shell benches that extend out into the water, and have low valleys or depressions that are situated adjacent to the water courts. Three are closely spaced together, each separated from the next water court by a shared, six to seven meter thick shell wall. These three water courts were systematically mapped using a Leitz Sokkia Laser Total Station (Figure 25), which shows that they vary slightly in size and shape. Unfortunately our grid did not extend far enough to show their exact relationship to the water, however, each is totally enclosed with the highest walls facing towards the water, at a distance of 12 to 30 meters from the current tide-line. This suggests that they could not have functioned as tidal fish traps, but were perhaps impoundments to store live fish or fresh water.

The northernmost water court, Water Court 1, is the largest and most circular, measuring 26 meters by 30 meters at the widest, outer ring perimeter, and 15 by 20 meters in its interior. The interior is a deep pond filled with mangroves, and the height of the water court walls is three meters above the pond.

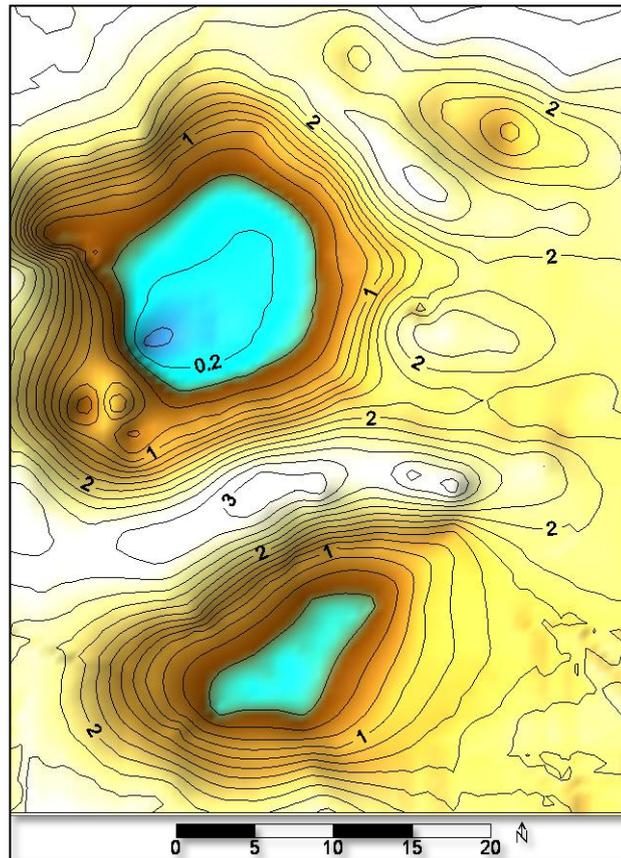


Figure 25. Contour map of Water Courts 1 and 2.

Water Court 2 is oval, and measures 20 by 25 meters at its outer perimeter, and 10 by 17 meters in its interior. Water Court 3 is closer in shape to a rounded rectangle, measuring 20 by 25 meters at its outer perimeter, and 10 by 15 meters in its interior.

A cluster of eight water courts is located on the opposite, eastern side of the island. These were measured and mapped with metric tapes and levels (Figure 26), and are fairly consistent in shape and size, ranging in size from 14.5 to 20 meters in width, and 13 to 22 meters in length. All are oval or circular in shape, and have heights ranging from 1.2 to two meters.

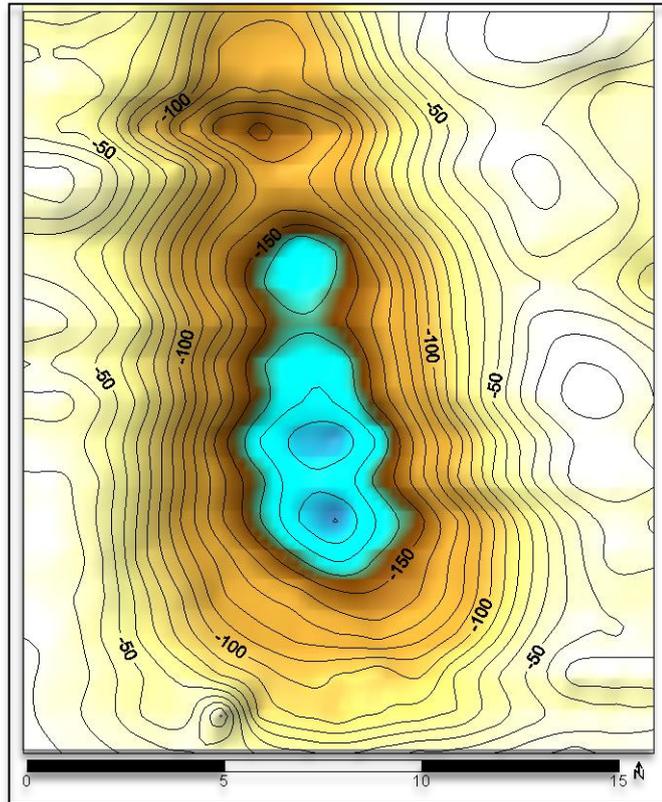


Figure 26. Water Court A contour map.

As noted, all water courts were enclosed with walls facing towards the sea, but Water Court 7 had sloping walls that lowered towards the water, with a gap that probably functioned as a sluice that allowed water to enter and escape with the tide, functioning as a fish trap. Other water courts evidenced similar sloping walls towards the water, but only Water Court 7 had evidence of a sluice.

Many of the water courts are currently filled with water and mangroves. Others were completely dry, and their floors could be thoroughly examined (and in one case, tested, see Chapter 6). In all cases where the ground surfaces of water courts were dry and exposed, artifacts were noted, mostly large, whole shell tools.

Water Court 6 is by far the largest water court at Russell Key, located at the southern end of the site, measuring 50 by 15 meters, and two meters in depth. Along the side of the water court, a few large *Busycon* whelks were observed to be pushed into the side of the water court wall, suggesting some type of decorative elaboration.

Extensive finger ridges are also common along the perimeter of Russell Key, many of which form very long, linear projections into the water, some 70 meters or more in length. Many finger ridges are clustered together, separated by only ten or twelve meters, and could have functioned as docks, jetties, or platforms to perform group fishing with nets. Others form partial enclosures that may have functioned as tidal fish traps.

Sandfly Key. Once known as Wiggin's Key, Santa Celeste Island and "Boggass Place" (Goggin n.d. 227; Hrdlička 1922:34; Moore 1900:377), Sandfly Key is a 20 hectare shell work site located in the southern end of the NP. The site was first investigated by C.B. Moore (1900:377) who reported extensive shell deposits and two small sand and shell burial mounds which Moore tested, but left him "unrewarded" (*ibid.*). Some considered the site to be the most extensive shell deposit in Collier County (Goggin n.d. 227).

Several Euro-American settlers homesteaded the island, tapping an artesian well that still provides fresh water today. Remains of the settlement are apparent on the northeastern ridge or interior ring, and include an above-ground cistern and several house sites marked by concrete piers. Two historic canals were dredged to keep saltwater from the farming settlements, and are visible as deep, jagged canals that cut through two sections along the southern half of the island (Figure 27). Large areas of the site were farmed, resulting in flattened fields.

The site was surveyed and mapped for this study (Figure 28), but only limited radiocarbon sampling was undertaken, due to concerns over disturbed deposits. Despite historic disturbances to about half of the island, the site does retain many intact shell work features, and the overall site configuration is preserved (Figure 29). The site consists of a very large, horseshoe shape island, with several nested concentric rings that open to the northeast. The central portion of the island appears to have once been

the highest, driest ground on the island, and thus very favorable for farming. Unfortunately, this area of the site was highly disturbed by historic farming activities, and it remains unknown what potential shell work features were destroyed. Two large areas of the site remain largely undisturbed, and are discussed, below.

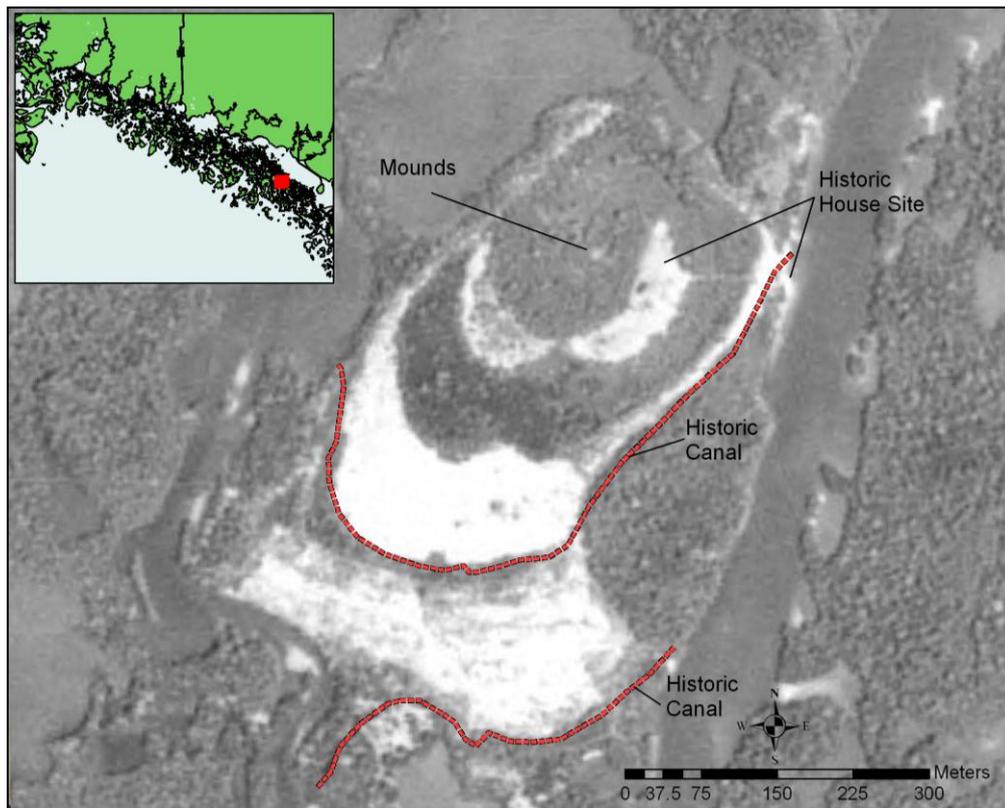


Figure 27. Aerial photograph of Sandfly Key, 1940.

Shell Ring and Sand Mounds. One of the remarkable features of Sandfly Key is its distinct, nested rings. The largest outer ring is horseshoe shaped, with very long east and west arms (415 meters for the west arm, 315 meters for the east arm), and is 300 meters wide at its widest point. The arms range from ten to 20 meters in width, are steep sided, and rounded on their tops (not flattened). The opposite, closed end of the large ring is unfortunately extensively disturbed, so its original features and forms are unknown. This large ring encloses a smaller, central ring, which appears as two

connected crescents. This ring is 230 meters at its widest, but because of extensive farming activities, the surface topography of the ring is very disturbed.

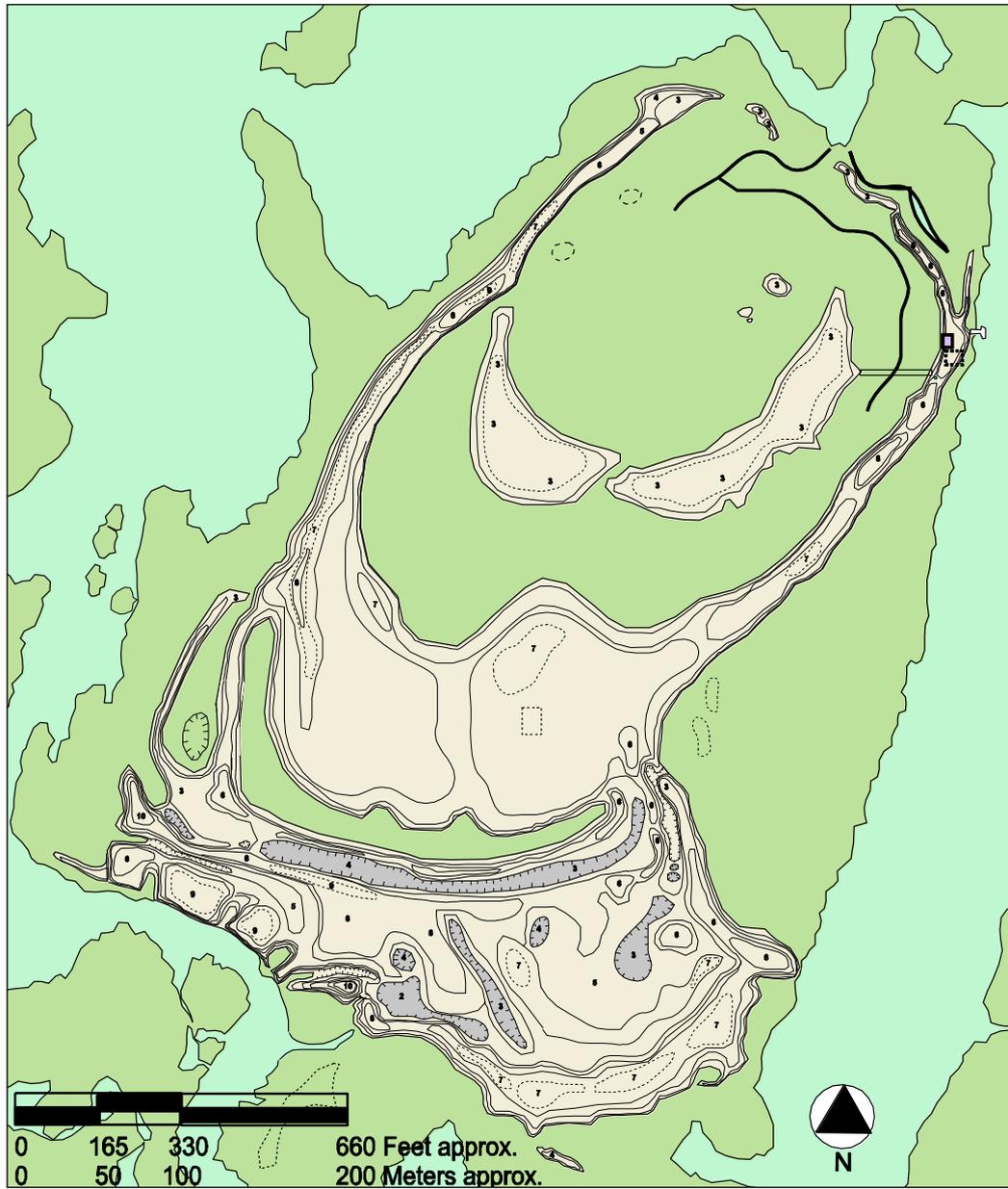


Figure 28. Contour map of Sandfly Key.

The smaller, interior ring encloses two small isolated sand and shell burial mounds (Moore 1900:377) that are located deep within the mangrove swamp, completely surrounded by water. The larger mound measures nine by seven meters, and

1.2 meters in height, and the smaller mound measures three by three and a half meters, and is only 60 cm in height.

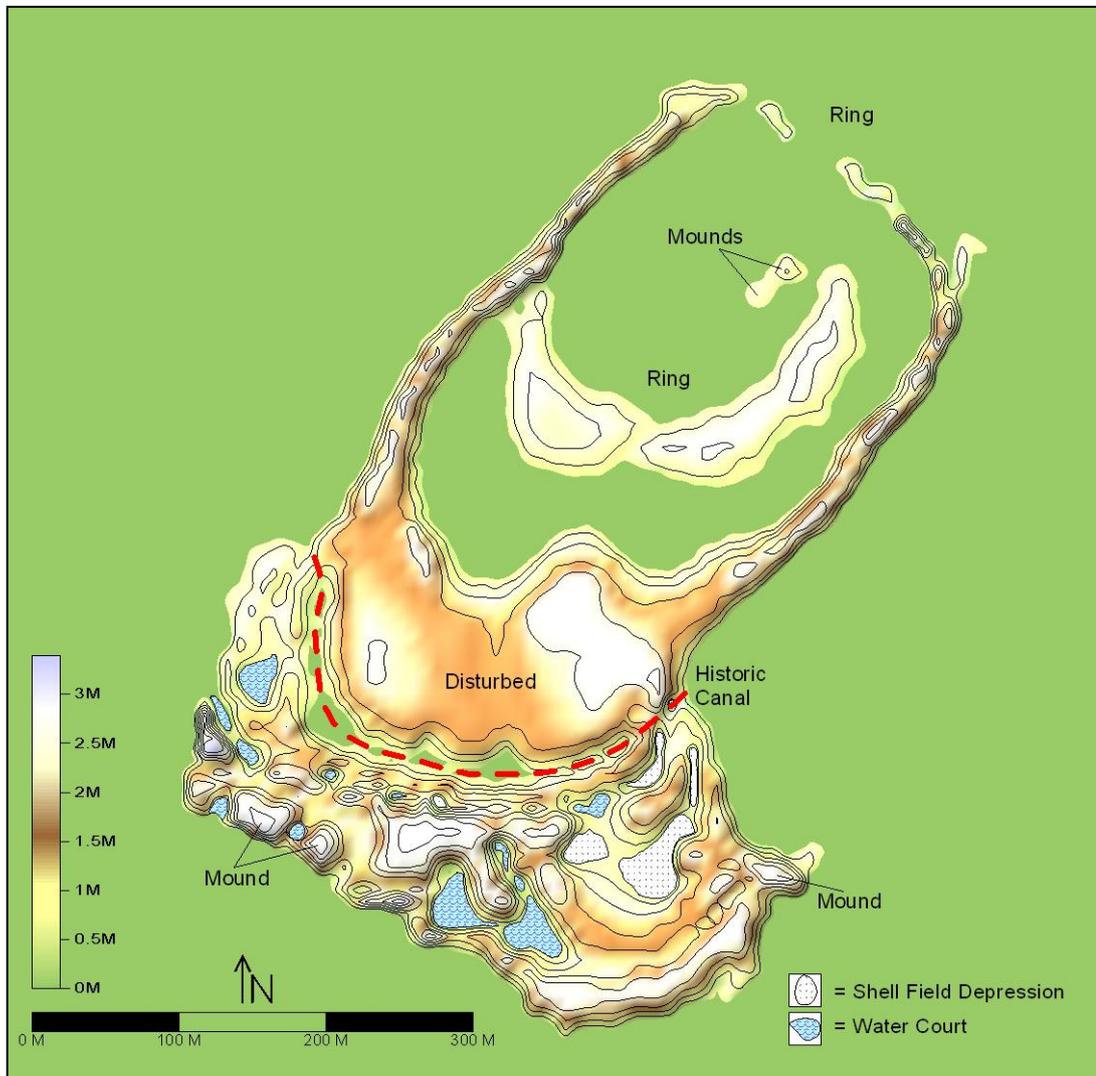


Figure 29. Contour map of Sandfly Key.

Mounds, Shell Fields and Water Courts. The southern end of the island, below the historic canal, appears to be intact, with no signs of farming or other disturbances. This area contains a 1.8 hectare area of shell fields, a few small water courts, small depressions, and mounded ridges. Along the outside perimeter of the island are five distinct truncated shell mounds that may have served as house platforms. Four of the

mounds are clustered in a row along the southwest edge of the site, and each are surrounded by distinct water courts, one of which is totally enclosed, and the other two being open to the river, which may have functioned as tidal traps. Other possible water courts and fish traps are located along the southern perimeter of the island.

Key Marco. Key Marco is the northernmost shell work island in the TTI, situated on the northern end of Marco Island, encompassing about 18 hectares (Figure 30).



Figure 30. Aerial photograph of Key Marco, 1963.

It is the most well-known shell work site, made famous in the 1890s by Cushing’s unearthing of an unusually well-preserved collection of wood, rope and net artifacts from a muck pond called the “Court of the Pile Dwellers” (Cushing 2000), making the site one of the most important archaeological discoveries ever made in North America (Schwadron 2009b:296).

Unfortunately, even in light of Cushing's important finds, most of Key Marco has since been destroyed by development. The site layout and many of the shell work features were fortunately recorded on a detailed topographic map prior to destruction (Figure 31, top left; also see Figure 9). In retrospect, the "Court of the Pile Dwellers" was a very small portion of the entire shell work site, measuring only about 27 by 33 meters, and therefore the artifacts recovered from the muck pond are not necessarily representative of the entire site.

Figure 31 demonstrates that although the site was largely under development by the 1950s, early aerials still show the visible remnants of shell works, such as shell finger ridges, canals, and mounds. This is very useful in helping to determine the visual signatures of features at other shell work sites which have since been destroyed, or for which we do not have detailed topographic maps (e.g., Chokoloskee Key).

Goggin (n.d.) thought that Key Marco was typical in all respects and form to other TTI shell work sites. The overall site layout is smaller, but very similar to that of Fakahatchee, Dismal, and Russell Keys, containing bilateral symmetry; a small, ring-shaped crescent at one end of the site; a central ridge and mound district; and a series of expanding, radiating finger ridges at the opposite end of the site, inter-dispersed with canals and water courts. Cushing's map was digitized and projected into a three-dimensional image for this study, which better illustrates some of the complex topography that was present at the site (Figure 32).



Figure 31. Comparatively scaled images of Key Marco. Top L: 1896 map, inset of Court of the Pile Dwellers (Cushing 2000:93). Top R: Key Marco 2006. Bottom L: Features visible on 1950 aerial. Bottom R: Superimposed digitized 1896 map of shell works.

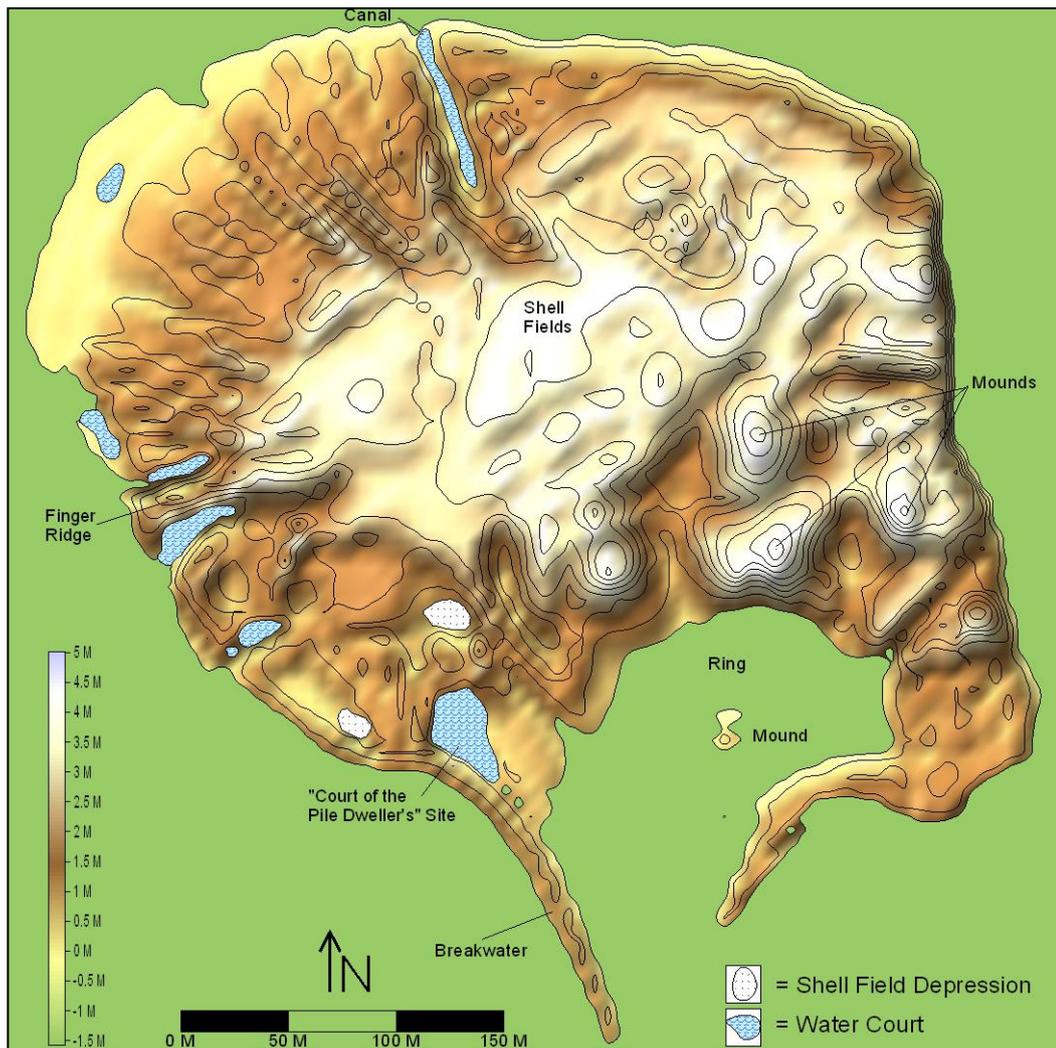


Figure 32. Topographic map of Key Marco (adapted from Cushing 2000:93).

Shell Ring, Breakwater and Court of the Pile Dwellers. Located at the south end of the site is a ring-shaped midden encircling a pond, with its open ends facing south. The ring shape consists of a curved midden on the east arm of the ring, and a 263 meter long linear midden ridge on the west arm of the ring, which may have functioned as a protective sea-wall or breakwater. A small, isolated mound and a small shell bench are located near the center of the pond. The Court of the Pile Dwellers is consistent in size and shape with water courts found at other shell work sites, only differing in terms of the unusual artifacts recovered from the court after de-mucking it.

Shell Mound/Ridge District. Located just north of, and partially superimposed on the ring is a grouping of five large mounds. Cushing described the tallest one as five and half meters in height, flat-topped, that perhaps housed the temple of a chiefly resident (Cushing 2000:22). The two largest mounds (60 by 40 meters, and 37 by 52 meters) are arranged next to one another, flanked by two smaller, but still large mounds that in turn flank a small depression, or perhaps a small plaza. Numerous smaller mounds and ridges are located around this cluster of mounds. Other observations Cushing offered were of a central canal dividing the site, as well as central courts and canals that he thought had subsequently been filled in.

Shell Fields. Located north of the mound and ridge district is an elevated but open area which lacks any distinct mounds. These could be the shell fields that Moore references having extensively collected from (Moore 1900:310).

Finger Ridges and Water Courts. Almost the entire perimeter of Key Marco has a complex arrangement of protruding shell finger ridges that radiate out from the interior of the site into the water. These are very similar to those at other shell work sites previously discussed, and have similar widths and lengths, averaging 70 to 80 meters long by 15 to 25 meters wide. Cushing distinguished canals from finger ridges in four instances, but stated that he thought many of the finger ridges functioned as canals. Cushing also noted the presence of two or three “remarkably regular and deep circular tanks or cenotes water courts” (Cushing 2000:22).

Chokoloskee Key. The site is located in the southern end of the NP of the TTI (Figure 33), and was once an isolated island, prior to the building of the causeway that now connects the island to the mainland. Potentially once the largest shell work islands at up to 50 hectares, the full extent the site may never be known due to its near total destruction by modern development.

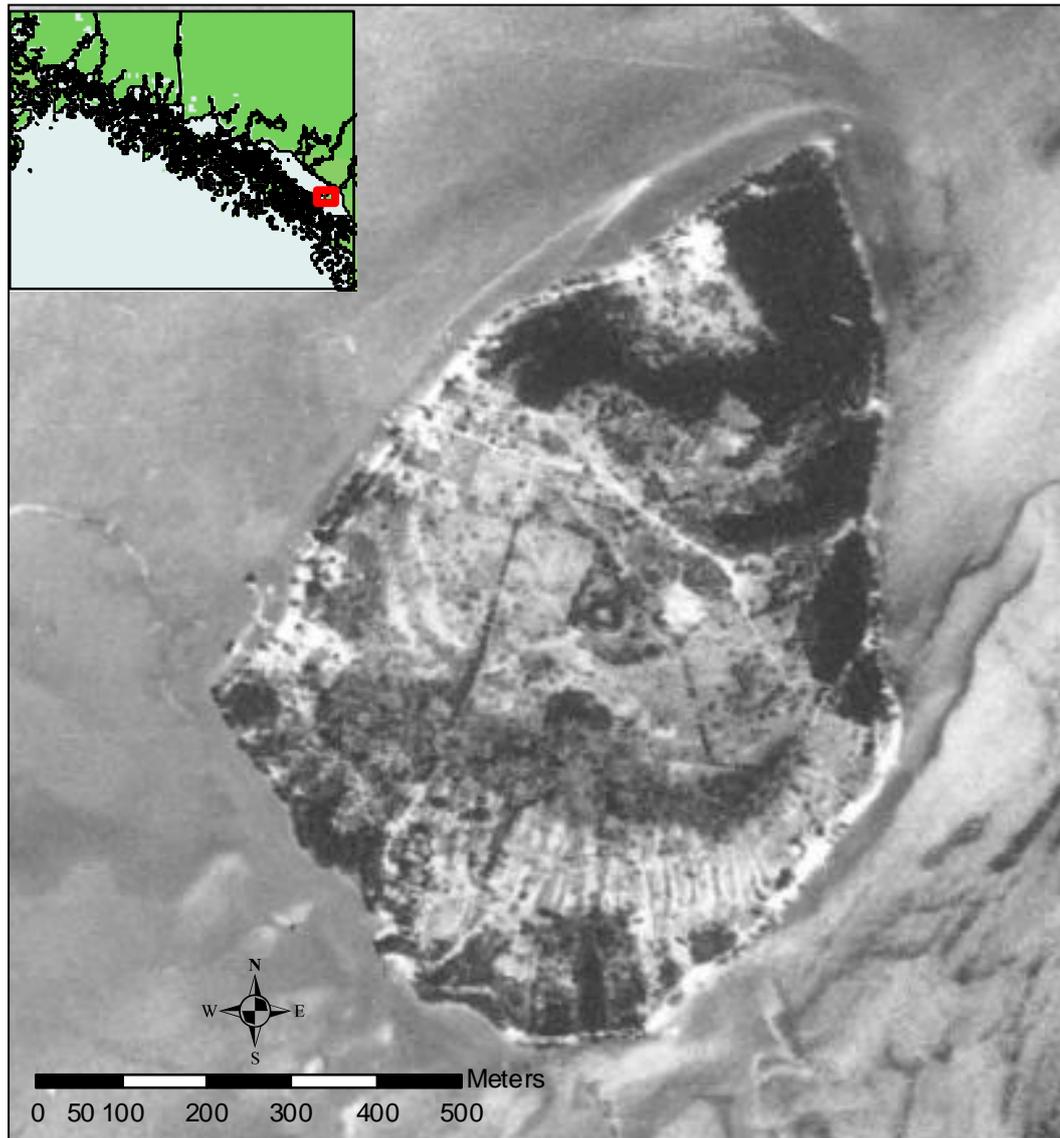


Figure 33. Aerial photo of Chokoloskee Key, 1940.

Moore (1900:379) surveyed the island extensively, stating that it was almost completely covered with “great shell deposits” (*ibid.*). Hrdlička also surveyed the

island, and thought that 80 out of the island's 105 acres were covered in shell works (Hrdlička 1922:35).

An attempt to reconstruct the extent and types of shell work features once present at Chokoloskee Key was undertaken by digitizing shell work features visible on the earliest aerial photograph available, and by referencing features drawn on a sketch map of the site produced by archaeologist John Beriault (Beriault and Strader 1984:iii). Figure 34 is a combination of the two, and although crude in comparison to the other surveys presented, shows the presence of extensive shell work features, such as finger ridges, canals, water courts, ridges and mounds.

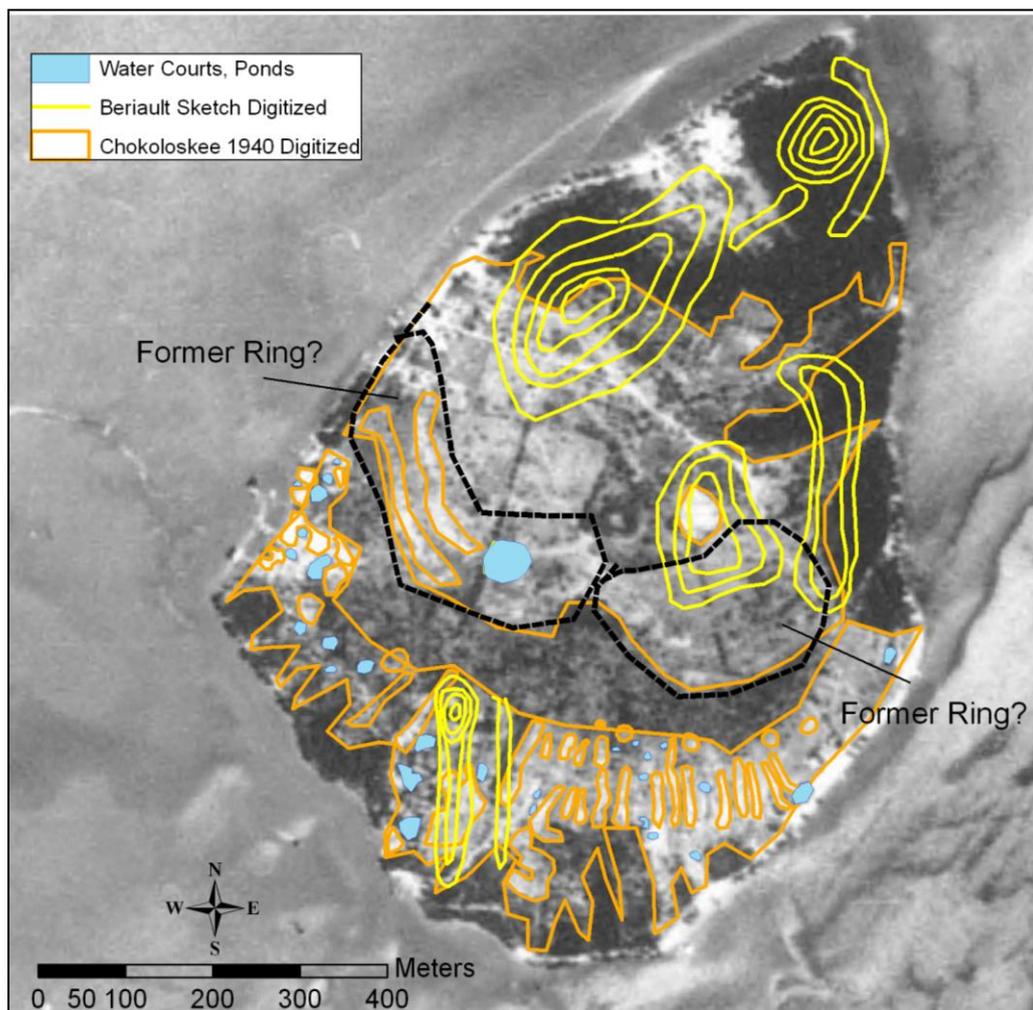


Figure 34. Composite of digitized shell work features visible on a 1940 aerial and as suggested by Beriault and Strader (1984:iii).

Based on reconstruction of shell work features, it appears that the Chokoloskee Key site was probably closer to 38-40 hectares in extent, making it about the same size as Fakahatchee Key. The island is similar in shape to others (e.g., Sandfly Key, Russell Key and Dismal Key), with several crescent-shaped districts of shell works that expand southward and radiate toward the water. Though barely visible (see Figure 34), there does appear to be the remnants of a smaller, central interior ring, which appears as two connected crescents and is similar in size and shape to Sandfly Key's smallest inner ring (see Figure 34). Using this reconstructed image, and historic accounts, the following spatial analysis of Chokoloskee Key is offered.

Shell Mounds. Moore described a single, isolated large mound located at the northern edge of the island (1900:379), 27 feet (8.2 meters) in height, which is depicted on Beriault's sketch (Beriault and Strader 1984:iii). He also described the southern end of the island as containing a pair of "graded ways" enclosing a canal that lead to two mounds that face one another, one 18 feet (5.5 meters) in height (Moore 1900:379). Hrdlička described a 25 foot (7.6 meter) tall, steep sided mound on the southwestern edge of the island, close to the edge of the water, with a 90 foot by 25 foot (27.4 by 7.6 meter) platform at the top. He noted that the mound was constructed out of oyster shell, but capped with sand, muck, and ashes at its top. Goggin (n.d.:220) also mentioned a tall mound located on the east edge of the island that was being eroded by tidal action.

Shell Fields. Since no topographic map exists for the site, and shell fields were not explicitly mentioned in any historic account of the site, it is not certain if, and where, shell fields may have been present. However, in the 1940 aerial, a central portion of the site appears consistent with what shell fields look like in photographs of other sites (e.g., Russell Key, Fakahatchee Key, etc.), and it is likely that this feature was once present at the site.

Finger Ridges, Water Courts and Canals. The southern end of Chokoloskee Key had extensive finger ridges, water courts, and several canals. These are visible on the aerial photograph, depicted on Beriault's sketches (Beriault 1986; Beriault and Strader 1984:iii), and described by earlier visitors to the island. Moore describes an artificial harbor with a protective seawall, which he thought served as shelter for canoes (Moore 1905:313). Both Moore and Hrdlička describe extensive canals at the site, with one canal leading from the bay to the interior of the island (Hrdlička 1922:35).

Turner River. This site is unusual, being one of two known riverine shell work sites, located 0.8 kilometers up the Turner River from its mouth, and two kilometers directly northeast of Chokoloskee Key (Figure 35).

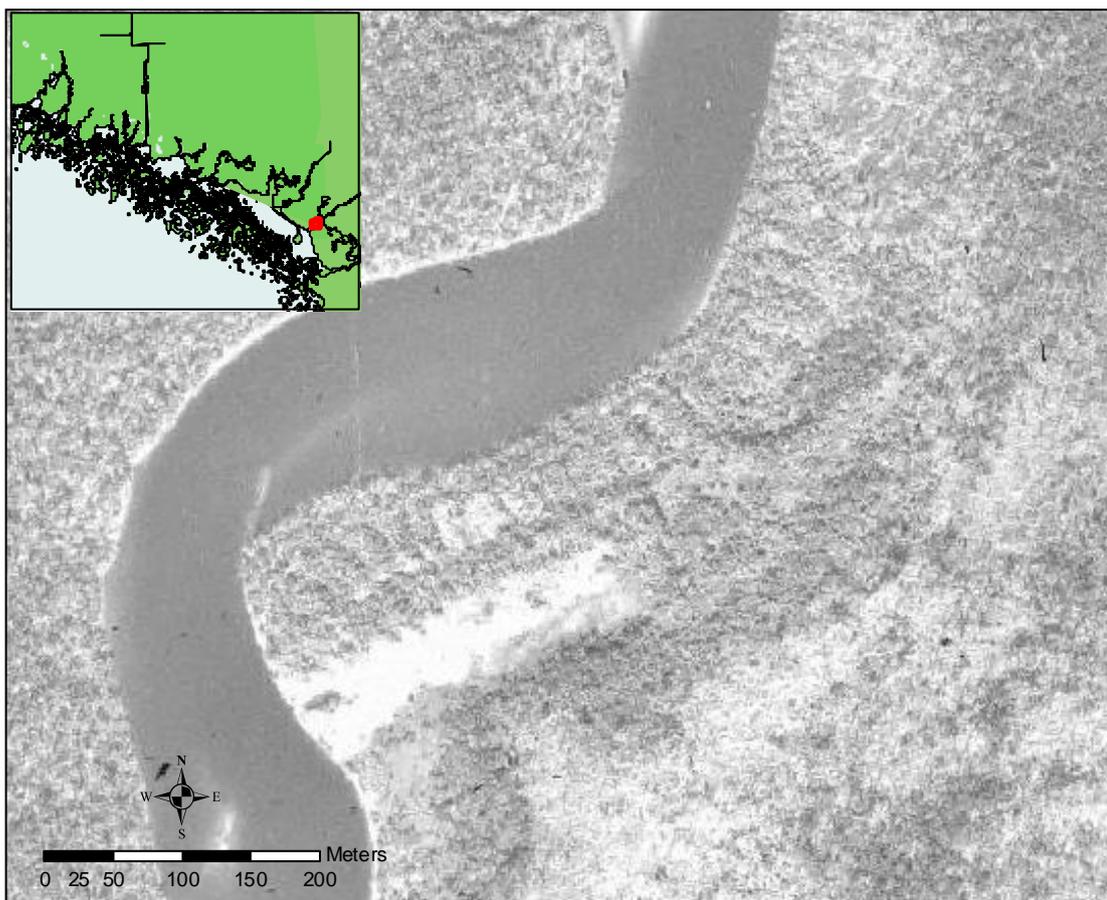


Figure 35. Aerial photograph of Turner River, 1962.

The site is ten hectares in area, and is very different in plan and layout than all the previously discussed shell work island sites, consisting of an “L”-shaped configuration that contains two linear rows of very large mounds arranged perpendicular to the river. Hrdlička (1922:36) called the site “the most noteworthy group of shell heaps and mounds to be found in the entire region,” and Moore thought it was a “considerable” site (Moore 1900:380).

The site was professionally surveyed and mapped in 1956, and the resulting plan was digitized and converted into a three-dimensional map for this study (Figure 36).

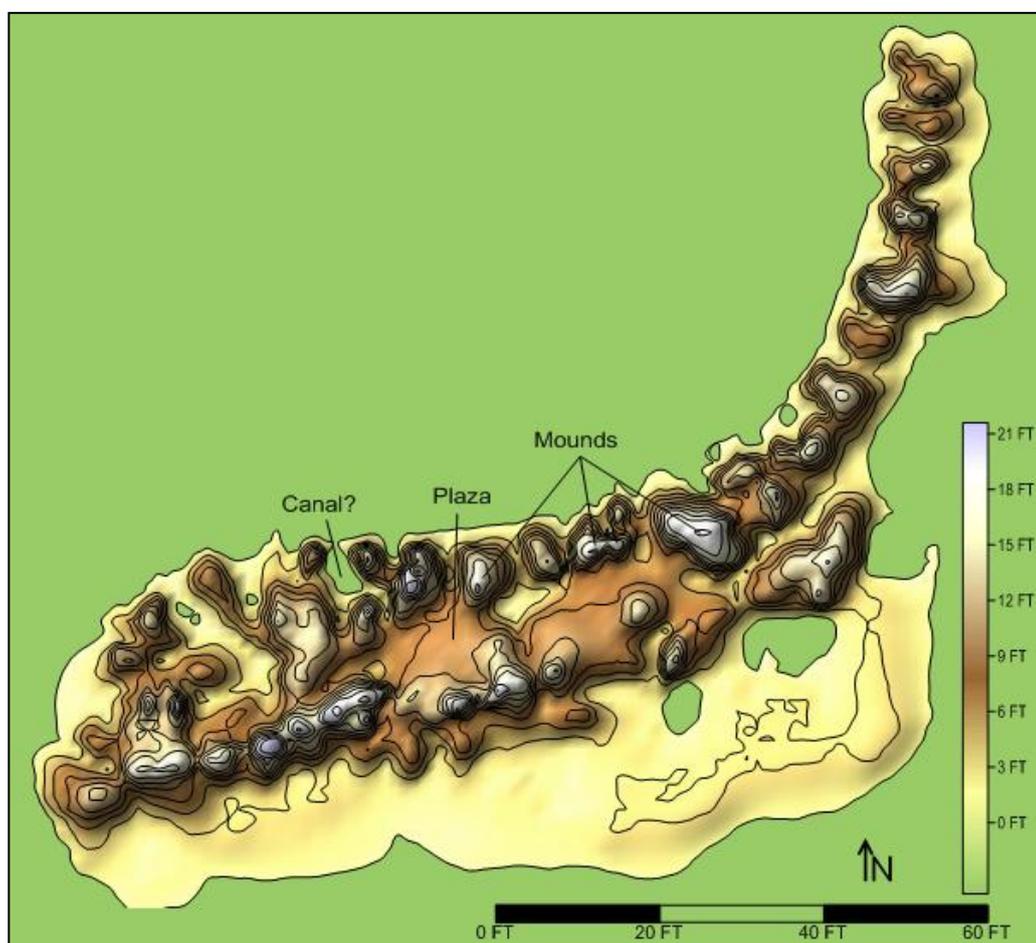


Figure 36. Topographic map of Turner River (adapted from Sears 1956).

The site was also briefly surveyed as part of this study, and together with the results of spatial analysis, it was determined that the site has 37 very large, individual mounds of varying size and shapes, with many reaching 7.6 meters in height, ten meters

in width, and 50 meters in length. Most are long, oval-shaped mounds that are conical in profile, with narrowed, truncated or slightly flattened surfaces on their tops. The mounds are exceptionally steep sided, and thus it is difficult to walk from one mound to the next by crosscutting over the sides of the mounds. Likewise, the river-facing fronts of each mound are the highest elevations and have the steepest faces with intense drop-offs reminiscent of cliffs, resulting in dramatic views of the entire river. In order to most easily access the tops of each mound, the approach appears to have been designed to have been accessed from the back side of each mound (furthest from the river), from the interior plaza area, where subtle ramps are present.

The first row of mounds closest to the water contains 22 individual mounds, and the second row contains 15. The mounds are not connected, and have deep troughs in-between each mound that appear like valleys, and which occasionally become flooded during high tides. One in particular appears canal-like (see Figure 36), and may have functioned as a fish-trap or a safe harbor for canoes. In-between the two rows of mounds are several plaza-like areas that are flat and open. Several low ponds are also present in the interior of the site, but they appear to be too shallow to have been water courts.

In 1955, Sears excavated five large test pits around the southwestern part of the site, sampling a few different areas, including a tall shell mound; a raised flat area; a flat area near the base of several mounds; and along the south outer margin of the site (Sears 1956). Sears concluded that the mounds indicated over-water habitations (*ibid.*:59).

SMALL SHELL WORKS

West Pass. The West Pass site is classified as both a small shell work site, and a potential shell ring site because of its distinct, crescent-shaped configuration. The site is located very near to Russell Key, at only 0.8 kilometers southwest, in a central position within the NP of the TTI (Figure 37).

Prior to this study, no archaeological work had ever been conducted on this site. The site was systematically surveyed, mapped, and tested for this study, and determined to encompass about 2.25 hectares. It contains three distinct midden components, the main one of which is a large, crescent-shaped midden (Figure 38).

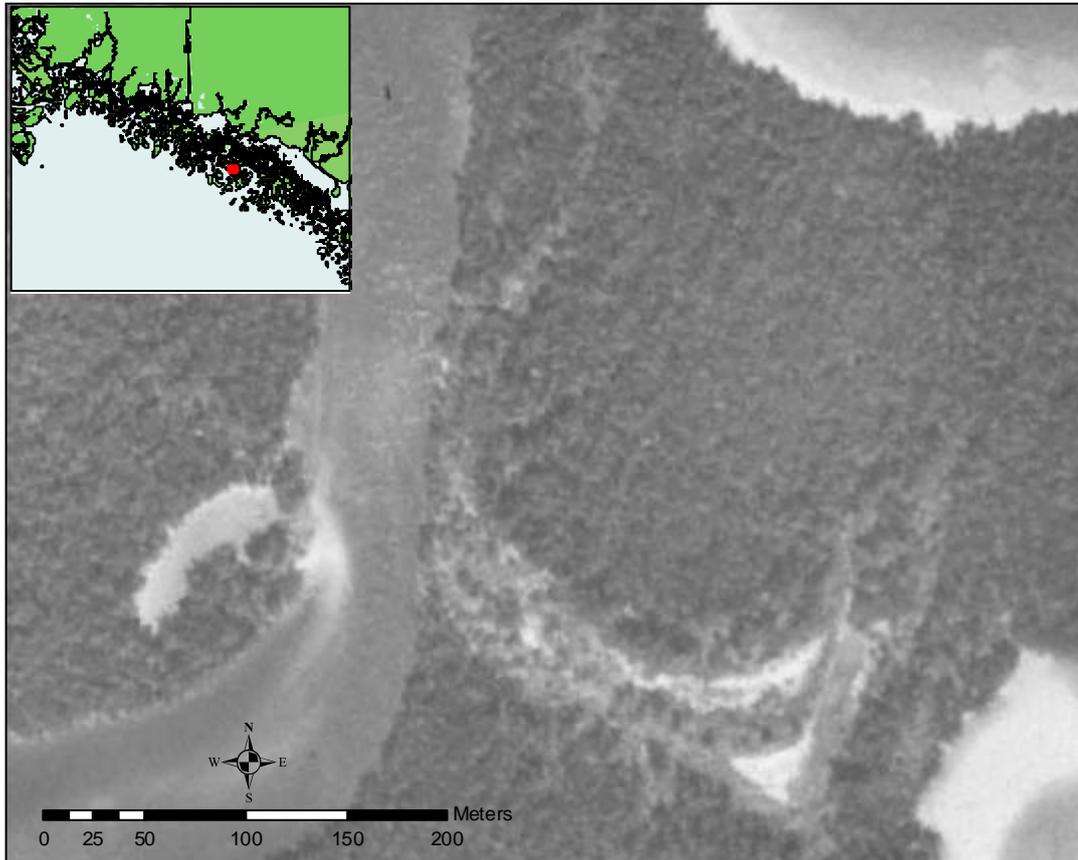


Figure 37. Aerial photograph of West Pass, 1962.

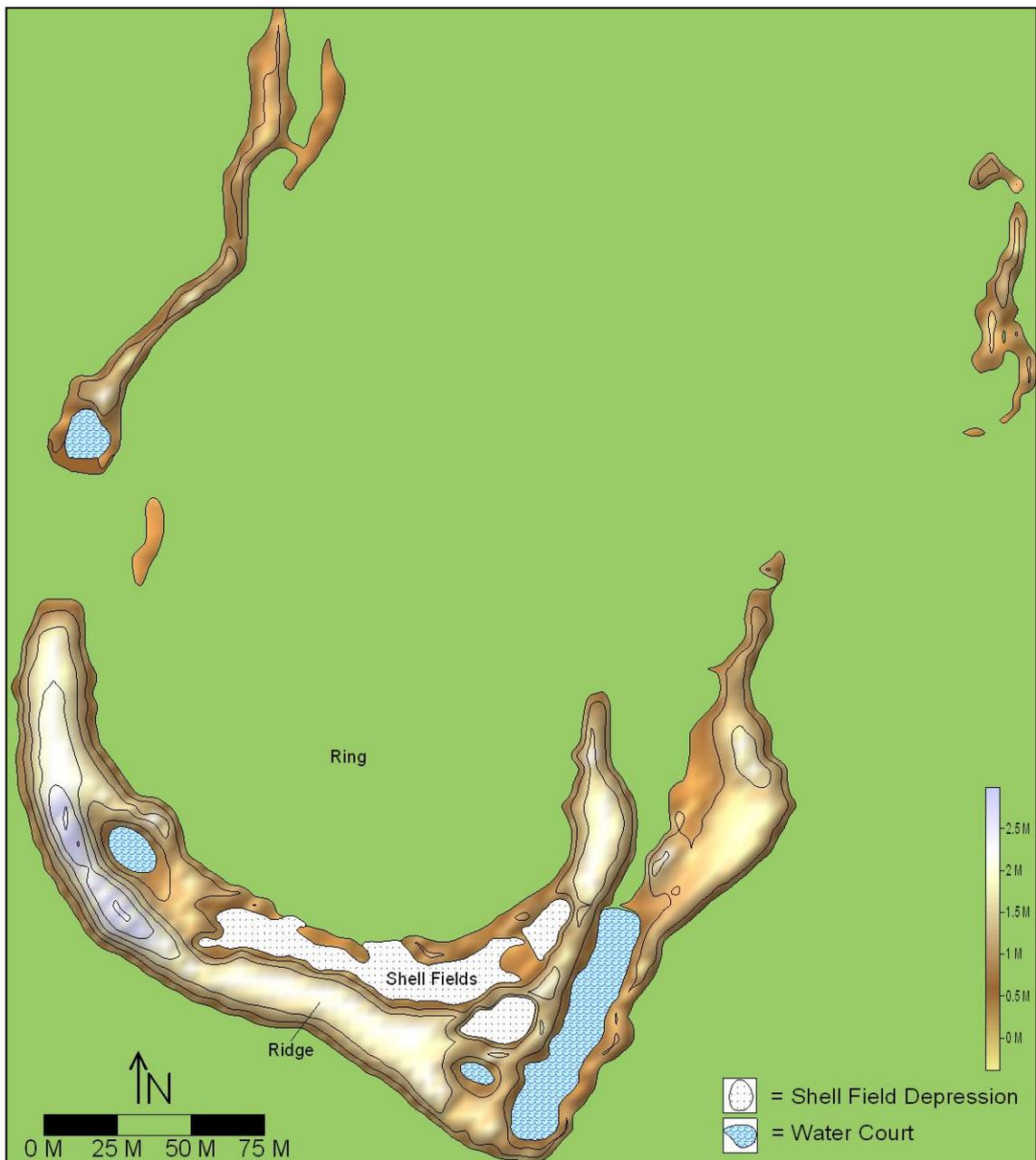


Figure 38. Topographic map of West Pass.

The site plan of West Pass is fairly simple, with no elaborate shell work features such as mounds, ramps, finger ridges, etc. Its main crescent-shaped midden has two arms that open to the north, and is 215 meters wide from end to end. The east end of the crescent midden is bifurcated, with a second arm paralleling the first, and extending 50 meters north. The crescent-shaped midden contains a high, fairly steep continuous midden ridge that encircles the entire southern perimeter of the site, ranging in height

from 1.5 to 2.5 meters. The midden ridge partially encloses low, flat, interior shell fields. The shell fields are similar to ones found at other sites previously discussed, however, they cover a much smaller area, at only 0.28 hectares, and do not contain as many distinct depressions and small ridge features as those found at the larger shell work sites. The shell fields at West Pass were noted to contain a dense amount of surface artifacts, and these were systematically piece plotted and surface collected (see Chapter 6).

West Pass does contain four water courts, which include two small rounded courts found within the interior of the site. An additional small water court, located on a separate small midden ridge north of the main part of the site, contained what appears to be a sluice or opening, suggesting that this may have functioned as a fish trap. A fourth water court, located on the east edge of the site is a very large rectangular construction, measuring ten by 80 meters. It is quite shallow, and lined with shell.

Fakahatchee Key 3. Much like West Pass' proximity to Russell Key, Fakahatchee Key 3 is also located a mere 1.1 kilometers southwest of Fakahatchee Key, in the central portion of the NP. This is a small shell work site, under 1.4 hectares in area, and is also considered a potential shell ring site, due to its vaguely crescent-shaped configuration. Prior to this study, the site had never been investigated, and no maps existed (Figure 39). This study produced the first survey, mapping, and testing of the site.

At first appearance on the aerial photograph, the overall site plan of Fakahatchee Key 3 appears similar to West Pass, with an overall crescent shape, and a possible small shell ring. Systematic survey, mapping (Figure 40) and spatial analysis (Figure 41) of the site determined that it is divided into three areas, the largest area on the eastern side, consisting of a raised, amorphous shell midden. Survey of this area determined that the 0.6 hectare midden is disturbed, with several large depressions that appear to be borrow

holes from looter's excavations, with resultant mounded areas located around the depressions. A fisherman's shack still stands on the south side of the midden.

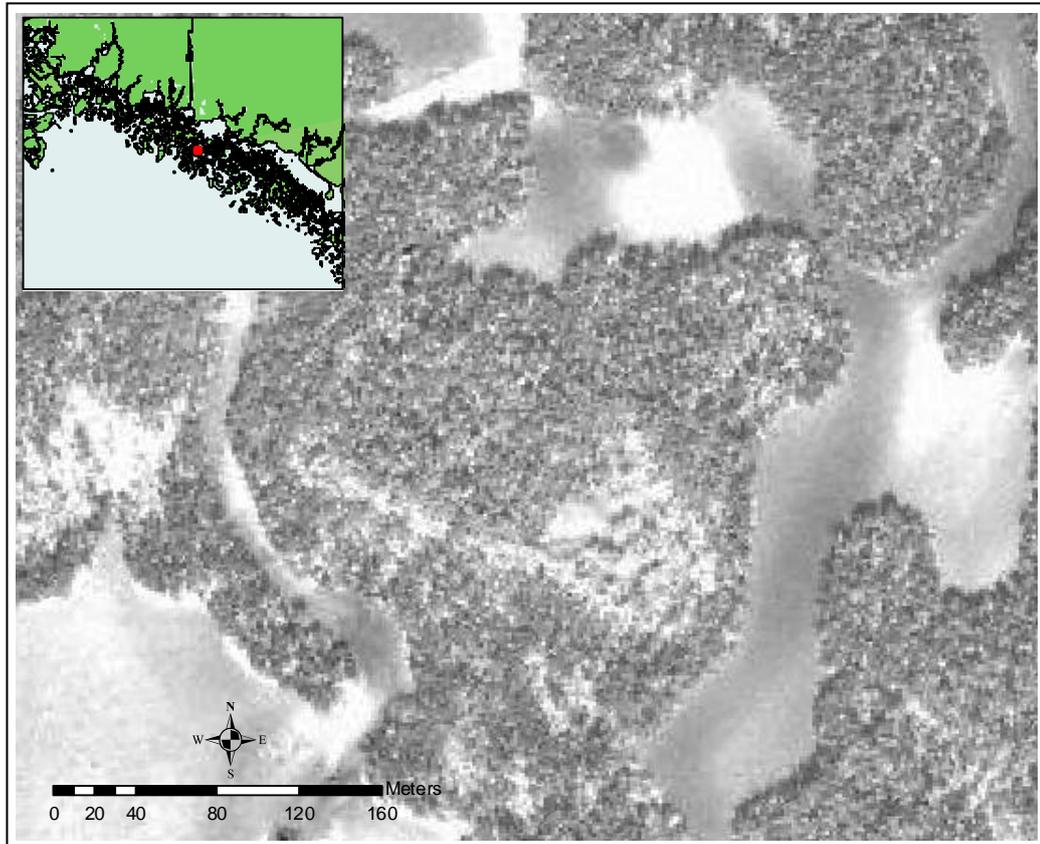


Figure 39. Aerial photograph of Fakahatchee Key 3, 1962.

A second area of the site is adjacent to the larger midden, and consists of a high, curvilinear midden ridge that runs westerly for 86 meters, and ends in a high, curved midden ridge. The end of the ridge has a small, ramp-like projection that leads into the mangrove swamp.

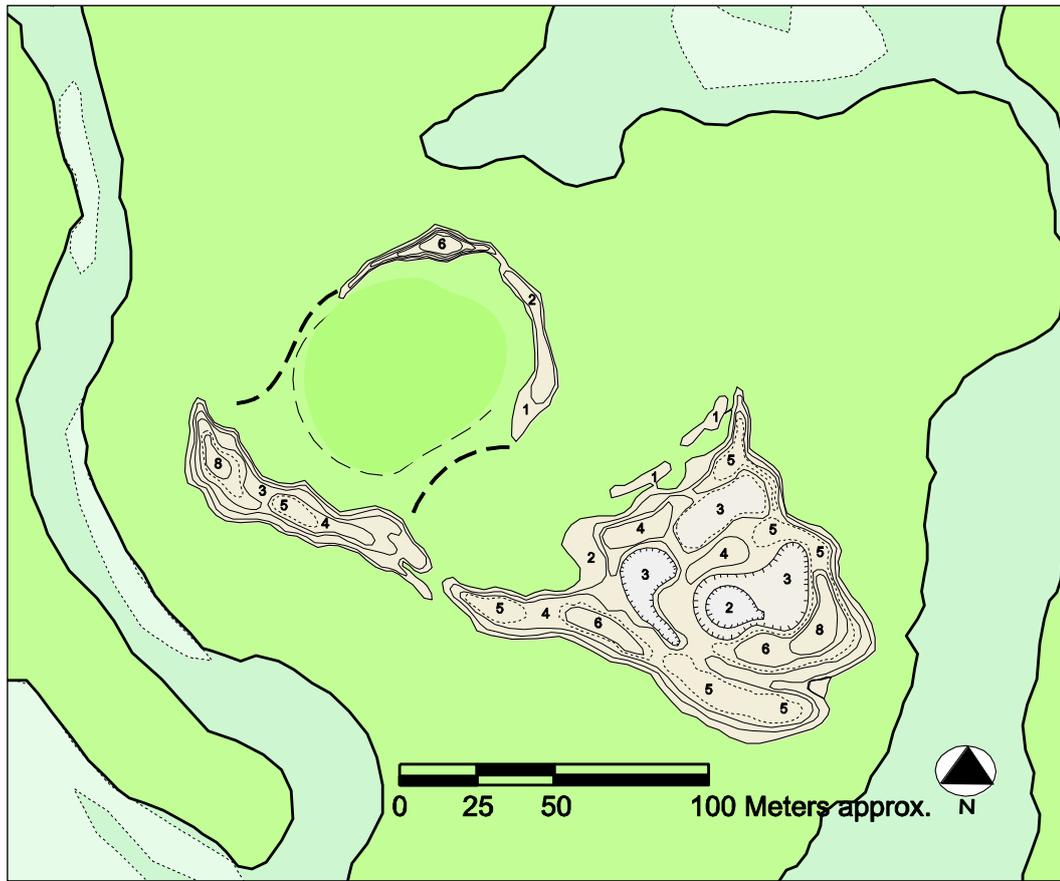


Figure 40. Map of Fakahatchee Key 3 (adapted from John Beriault, Archaeological and Historical Conservancy).

The third area of the site is a very shallow shell ring, 6 to 20 meters in width, and 70 meters from outer ring to outer ring opening. The shell ring faces southwest, and encircles a deep pond. The west half of the ring is very low, at 30 to 70 centimeters above the surrounding swamp, and consists of a crushed oyster shell and sand matrix. This half of the arm is also very flat, and appears as if it were a walkway or ramp leading to a large, ovoid shell mound located on the west center of the shell ring. The shell mound measures 10 by 25 meters, and reaches a height close to two meters. The top of the mound is conical in form, with two ramp extensions on both ends of its longer axis.

Aside from the single conical shell mound located on the shell ring, the site has no extensive shell work features, including no water courts, canals, shell fields, or finger ridges.

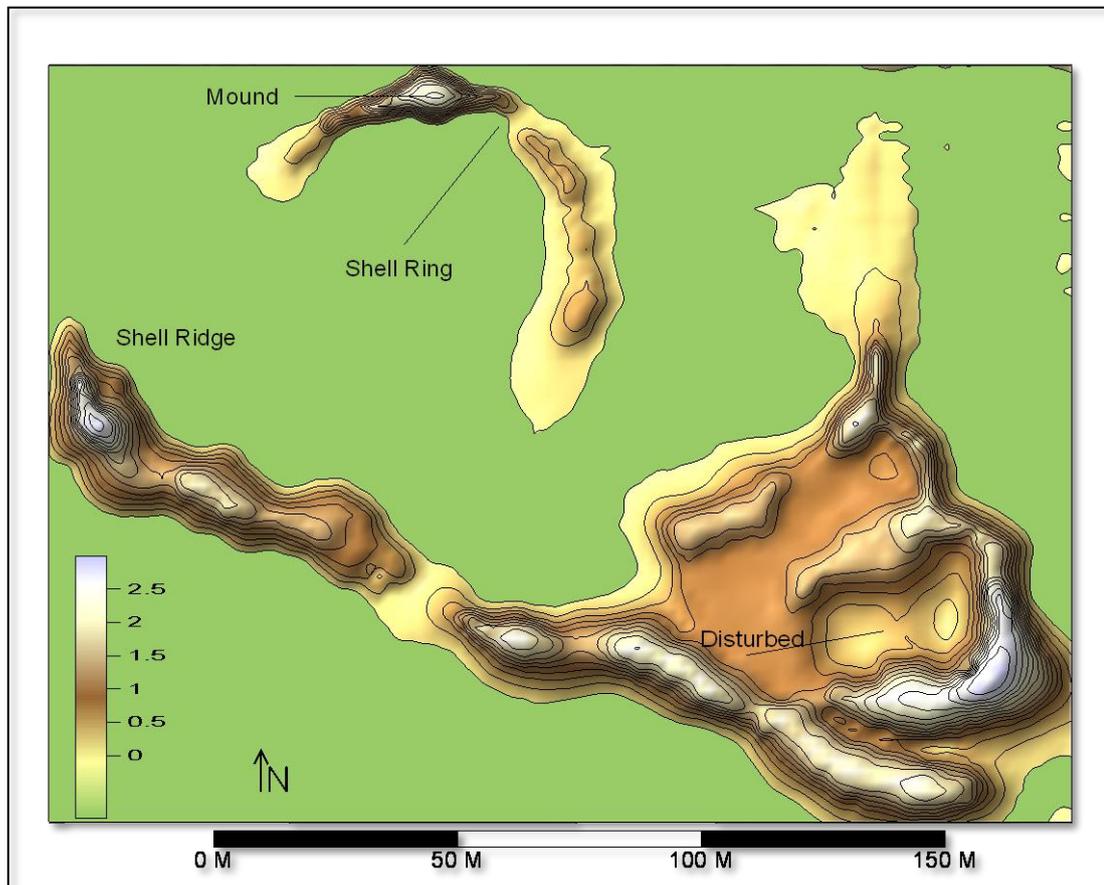


Figure 41. Contour map of Fakahatchee Key 3.

POTENTIAL SHELL RINGS

Dismal Key Southeast Ring. The Dismal Key Southeast Ring is the closest site to Dismal Key, located only 750 meters southeast, situated within a small, dense mangrove island (Figure 42). The site was first recorded and mapped by Beriault *et al.* (2003:96) (Figure 43), who interpreted the site as a shell work or possible fishing related structure, perhaps intentionally shaped to function as a fish weir or enclosure. A small creek entering into the central area of the site and emptying into a central pond was thought to have possibly functioned as a canoe channel or basin (*ibid.*).

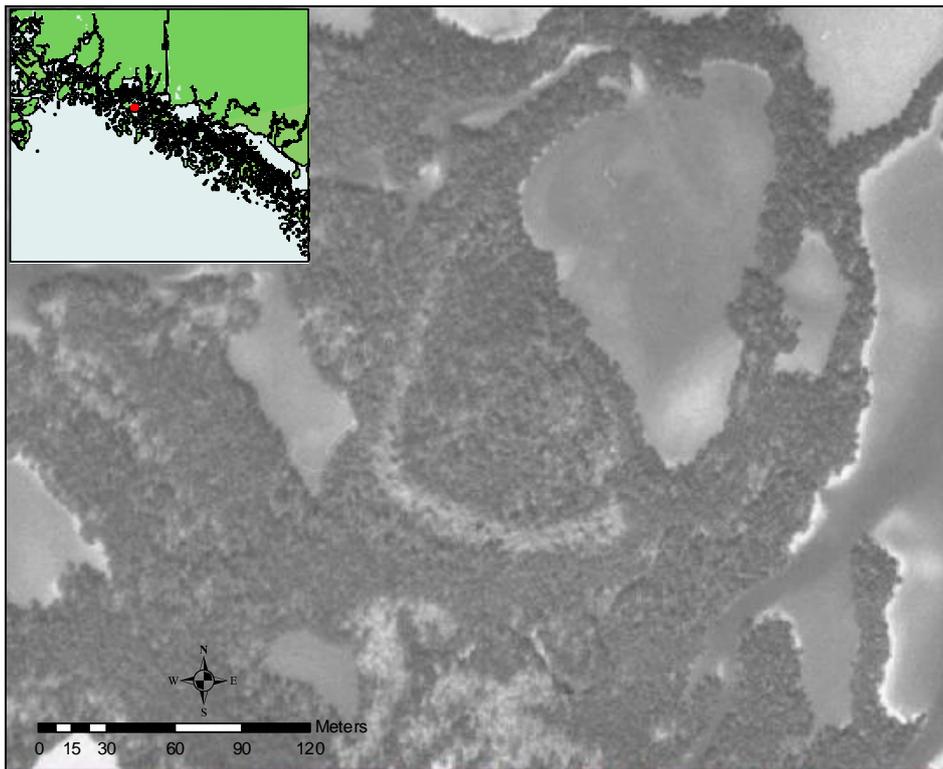


Figure 42. Aerial photograph of Dismal Key Southeast Ring, 1962.

The site consists of a single, large “C”-shaped ring that encompasses about 5.3 hectares (Figure 44), and encloses a mangrove filled pond. Appearing very similar in size and form to Dismal Key’s inner shell ring, the Dismal Key Southeast Ring faces northeast, and is roughly the same size, at about 320 meters at its widest from outer arm to outer arm. The ring is much narrower, however, at only about 25 meters wide at its widest point. The highest elevation of the ring is also much lower, reaching only 2.5 meters at its highest point, which are two spots along the center of the ring just adjacent to its midpoint. Across from the center of the ring is an isolated curvilinear bench, and a very small, low mounded area that may be a small circular midden, or the top portion of an inundated mound. There are no other shell work features, and the site lacks any large mounds, finger ridges, shell fields, or water courts.

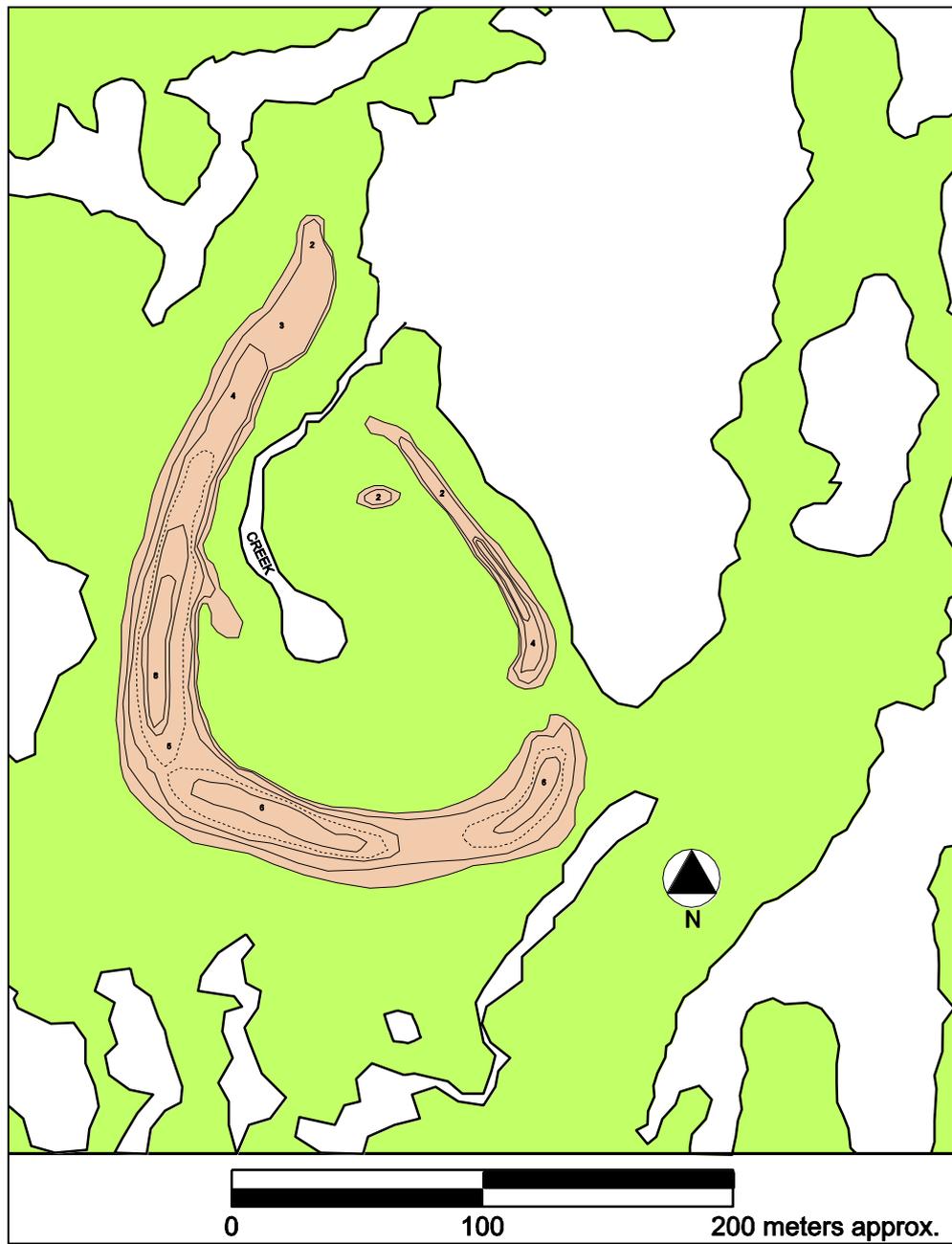


Figure 43. Dismal Key Southeast Ring (adapted from Beriault *et al.* 2003: 98).



Figure 44. Contour map of Dismal Key Southeast Ring.

Everglades City No. 7. The site is located in the southern end of the NP (Figure 45), and consists of two crescent-shaped shell ridge features situated within the mangroves. The site was first recorded by Taylor (1984:279), and was classified as a possible site, probably a relic shell ridge. This type of site was thought to be a natural feature, such as a relict shoreline, marked by small encampments and middens. After Taylor's initial recording of the site, no archaeological testing or mapping of the site was conducted until this study.

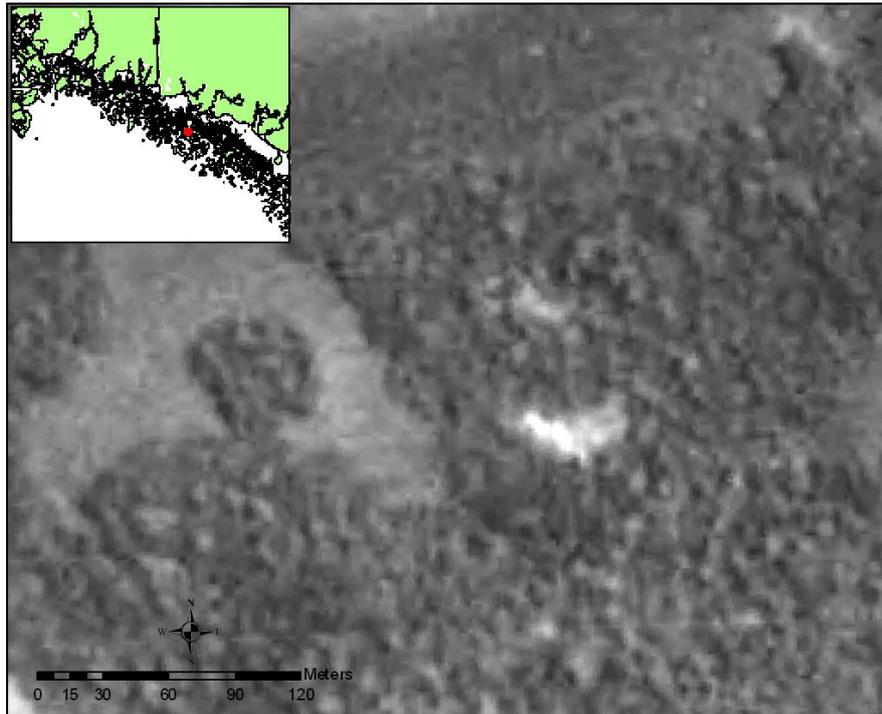


Figure 45. Aerial photograph of Everglades City No. 7, 1940.

An expedient survey was conducted of the site, and a measured GPS sketch map produced, resulting in an interpretive topographic map (Figure 46). Survey and spatial analysis determined that the site area is 0.35 hectares, and that the two shell rings are aligned north and south, separated by about 25 meters, with their open ends both facing to the north.

The larger, southern ring is crescent-shaped, measuring a distance of 62 meters between the two outer ring openings. The width of the ring varies from two to ten meters, and is widest and tallest at the center opposite the opening, with an elevation of 1.75 meters.

About 25 meters north of the southern shell ring is a second “J” shaped shell ring, measuring a distance of 33 meters between the two outer ring openings, and seven meters at its widest point. It is slightly smaller than the first ring, and slightly lower in elevation, at .75 to 1.5 meters. This ring has a 40 meter long walkway, or low ramp that leads south from the edge of the water, through the mangroves, directly to the ring.



Figure 46. Interpretive topographic map of Everglades City No. 7 (Produced by measured sketch map).

Everglades City No. 9. The site is located in the southern half of the NP (Figure 47), and was first recorded by Taylor (1984:281). He also thought this small, curvilinear site to be a relic shell ridge. Taylor described the site as consisting of fragmented oyster shells, located deep within a mangrove swamp about 100 meters northwest of the West Pass entrance. A surface scatter of other marine shell was noted, but no artifacts were observed. Taylor submitted a single surface collected shell from the site for radiocarbon dating, which returned a calibrated date of 1680 to 1360 cal BC, placing it within the Late Archaic period. However, he never acknowledged the results of the date in any report, and concluded that the site was likely a natural formation with a minor surface

scatter of midden from a temporary camp. No other archeological testing has ever been conducted to confirm whether this is a natural or cultural feature until this study.

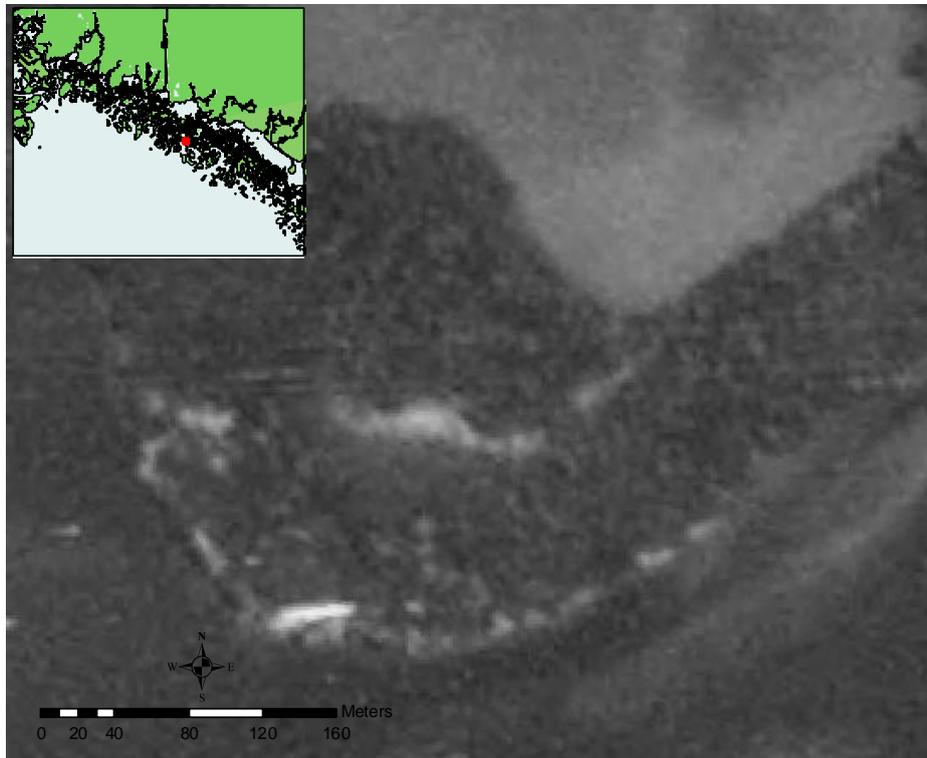


Figure 47. Aerial photograph of Everglades City No. 9, 1940.

An expedient survey was conducted of the site, and a measured GPS sketch map produced, resulting in an interpretive topographic map (Figure 48). Survey and spatial analysis determined that this small ring site encompasses about 0.3 hectares, and consists of two small, connected crescent-shaped rings. The rings face north, and are joined on their inner ends to a central, high mounded area. The western ring is smaller, with 62 meters between its ring openings. The eastern ring is slightly larger, with a 72 meter wide opening between ring ends. The highest point is the central mounded area where the two rings join, which reaches a height of about 2.5 meters. Both rings range in thickness from about 12 to 20 meters. No other shell work features are present, and the site lacks any elaboration, such as finger ridges, mounds, water courts and shell fields.

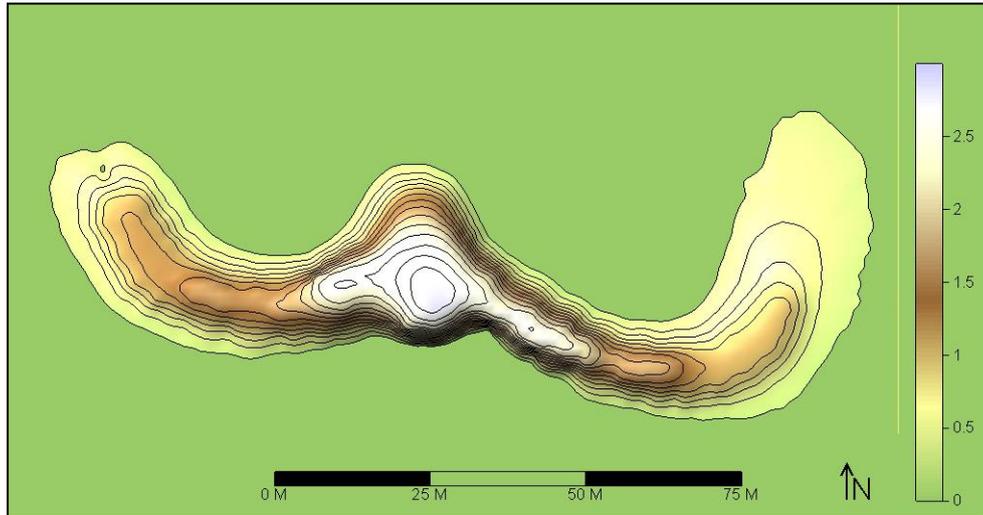


Figure 48. Interpretive topographic map of Everglades City No. 9 (Produced by measured sketch map).

Everglades City No. 10. The site is located in the southern half of the NP (Figure 49), and was first recorded by Taylor (1984:282), who classified it as a relic shell ridge of natural origin. After Taylor's initial recording of the site, no archaeological testing or mapping of the site was conducted until this study.

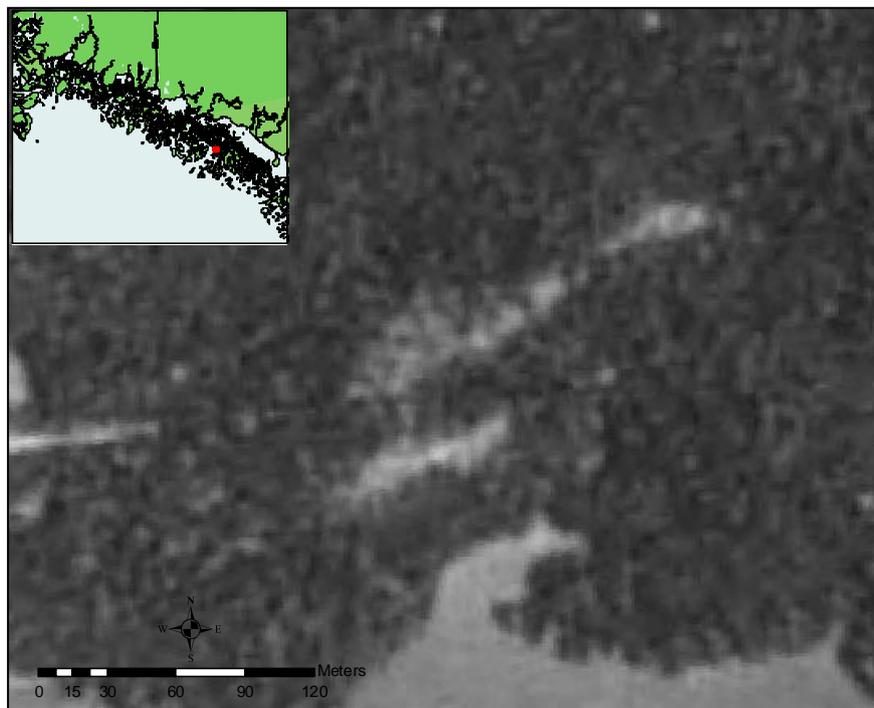


Figure 49. Aerial photograph of Everglades City No. 10, 1940.

A very cursory survey was made of the site, and a partially completed measured GPS sketch map produced, resulting in an interpretive topographic map of the site (Figure 50). It should be noted that only the northern midden of the site was mapped, as the southern midden was very low and barely visible (and therefore not represented on Figure 50).

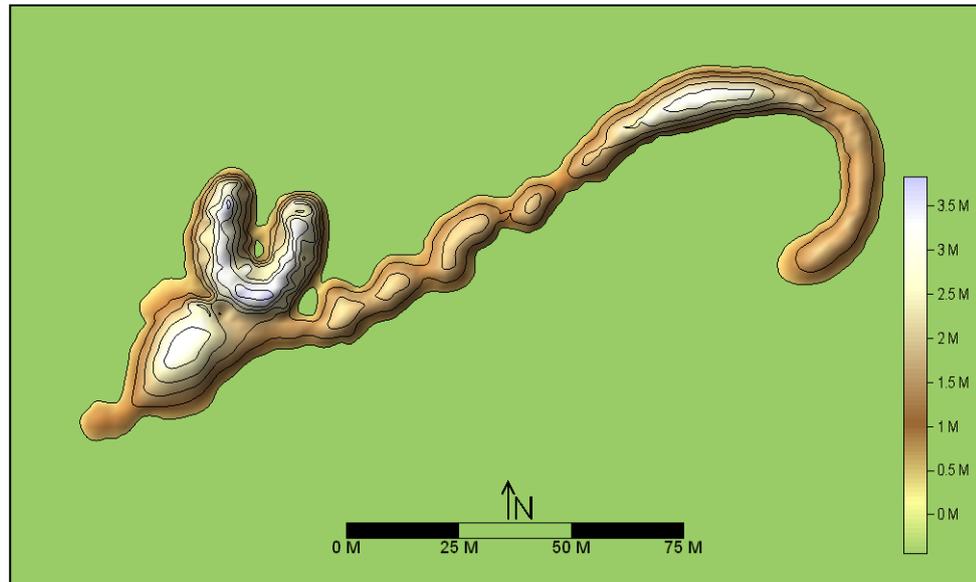


Figure 50. Partial interpretive topographic map of Everglades City No. 10 (Produced by measured sketch map).

The site contains two shell midden ridges, with the northern ridge consisting of a long, 170 meter linear ridge that contains two small ring projections on both ends of the ridge. The northwest ring is a small, horseshoe shaped ring facing north, measuring 30 meters from outer ring to outer ring. Maximum height is about three meters. Adjacent to the ring is a possible mound, consisting of a mounded area with a flattened top, and a small ramp leading off its southwest edge up to the top of the mound. The mound measures roughly 20 by 25 meters, and reaches a height of about 2.5 meters.

Connected to the ring and mound by a long, linear midden averaging about nine meters in width is another ring projection on the east end of the midden. The northeast

ring is much larger than the western ring, faces southwest, and measures 65 meters from outer ring to outer ring.

The southern midden (not mapped) is located about 28 meters south of the northern midden, and is much smaller. It is a simple, linear midden with no apparent rings, mounded areas, or projections. The midden is extremely low, at about one meter in height at its tallest, and based on measurements taken from aerial photographs, measures about 70 meters long by seven meters wide.

With the exception of the possible mound and ring projections, at either midden, no elaborate shell work features are present, such as mounds, water courts, finger ridges, or shell fields.

SPATIAL ANALYSIS OF SHELL WORKS: CONCLUSION

Spatial analysis of shell works and potential shell ring sites in the TTI have revealed several significant patterns. The first is of overall distribution, with the NP having a significantly higher density of shell work sites than the SP. The reason for this disparity is not yet understood, but it may suggest that these represent two distinct sub-regions.

The second significant pattern is that the largest of the major shell work sites are situated in a linear succession within the central part of the mangrove island complex, and are spaced relatively equidistantly apart from one another, an average of 5.4 kilometers apart. This suggests that if the settlements were contemporaneous, they were likely closely linked, with daily interaction possible between most sites.

Repetition and consistent patterning of shell work site forms is also significant (Figure 51). At the major shell works, overall site forms tend to be crescentic, with small shell rings located at one end of the site, and an expanding body of shell works that include expansive shell fields, districts of mounds and tall ridges, and a series of

radiating shell finger ridges, canals and water courts at the opposite ends of each site. This pattern is present at the four largest shell work sites (Chokoloskee, Fakahatchee, Dismal, and Russell Keys).

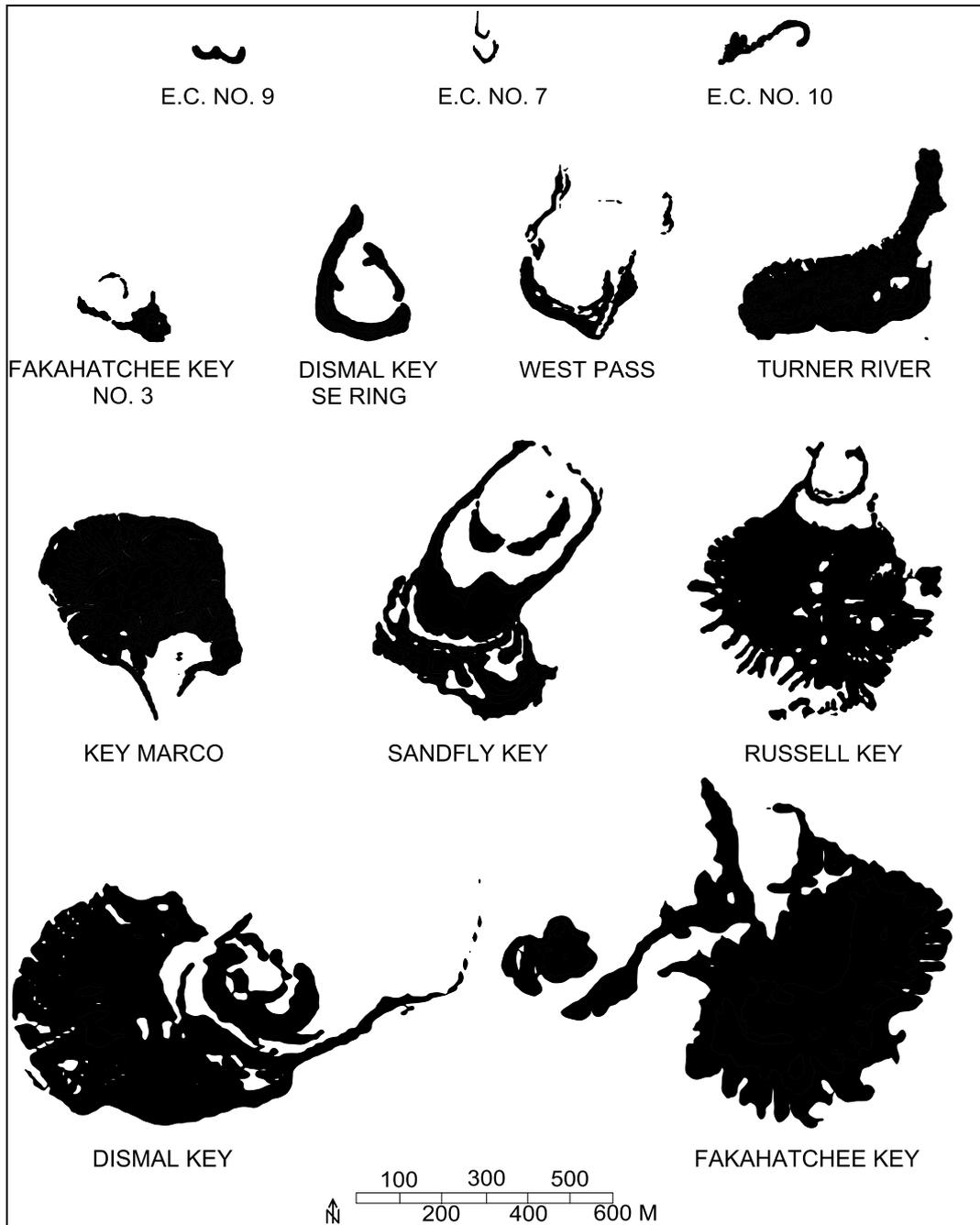


Figure 51. Outline of shell works and rings sites.

The sixth largest site, Sandfly Key, possesses most of these attributes, but lacks the distinct finger ridges so common on the larger sites. The reiteration of form can not simply be explained as coincidental, and I argue, the recurrence of distinct shell work

features and site layouts throughout the region strongly suggests that settlements shared a common community structure (see Chapter 7).

Critical to interpreting the significance of similarity in site structure is a temporal understanding to determine whether certain features and phases of sites are contemporaneous. Results of archaeological testing to determine temporal patterns are discussed in Chapter 6.

Spatial analysis of potential shell ring sites also suggests several significant patterns. Most of the potential shell rings are located south of the larger shell work sites, closer to the outer margins of the open water. Many have very low elevations, suggesting that they may have deeply buried deposits that have since become inundated by rising sea levels. These patterns suggest that these may be earlier dated sites, as lower sea levels are known to have occurred during the early and middle Holocene, and the earliest sites are predicted to be partially or fully inundated, and located further from the modern coastline than presently found (Faught 2004). Only archaeological testing and radiocarbon dating can help to confirm this possibility (see Chapter 6).

In conclusion, spatial analysis has helped to elicit significant patterns wrought and within shell works and rings, but several questions remain unanswered. How do these large shell works and smaller ring sites relate to one another temporally? Are they contemporaneous, and thus, support Widmer (1988:256) and Griffin's (2000:278) contention that these different site forms represent a hierarchical settlement pattern, and ring sites represent small fishing hamlets, collection stations, or subservient sites related to the large shell works? Alternatively if the rings are not contemporaneous do they reflect evidence of diachronic settlement pattern change throughout the region?

CHAPTER 6

ARCHAEOLOGICAL ANALYSIS

INTRODUCTION

In the previous chapter I present the results of spatial analysis of shell works, which helped to guide archaeological sampling strategies of shell work features and sites. Spatial analysis determined that several significant spatial patterns do occur within the region, mainly, at major shell work sites a consistent repetition and patterning of features and site forms is present. Most notable is that overall site forms at major shell work sites tend to be crescent-shaped, often with small shell rings located at one end of the site, and with an expanded body of shell works that include extensive shell fields, districts of mounds and tall ridges, and series of radiating shell finger ridges, canals and water courts at the opposite ends of each site. Another significant pattern is the equidistantly placed settlements, and their proximity to one another.

Potential shell ring sites also reflect consistent spatial patterns, such as simple crescent shapes, smaller site areas, and a lack of any additional shell work feature elaboration (e.g., finger ridges, shell fields, water courts, canals, mounds, etc.). The potential shell ring sites tend to be located in positions south of the larger shell works, closer to the outer margins of the open water, suggesting the possibility that these may be earlier Archaic sites based on known positions of previously lower sea levels.

Critical to interpreting the significance of these patterns is a temporal understanding of when and how these sites were constructed, occupied, re-used, and abandoned. In this chapter, I present the results of archaeological testing primarily to determine the nature, composition, formation processes, and most importantly, the temporal association of shell works. This helps to answer the critical questions that form the basis of this study, such as how did shell work and ring sites relate to one another in time and space throughout the region? Does similarity or diversity in site layouts, and

the presence or absence of certain architectural features indicate changes in site functions, or social organization over time?

Finally, results of archaeological testing are used to examine potential patterns in both inter-site and intra-site variability among differently shaped and sized shell work forms and features, to determine if features are coeval.

The following chapter presents the results of archaeological testing, organized in sections based on site type, first discussing the results of testing major shell work sites, small shell work sites, and then potential shell ring sites.

ARCHAEOLOGICAL TESTING: MAJOR SHELL WORKS

FAKAHATCHEE KEY

Fakahatchee Key, the largest shell work site encompassing over of 40 hectares, had never been systematically tested prior to this study, and nothing was known about the timing or length of the site's prehistoric occupation. Fieldwork at Fakahatchee Key was designed to sample spatially dispersed areas of the site, as well as a number of different types of features. It resulted in the completion of a site base map, nine-one meter-square excavation units, two shovel tests, recovery of 1,526 artifacts, and 25 radiocarbon dates (Table 8, Figure 52). Areas and features of the site sampled include testing of the Youman's Mound complex; two potential shell rings or curvilinear shell midden ridges; Ellis Place; the interior shell fields; the shell mound and ridge district; and finger ridges and water courts. Results of testing are discussed in detail, below.

Table 8. Results of Radiocarbon Sampling from Fakahatchee Key.

SITE	PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Fakahatchee Key	EU 1 Plaza, W Wall, 10 cmbs	UGAMS-3794	1970	20	-1.66	AD 370-AD 570
Fakahatchee Key	EU 1 Plaza, NW Wall, 63 cmbs	UGAMS-3795	1870	20	-2.62	AD 480-AD 650
Fakahatchee Key	EU 2, RC, N Wall, 0-10 cmbs	UGAMS-3796	1990	20	-2.53	AD 340-AD 550
Fakahatchee Key	EU 2, RC, NE Corner Wall, 100 cmbs	UGAMS-3797	1940	20	-2.34	AD 420-AD 580
Fakahatchee Key	EU 3, Top, Tallest Ridge, RC, NW Wall, 2-10 cmbs	UGAMS-3798	1750	20	-3.57	AD 610-AD 740
Fakahatchee Key	EU 3, Top, Tallest Ridge, RC, NW Wall, 106 cmbs	UGAMS-3799	1770	20	-2.37	AD 600-AD 720
Fakahatchee Key	EU 4, Midden Spur, RC, NE Corner, 10 cmbs	UGAMS-3800	2110	30	-2.97	AD 210-AD 400
Fakahatchee Key	EU 4, Midden Spur, RC, NE Corner, 110 cmbs	UGAMS-3801	2120	30	-3.12	AD 190-AD 390
Ellis Place	EU 5, RC, SW Corner, 10-20 cmbs	UGAMS-3802	2180	20	-3.05	AD 130-AD 300
Ellis Place	EU 5, RC, SW Corner, 100 cmbs	UGAMS-3803	2010	30	-3.89	AD 310-AD 540
Ellis Place	ST 1, Base of S. Side Inner Ring, 1 M Above Swamp, 40 cmbs	UGAMS-3814	2060	20	-2.09	AD 270-AD 430
Fakahatchee Key	EU 7, Ridge 1, RC, W Wall, 10 cmbs	UGAMS-3804	2530	20	-3.09	BC 340-BC 110
Fakahatchee Key	EU 7, Ridge 1, RC, W Wall, 100 cmbs	UGAMS-3805	2550	20	-3.4	BC 350-BC 140
Fakahatchee Key	EU 8, Ridge 2, RC, SE Wall, 10 cmbs	UGAMS-3806	1780	20	-3.53	AD 590-AD 710
Fakahatchee Key	EU 8, Ridge 2, RC, SE Wall, 100 cmbs	UGAMS-3807	1770	20	-4.41	AD 600-AD 720
Fakahatchee Key	EU 9, Ridge 1, RC, W Wall, 10 cmbs	UGAMS-3808	2210	20	-2.9	AD 100-AD 260
Fakahatchee Key	EU 9, Ridge 1, RC, W Wall, 83 cmbs	UGAMS-3809	2490	30	-3.12	BC 260-BC 40
Fakahatchee Key	RC Sample, Ridge NW Hart's Grave, 10 cmbs	UGAMS-3810	1900	30	-3.93	AD 450-AD 620
Fakahatchee Key	RC Sample, Finger Ridge 1, 0-10 cmbs	UGAMS-3811	1240	20	-3.58	AD 1130-AD 1280
Fakahatchee Key	RC Sample, Finger Ridge 2, 10 cmbs	UGAMS-3812	1400	30	-3.31	AD 950-AD 1150
Fakahatchee Key	RC Sample, "Fish Weir", 10 cmbs	UGAMS-3813	1630	20	-2.03	AD 710-AD 890
Youman's Mound	RC Sample, S. Conical Mound, Top, 25 Ft El., 0-3 cmbs	UGAMS-3815	2380	30	-2.51	BC 130-BC 80
Youman's Mound	RC Sample, Ramp, S End, 2.5 M From End, 10 cmbs	UGAMS-3816	2340	30	-3.33	BC 70-AD 130
Youman's Mound	RC Sample, N. Conical Mound, Top, 25 Ft El., 5-10 cmbs	UGAMS-3817	4490	30	-2.77	BC 2830-BC 2570
Youman's Mound	RC Sample, Exterior of Outer Ridge, Base, 20 cm Above Swamp, 40 cmbs	UGAMS-3818	2400	20	-2.81	BC 140-AD 50



Figure 52. Site map of Fakahatchee Key, Ellis Place and Youman's Mound (Adapted Archaeological and Historical Conservancy, Inc.).

Youman's Mound. As discussed in Chapter 5, the Youman's Mound complex is located on the western end of Fakahatchee Key, and is a very complex site containing a large, bowl-shaped, enclosed shell midden ring (Figure 53). The ring's perimeter is an elevated but slightly flattened ridge, with the central area of the ring containing a lower, but elevated open area. The north end of the complex contains a pair of tall, steep-sided conical mounds near 8 meters in height. A long, low ramp is located on the southwest edge of the site, which gradually leads up and into the complex.

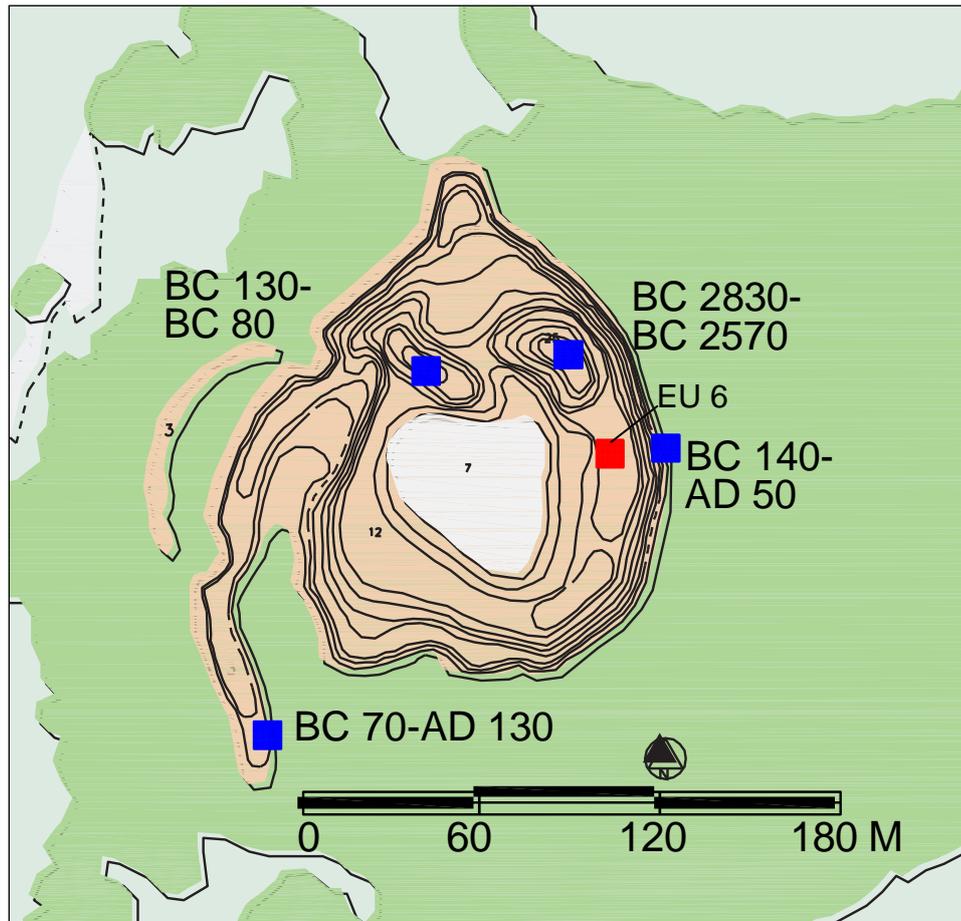


Figure 53. Site map of Youman's Mound complex (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

Due to logistical restraints in accessing this remote site, time was very limited at the Youman's Mound complex. Though the entire site was surveyed and mapped, and radiocarbon samples taken from several features, only one partial unit was excavated at the site.

EU 6 (Figure 53) was placed on the eastern end of the complex, towards the outer edge of the raised ring. Archaeological testing determined that it contained highly broken and crushed oyster shell, whelks, and a rich, dark brown sand loam. Many disarticulated human teeth and small pieces of human bone were found within the first 10 cm of the unit, and further excavation ceased in accordance to the Native American Graves Protection and Repatriation Act (NAGPRA). In deference to NAGPRA, nothing was collected from this unit (due to the potential of there being associated funerary

objects), but an inventory of artifacts present within the first 10 cm was carefully noted. Artifacts included three *Busycon* dippers, six worked columella shell tool fragments, a limestone manuport, and numerous large mammal and marine food remains, including dolphin or manatee vertebrae, very large marine turtle, deer, and very large fish (possibly tarpon or drum). The dolphin or manatee and very large marine turtle represent rare taxa, possibly prestige foods that were not found at any other sites during this study, and are not common on south Florida sites. The unusually large size of bone could represent potential luxury or high-status food remains, much like those found by Luer (2008:366-367) from the tallest mound at Big Mound Key, which he interpreted as the locus of chiefly or elite private food consumption.

In an attempt to sample the basal portion of the Youman's Mound complex, a small shovel test was placed close to EU 6, but on the lower, outside slope of the exterior edge of the raised ring at ground level, 3.6 meters lower than EU 6. The test determined that the base of the shell complex is made up of whole oyster shell, coated with a gray muck. The test quickly became inundated with water, and probing determined that midden extended to an undetermined depth below the current ground level. A single radiocarbon sample was obtained from 20 centimeters below surface at the base of the ring, resulting in a determination of BC 140 to AD 50, dating to the Glades I period.

The tops of the two eight meter-tall conical mounds were sampled with small, hand-excavated tests to recover radiocarbon samples that represent terminal dates for mound construction. The west conical mound was found to be very steep-sided and difficult to climb, with a slope percent of 127%, or 52°. At the top of the mound we located an old, U.S. Geodetic Coastal Survey Marker, marked "Ft. Myers, 1928." The central portion of the mound contained a large, old depression, probably the pit in which locals had excavated and reported recovering human remains (Hrdlička 1922:33). A

single radiocarbon sample was taken from the top three centimeters of the mound, two meters south of the looter's pit, and one meter southeast of the marker. The top matrix of the mound consisted of a thin cap of highly crushed oyster shell mixed with a black sand, covering a matrix of small, whole oyster shell. The sample resulted in a date of BC 130 to BC 80, statistically identical to the sample from the base of Youman's Mound, 83 meters south and a difference in elevation of nearly 12 meters.

The eastern mound is slightly larger and more steep-sided, with a slope percent of 145%, or 55°. A small, hand-excavated test five to ten centimeters below surface determined that the mound consisted of very small, whole oyster shells mixed with a fine black sand. It was noted that an unusual number of small land snails were mixed in with the marine shell, suggesting that the shell midden had originally formed on dry land. The sample from the east mound resulted in a much earlier than expected date of BC 2830 to BC 2570 (Late Archaic), suggesting that shell was likely borrowed from an older portion of the site and added to the top of the mound.

The next area of the site investigated was the ramp feature, which gradually appears out of the low, flat inundated mangrove swamp, progressively rising in height as it leads towards the interior of the complex. The surface was noted to contain very highly crushed shell, supporting the theory that it functioned as a ramp and walkway. A surface scatter of columella hammers were noted and collected, but no other artifacts were seen. A fourth radiocarbon sample was taken near the end of the ramp feature, 20 centimeters below the surface, in order to date its construction. The test determined that the upper 5 centimeters of the ramp consists of highly crushed oyster shell hash, overlying whole oyster shell. The radiocarbon sample resulted in a date of BC 70 to AD 130, dating to the Glades I.

Investigation of the Youman's Mound complex, though limited in scope, suggests that this may have functioned as a ceremonial or ritualized landscape (see

Ashmore 2008:167). The site's position segregated away from the main part of Fakahatchee Key, separated by a watery swamp and only accessible by boat is consistent with other sites interpreted as sacred that were also separated by water. Symbolically, water was often viewed as a supernatural barrier or portal to another world (Brady and Ashmore 1999), and used as a barrier. The ramp, which gradually leads from the mangrove swamp up and into the site, suggests that it functioned as a processional route. Once inside the complex, the large, open area is suggestive of space designated for gathering or ceremony, and is reminiscent of a public arena, where visual attention is directed towards a central focal point, in this case, the pair of imposing conical mounds.

The structure, composition and position of the conical mounds suggest that they are not habitation or gradually accumulated refuse mounds, but are monuments, and were ceremonial in nature. Their steep-sided heights and conical tops suggest that their purpose was not domestic, and they did not function to house structures, rather, they probably functioned as monuments or mortuary mounds. Reports of human remains from the west mound support this theory, as well as the human remains present within EU 6.

The earlier radiocarbon date from the east mound, as well as prevalence of many small land snails within the oyster shell matrix suggests that older shell fill from a dry midden was borrowed and used to add height to the top of the mound. This also supports the notion that the mounds were purposefully constructed monuments, and suggests that the material used to build them was deliberately brought to the site (perhaps from other significant places).

EU 6 contained many disarticulated human remains and teeth, further supporting the possibility that Youman's Mound was primarily a mortuary complex, with the plaza area perhaps functioning as a charnel preparation area. The presence of three *Busycon*

dippers along with the human remains in the top 10 cm of the unit is significant, suggesting a ceremonial context. Consumption of ceremonial teas by mortuary specialists and elites was found at the Fort Center site, with *Busycon* drinking vessels commonly found there and on other southwest Florida burial mounds (Patton 2001:35-36). The unusually large, and rare taxa also suggest the possibility of elite private food consumption or feasting (see Luer 2008:366-367).

The radiocarbon dates obtained from Youman's Mound suggest that the complex was likely constructed sometime between BC 140 to AD 50, during the Glades I period, though the east conical mound sample suggests that borrowing from an older portion of the site (possibly the interior plaza, or an underlying shell ring) is possible. This in turn raises the possibility that Youman's Mound may have deeply buried deposits that date as early as BC 2830 to BC 2570, which would be temporally consistent with other documented Late Archaic shell rings (Russo 2006:13-16).

Shell Rings, Ridges and Mounds. The next area of Fakahatchee Key to be investigated were several large, open curvilinear midden ridges and smaller ring-shaped middens east of Youman's Mound. The first area tested was the western curvilinear midden ridge, where two units were placed in order to determine the nature, construction and temporal association of the potential shell ridge and ring.

EU 7 was placed midpoint along the center of the shell ridge, and excavated to one meter below surface (Figure 54).

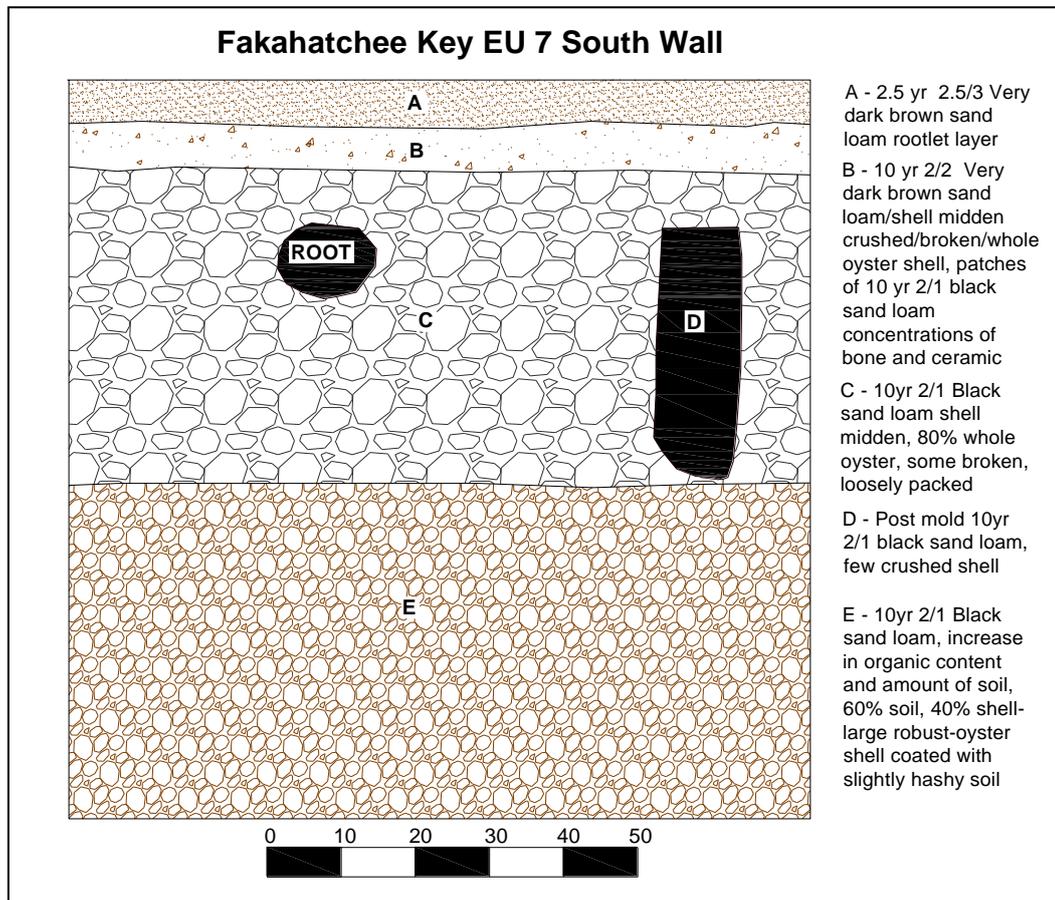


Figure 54. Fakahatchee Key EU 7 south profile map.

The upper portion of the midden contained a thin organic-rich shell midden consisting of mostly whole and crushed oyster shell, mixed with conchs, whelks, fish bone, and discarded shell tools. Lower levels were similar, but contained lenses of black earth and shell midden interspersed between small lenses of crushed shell, suggesting that this was a primary domestic refuse midden (Aten 1999:143; Patton 2001:313). Evidence of a single post hole was encountered in the south wall profile, suggesting the presence of a post or a structure. Artifacts recovered include shell tools (mostly columella hammers), a shell net-weight and a bone pin fragment. Two radiocarbon samples from near the top and bottom of the unit (10 cmbs and 100 cmbs, respectively)

were statistically identical, suggesting that this portion of the midden ridge dates from BC 340 to BC 110, dating to the Glades I period.

EU 9 was placed at the northern end of the ridge, and contained similar strata (but no post holes) (Figure 55). Two radiocarbon dates from near the top of the ridge and the bottom of the unit (10 cmbs and 83 cmbs, respectively) resulted in dates of AD 100 to AD 260; and BC 260 to BC 40; also dating to the Glades I period. Ten Glades Plain ceramics and an un-typed incised sherd were recovered from this unit.

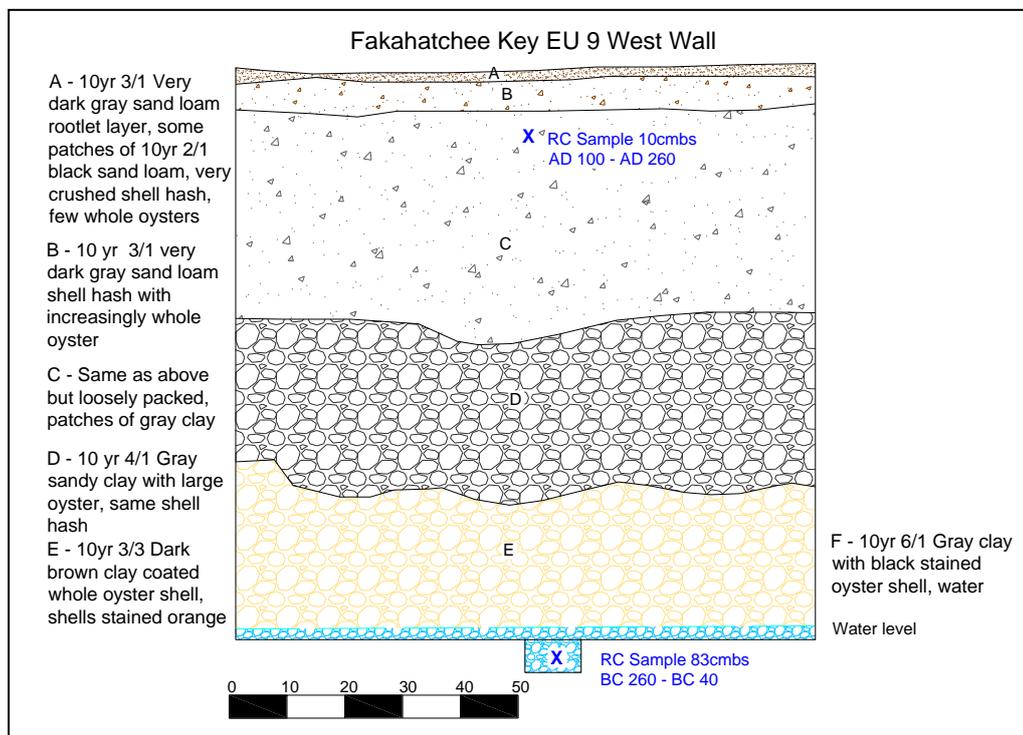


Figure 55. Fakahatchee Key EU 9 west profile map.

Located on the northern end of Fakahatchee Key and just east of the midden ridge is Ellis Place, an isolated ovoid shell midden ridge mound. One excavation unit (EU 5) (Figure 56) placed on the central, highest portion of the ridge (5.8 meters in height) determined that the upper five centimeters contained very highly crushed and compacted shell hash, suggesting that a structure may have stood on top of the mound.

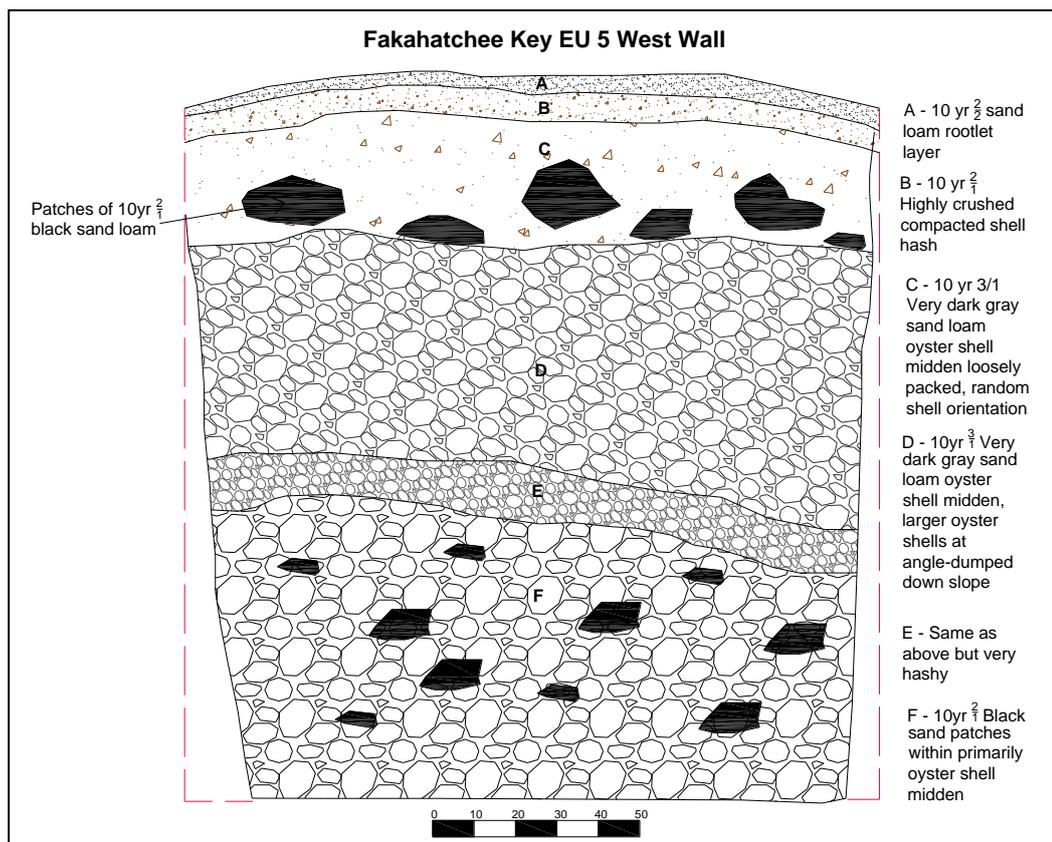


Figure 56. Ellis Place, EU 5 west profile map.

Lower levels of the mound contained mostly whole, loose oyster shell mixed with dark brown sandy loam. The orientation of the shell suggested discrete dumping episodes following a mounded contour. The remains of a probable fire-pit with abundant ash and charcoal was found, and artifacts recovered included many food remains (mostly fish and shellfish, some turtle and mammal), as well as small expedient shell tool hammers (Type G and columella hammers) and Glades Plain ceramics. Two radiocarbon dates from the upper and lower levels of the unit (10 cmbs and 100 cmbs, respectively) date the upper portion of the mound to between AD 130 to AD 300; and AD 310 to AD 540, Glades I to Glades I (late).

In order to sample the basal portion of Ellis Place mound, a small shovel test was placed at the interior edge of the mound near ground surface (five meters below the top of the mound), and excavated to 40 cmbs. One radiocarbon sample resulted in a date

of AD 270 to AD 540, suggesting that the Ellis Place mound was probably constructed and occupied within a short time interval, sometime between AD 130 and AD 540, dating to the Glades I to Glades I (late) period.

Though presently the lower portion of the site is inundated by rising sea level and encroaching mangroves, it appears that Ellis Place may have been formerly connected to a larger ring-shaped feature, the remains of which are visible just south of Ellis Place. If formerly connected, the entire ring would have faced west, and measure approximately 200 meters from outer arm to outer arm; similar in size to Dismal Key's ring and Dismal Key SE Shell Ring. In order to test this possibility, EU 4 was placed on the southern, opposite end of the ring's arm (Figure 57).

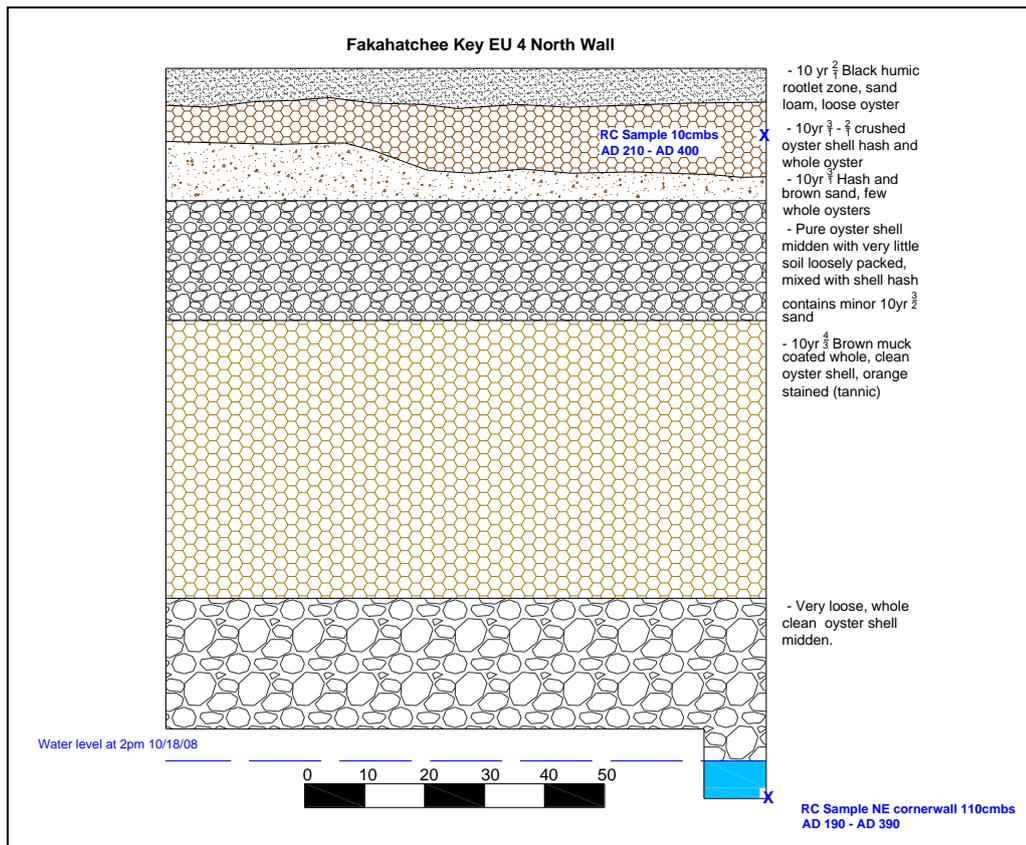


Figure 57. Fakahatchee Key EU 4 north profile map.

The ring midden consisted of six strata of alternating whole and crushed oyster shell midden mixed with lenses of crushed shell hash. Minor amounts of sand were found mixed within the predominately oyster shell midden, though one stratum contained almost pure, loosely packed oyster shell with very little sediment. Artifacts recovered include 33 Glades Plain ceramics and a Type B hammer. Two radiocarbon dates from the upper and lower (10 cmbs and 110 cmbs, respectively) of the test indicate that this portion of the ring was constructed rapidly, dating from AD 210 to AD 400; and AD 190 to AD 390 (Glades I), and is contemporaneous with Ellis Place, supporting the possibility that these features were probably once connected as a larger shell ring.

Shell Fields and Midden Ridge. The next shell work feature investigated at Fakahatchee Key were the shell fields. EU 1 was placed within the center of a very

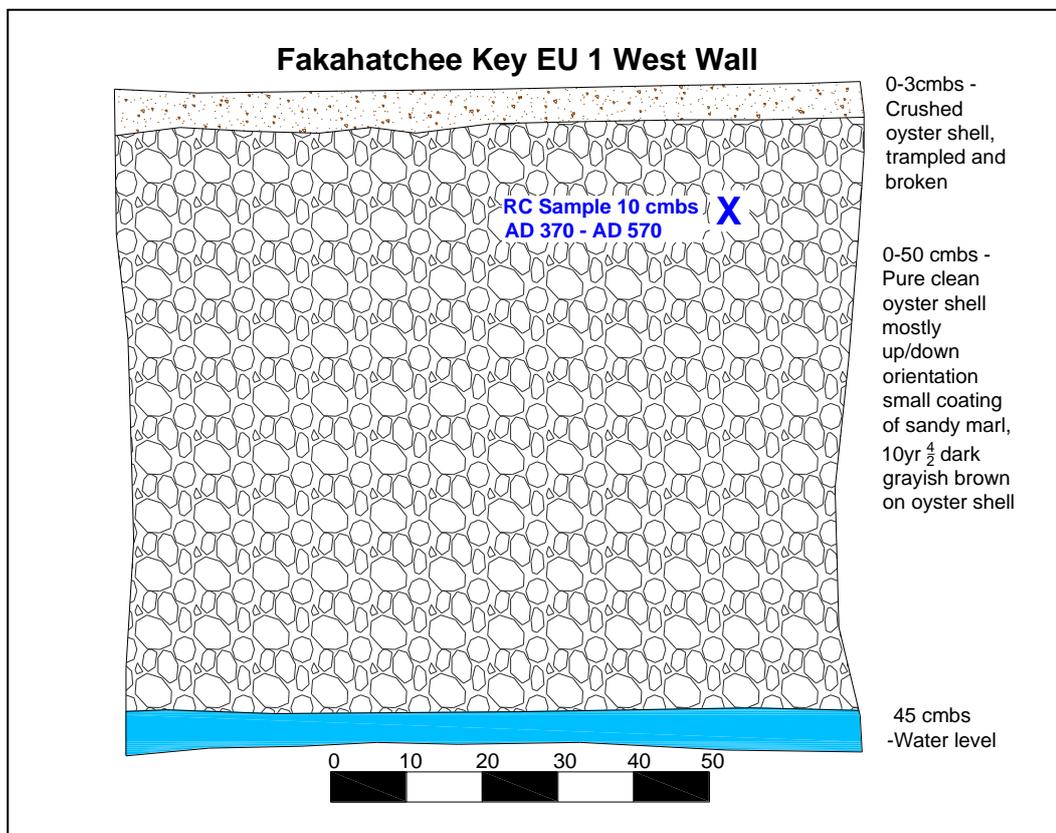


Figure 58. Fakahatchee Key EU 1 west profile.

expansive, open area of shell fields. The surface and top three centimeters of the unit contained highly broken, crushed, and degraded oyster shell (Figure 58).

The upper levels of the unit contained almost pure, clean oyster shell, containing no other midden material (e.g., no bone, broken shell tools, charcoal, etc.). The oyster shells in the lower levels of the unit contained a fine coating of sandy marl that appeared to be the result of tidal up-wash. Water was encountered at a depth of only 45 cm below ground surface, however land snails were noted to occur throughout the midden, suggesting that it originally had been deposited in dry conditions. Only two small Glades Plain ceramic sherds were recovered, along with six shell tools, including three Type C hammers, one Type G hammer, an un-typed hafted hammer and a columella hammer, suggesting that some type of hammering or pounding activity took place in the shell fields. Two radiocarbon dates, from 10 cmbs and 63 cmbs, suggest that this portion of the shell fields were constructed sometime around AD 370 to AD 570; and AD 480 to AD 650 (Glades I).

EU 2 (Figure 59) was placed about 80 meters southwest of EU 1, along a low, curvilinear midden ridge adjacent to and partially enclosing the shell fields. The configuration of the midden ridge and its slightly elevated height suggests that it may have functioned as an occupation area.

The upper portion of the shell ridge contained a slightly organic oyster shell midden with dark sandy loam. Lower levels of the unit contained mostly whole, loosely-packed oyster shell mixed with black humic sand loam, with small amounts of bone (fish). Artifacts recovered include 68 Glades Plain ceramics, and 17 shell tools, including one Type A hammer, two Type C hammers, numerous un-typed hafted hammers and columella hammers, a clam chopper and anvil, and shell vessels (one dipper, scoop and cup). Two radiocarbon dates from the upper and lower portions of the test (10 and 100 cmbs) suggest that the midden ridge is contemporaneous with the shell

fields unit, and occupation in this area of the site was sometime around AD 340 to AD 550; and AD 420 to AD 580, from the Glades I to Glades I (late) period. The midden strata and artifact assemblage from this shell work feature suggests that of a domestic occupation, with the midden ridge probably functioning as part of a residential district.

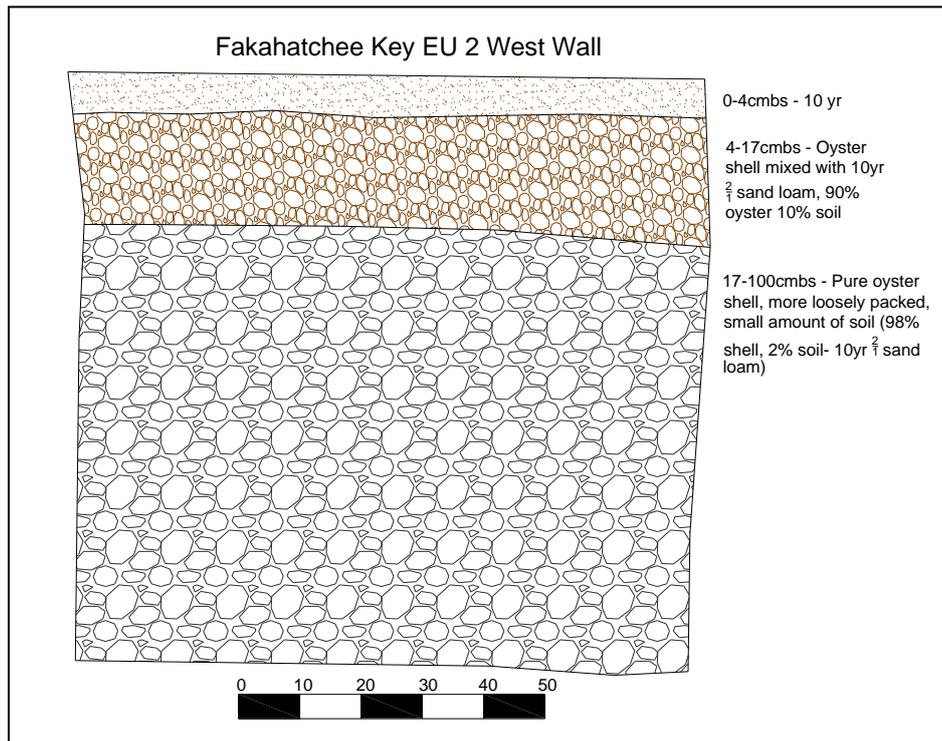


Figure 59. Fakahatchee Key EU 2 west profile.

EU 8 (Figure 60) was placed on the opposite end of the midden ridge, 355 meters northeast of EU 2. The upper portion of the test contained a very dark brown, organic sand loam mixed with crushed and broken oyster shell. The unit contained five distinct strata, with the upper levels showing a very rich organic loam mixed with typical oyster shell midden, and containing abundant ceramics (394 Glades Plain, one Belle Glade, one Gordon's Pass Incised, two Goodland Plain, and one Fort Drum Incised), as well as seven shell tools. Lower levels contained clean oyster shell with very little sediment, and contained very few artifacts (eight Glades Plain ceramics).

Significantly, EU 8 evidenced five post molds in the west and south profile walls, suggesting that a structure was once located on the ridge.

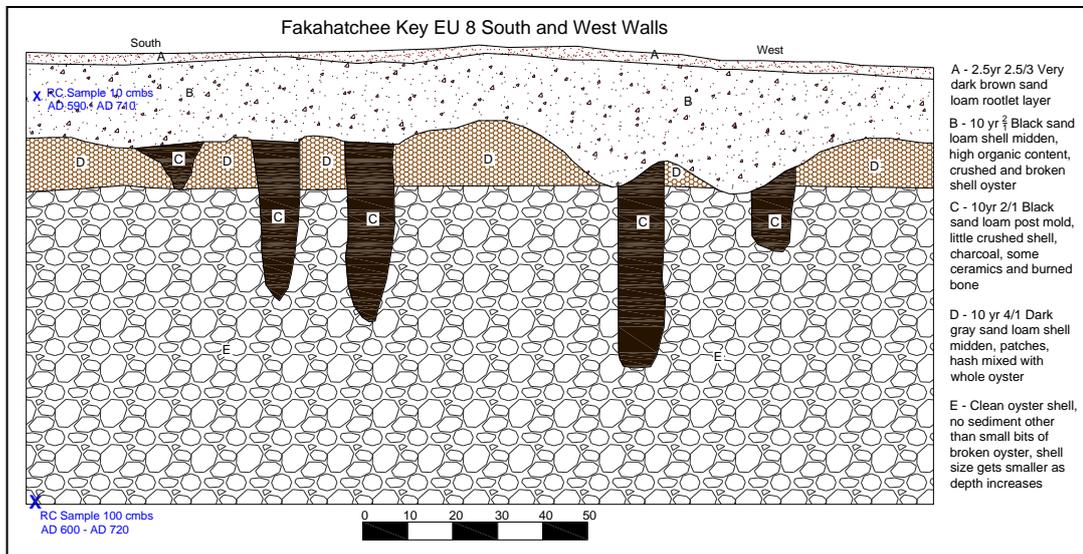


Figure 60. Fakahatchee Key EU 8 south and west profile map.

The diagnostic ceramics recovered from the unit were recovered between 0 and 40 cmbs, and all date to the Glades I (late) period, AD 500 to AD 750 (Milanich 1994). A radiocarbon sample taken from 10 cmbs returned a date of AD 590 to AD 710, confirming the temporal association of the ridge. A second date from 83 cmbs resulted in a statistically similar (though slightly younger) date of AD 600 to AD 720.

Shell Mound/Ridge District. Fakahatchee Key has a complex shell mound district arranged in a large arc, mostly with a height of 3.5 meters or less, with only one mound reaching a maximum height of five meters. EU 3 was placed on top of the tallest mound, determined to consist of very large, whole oyster shell, mixed with very little shell hash or soil, and no distinct strata. No evidence of any occupation floors, living surfaces or post holes were found. Artifacts were few, and include a notched clam spokeshave and a small net weight. A piece of fired clay (or daub), 27 Glades Plain ceramics and food remains (fish bone) were recovered. Two radiocarbon dates from the top and bottom of the unit (2 to 10 cmbs, and 106 cmbs, respectively) suggest the

mound was formed rapidly, sometime between AD 610 to AD 740 and AD 600 to AD 720, Glades I (late).

Finger Ridges and Water Courts. Fakahatchee Key has a complex arrangement of protruding finger ridges that radiate out from the site towards open water. At least 14 distinct finger ridges were mapped. Due to time constraints, no excavation units were excavated within the shell finger ridges (but see Russell Key EU 11 for a finger ridge excavation), however, three radiocarbon samples were taken from the upper (10 cm) portions of these features. Dates confirm that these features are the most recent, and perhaps the last shell work constructions made at Fakahatchee Key. Two finger ridges, located on the southern and eastern edges of the site were determined to date between AD 950 and AD 1280 (Glades IIb to IIIa). A third feature, which was less like a typical finger ridge and more like a possible fish trap construction, dated between AD 710 to AD 890 (Glades I (late) to Glades IIa).

Fakahatchee Key: Conclusion. Archaeological testing of Fakahatchee Key suggests that this complex shell works island represents a prehistoric landscape that was constructed over time in spatially distinct occupational phases, and that the maximal extent of the site was not utilized at a single point in time as Widmer predicted (1988:256). The earliest components of the site appear as simple, ring-shaped middens, dating from BC 350 to AD 260, during the Glades I period. However, earlier dates at the Youman's Mound complex suggest that even earlier components of the site may remain deeply buried and un-sampled, perhaps dating as early as BC 2830. It is also possible that Youman's Mound may represent an earlier shell ring site that was abandoned and later reused, perhaps with borrowing, filling and rearranging with shell to create the distinct conical mounds, ramp, and recessed ring-shaped plaza.

The Youman's Mound complex suggests that intensive monumentality and ceremonialism were present at shell work sites, and are perhaps associated with ring

sites. Youman's Mound inhabitants constructed a ritualized landscape that may have functioned as a mortuary complex, or represented a chiefly or elite center. Significantly, the complex appears to have been constructed at a much earlier date than intensive mound building is seen in the neighboring Calooshattee region, where mound building is noted to occur there around AD 900 (Luer 1999; Patton 2001:50).

Other mounds, such as at Ellis Place, suggest that tall mounds may have been constructed to serve a range of purposes, perhaps to house structures, as lookouts, or for long-distance communication such as smoke signaling. These possibilities are suggested by the compacted and crushed shell at the upper level of the mound, the fire pit, and the advantageous position and height of the mound on the edge of the site.

Following the earlier shell ring constructions, the community plan of Fakahatchee Key shifted towards a distinct mound-building phase, with a district of shell midden mounds, ridges and plazas that were constructed between AD 340 and AD 740. Shell fields appear to have been activity areas purposefully kept open and flat, where small amounts of refuse became intermixed with shell, but where mostly whole shell was dumped but kept level to create an open, plaza-like area. By contrast, the adjacent curvilinear midden ridge, with slightly mounded areas of elevation that encloses the flat shell fields contained much denser occupational artifact debris (ceramics and shell tools), organic sediments, and evidence of post molds, suggesting that this type of shell work feature served as a domestic, habitation area.

Several large mounds were also mapped, and one tested, which was found to be slightly younger than the curvilinear midden ridge and shell fields, indicating that there may have been a shift in community settlement patterns towards the construction of larger mounds. Alternatively, this may also indicate differential or hierarchical habitation areas within the site.

Lastly, the shell finger ridges, canals and water courts also have temporal significance at Fakahatchee Key, with a possible fish trap dating between AD 710 to AD 890, and finger ridges dating between AD 950 and AD 1280. These are the youngest dated features at the site, and the last dated shell work constructions to be made at Fakahatchee Key. After AD 1280, there is no evidence of any prehistoric occupation, and Fakahatchee Key appears to have been abandoned prior to AD 1300.

In summary, archaeological testing of Fakahatchee Key demonstrates a definite temporal phasing to shell work features, with the earliest site components composed of simple rings and large curvilinear midden ridges. Over time, site movement appears to have continuously expanded in a southeasterly direction, ending in the radiating finger ridges, just prior to AD 1300.

DISMAL KEY

Prior to this study, no systematic archeological testing had ever been conducted on Dismal Key. The site encompasses upwards of 30 hectares, situated on a densely vegetated and remote mangrove island in the northern TTI. Archaeological testing included sampling of a variety of different shell work features (rings, plazas, mounds, finger ridges, water courts and canals) and areas of the site to determine occupational history, phasing of site features, and to help interpret shell work functions. A total of six excavation units were completed, along with numerous smaller radiocarbon tests, generating 2,678 artifacts and 20 radiocarbon dates (Figure 61, Table 9), providing a major foundation for understanding the history of Dismal Key's occupation and TTI shell work settlement patterns.

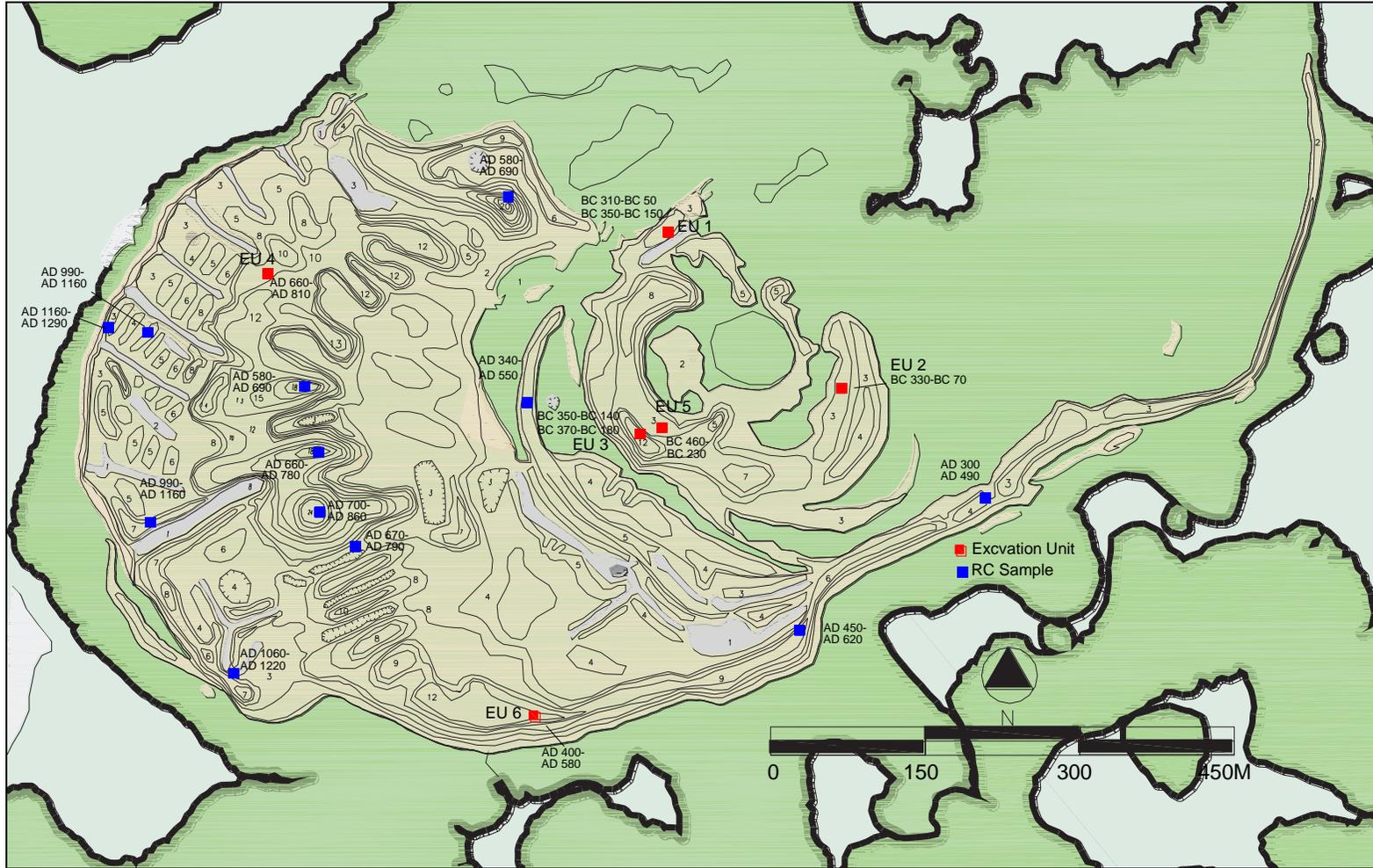


Figure 61. Dismal Key site map (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

Table 9. Results of Radiocarbon Sampling from Dismal Key.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
EU 1, RC, N Corner Wall, 114 cmbs	UGAMS-3770	2560	30	-3.01	BC 350-BC 150
EU 1, RC, N Corner Wall, 10 cmbs	UGAMS-3771	2500	30	-2.1	BC 310-BC 50
EU 2, RC Sample, NE Wall, Outside Unit, 20 cmbs	UGAMS-3772	2510	30	-4.77	BC 330-BC 70
EU 3, RC, Zone B, N Wall, 7 cmbs	UGAMS-3773	2550	30	-4.26	BC 350-BC 140
EU 3, RC, Zone E, N Wall, 126 cmbs	UGAMS-3774	2590	30	-1.88	BC 370-BC 180
EU 4, RC, NW Wall, 90 cmbs	UGAMS-3775	1690	30	-1.98	AD 660-AD 810
EU 5, RC, S Wall, 85 cmbs	UGAMS-3776	2660	30	-3.1	BC 460-BC 230
EU 6, RC, Zone C, Bottom, W Wall, 100 cmbs	UGAMS-3777	1950	30	-2.47	AD 400-AD 580
RC Sample A, Central Bench, Upland, Mid Bench, 10 cmbs	UGAMS-3778	1380	30	-2.06	AD 990-AD 1160
RC Sample, N Edge Bank, Main Canal, 10 cmbs	UGAMS-3779	1380	30	-2.18	AD 990-AD 1160
RC Sample #4, Tail Base, 9 Ft Above Shell Fields, 10 cmbs	UGAMS-3780	1900	20	2.14	AD 450-AD 620
RC Sample #6, N Canal Mound, 20 cmbs	UGAMS-3781	1800	20	-0.83	AD 580-AD 690
RC Sample #7, S Canal Mound, Top, 20 cmbs	UGAMS-3782	1710	20	-2	AD 660-AD 780
RC Sample #10, Shell Midden Ridge, 5 cmbs	UGAMS-3783	1690	20	-3.13	AD 670-AD 790
RC Sample #12, Breakwater Edge, 10 cmbs	UGAMS-3784	1220	20	-1.86	AD 1160-AD 1290
RC Sample, Ring, 10 cmbs	UGAMS-3785	1990	30	-1.6	AD 340-AD 550
RC Sample, Tail, 10 M West of Major Cut, 1 M Above Mangroves, 10 cmbs	UGAMS-3786	2020	20	-1.92	AD 300-AD 490
RC Sample, Water Court, S Bank, 2 M El., Top, 10 cmbs	UGAMS-3787	1300	20	-1.93	AD 1060-AD 1220
RC Sample, Temple Mound, Top, 0-5 cmbs	UGAMS-3788	1640	20	-1.76	AD 700-AD 860
RC Sample, Moore Mound, 20 Ft El., Top, Center, 5 cmbs	UGAMS-3789	1800	20	-3.78	AD 580-AD 690

Shell Ring. As determined in the spatial analysis of shell works (Chapter 5), smaller, ring-shaped middens are often present within the interior of major shell work sites (e.g., Russell Key, Sandfly Key, Fakahatchee Key and Key Marco), and are situated in a nested configuration. The “C”-shaped shell ring at Dismal Key faces northeast, and measures approximately 275 meters wide from its outer ends, and about 50 meters wide within its interior. The highest elevation of the ring reaches close to 4 meters at the center of the ring, with a low, but raised open plaza encircling a pond or water court in the inside interior.

Four excavation units (EU) sampled the two opposite arms of the ring, the central and highest part of the ring, and the low plaza area inside the ring. Testing within the shell ring determined that it formed rapidly in episodes as evidenced by mostly “clean” whole oyster shell with little to no sediment, mixed with layers of crushed oyster shell hash and other marine shell, and occasionally, a small amount of

fish bone. Very little sand or soil was present within the midden, suggesting rapid formation. The crushed shell hash layers suggest former activity surfaces or living floors that were later buried under additional deposits of shell.

EU 1 was placed on the northwest end of the ring's arm, at about two meters in elevation. Strata included alternating layers of crushed and whole shell (Figure 62).

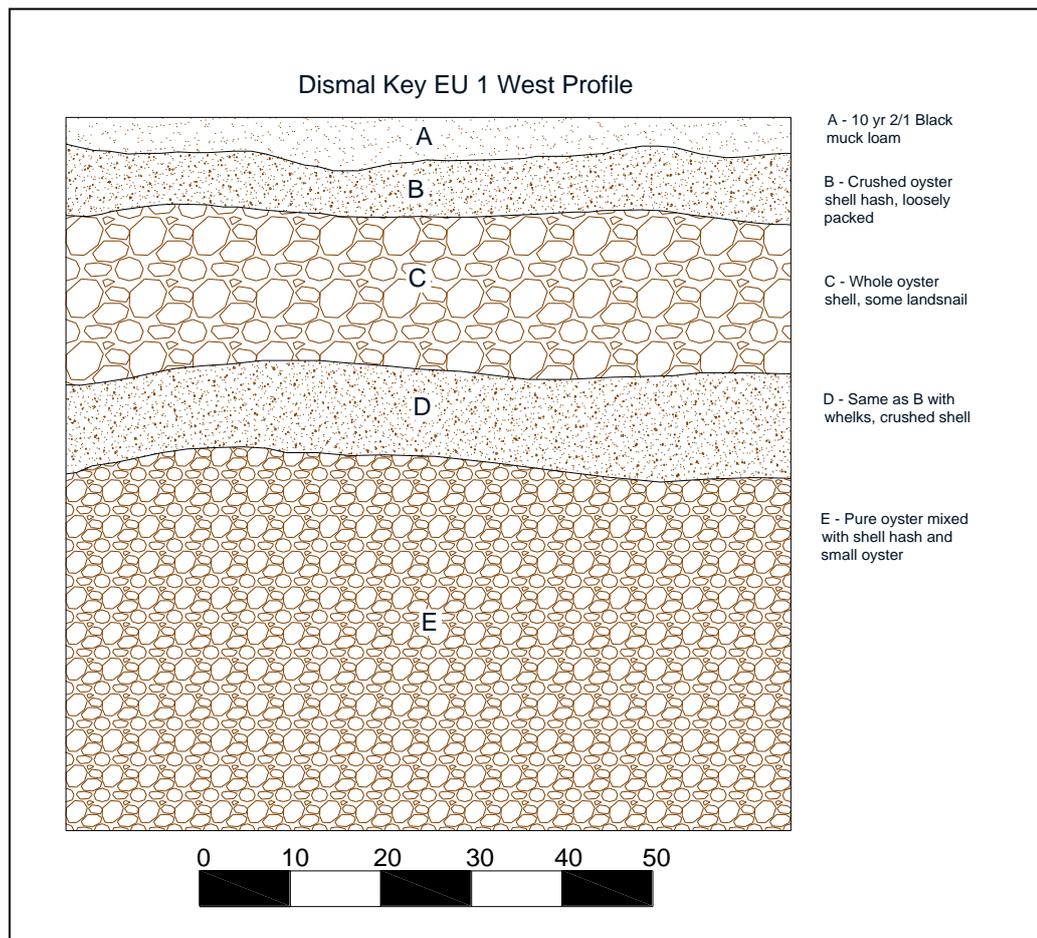


Figure 62. Dismal Key EU 1 west profile.

Artifacts from EU 1 included several exotic and unusual finds not typical of TTI shell middens, such as a fired clay ball, pieces of red ochre, and a chert flake, which is very rare for the area, as the nearest chert source is over 250 kilometers away. The red ochre may suggest a ceremonial context (Brown 1997:473), and the other artifacts those of a high-status residence. Twenty-nine plain (Glades and Goodland) ceramics were

recovered, and radiocarbon samples from near the top and bottom of the unit (10 cmbs and 114 cmbs) date the ring from BC 310 to BC 50, and BC 350 to BC 150, to the Glades I period.

EU 2 was placed opposite EU 1 on the northeast end of the ring's arm, which was lower in elevation (less than one meter) than the other side of the ring. The top levels of the excavation contained whole oyster shell mixed with some crushed shell, black sandy loam, and a few whelks and conchs. Between 10 and 20 cm, a single, disarticulated human long bone fragment with possible modification (cut or ground on one end) was recovered. The unit was carefully troweled to determine if there was a burial pit or other remains, but there was no indication that this was an *in situ* burial. While troweling the unit, one very worn premolar tooth was uncovered. Another possible human bone was visible in the southwest corner of the unit, but it appeared disarticulated and isolated, and not associated with a burial pit. In compliance with NAGPRA regulations, all excavation ceased within this unit, and no artifacts were collected.

An inventory of artifacts was quickly taken, which included a *Busycon* shell dipper, two Glades Plain ceramics, fish bone, and other small unidentified bone. All artifacts and bone were returned to the unit and reburied. A small radiocarbon sample of shell was taken from just outside the unit's northeast wall at 20 cmbs, and resulted in a date of BC 330 to BC 70 (Glades I), which is contemporaneous with EU 1.

EU 3 was placed at the central, highest point of the ring, at an elevation close to four meters in height. The unit, excavated to 130 cmbs, contained four distinct stratum (Figure 63), mostly characterized as alternating layers of whole oyster shell midden mixed with dark, organic sediment, and very dense with artifacts. A stratum of mostly clean, whole shell containing no sediment, and very little artifacts was capped with a small lens of crushed shell hash, suggesting that it was a former ground surface. Two

post molds were noted in the west and north walls, suggesting a structure once stood on the summit of the ring.

EU 3 also contained possibly ceremonial or high-status artifacts, including shark teeth (some drilled), worked sting ray spines, a bi-pointed bone awl, a bone gouge (Figure 64), red ochre, a limestone pendant, a shell dipper, and an unidentified seed. A dense concentration of 32 shell columella hammers (Figure 65) and tools were recovered from the unit, including nine unusual “pestle”-like columella shell tools that suggest some type of specialized grinding and processing activity (perhaps seeds or pigments) may have taken place at the ring.

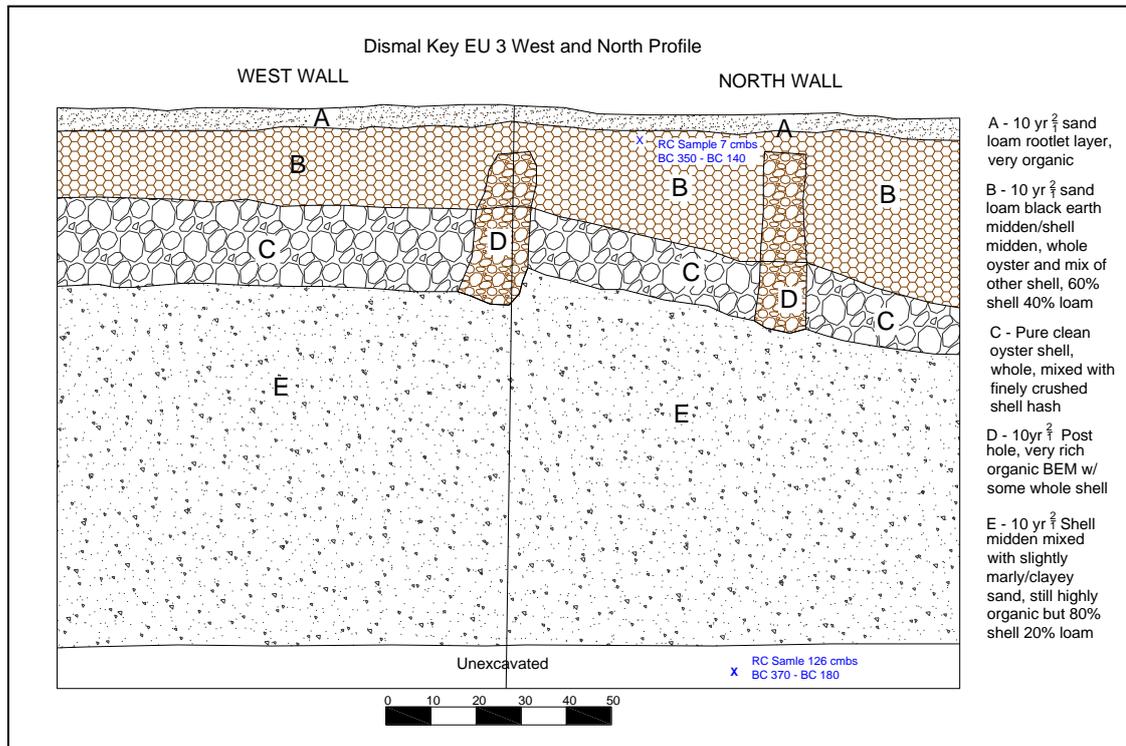


Figure 63. Dismal Key EU 3 west and north profile map.

Seven plain ceramics (Glades and Goodland) were recovered from the unit. Two radiocarbon dates, from 7 cmbs and 126 cmbs suggest a short duration of occupation,

indicating the ring was occupied from BC 350 to BC 140, and BC 370 to BC 180 (Glades I), and is contemporaneous with the dates from EU 1 and 2.

In order to obtain a basal date for the ring, EU 5 was placed in the low plaza area at the inner foot of the ring in direct alignment with EU 3, four meters lower than the top of the ring. It was excavated to 85 cmbs, where water inundated the unit. It contained mostly whole oyster shell, with a few artifacts, including nine shell tools (mostly columella hammers), and no ceramics. One radiocarbon date from 85 cmbs resulted in a date of BC 460 to BC 230, bordering on the Terminal Archaic period and Glades I period.

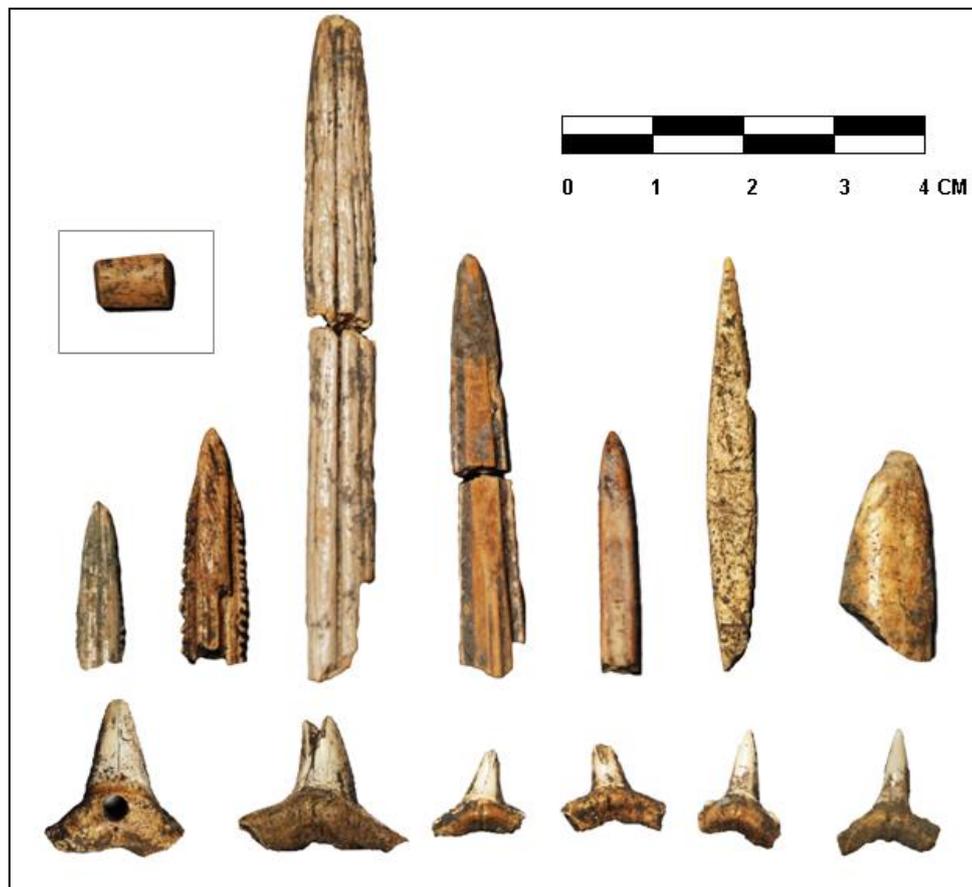


Figure 64. Examples of worked bone and tools: bone pins, awls, fids, gouges and drilled and undrilled shark teeth.



Figure 65. Examples of shell tools: columella hammers and cutting-edges from lightning whelks and horse conchs.

In summary, six radiocarbon dates taken from the upper and lower portions of four units placed throughout the ring indicate that construction and occupation of the ring was between BC 460 to BC 50, close to the Terminal Archaic and within the Glades I period. In EU 3, over one meter of shell separated the top and bottom radiocarbon samples, yet these dates are statistically identical, suggesting very rapid accumulation of shell. Over four meters of shell separated the top and bottom dates of EU 3 and EU 5, yet the age difference between the two is only about 140 years, suggesting very rapid deposition of material. However, evidence of floors and post holes suggest that although deposition of large amounts of shell occurred rapidly, episodes of occupation and evidence of structures indicate that the ring was occupied and functioned as a habitation structure, and is not simply a refuse ring built in one rapid feasting episode.

The assemblage of artifacts from the ring suggests several things. One is that exotic, rare, and or ceremonial materials and items were present, such as red ochre, fired clay balls, chert, a limestone pendant, and shell dippers. Other items, like drilled shark teeth, worked sting ray spines, a bi-pointed bone awl, and a bone gouge, together with a

high concentration of shell columella hammers and “pestle”-like columella shell tools recovered from an area where a structure once stood, may suggest the residence of a high status individual, or a craft area. That this occurs in the central, highest portion of the ring is consistent with social space theory that suggests visual dominance is afforded to leaders or those with socially dominant positions within a group (Grøn 1991:108; Russo 2004:54).

Only plain ceramics, in low frequencies, were recovered from the ring, which is consistent with a Glades I occupation. The high concentration of shell columella hammers and “pestle”-like columella shell tools is also consistent with Late Archaic and transitional sites (Marquardt 1992:205, 220; Torrence 1999), which also tend to have high concentrations of these types of tools. Exactly what they were used for remains unknown, but the pestle-like columella grinders suggests that some sort of grinding or pulverizing activity (perhaps of seeds or pigments) took place.

Evidence of disarticulated and possibly modified human remains from EU 2 suggests that the ring may have served as a mortuary or ceremonial structure. As known from other south Florida burial sites, *Busycon* dippers were found in association with the human remains, which may have been related to ceremonial tea consumption (Milanich 1994:135; Patton 2001:35-36). Although purely speculative, it remains possible that the inner circular pond enclosed by the ring may have functioned as a charnel pond, much like the one present at the Fort Center site (Sears 1982; Widmer 1988:77).

Shell Fields, Breakwater. EU 6 was placed in the southern edge of the shell fields, in a slightly raised area of midden, and excavated to one meter below surface (Figure 66).

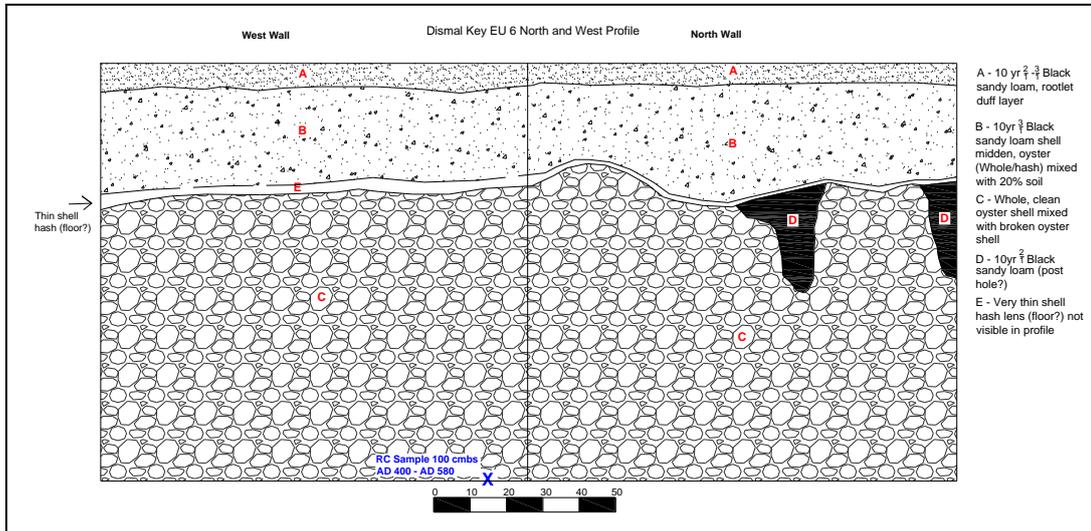


Figure 66. Dismal Key EU 6 north and west profile map.

The upper levels of the unit contained very loosely packed whole and crushed oyster shell midden with small amounts of sandy loam mixed with frequent artifacts (modified shell and shell tools and ceramics). Lower levels contained almost pure, clean oyster shell with little to no soil, and no artifacts. The top of the lower strata was capped with a thin layer of highly crushed shell hash, suggesting that it was a former ground surface. Two possible post holes were present in the north wall of the unit beginning at the top of the thin shell hash layer, suggesting a possible structure.

From 0 to 40 cmbs, 59 ceramics were recovered, including 56 Glades Plain, one Sanibel Incised, one Fort Drum Incised, and one un-typed incised ceramic. Diagnostic ceramics date from the Glades I (late) period (AD 500 to AD 750) (Milanich 1994). No ceramics were recovered in the lower levels. A radiocarbon date from one meter below the surface resulted in a date of AD 400 to AD 580, dating to the Glades I to Glades I (late) periods.

Along the southeast edge of the shell fields, a radiocarbon sample was taken from a high shell midden ridge (2.7 meters in elevation) enclosing the lower shell fields. The sample was hand-excavated with a small potato rake, and a sample taken at 10 cmbs. The midden ridge appears to be constructed out of whole, clean oyster shell, with no artifacts present. The sample resulted in a date of AD 450 to AD 620, Glades I to Glades I (late). A second sample was taken from the center of the linear midden ridge or tail that could have functioned as a breakwater. A sample from 10 cmbs determined that the tail is also constructed out of clean, whole oyster shell with no artifacts present, resulting in a date of AD 300 to AD 490 (Glades I).

Shell Mound/Ridge District. Located west of the shell ring is a complex shell mound “district” arranged in a large arc, covering 6 hectares, and enclosing the shell fields. The shell mound district contains four enormous shell mounds five to eight meters in height, surrounded by eight smaller, 3 to 4 meter tall mounds. Each mound is separated by low ridges that may have served as canoe portals or entranceways to the mounds. Three mounds are centrally placed, with a large canal leading to the tallest mound. This mound contains a long, impressive ramp that leads up to the top of the mound, which has an imposing position and offers clear views of the entire site. Six radiocarbon dates from the tops of the four tallest mounds and a low ridge place the terminal construction or occupation of the mounds between AD 580 to AD 860 (Glades I (late) to Glades IIa), suggesting that the shell mound district of the site dates within an approximate 300-year period, and post dates Dismal Key’s ring by over 500 years.

One excavation unit, EU 4 (Figure 67), was placed in a slightly elevated area just down slope from a large mound, and near the interior end of the shell finger ridges. The upper 40 cm of the unit consisted of extremely rich, very organic black earth and shell midden mixed with pockets of ash, and broken oyster shell, whelks and conchs. At

least eight probable post molds were evident in the west and north wall profiles, each extending about 40 centimeters in length to a depth of 50 cmbs.

This upper black earth and shell midden was incredibly dense with artifacts (ceramics, worked shell and bone, etc.), and contained extremely dense faunal remains—mostly fish, including catfish, black and red drum, sheepshead, snook, jack and mullet. Catfish was so prevalent in the upper 20 cm that an MNI (minimum number of individuals) of at least 301 fish were calculated. Two Type B, two Type F and one Type G hammers, plus numerous worked and modified shell tools (an anvil, a net weight and numerous columella hammers) were present in the upper levels, along with a bone bead, four stingray pins or points, and four shark teeth.

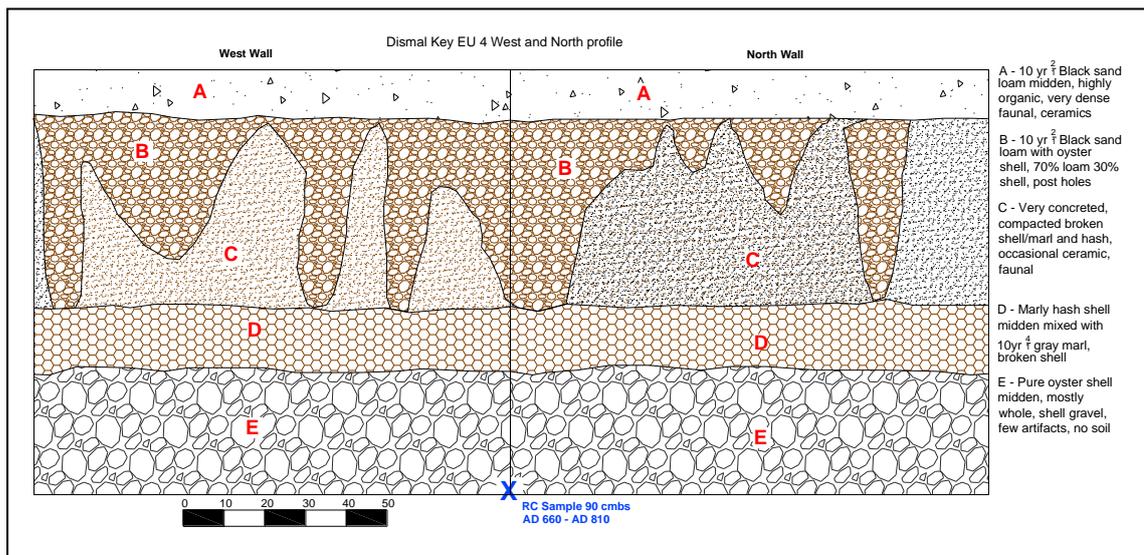


Figure 67. Dismal Key EU 4 north and west profile map.

The upper levels of the unit also contained numerous prehistoric ceramics, including 1,039 Glades Plain ceramics and four Surfside Incised ceramics. The presence of the Surfside Incised dates the upper portion of the midden to the Glades IIIa period, sometime between AD 1200 and AD 1400 (Milanich 1994).

Below the black earth and shell midden the strata graduated into a pure, clean oyster shell midden that contained little soil, and a precipitous decrease in artifacts. A

radiocarbon date taken from the bottom of the unit (90 cmbs) resulted in a date of AD 660 to AD 810 (Glades I (late) to Glades IIa).

Finger Ridges and Water Courts. Located further west is a district of complex shell finger ridges, benches, canals and water courts. The finger ridges radiate out to the edge of the site, protruding into a thick mangrove swamp, some reaching close to open water. In-between the finger ridges are low canals that likely functioned as fish weirs or traps, water control devices, or as canoe portals to enter the site. The finger ridges may have functioned as docks, as platforms for fish traps, or as foundations for individual houses. Many of the finger ridges lead inland to a series of water courts, pools or basins. Four radiocarbon dates from the upper portions of these features date the ending construction from AD 990 to AD 1290 (Glades IIb to IIIa), the last dated shell works construction at Dismal Key.

Dismal Key: Conclusion. Archaeological testing of Dismal Key determined that this complex shell works island, like Fakahatchee Key, reflects a prehistoric landscape that was constructed over time in spatially distinct, occupational phases. It does not appear that the maximal extent of the site was utilized at a single point in time (*contra* Widmer 1988:256), but that distinct phasing of features and areas of the site occurred gradually over time.

Most notably, the first occupation at Dismal Key occurred in the form of a large shell ring, occupied between BC 460 to BC 50, on the heels of the Terminal Archaic, extending into the Glades I period. Like other known southeastern prehistoric shell rings, the large, open ring configuration may suggest a community pattern consistent with that of a fisher-hunter-gatherer egalitarian social organization (Trinkley 1985). However, the highest, central portion of the ring contained the most high-status artifacts (drilled shark teeth, worked sting ray spines, a bi-pointed bone awl, a bone gouge, red ochre, a limestone pendant, a shell dipper, etc.), as well as the remains of posts

suggesting a structure. This suggests the possibility of an elite residence, and perhaps evidence of a trans-egalitarian community (Hayden 1995).

The artifact assemblage may also be suggestive of a possible ceremonial context, perhaps accumulated during aggregation episodes, feasting events, or associated with a mortuary context. Human remains (possibly modified) found within the ring suggest that perhaps the ring functioned as a charnel preparation or mortuary complex. Nevertheless, the ring was abandoned sometime after BC 50, with no evidence of re-use or re-occupation after this time.

Following the abandonment of the shell ring, the next phase of the Dismal Key shell works construction occurred to the west within the large shell fields. While limited testing was done in this area, four radiocarbon dates suggest that shell work construction of the breakwater, a midden ridge, and the shell fields occurred around AD 300 to AD 620, during the Glades I to Glades I (late) periods. This is remarkably similar in timing to the shell fields at Fakahatchee Key, in which investigation suggested that shell fields probably functioned as activity areas purposefully kept open and flat, where mostly clean shell was used as construction material to create an open, communal plaza-like area.

Like Fakahatchee Key, community shifts in shell work construction are evident at Dismal key, with a shift towards an intensive mound-building phase, constructing an impressive district of enormous shell midden mounds with ramps and canals, sometime between AD 660 and AD 810 (Glades IIa). The timing of this mound building phase coincides with the beginning of intensive mound building seen in the Caloosahatchee region to the north, interpreted there to be the antecedents of the Calusa chiefdom (Patton 2001; Widmer 1988).

Finally, the distinct shell finger ridges, canals and water courts at Dismal Key may represent a temporally significant “taskscape” (Ingold 1993), dating between AD

990 to AD 1290 (Glades IIb-IIIa), the last known prehistoric occupation of Dismal Key. This is almost identical in timing to the dated finger ridges at Fakahatchee Key, dating between AD 950 and AD 1280. At both these sites, these are the youngest dated features, and the last dated shell work constructions. Both sites are abandoned shortly before AD 1300.

While it remains unknown exactly how the finger ridges, canals and water courts functioned, I argue that they were likely related to increased intensification and production of marine resources (fish and shell fish). The finger ridges may have served as docks for canoes to bring in loads of shell fish, or as tidal fish weirs or traps to serve communal fishing activities. The water courts may have served as short-term storage facilities for excess shellfish and fish prior to preparation for future consumption, signifying a delayed-return economy. Whatever their function, they were closely associated with a planned, organized community pattern evident on a regional scale, that reflects a growing population, changing social organization and a clearly intensified level of effort, coordination and investment in shell-built architectural features.

In summary, archaeological testing of Dismal Key once again demonstrates temporally significant phasing to shell work features, with the earliest site components composed of shell rings, dating from the Terminal Archaic through the Glades I period. The shell ring became abandoned, and over time, site movement expanded to shell fields, midden ridges, and a district of distinctly tall shell mounds with ramps and canals. The site's last shell works phase ends with a series of water courts, canals and radiating finger ridges. Much like Fakahatchee Key, Dismal Key's occupation appears to have come to an end just prior to AD 1300.

RUSSELL KEY

Encompassing over 23 hectares, Russell Key is the fourth largest shell work site. It had never been archaeologically tested prior to this study. Fieldwork at Russell Key

was designed to sample spatially dispersed areas of the site, as well as a number of different types of shell work features, resulting in the completion of a site base map, 11 one-meter-square (or larger) excavation units, three shovel tests, recovery of 3,396 artifacts, and a total of 40 radiocarbon dates (Table 10, Figure 68). Areas and features of the site sampled included testing of a potential shell ring; a flat topped mound and smaller isolated mound; interior shell fields; a shell mound and ridge district; finger ridges; and water courts.

Table 10. Results of Radiocarbon Sampling from Russell Key.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Excavation Unit 1, South Wall, 10 to 15 cmbs	BETA-221579	1760	60	-2.5	AD 550-AD 800
Excavation Unit 1, South Wall, Below Water, 115 cmbs	BETA-221580	1850	70	-3.2	AD 420-AD 710
Excavation Unit 2, North Wall, 150 cmbs	BETA-221581	1890	50	-3.1	AD 430-AD 660
Excavation Unit 3, West Wall, 15 cmbs	BETA-221582	1770	60	-1.6	AD 530-AD 800
Excavation Unit 4, ST, 70 cmbs	BETA-221583	2570	50	-4	BC 380-BC 120
Excavation Unit 5, N Wall, 0 to 10 cmbs	BETA-221584	1710	50	-3.6	AD 610-AD 840
Excavation Unit 5, N Wall, 90 cmbs	BETA-221585	1750	60	-4.3	AD 550-AD 810
Shovel Test 3, Water Court 1, 0 to 10 cmbs	BETA-221586	1550	50	-3.6	AD 750-AD 1010
Surface Collection Around Clam Cache	BETA-221587	1400	50	-3.4	AD 910-AD 1170
S Central Bifurcated "ring", Surface	BETA-221588	1760	40	-3.4	AD 590-AD 770
S Crescent "ring", Surface	BETA-221589	1270	50	-3	AD 1050-AD 1270
NW Terminus "shell ring", Surface	BETA-221590	2440	50	-3.9	BC 240-AD 60
Water Court 5, Surface	BETA-221591	1710	50	-3.7	AD 610-AD 840
Water Court 8, Surface	BETA-221592	1670	50	-1.9	AD 660-AD 880
Mar's Mound, EU 8, N Wall, Above "hash", 10 cmbs	BETA-221593	1650	50	-6.5	AD 670-AD 900
Mar's Mound, EU 8, 10 to 15 cmbs	BETA-221594	1680	60	-3.7	AD 640-AD 890
Mar's Mound, EU 8, W Wall, 180 cmbs	BETA-221595	1660	60	-3.8	AD 650-AD 910
EU 6, 180 cmbs	BETA-221608	1700	50	-3	AD 630-AD 850
Excavation Unit 9, South Wall, Zone A, 10-15 cmbs	BETA-227110	1630	70	-2.8	AD 660-AD 960
Excavation Unit 9, North Wall Base of Unit, 58 cmbs	BETA-227111	1460	60	-3.3	AD 820-AD 1120
Water Court 6, Top of SW Edge, 2M High Surface, Conch Lined	BETA-227112	1220	60	-3.2	AD 1070-AD 1310
Finger Ridge 2, 20 cmbs	BETA-227113	1750	60	-3.5	AD 550-AD 810
Water Court H, Excavation Unit 10, Level 1, 0 to 10 cmbs	BETA-227114	1100	70	-2.9	AD 1200-AD 1440
Water Court H, Excavation Unit 10, Level 6, 60 cmbs	BETA-227115	1260	60	-2.8	AD 1050-AD 1290
South End of Walkway, Surface to 5 cmbs	BETA-227116	1240	60	-4.6	AD 1060-AD 1300
Southernmost Shell Midden, 0 to 5 cmbs	BETA-227117	1300	60	-3.5	AD 1020-AD 1270
Em's Mound, Center, 8-11 cmbs	BETA-227118	1950	60	-3	AD 340-AD 630
Beach Landing East 67 cmbs at low tide	UGAMS-2906	1910	40	-2.1	AD 430-AD 630
WC H East Bank	UGAMS-2907	1900	40	-2.5	AD 430-AD 640
WC H West Bank	UGAMS-2908	2030	40	-1.3	AD 270-AD 520

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Water Court H, Excavation Unit 10, Level 2, 10 to 20 cmbs	UGAMS-2909	1590	40	-1.4	AD 720-AD 950
East Arm Water Court High Bank N. End	UGAMS-2910	2290	40	-1.5	BC 30-AD 210
EU 11, S Wall, 20 cmbs	UGAMS-2911	2170	40	-2.8	AD 100-AD 350
EU 11, S Wall, 218 cmbs	UGAMS-2912	1980	40	-3.2	AD 340-AD 570
RC Sample, Mar's Mound, 1 M above base of mound, 30 cmbs	UGAMS-2913	2080	40	-2.3	AD 210-AD 440
RC Sample, Water Court K, Center, 10 cmbs	UGAMS-2914	2040	40	-2.2	AD 260-AD 500
RC Sample, Water Court K, East Edge Ridge, 10 cmbs	UGAMS-2915	2070	40	-3	AD 230-AD 460
RC Sample, Water Court K, West Edge Ridge, 10 cmbs	UGAMS-2916	2090	40	-2.9	AD 200-AD 440
RC Sample, Water Court A, Center, 10 cmbs	UGAMS-2917	2120	40	-2.2	AD 160-AD 410
RC Sample, South Tip, Ridge between WC A and WC B, 0 to 5 cmbs, 1M above Water	UGAMS-2918	1980	40	-2.4	AD 340-AD 570

Shell Ring and Mounds. Located at the northern end of Russell Key is an isolated “C”-shaped shell ring, with its ring opening facing north. The ring is extremely low in elevation, ranging from only one to two meters, with sections nearly completely inundated by rising sea level and encroaching mangroves. The center of the ring is filled with a deep, mangrove pond. A single 50-x-50 cm shovel test (ST 4) was placed at the middle portion of the ring at its highest elevation, opposite the rings openings, and excavated to 70 cmbs, where it became completely inundated with water.

The shell ring midden consisted of black mangrove muck and oyster shell in the top 10 cm. The bottom 60 cm contained mostly whole oyster shell, which also contained two types of non-marine land snails, suggesting that the shell ring midden had been formed in formerly dry conditions. No pottery, and only one artifact, a columella hammer, were recovered from this unit. A single radiocarbon date from 70 cmbs returned a date of BC 380 to BC 120, consistent with a Glades I occupation. Probing through the bottom of the test determined that shell extends for at least another meter below the test, to a depth of 1.7 meters below ground surface, and possibly deeper. At the northwest end of the shell ring, a single surface collected oyster shell sample returned a date of BC 240 to AD 60 (Glades I).



Figure 68. Site map of Russell Key (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

On the east end of the shell ring is an isolated, quadrilateral-shaped truncated shell mound with a central ramp leading from the interior of the ring up to the top of the mound. The mound measures roughly 15 meters wide by 30 meters long, is five and a

half meters in height, and the ramp extends 20 meters in length. EU 8, a 100 by 200 cm excavation unit was placed on the northeast top of the mound (Figure 69).

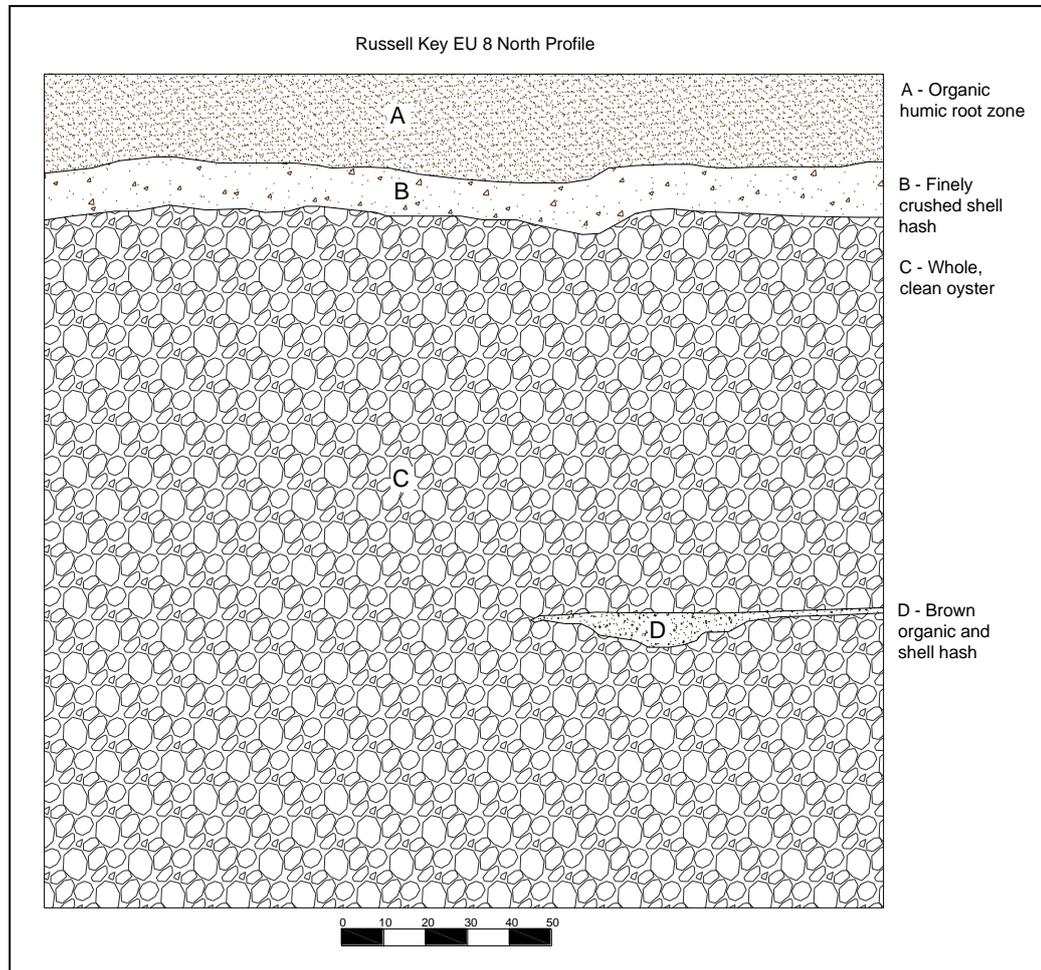


Figure 69. Russell Key EU 8 north profile map.

The unit was excavated to 180 cm below surface, and contained three distinct strata. The upper 20 cm contained a very dense, organic humic root mat with very small amounts of crushed shell. Under the recent root mat was an extremely crushed layer of fine shell hash, about 10 cm in thickness. This suggests that the mound was either capped with this shell hash, or that this represented a former surface where much walking and trampling of shell had reduced the shell to hash. No post holes, fire pits or other features were present.

Underneath the shell hash, extending to 180 cmbs was a homogenous, clean oyster shell midden which contained very little sediment, with the exception of a very small lens of brown, organic-stained shell hash. This small lens appears to have been dumped (basket loaded?) along with mostly clean shell, suggesting that the mound was purposefully constructed with fill. Very few artifacts, including a total of 12 Glades Plain ceramics, and 40 worked shell (including one *Busycon* dipper, several un-typed hammers, six worked columellas, and eight clam choppers) were recovered from the entire unit, suggesting that it was not a primary habitation or refuse mound, but a purposefully constructed mound built with mostly clean, secondary refuse.

Three radiocarbon samples were taken from the top and bottom levels of the unit (10, 15 and 180 cmbs). The top two samples resulted in dates of AD 670 to AD 900, and AD 640 to AD 890, and the bottom date, separated by 165 cm of midden, was statistically identical, at AD 650 to AD 910. The three radiocarbon dates, together with the lack of strata in the mound suggest that the flat-topped mound was purposefully constructed with mostly clean shell fill sometime between AD 640 and AD 910 (Glades I [late] to Glades IIa), or anytime after these dates. A fourth radiocarbon sample taken from the bottom side of the mound to date its basal layers returned a date of AD 210 to AD 440, suggesting that the basal construction of the mound may have begun slightly earlier.

That the flat-topped mound is isolated, and placed on top of the presumably abandoned shell ring feature suggests that it may have functioned as a monument, perhaps to preserve, commemorate and empower collective memory and identity (Dietler 1998; Van Dyke 2008; Williams 1998). Alternatively, it may have served to mark territories or boundaries (Crumley and Marquardt 1987), or like Youman's Mound, was segregated away from the main part of the settlement and separated by water, reflecting the symbolism of water as a supernatural barrier or portal to another world (Brady and Ashmore 1999). Lastly, this mound may have functioned to house a

structure, as flat-topped platform mounds are often cited as evidence for elevated temples or high-status residences in south Florida (Patton 2001:51). In Florida's Woodland period, Weeden Island ceremonial mound complexes often contain multiple platform mounds, with one typically serving as the residence for a religious specialist; and others for mortuary preparation and feasting (Milanich 1994:178).

A second, smaller, amorphous-shaped shell mound is located midway between the shell ring and the main portion of the site, 150 meters south of the flat-topped mound. This mound measures 25 by 15 meters, and is three meters in height. Though the mound was not tested with an excavation unit, a single radiocarbon sample was taken from the top 8 to 11 cmbs to date the terminal construction of the mound, returning a date of AD 430 to AD 630, which slightly predates the flat-topped mound.

Shell Fields. Russell Key has an extensive area of shell fields located just south of the shell ring, encompassing about a six-hectare area (Figure 70). The shell fields are typical of those found at other shell work sites, containing large expanses of open, relatively flat shell midden. Intensive surface inspection indicated that there was a very dense amount of artifact debris, and an intensive controlled surface collection (CSC) was undertaken in several areas. Close surface inspection also noted potential patterns of very shallow, small circular pits, as well as oval depressions with crushed shell, which may indicate permanent structures (Waselkov 1984:145). Other features noted include mounded linear ridges or benches that extend into higher hammock areas of the site.

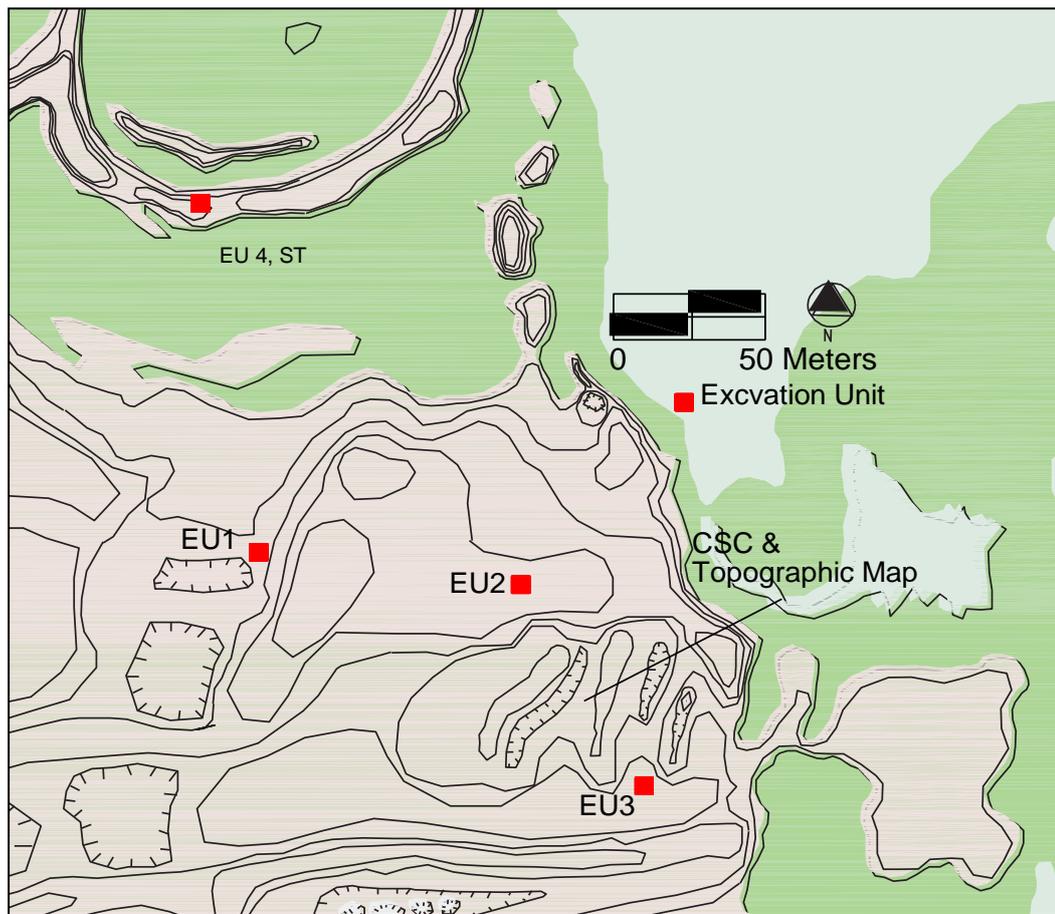


Figure 70. Russell Key, detail of east shell fields area.

Three excavation units were placed in various areas of the shell fields. EU 1 was a 100-by-200 meter unit placed in the central, northern end of the plaza, and excavated to 115 cmbs (Figure 71). Strata in this unit consisted of mostly clean, pure oyster shell with little soil, and containing pockets of crushed shell hash. The unit produced very few artifacts, with a total of nine modified shells, including two Type G Hammers, a clam anvil, and three un-typed hammers. No ceramics were recovered. Two radiocarbon dates from 10-15 cmbs, and 115 cmbs returned dates from AD 420 to AD 710, and AD 550 to AD 800, within the Glades I to Glades IIa periods.

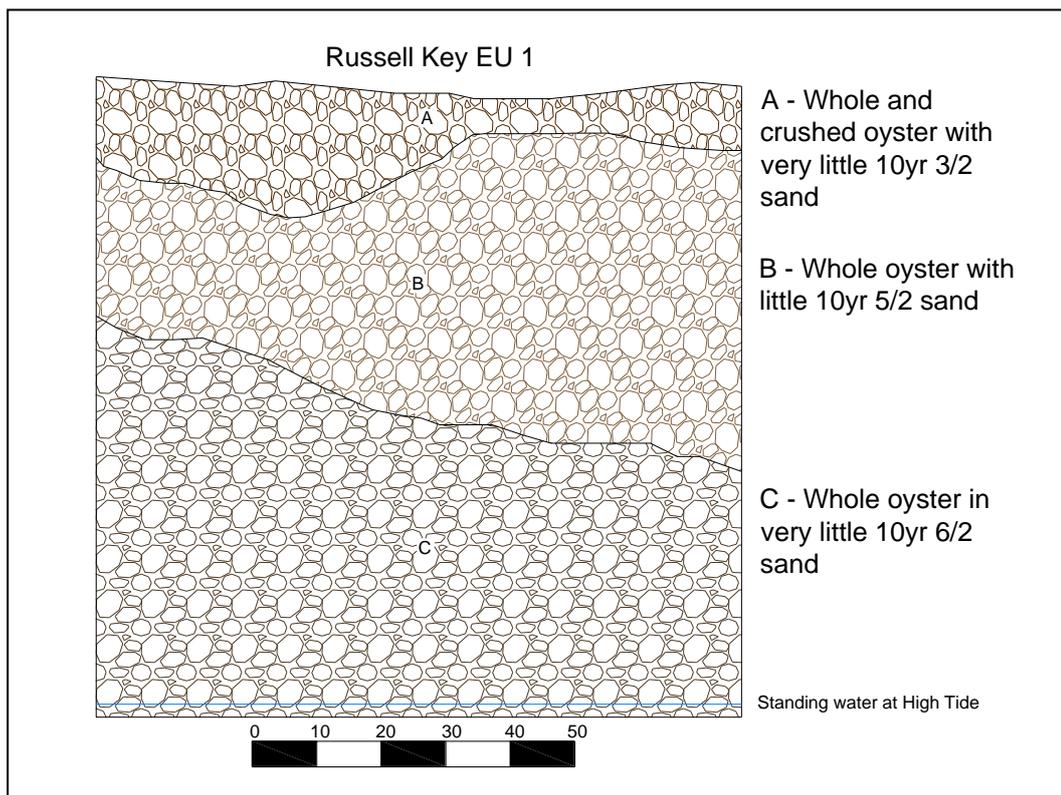


Figure 71. Russell Key EU 1 north profile.

EU 2 was placed within a small, raised hammock within the interior of the shell fields, 87 meters southeast of EU 1. The slightly elevated area was thought to be a potential habitation area. The one-meter -square unit was excavated to 150 cmbs, and contained an upper stratum of black earth and shell midden (0 to 40 cmbs) containing dense ceramics and artifacts, over a clean oyster shell midden. Sixty-seven Glades Plain and one Goodland Plain ceramic sherds were recovered from the black earth and shell stratum, with 25 shell tools (including three cutting-edged tools, two Type A hammers, a Type B hammer, choppers and columella hammers). Below the top black earth and shell midden, the clean oyster shell midden contained very little sediment and few artifacts. A radiocarbon date from 150 cmbs returned a date of AD 430 to AD 660, which is contemporaneous with shell field test EU 1, and dates to the Glades I to Glades I (late).

The third unit, EU 3, was placed in the eastern edge of the shell fields within a slightly elevated hammock, 80 meters southeast of EU 2. This unit was excavated to 120 cmbs, and exhibited the same strata as EU 2, with an upper stratum consisting of a black earth and shell midden (0 to 40 cmbs), but containing significantly less artifactual material, including only three Glades Plain ceramics and fourteen worked shell tools (including one Type C hammer, columella hammers, and an anvil). The black earth and shell midden overlies a stratum of clean, whole oyster shell midden. A radiocarbon date from 15 cmbs returned a date of AD 530 to AD 800, which is contemporaneous with EU 1 and EU 2 shell field tests. An additional radiocarbon sample taken from the shell fields in the center of the site from the upper 10 cm returned a date of AD 590 to AD 770, which is consistent with the other four dates from the shell fields, which date between Glades I to Glades IIa.

Shell Fields Mapping and CSC. Shell fields are often described as relatively flat, open, and sometimes gently undulating areas of low shell ridges. Though difficult to see compared to the more obvious, mounded features of other shell work features, there is a subtle topography to shell fields, and it was decided to systematically map a 0.28 hectare portion of the east shell fields with a Leitz Sokkia Laser Total Station to replicate this topography. A systematic 2-meter interval grid was established over a 30 by 100 meter area, and over 2,000 individual points taken, resulting in a high-precision map of the shell fields (Figure 72). A slightly larger area of the shell fields than mapped was subjected to a systematic, controlled surface collection (CSC), resulting in the collection of 1,679 artifacts.

Results of topographic mapping reveal several interesting patterns that may reflect a distinct community pattern. The first notable feature is a series of small depressions. One oval depression on the west end of the grid measures six by 12 meters, and while a definite depression, is quite low at only about 60 centimeters at its deepest

point. This feature was not sampled, but surface inspection showed that it contained partially crushed oyster shell, suggesting that it may have housed a structure. Based on its size, it was likely an individual household.

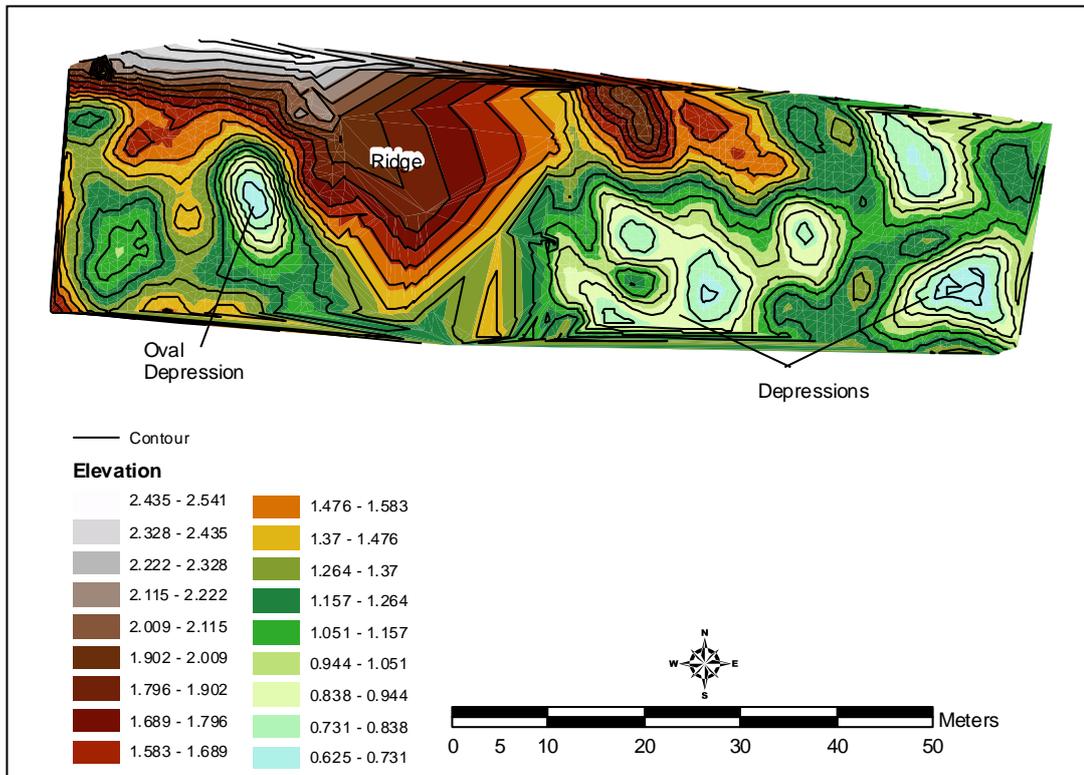


Figure 72. Topographic contour map of Russell Key shell fields.

Another interesting feature is a ring-shaped depression (see Figure 72) with three smaller depressions situated within the ring and with a small mounded area in the center. The entire ring is about 15 by 20 meters in area, and the individual smaller oval depressions inside the ring vary, but several measure six by eight meters and five by four meters in diameter, which is consistent with the size of circular houses recorded in the Caloosahatchee region (Worth 2007). The entire area was carefully inspected and surface collected, but no distinct post holes were noted. Each depression contained several concentric rings of debris, suggestive of what Binford (1978:345, 355) interpreted as a men's outside hearth (Figure 73). The center of each depression was found to contain a thin layer of black, organic muck with some ashy residue (but no

visible charcoal), suggesting that these may have been individual fire pits or hearths. Each central depression is surrounded by an outer ring of finely crushed oyster shell, suggesting that the area was a high-activity area (walking, sitting?), or that structures were situated in this area. A higher concentric ring encircles the depression and inner ring of crushed shell, and contains mostly whole oyster shell, as well as whelk and conch shell debris and shell tools. This suggests that either a cluster of households were situated in a ring formation, or, that this was a communal hearth, series of roasting pits, or a specialized activity area.

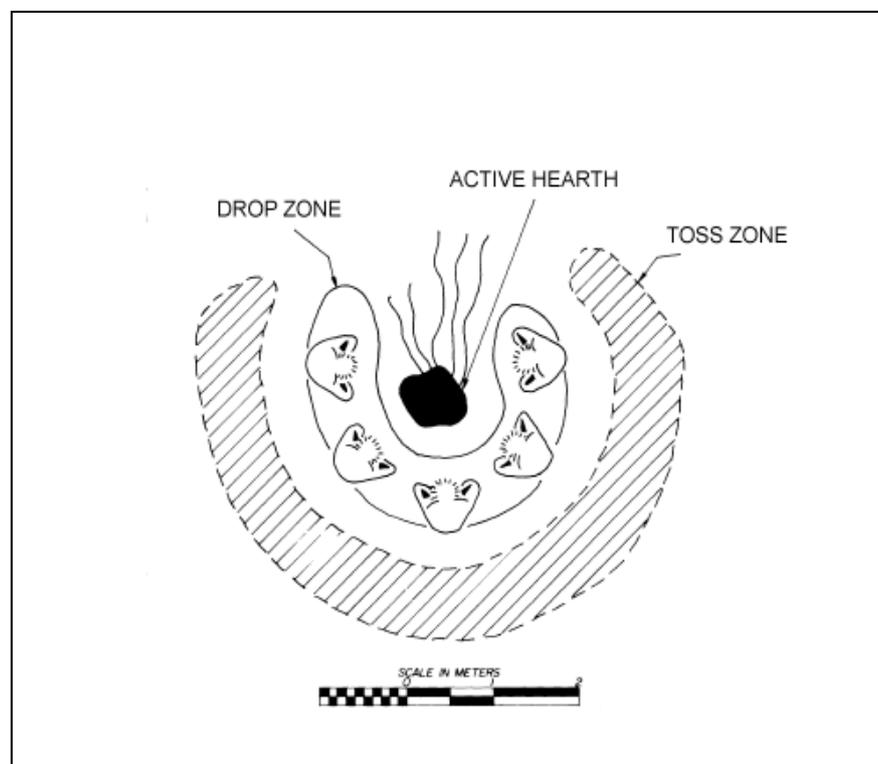


Figure 73. Binford's model of a men's outside hearth (adapted from Binford 1978:339).

Seven distinct depressions were mapped, however, an eighth substantial depression was noted just outside of the established grid. Unfortunately, this depression feature was not mapped, but CSC of the area (see below) shows very distinct spatial distributions of artifacts suggesting that it too was likely a household structure.

Controlled surface collection (CSC) of 1,679 artifacts from the east shell fields was conducted in order to reveal potential artifact spatial patterning, and to help interpret the function of various features. Spatial analysis of the CSC was conducted by examining six main artifact categories (prehistoric ceramics, shell vessels, hammers, clam choppers, cutting-edged tools, and lithics) that are thought to represent potentially distinct activities.

For example, mostly domestic activities are represented by ceramics and shell vessels. Ceramics reflect cooking and food storage activities, and shell vessels (dippers, scoops, spoons and cups) potentially represent cooking and food/water/tea preparation, serving and consumption (Bullen 1978:94; Webster 1970:3-4). However, as noted elsewhere, shell dippers may also have had a ceremonial context (Marquardt 1992:215; Patton 2001:35-36; Torrence 1999:41).

While the exact function of all types of shell hammers is not known, shell hammers probably reflect a wide range of activities, including shell and wood tool working and production, food preparation (extracting shellfish, tenderizing shellfish meat, etc.) and the construction of shelter. Clam choppers were also used for some type of activity related to hammering, or as some hypothesize, were perhaps implements used for the digging of roots, or as shellfish rakes. Cutting-edged shell tools were usually hafted, and were highly specialized tools used for woodworking, presumably for chopping and carving wood, and as some contend, for canoe manufacturing (Dietler 2008). Finally, lithics are very rare in the Ten Thousand Islands, and had to be imported from the mainland. All of the lithics recovered from the east shell fields were modified and unmodified pieces of local limestone and sandstone, which may have been used as abraders, hones, or possibly as boiling stones.

The six classes of CSC artifacts were plotted as density clusters, superimposed on the topographic map (Figures 74 to 79). Figure 74 plots the positions and densities of

238 surface collected ceramics (236 Glades Plain, one Fort Drum Incised and one Goodland Plain), which shows the densest clusters occurring on the ends of the two western depressions and between them. Another cluster occurs on the north arm of the ring depression.

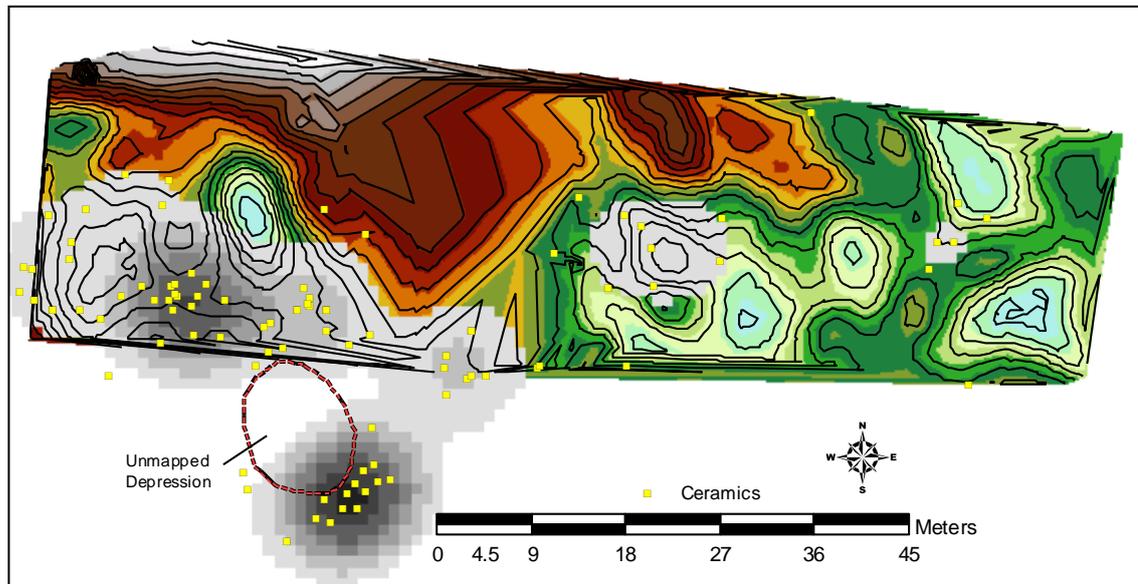


Figure 74. Russell Key East Shell Fields, CSC distribution of ceramics.

Shell vessels (Figure 75) are slightly more frequent, with 291 recovered. They have a similar clustering around the ends of the two western depressions, and in-between the two depressions, as well as frequently around the perimeters of all the depressions. This suggests that cooking, or food consumption may have taken place around the depressions.

A total of 316 shell hammer tools (including four Type B, 47 Type C, three Type D, two Type E, one Type F, 28 Type G, and two Type H hammers) were recovered from the east shell fields (Figure 76). Distribution of shell hammers is fairly uniform across all of the shell fields, but shell hammers are the only class that occurs within the centers of the western depressions. By contrast, 81 clam shell choppers are less frequent as a tool type, and tend to occur in clusters around depressions and on the east edge of the site (Figure 77).

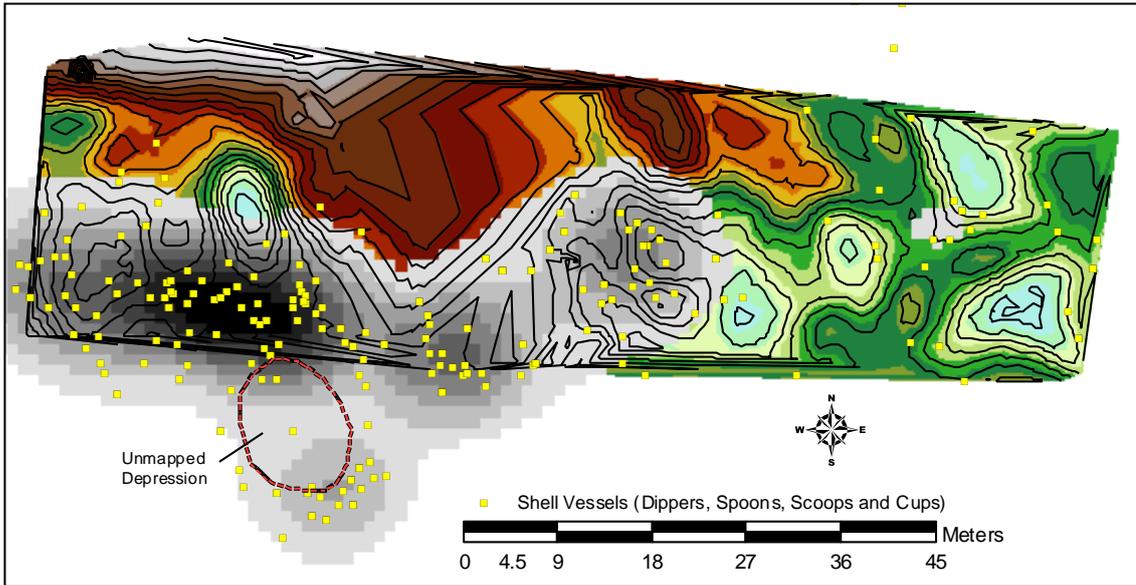


Figure 75. Russell Key East Shell Fields, CSC distribution of shell vessels.

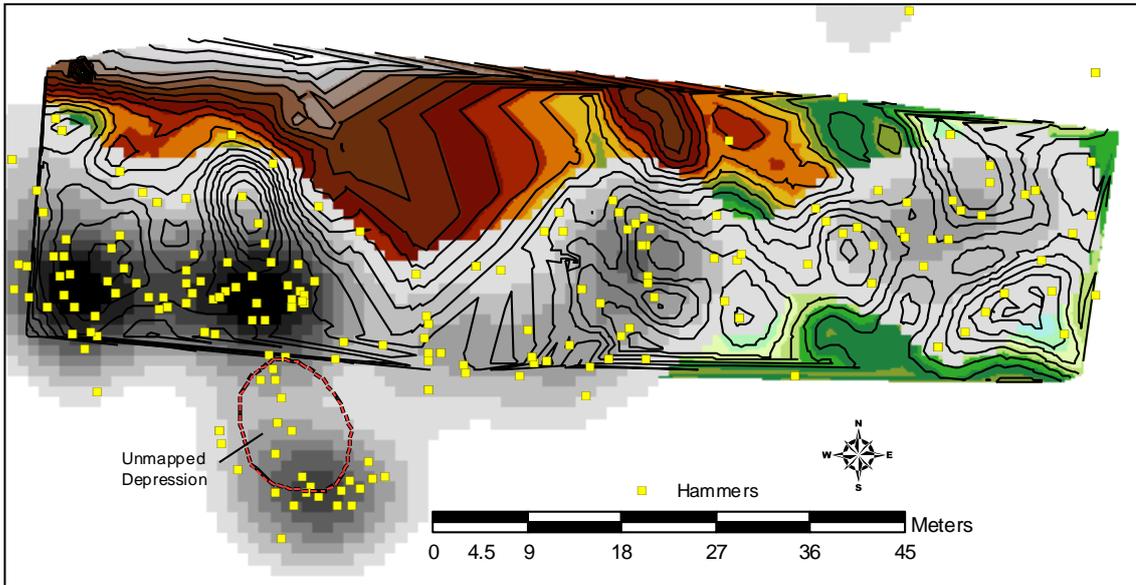


Figure 76. Russell Key East Shell Fields, CSC distribution of shell hammers.

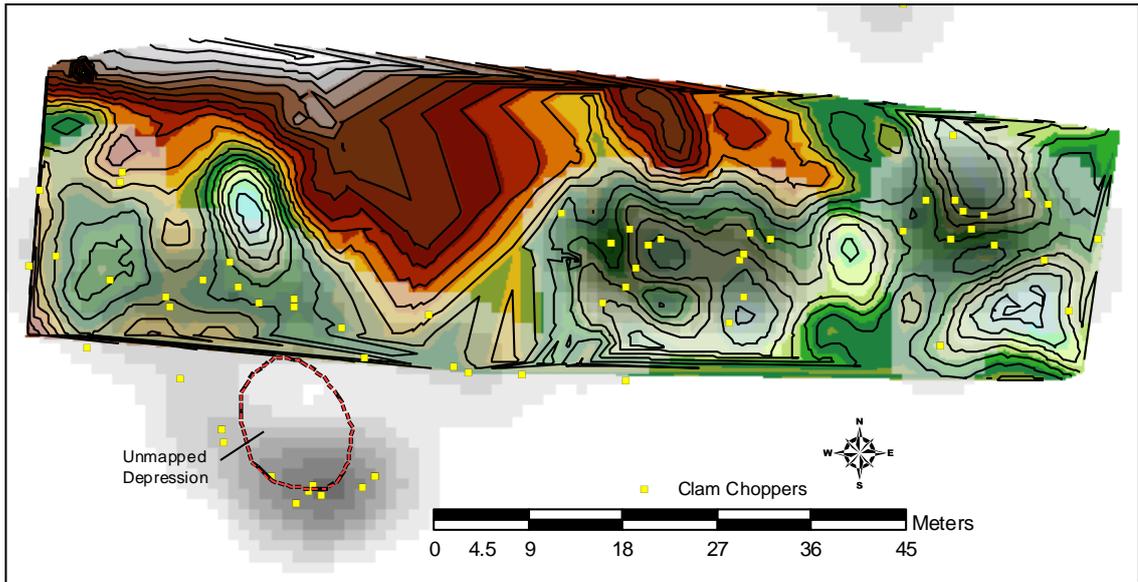


Figure 77. Russell Key East Shell Fields, CSC distribution of clam choppers.

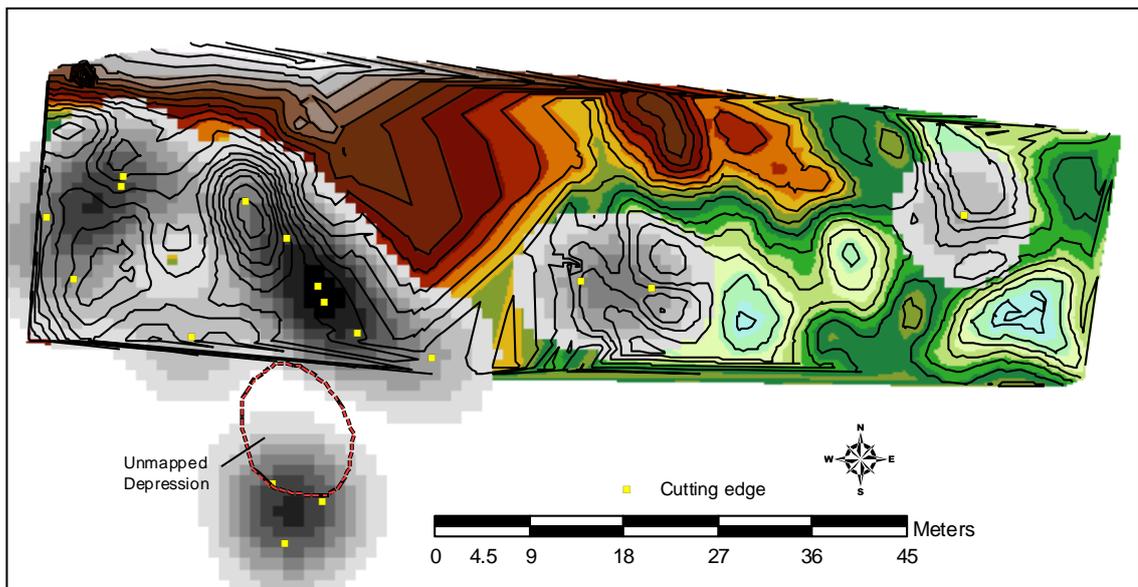


Figure 78. Russell Key East Shell Fields, CSC distribution of cutting-edged shell tools.

Cutting-edged shell tools are usually much less frequent on shell work sites, and at the east shell fields, only 17 were recovered (Figure 78). These are clustered around the two depressions and in-between them, as well as around the ring depression. Finally, nine lithics, which are exceedingly rare on shell work sites, were piece plotted and found to cluster mainly around the ring depression, suggesting that they may be

associated with some type of specialized activity that took place around this feature (Figure 79).

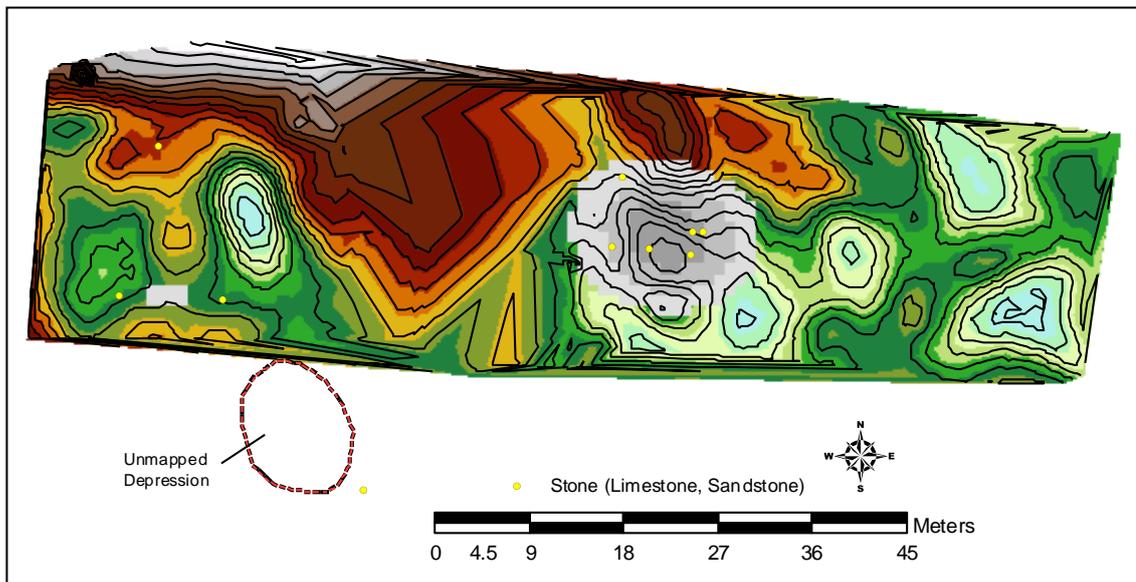


Figure 79. Russell Key East Shell Fields, CSC distribution of lithics.

Shell Fields CSC and Mapping: Conclusion. Systematic mapping and controlled surface collection of a small portion of the east shell fields was a time consuming endeavor, but it served to demonstrate that the subtle topography of the “flat” shell fields is much more spatially significant than previously recognized. Though the exact function of the various shell field features (depressions, ridges, and ring depressions) remain uncertain, it is likely that these represent distinct households and household clusters, hearths, roasting pits, and or communal activity areas.

Shell Mound/Ridge District. The next area to be investigated at Russell Key was an area of shell mounds and ridges arranged in an arc, south of the shell fields. This is reminiscent of the impressive shell mound districts at Dismal and Fakahatchee Keys, but is much less distinct, with twelve individual mounds ranging in height from two to four meters.

EU 9 (Figure 80) was placed down slope from a mound in a gently sloping but still elevated area on the southeast side of the site. The upper levels (0 to 30 cmbs)

contained a black earth and shell midden containing densely concentrated bone (mostly fish, including 771 otoliths), 1,017 plain ceramics (Glades Plain and Goodland), and shell tools (mostly clam choppers, two Type G hammers, a pounder, a shell bead, and columella hammers), as well as two shark teeth.

Below the black earth and shell stratum, the midden transitioned into a pure, clean oyster shell deposit containing very few artifacts. A single post hole was present in the east wall profile. Two radiocarbon samples from 10-15 cmbs and 58 cmbs returned dates of AD 660 to AD 960 and AD 820 to AD 1120, respectively, dating to the Glades IIa to IIb periods. The unit did not demonstrate disturbed stratigraphy, and the slightly older date of the top sample over the younger date of the bottom sample overlap, suggesting that this part of the site was likely occupied sometime between AD 660 and AD 1120, Glades I (late) to Glades IIc.

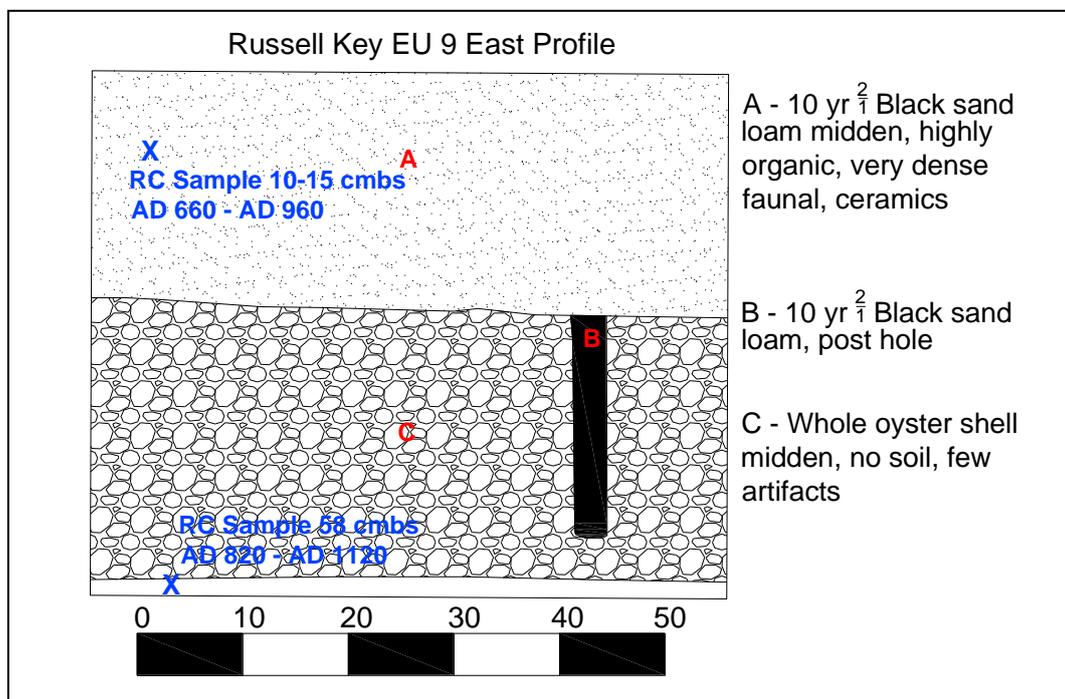


Figure 80. Russell Key EU 9 east profile map.

Finger Ridges and Water Courts. Russell Key has more water courts than any other shell works site yet recorded, with at least 18 identified. They are clustered in three distinct areas, near or along the outside perimeter of the site. The first cluster of water courts are five located on the western edge of the site. This area was tested with two excavation units and a shovel test.

EU 5, a one by two meter unit was placed on the slope of a finger ridge leading towards Water Court 1, located ten meters southwest of the water court. The unit was excavated to 70 cmbs, and contained black earth and shell midden throughout, with higher concentrations of shell in the southern half of the unit. EU 5 contained 52 worked shell or shell tools, including one each of Type B, D and G hammers, three un-typed hammers, three cutting-edged tools, six choppers, one anvil, and 15 worked columella.

A total of 73 ceramics were recovered from the unit, mostly Glades Plain, but several diagnostic decorated types, including one Miami Incised from 20 to 30 cmbs (Glades IIa, AD 750 to AD 900), and ten Fort Drum Incised from 40 to 50 cmbs, dating to Glades I (late) (AD 500 to AD 750). Two radiocarbon samples, from 0-10 cmbs, and 90 cmbs, resulted in dates of AD 610 to AD 840, and AD 550 to AD 810, which are consistent with the diagnostic ceramics.

EU 6 (Figure 81), a 100 cm by 200 cm unit was placed within the sloping wall of Water Court 1, at about three meters lower than the top of the water court wall. The unit was excavated to 160 cmbs, where it became inundated with water. A small shovel test was placed in one corner and excavated to 180 cmbs, and further probing determined that shell extended another 40 cmbs before ending. The unit contained almost pure, clean oyster shell, with only one artifact, a columella hammer. One radiocarbon date from 180 cmbs resulted in a date of AD 630 to AD 850 (Glades I (late) to Glades IIa).

Directly above EU 6, three meters higher up on the top of the water court wall, a shovel test (ST 3) was excavated to 90 cmbs. It contained dense, clean oyster shell with a few modified shells. A radiocarbon sample from the top 0 to 10 cmbs returned a date of AD 750 to AD 1010 (Glades IIa to Glades IIb), suggesting that five meters of shell were deposited within about a 380-year period.

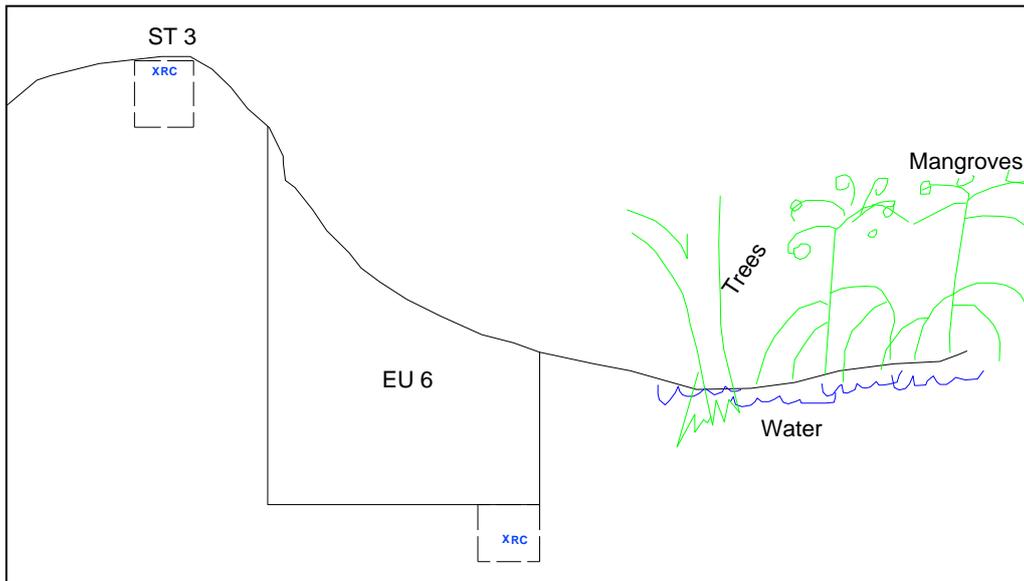


Figure 81. Russell Key sketch map of EU 6 and ST 3 units in Water Court 1.

Two additional shovel tests were placed within the centers of Water Court 1 and 2. Both tests were excavated within standing water, so it was difficult to see what was being excavated. Nevertheless, both tests confirmed that the water courts contained oyster shell and were likely shell-lined, but were overlain with thick deposits of mangrove peat, fibrous roots and deep water.

On the opposite eastern side of the island is another cluster of water courts, with eight water courts arranged with their walls facing towards the sea. Most of the water courts have finger ridges that are situated between each one, extending out towards the open water. EU 11 (Figure 82) was placed on the north (interior) end of the highest and flattest finger ridge, situated in-between Water Court 7 and 8.

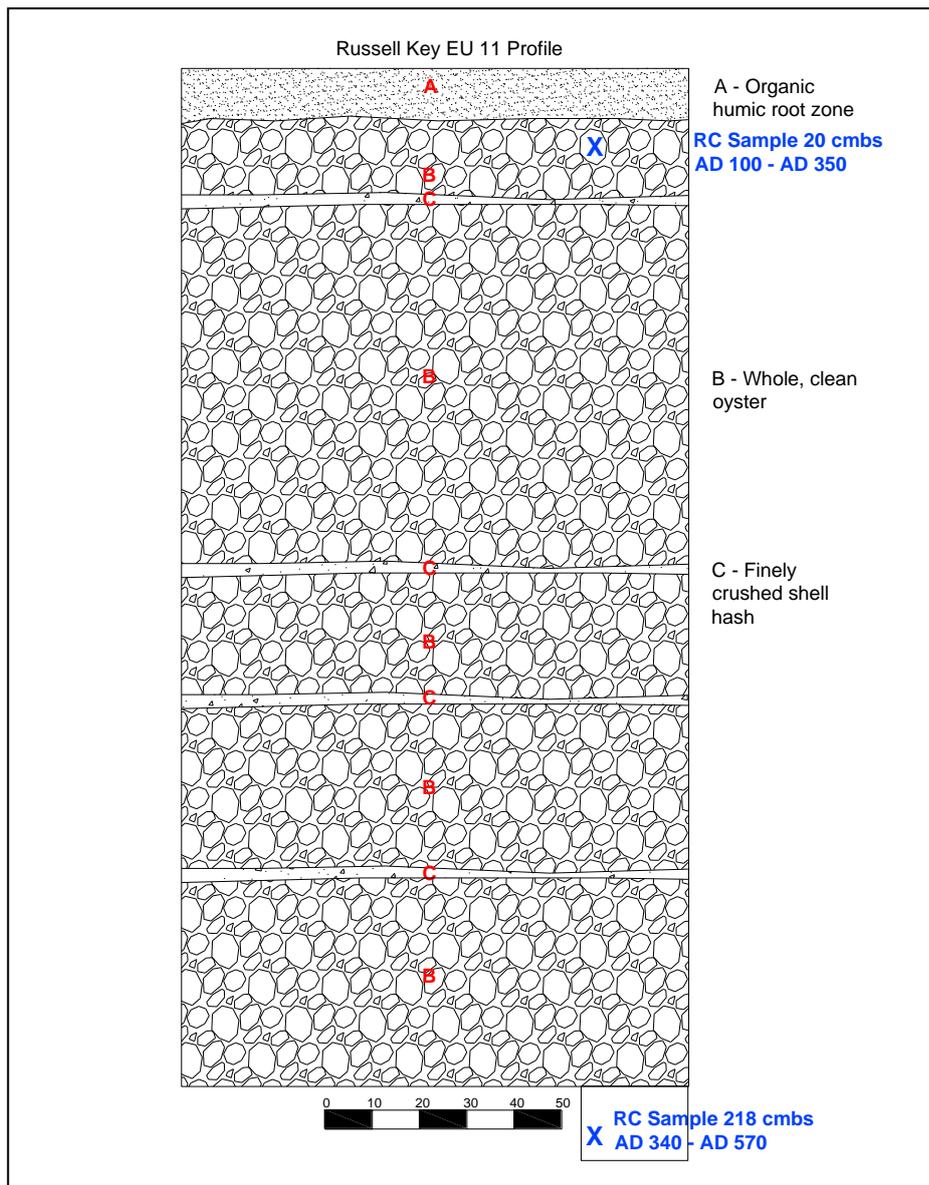


Figure 82. Russell Key EU 11 north profile map.

The unit was excavated to 200 cmbs, and contained a thin top humic layer (0-8 cmbs) with highly crushed oyster shell, suggesting that shell became trampled on the top of the finger ridge, probably by repeated walking. The rest of the unit contained clean, pure oyster shell, with very subtle, thin, alternating layers of crushed shell hash, suggesting that the ridge was constructed in episodes alternated by shell dumping to enlarge the ridge, punctuated with new surfaces that became trampled by walking, and then buried under further deposits of shell. Occasionally, very small pockets of tiny fish bone were encountered. It was noted that the fish bone were extremely small, suggesting that netting had to have been employed for capture. No artifacts were recovered from the unit.

Two radiocarbon dates, from 20 cmbs, and from 218 cmbs, resulted in dates of AD 100 to AD 350, and AD 340 to AD 570, dating to the Glades I to Glades I (late) periods. Though no evidence of mixed or disturbed stratigraphy was noted within the unit, and the two dates slightly overlap, the top date is slightly older than the bottom date. This could suggest that that the finger ridge was built within a short time interval, and dates around AD 350, or that borrowed shell was used to construct the finger ridge. An additional radiocarbon sample was taken from the farthest edge of the finger ridge that projects out into open water. This sample resulted in a statistically identical date to the bottom unit date of AD 340 to AD 570, suggesting that the finger ridge was likely constructed between AD 340 to AD 570, dating to the Glades I to Glades I (late) periods.

Two radiocarbon samples from Water Court 8 were submitted, one from the surface, and the other from 10 cmbs, resulting in dates of AD 660 to AD 880, and AD 160 to AD 410. Water Court K, located 20 meters west of Water Court 8, had three radiocarbon samples submitted. Two dates were submitted from the upper east and west edges of the water court, at 10 cmbs, and resulted in dates of AD 230 to AD 460, and AD 200 to AD 440. A sample taken from the center of the water court at 10 cmbs returned a

date of AD 260 to AD 500. These dates suggest that the water court and finger ridge shell work features in this area date sometime between AD 160 and AD 880 (Glades I (late) to Glades IIa), and are contemporaneous with the neighboring water courts and shell ridges, though they have slightly younger end dates.

Two additional radiocarbon samples were taken from the ends of finger ridges and from a subsurface test along the beach in this area, and resulted in dates of AD 550 to AD 810 and AD 430 to AD 630. The seven dates suggest that this area of Russell Key was constructed and inhabited between AD 100 and AD 880, during the Glades I to Glades IIa periods.

In the south, central part of Russell Key, towards the outer perimeter of the site, an isolated water court (Water Court H) was identified and tested. This water court had very high outer walls, at about three meters above the center depression. Seven hafted hammer shell tools were scattered on the surface of the water court, and these were collected. EU 10 (Figure 83), a small excavation unit (60 cm x 60 cm) was placed in a low spot in the interior of the water court towards its southeast slope, and excavated to 70 cmbs. The unit consisted of whole oyster shell with a lens of very highly crushed shell hash from 10 to 12 cmbs. The lower levels of the unit were whole, clean oyster shell, coated with a thick, mucky clay.

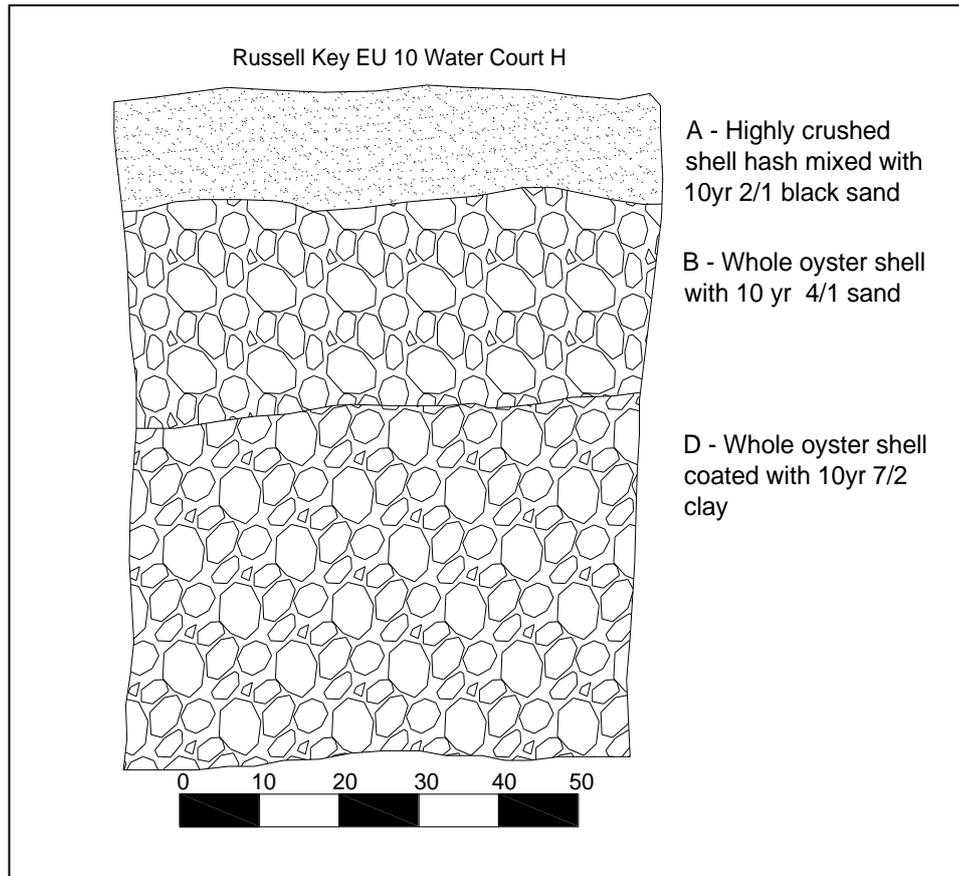


Figure 83. Russell Key EU 10, Water Court H, north profile map.

In the upper 0 to 20 cm, 68 Glades Plain ceramics were recovered, along with 18 shell tools (including ten choppers/anvils, four Type A hammers, one un-typed hammer, two worked columellas, and one dipper). No artifacts (except three pieces of burnt wood or charcoal) were present from below 20 cm to the bottom of the test. Three radiocarbon samples taken from the unit resulted in the following: 0 to 10 cmbs resulted in a date of AD 1200 to AD 1440; a sample from 10 to 20 cmbs resulted in a date of AD 720 to AD 950; and from 60 cmbs, a date of AD 1050 to AD 1290 was obtained.

Two additional samples were taken from the highest mounded edges of the water court, about three meters higher than the interior, on the east and west sides. Samples taken from the tops of the walls, from 10 cmbs, resulted in dates of AD 430 to AD 640, and AD 270 to AD 520, suggesting that perhaps older shell was borrowed and used to add height to the outer ring of the water court. The range of dates from this

water court make evaluating the chronology of its construction or occupation difficult, as it could potentially date anywhere from AD 270 to AD 1440. However, the excavation unit placed in the center of the water court suggests that it was probably constructed sometime within AD 720 to AD 1290, with earlier borrowed shell added to the outer arms.

Finally, the extreme southern end of the site contains the largest water court (Water Court 6), and the longest finger ridges found at Russell Key. Water Court 6 measures 50 by 15 meters, and is two meters in depth. Two radiocarbon samples were taken from different areas of Water Court 6, with the first sample taken from the surface on the east side of the water court, resulting in a date of AD 1050 to AD 1270 (Glades IIb to IIIa). The second sample was taken from the upper southwest edge of the water court, dating from AD 1070 to AD 1310 (Glades IIb to IIIa).

Two finger ridges, located in the southwest edge of the site, had samples taken from the top 10 cm, resulting in dates of AD 910 to AD 1170, and AD 1060 to AD 1300 (Glades IIb to IIIa). Finally, the southernmost shell midden at Russell Key had a sample taken from 20 cmbs, which resulted in a date of AD 1020 to AD 1270 (Glades IIb to IIIa). It appears that the southern portion of Russell Key was constructed and inhabited sometime during the Glades IIb to IIIa periods, between AD 910 and AD 1300, and comprises the last dated shell work constructions on Russell Key. Like Fakahatchee and Dismal Keys, occupation of the site continued up until about AD 1300, but possibly as late as AD 1440.

Russell Key: Conclusion. Archaeological investigation of Russell Key determined that this complex shell work island, like both Fakahatchee and Dismal Keys, reflects a prehistoric landscape that was constructed over time in spatially distinct, occupational phases. Like the two other major shell work islands, Russell Key has a distinct shell ring located at one end of the settlement. Russell Key's shell ring is very

low in elevation, suggesting that it may have deeply buried, submerged deposits that date to earlier occupations during lower sea level positions. Testing of the upper portions of the ring determined that it dates to the Glades I period, from BC 380 to AD 60.

On the east arm of the shell ring is a remotely located flat-topped mound, with its upper portions dating from AD 640 to AD 910, which is temporally consistent with a florescence of flat-topped mound construction in the Caloosahatchee region. That this mound is separated by water from the main portion of the settlement is suggestive of a sacred or ceremonial purpose, and its location superimposed on an earlier, abandoned feature of the site suggests that the mound may be monumental in nature, perhaps to memorialize ancestors, or mark boundaries or territories. A highly crushed lens of shell on the top of the mound suggests a structure was housed on its summit, and that it was built rapidly with mostly clean shell, possibly basket-loaded secondary fill. A second, smaller mound is located near the flat-topped mound, suggesting that it may be related in function.

Portions of the shell fields at Russell Key were intensively mapped and surface collected, indicating that shell fields are more than flat, open expanses of shell, and reflect community patterns of individual households, household clusters, hearths, roasting pits, and or community activity areas. Archaeological testing of the shell fields determined that although shell fields appear to be low in elevation, they too have deep deposits, consisting of mostly clean shell. At Russell Key, the shell fields appear to have temporal significance, dating from AD 420 to AD 800 (Glades I to IIa).

Also much like Fakahatchee and Dismal Keys, Russell Key's overall site pattern appears to grow, expand, and radiate out from the earliest constructed areas of the site, suggesting that a distinct phasing of shell work features is evident at this site, and many of the features appear to be contemporaneous with other shell work sites. These include

a district of tall mounds arranged in a semi-arc around the southern half of the site, as well as two clusters of 18 water courts, and a series of multiple shell finger ridges. One cluster of water courts on the west edge of the site date from AD 650 to AD 1010 (Glades I (late) to IIb), and another cluster located on the east side of the site date from AD 100 to AD 880 (Glades I to IIa). Most of the water court dates, however, cluster around AD 600 to AD 880.

One shell finger ridge was tested and determined to have been constructed with loads of clean oyster shell, alternating with very thin, discrete lenses of crushed shell, suggesting that it was continually being constructed. The strata and lack of artifacts suggests that shell finger ridges were purposefully constructed, architectural features that served some form of specialized activity, as evidenced by trampled and crushed shell. Based on the absence of domestic artifacts, and organic material found within the ridges, they were likely not habitation platforms, rather they served as structures such as piers, components of fish weirs, or as raised platforms for accessing the water or to conduct group fishing activities.

Excavations in several water courts suggest that they were purposefully constructed features, some evidencing rapid construction with primary, clean shell, and others suggesting that perhaps older shell fill was borrowed and used to further add height to some of these features. The water courts vary in shape and size, but most have very consistent orientations, size-ranges, and depths. One water court evidenced a sluice, suggesting that it functioned as a fish pond and trap. What the other water courts functioned for remains unknown, but their position and association with finger ridges at the perimeter of the site strongly suggests that they were related to aquaculture, perhaps for the short-term storage of excess fish (fish ponds). Alternatively, they could have stored fresh water, or even mark the positions of households, but their forms and contexts are more suggestive of marine food production than habitation.

Finally, the south end of Russell Key comprises the latest dated shell work constructions present on the site, dating from AD 1050 to AD 1440 (Glades IIb to IIIb). One large water court, the largest found on Russell Key, suggests that the population perhaps moved towards a centralization of production. Like Fakahatchee Key and Dismal Key, all but one of the terminal dates end at around AD 1300, with a single date ranging from AD 1200 to AD 1440, still suggesting that Russell Key was likely abandoned around AD 1300.

SANDFLY KEY

Sandfly Key is a 20-hectare site located in the southern end of the NP. The site was first investigated by C.B. Moore (1900:377) who reported extensive shell deposits and two small sand and shell burial mounds which he tested. The site was surveyed and mapped as part of this study, but only limited radiocarbon sampling was conducted (Table 11, Figure 84).

Table 11. Results of Radiocarbon Sampling from Sandfly Key.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Triangular Mound, SW Site	UGAMS-2920	2180	40	-2.4	AD 100-AD 340
Sand Mound 1, Center, Surface	UGAMS-2921	2830	40	-2.8	BC 740-BC 430
NE Ridge Terminus	UGAMS-2922	2950	40	-2.7	BC 830-BC 590
NW Ridge End	UGAMS-2923	2420	40	-1.7	BC 180-AD 50
SE Edge of Mound, 5 to 10 cmbs	UGAMS-2924	1890	40	-2.2	AD 440-AD 650
West Edge Eroding Bank, Top of Mound, 5 cmbs	UGAMS-2925	2220	40	-2.3	AD 50-AD 280
West Edge Eroding Bank, Side of Bank, 260 cmbs	UGAMS-2926	1920	40	-3.1	AD 420-AD 630

Shell Ring and Sand Mounds. Sandfly Key contains several nested concentric rings that open to the northeast. The largest outer ring was completely surveyed, and determined to consist of two long east and west arms that range in width from ten to 20 meters wide. The arms are steep sided, and are rounded on their tops (not flattened), suggesting that they did not serve to house structures on their summits, and probably

were purposefully constructed enclosures or built to function as a protective seawall. Heights of the arms range from one to 2.5 meters in height.

Two radiocarbon samples were taken from the northern, opposite ends of the ring. The first sample was taken from 0 to 5 cmbs from the northwest edge of the ring, at an elevation of 1.2 meters. The small test determined that the ring is built of large, whole oyster shell, with little sediment, and no artifacts seen. The first sample resulted in a date of BC 160 to BC 50 (Glades I). The second sample was taken from 0 to 5 cmbs on the opposite, northeastern end of the ring's arm, 175 meters southeast of the first sample, at a higher elevation of 2.5 meters. This test determined that the ring is constructed of whole oyster shell, with little other sediment, and with no artifacts present. The sample resulted in a date of BC 830 to BC 590, placing it within the Terminal Archaic.

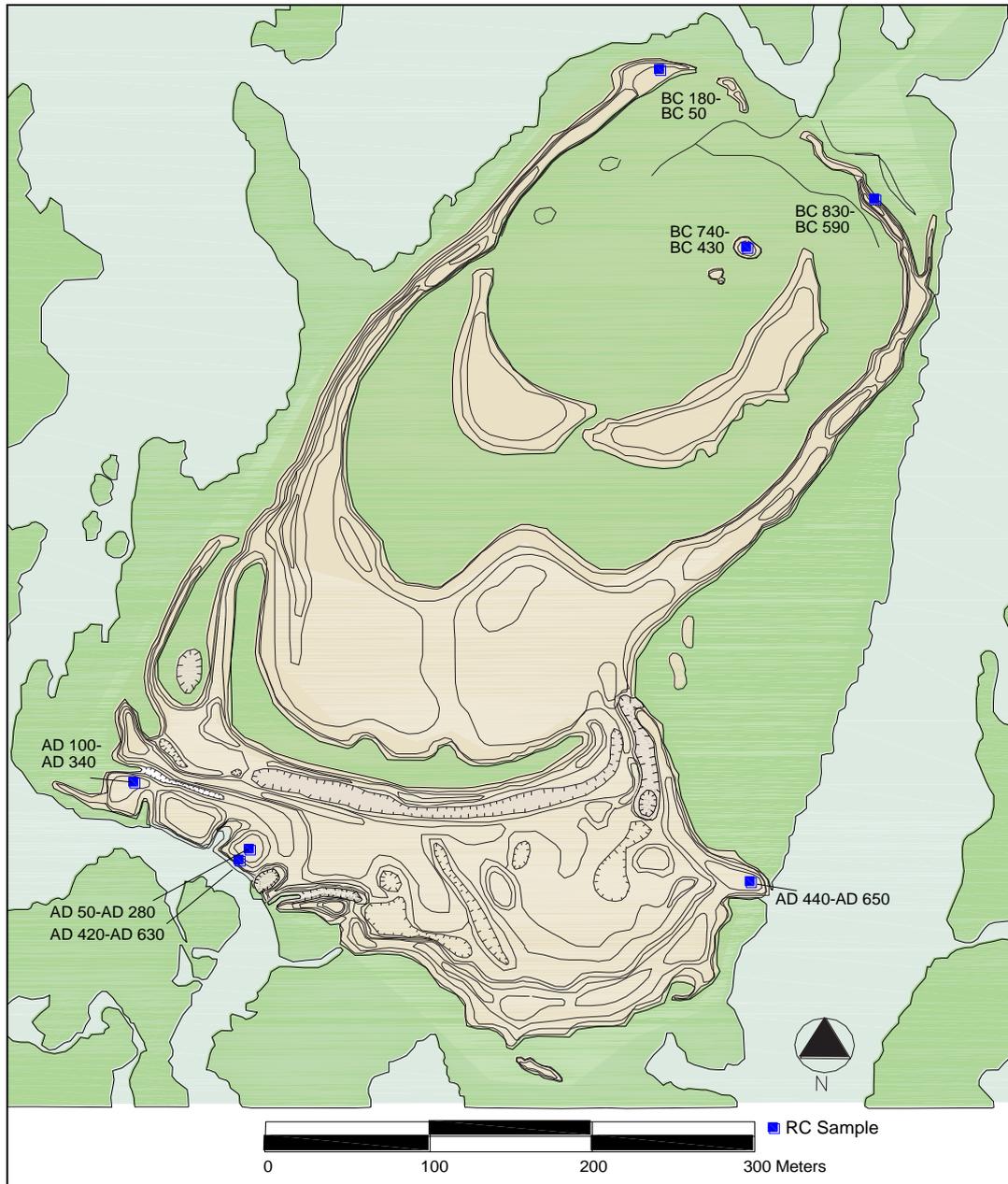


Figure 84. Site map of Sandfly Key (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

The closed end of the large ring was found to be extensively disturbed, and so was not tested. This large ring encloses a smaller, inner central ring, which resembles two connected crescents. The inner central ring was also disturbed by extensive farming activities, and so was not sampled. Situated within the interior of the nested crescents are two small isolated sand and shell mounds, located deep within the mangrove

swamp, completely surrounded by shallow water. The mounds are located 50 meters into the swamp, and are not visible from the edge of any of the rings.

The larger mound measures nine by seven meters, and 1.2 meters in height. Two large pits were observed in the center of the mound (possibly from C.B. Moore's excavation, 1900:377). The profile of the open pits was examined, and it was determined that the mound consists of sand mixed with shell that is capped with an oyster shell lens. A single radiocarbon sample was taken from an undisturbed area of the mound, from the top 0 to 5 cmbs. The sample resulted in a date of BC 740 to BC 430, dating between the Terminal Archaic and the Glades I periods.

The second, smaller mound measures three by 3.5 meters, and is only 60 cm in height. It appeared to be highly disturbed and almost completely excavated, and so was not sampled. Moore (1900:377) referred to these as burial mounds, and their construction out of sand supports his classification of the mounds as probably mortuary structures.

The three radiocarbon dates from the rings and the mound suggest that they were constructed sometime between BC 830 and BC 50, and were likely contemporaneous constructions. The mounds' isolated, hidden position within the confines of the protective rings, and their probability of being burial mounds may suggest that this portion of Sandfly Key may have been a purposefully composed sacred landscape (e.g., Bradley 1998a; Buikstra and Charles 1999; Crumley 1999; McNiven 2003, 2008; Oubina *et al.* 1998), or a place of avoidance or taboo. As has been noted, separation by water may also indicate that the mounds were imbued with sacredness (Brady and Ashmore 1999).

Mounds, Shell Fields and Water Courts. The southern end of the island appears to be intact, with no signs of farming, and few other disturbances. This area contains shell fields, a few small water courts, small depressions, and mounded ridges.

The shell fields were found to be extensive, about 1.8 hectare in area, and similar in layout to Fakahatchee, Dismal, and Russell Keys. The shell fields contain large ridges with connecting water courts, as well as open, flat areas with slight depressions. A surface scatter of artifacts was also found to be fairly dense in the shell fields.

Along the outside perimeter of the island were found five distinct flat-topped shell mounds that may have served as house platforms. Four of the mounds are clustered in a row along the southwest edge of the site, and the other is located on the southeast edge.

The southeast mound measures about 2.5 meters wide by 5.5 meters long along its flat top, and is 2.5 meters in height. The mound appears to be constructed out of whole oyster shell. A single radiocarbon sample from the top 5 cmbs resulted in a date of AD 440 to AD 650, dating to the Glades I (late). The southwest flat-topped mound measures about 7 meters wide by 7.5 meters long, and is nearly two meters in height. A single radiocarbon sample from the top 5 cmbs of the oyster shell mound resulted in a date of AD 100 to AD 340 (Glades I). Finally, two radiocarbon samples were taken from the south central edge of the site from a tall shell mound that is severely eroding along a bank in the river. Samples were taken directly out of the exposed shell mound wall. The top sample, from 5 cmbs, resulted in a date of AD 50 to AD 280 (Glades I), and the bottom date from 260 cmbs resulted in a younger date of AD 420 to AD 630 (Glades I to Glades I (late)). The discrepancy in dates is probably due to severe wall slumping and mixing of top deposits down into the lower portions of the wall. Alternatively, the older top date may have resulted from borrowing older shell and mounding it at the top of the mound.

Finally, Sandfly Key contains several water courts, one of which is totally enclosed, and the other two having openings towards the river, which suggest that they

functioned as tidal traps. Other possible water courts and fish traps are located along the southern perimeter of the island, but none of these were tested or sampled. No shell finger ridges are present at Sandfly Key.

Sandfly Key: Conclusion. Archaeological investigation of Sandfly Key was very limited, but survey, mapping, and seven radiocarbon sample results indicate that the site shares similar patterns with other shell work sites investigated. First, Sandfly Key shares a similar site configuration, with a series of nested, concentric crescent-shaped shell rings. Sampling of the largest outer ring determined that it is the earliest dated component of the site, and is similar in age with Fakahatchee, Dismal, and Russell Key's inner shell rings.

Second, Sandfly Key also contains isolated, segregated mounds, which have mortuary contexts. Though not as complex and monumental in size and nature as the Youman's Mound complex at Fakahatchee Key, they share similar spatial patterns in that both have paired mounds, and both appear to be purposefully segregated away from domestic or public areas of the site. Both would have required access through water, which may have given sacred or symbolic significance to their placement.

The third significant pattern is that areal site growth appears to have occurred over time. While Sandfly Key needs much more additional testing and many more radiocarbon dates to support this observation, the radiocarbon sampling to date shows that like Fakahatchee, Dismal and Russell Keys, Sandfly Key's inhabitants built shell work sites in phases, and in this case with a continuously southward expansion. Sandfly Key contains all the shell works components seen at other sites, with the exception of shell finger ridges and distinct districts of large shell mounds. It remains unclear why Sandfly Key lacks these features.

Lastly, Sandfly Key appears to have been occupied up until about AD 650, and appears to have been abandoned much earlier than the other major shell work sites,

where terminal dates for Fakahatchee, Dismal and Russell Keys are consistently around AD 1300. Of course this may be a result of much less testing and dating, so this remains a preliminary observation, but to date, there is no evidence that Sandfly Key was occupied after AD 650, and was abandoned sometime in the Glades I (late) period.

ARCHAEOLOGICAL TESTING: SMALL SHELL WORKS

WEST PASS

The West Pass site is a small shell work site, and is also considered a potential shell ring site because of its distinct, crescent-shaped configuration. The site encompasses about 2.25 hectares, and is located very near to Russell Key, at only 0.8 kilometers southwest. The site was systematically surveyed, mapped, and tested with four excavation units, two shovel tests, 3,962 controlled surface collected artifacts, and 12 radiocarbon samples (Figure 85, Table 12).



Figure 85. Site map of West Pass (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

Table 12. Results of Radiocarbon Sampling from West Pass.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Excavation Unit 2, Levels 5 to 7, 40 to 70 cmbs	BETA-227093	2060	70	-3.7	AD 170-AD 540
Shovel Test 1, Shoreline, 180 to 190 cmbs	BETA-227094	2090	70	-3.5	AD 140-AD 500
Excavation Unit 1, West Wall, 20 cmbs	BETA-227095	2010	70	-2.4	AD 240-AD 600
Excavation Unit 1, East Wall Under Plaza, 170 cmbs	BETA-227096	2000	70	-4.5	AD 250-AD 600
Excavation Unit 2, North Wall, 10 to 20 cmbs	BETA-227097	2000	70	-2.7	AD 250-AD 600
Excavation Unit 2, North Wall, Base, Under Water, 120 cmbs	BETA-227098	1830	60	-3.8	AD 450-AD 710
Excavation Unit 3, South Wall, 0 to 10 cmbs	BETA-227099	1820	70	-3	AD 440-AD 740
Excavation Unit 3, South Wall, 130 to 140 cmbs	BETA-227100	1810	60	-4.4	AD 470-AD 740
Excavation Unit 4, North Wall, 10 to 15 cmbs	BETA-227101	1980	50	-3	AD 310-AD 590
Excavation Unit 4, North Wall, 100 cmbs	BETA-227102	2040	60	-3.7	AD 230-AD 550
Top of Ridge/Bank Next to WC	BETA-227109	1820	70	-3.2	AD 440-AD 740
Landing 2 M bs at low tide	UGAMS-2919	2350	40	-2.1	BC 100-AD 130

West Pass contains three distinct components, the main one of which is a large, crescent-shaped midden. While the site does contain a few examples of shell work construction, including one very large, rectangular water court; three small water courts; a large curvilinear midden ridge; and extensive shell fields; no other elaborate or complex architectural features are present at West Pass. Typical shell work features found at other sites, such as rows or districts of large mounds, series of radiating finger ridges, platform mounds, canals and isolated mounds are not present.

According to some models (Widmer 1988), the smaller, simple configuration of the site, as well as the lack of any elaborate shell works may suggest that this was a special-use site, such as a fishing or shellfish collecting station or a small fishing hamlet, and not a permanent village. Others may suggest that a site with this configuration may be a satellite or subsidiary site to Russell Key (see Beriault *et al.* 2003). Testing of West Pass was designed to examine these possibilities.

Shell Ridge. The shell midden ridge at West Pass is long, curvilinear or crescent-shaped, and ranges from 1 to 2.7 meters in height. In some areas, the ridge is steeply sloped against the side that faces the sea, and has a more gradual slope on the interior of the ridge, which encloses extensive shell fields.

Shovel Test 1 was placed along the northeast edge of the site at an elevation of 1.75 meters above sea level, and the test was excavated to one meter below surface, which contained mostly pure oyster shell mixed with a few conch and whelks. Artifacts included five plain ceramics and 13 worked shell and shell tools. An additional shovel test was placed one meter west of ST 1 at a slightly lower elevation, near the shoreline, but at an elevation of 80 cm above sea level. The shoreline test was excavated to 190 cmbs, and a probe determined that shell midden still continued at least another meter, indicating that West Pass has deeply buried shell midden deposits. A radiocarbon sample from 190 cmbs resulted in a date of AD 140 to AD 500 (Glades I).

Further off the shell ridge and within the low, flat beach face of West Pass, a bucket-auger was used to secure a basal radiocarbon sample for the site from the deepest depth possible. A sample from two meters below the beach returned a date of BC 100 to AD 130 (Glades I). The probe indicated that shell likely continued below two meters, indicating that West Pass deposits are at least five meters deep.

EU 1, a 100 by 200 cm unit was placed further west along the ridge towards the middle of the site, on the interior slope of the ridge, at an elevation of about 1.5 to 2.5 meters in height, and was excavated to 160 cmbs. The unit contained almost pure, clean oyster shell with occasional whelks and conch, but containing very little sediment, rare bone, and few artifacts. In total, 21 plain ceramics (Glades and Goodland) were recovered, as well as 16 worked shells (mostly columella hammers, two Type G hammers, and a shell scoop). Two radiocarbon samples from the top and bottom of the units were submitted. Oyster shell from 20 cmbs resulted in a date of AD 240 to AD 600, and a sample from 170 cmbs resulted in a date of AD 250 to AD 600 (Glades I to Glades I (late)). With 150 cm separating the top and bottom samples, and the dates being statistically identical, this portion of West Pass was likely formed very rapidly. The lack of sediments, absence of organic soils, and the very few artifacts recovered in the unit

also argues for the rapid construction of the shell ridge with primary shell refuse, and against slow accumulation.

EU 2 was placed on the northeast edge of the site in a low midden ridge. The unit consisted of oyster shell midden with small amounts of sediment, including dark gray sandy loam. Artifacts included 23 worked shell or shell tools (mostly columella hammers, a shell dipper and scoop), and eight Glades Plain ceramics. Three radiocarbon dates resulted in a date of AD 250 to AD 600 from 10 to 20 cmbs; a date of AD 170 to AD 540 from 40 to 70 cmbs; and a date of AD 450 to AD 710 from 120 cmbs. Bracketing these dates, this portion of the site was likely occupied around AD 250 to AD 710, during the Glades I to Glades I (late) periods.

The last excavation unit placed on the ridge was EU 3, situated on the south central part of the midden ridge along its slope, at about 1.5 meters in elevation. The unit was excavated to 140 cmbs, and contained oyster shell midden mixed with small amounts of sandy loam and shell hash. Land snails were noted to be in abundance within this test. A total of 22 worked shell artifacts (columella hammers, one shell vessel, and one Type G Hammer) were recovered, along with one Glades Plain ceramic. Two radiocarbon samples, from 0 to 10 cmbs and from 130 to 140 cmbs resulted in dates of AD 310 to AD 590 and AD 230 to AD 550, respectively, suggesting that this area of the site was formed fairly rapidly during the Glades I to Glades I (late) periods.

Shell Fields: CSC. West pass contains an extensive area of shell fields that are partially enclosed by the tall shell midden ridge. The shell fields are similar to ones found at other sites, however, they cover a much smaller area, at only 0.28 hectares, and they contain only a few distinct depressions and small ridge features like those found at the larger shell work sites. The shell fields at West Pass were noted to contain a high density of surface artifacts, and these were systematically piece plotted and surface collected. A total of 3,962 surface collected artifacts were mapped and collected from a

roughly 1300 square meter area, giving the shell fields an artifact density of approximately 3 per square meter. This is much denser than Russell Key's east shell field, which resulted in the recovery of 1,679 artifacts over a 3,000 square meter area, and a density of 0.55 artifacts per square meter.

Controlled surface collection (CSC) was conducted in order to reveal potential artifact spatial patterning, and to help interpret the function of various features. Spatial analysis of the CSC results was conducted by examining six main artifact categories (prehistoric ceramics, shell vessels, hammers, clam choppers, cutting-edged tools, and lithics) that are thought to represent potentially distinct activities.

The six classes of CSC artifacts were plotted as density clusters (Figures 86 to 92). Figure 86 plots the density of 247 surface collected ceramics (244 Glades Plain, one Glades Red and two Goodland Plain), which shows six main, distinct clusters arranged in a crescent in the central portion of the site. The six clusters are spaced from eight to ten meters apart. Another cluster is situated just south of a small water court, and another small cluster occurs on the west edge of the site.

While ceramics reflect cooking and storage activities, shell vessels (dippers, scoops, spoons and cups) are thought to have been used for cooking, and food/water/tea preparation, serving and consumption. The distribution of 586 shell vessels (Figure 87) shows eight distinct clusters in the same areas as the ceramic clusters, as well as a cluster south of the water court, and on the east edge of the site. An additional cluster is found just south of another water court.

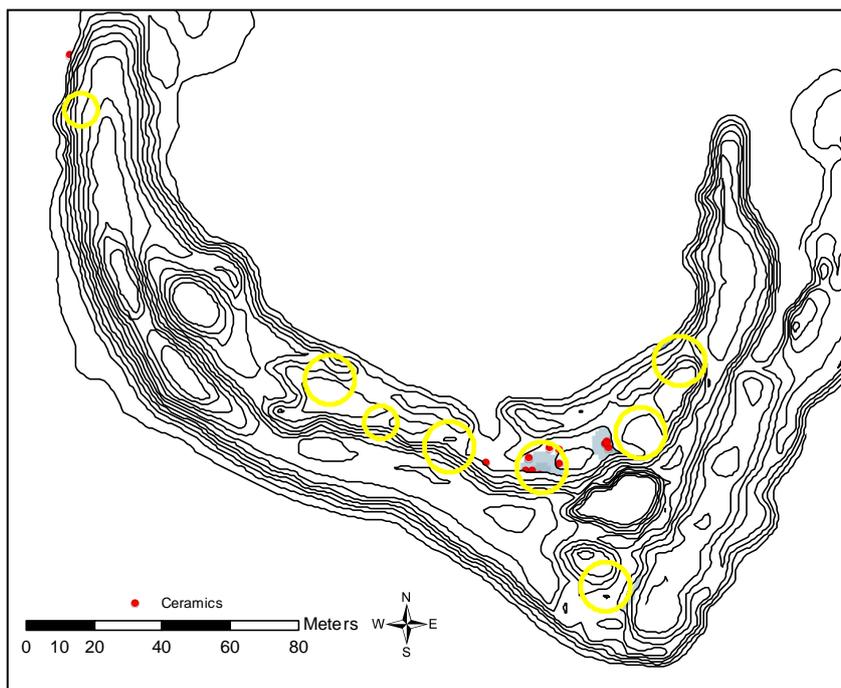


Figure 86. West Pass distribution of ceramics.

As noted previously, the exact function of all types of shell hammers is not known, and they probably reflect a wide range of activities, including shell and wood tool working and production, food preparation (extracting shellfish, tenderizing shellfish meat), and shelter construction. The surface distribution of 662 various types of shell hammers across the shell fields shows a similar pattern to the shell vessels, with a notable pattern of six clusters occurring in a crescent along the central interior portion of the site (Figure 88). A larger cluster of shell hammers was also noted around the two water courts, suggesting some type of hammering activity took place around these features.

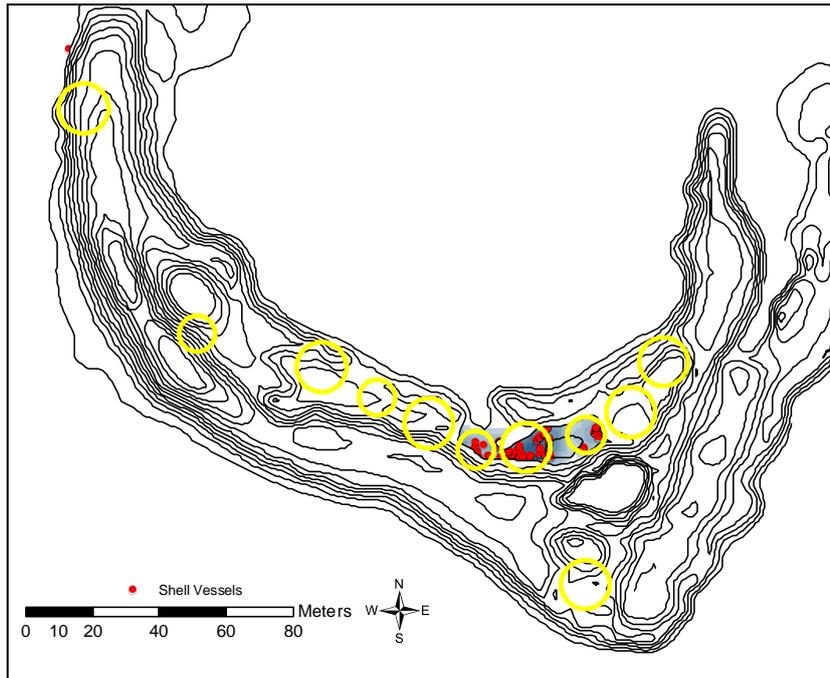


Figure 87. West Pass distribution of shell vessels.

Clam choppers were also used for some type of activity related to hammering and chopping, and may have been more expedient tools compared to formally crafted and often hafted hammers. A total of 151 clam shell choppers were recovered during the CSC (Figure 89), mostly clustering in three main areas, with the highest density cluster just south of the southern water court. In several areas, caches of unmodified clam shells were found stacked and partially buried *in situ*, possibly suggesting that these caches reflect *de facto* refuse collected prior to abandonment of the site, or were caches collected for future tool manufacturing.

Cutting-edged shell tools were highly specialized and used for woodworking (mostly for chopping and carving wood), and are generally much less frequently found as a tool type (see Marquardt 1992:217-219). A total of 29 cutting-edged shell tools were recovered from the CSC, and cluster around four main areas that correspond with other shell tool clusters (Figure 90).

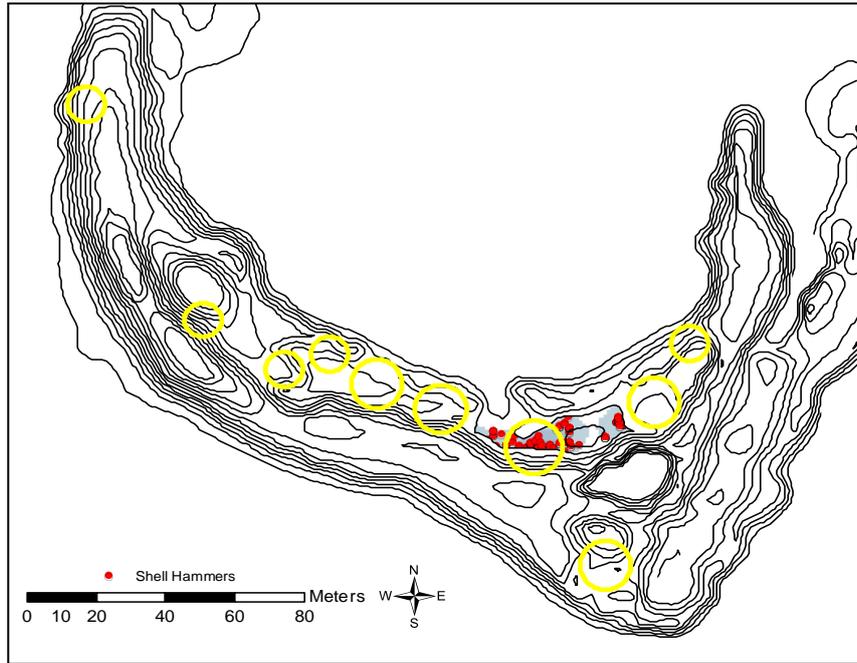


Figure 88. West Pass distribution of shell hammers.

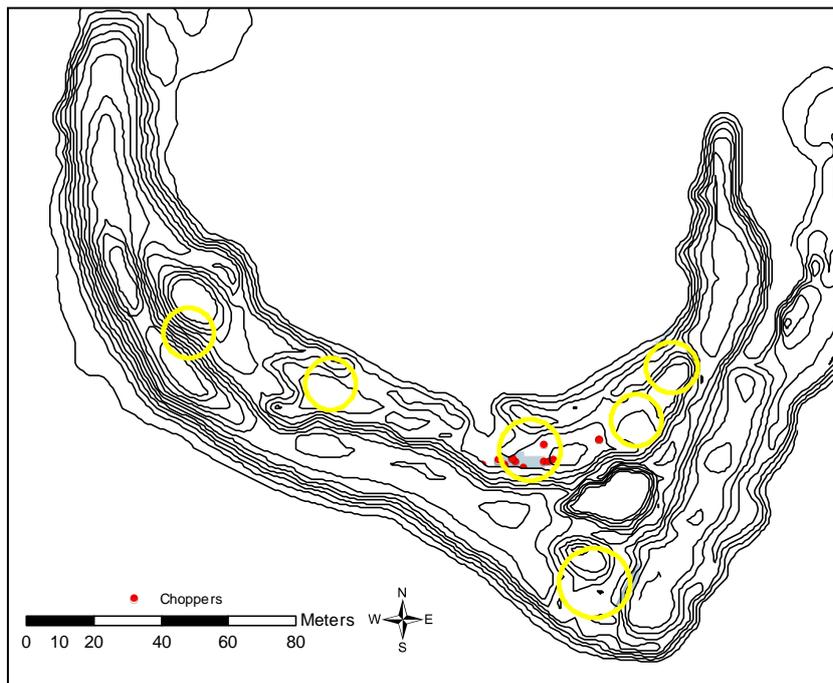


Figure 89. West Pass distribution of clam choppers.

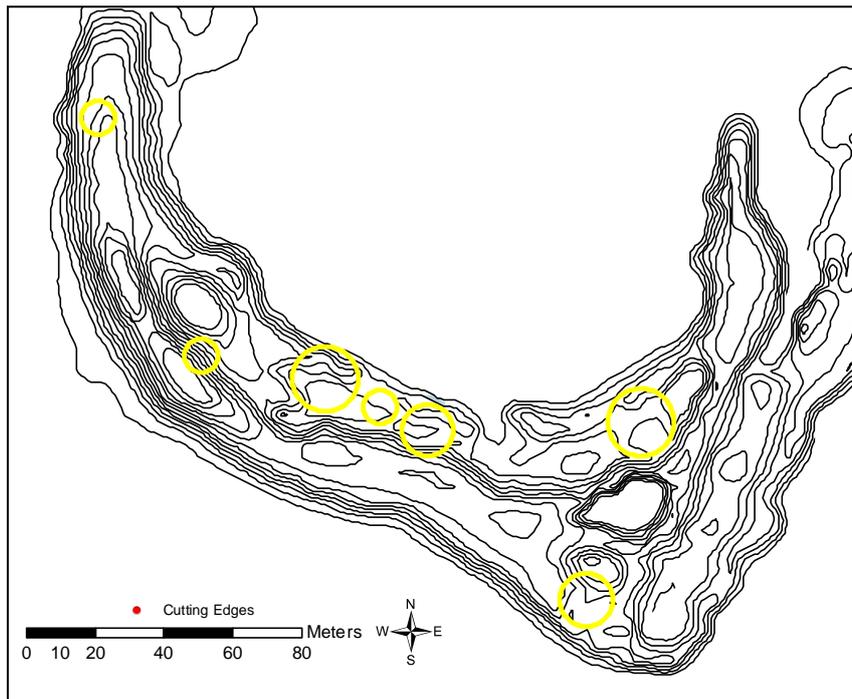


Figure 90. West Pass distribution of cutting edges.

The last category of artifacts examined are lithics, which as noted earlier, are rare in the TTI, as they had to be imported in from the mainland. Shell was an abundant raw material used for the majority of tool making, however lithics may have served specialized functions for crafting sharp edges on cutting-edged tools, in polishing bone points, and as abraders, hones, or hammers in crafting and finishing shell and bone tools. A total of 13 modified and unmodified pieces of local limestone and sandstone were clustered in five small areas of the shell fields (Figure 91).

Shell Fields CSC: Conclusion. Controlled surface collection of 3,962 artifacts from West Pass' shell fields produced several significant spatial patterns. The first is a notable pattern of six to eight distinct clusters of artifact densities that occur in an arc or crescent in the central portion of the site (Figure 92). Though no distinct depressions, post holes, or hearths were noted during surface inspection of the shell fields, the six to eight clusters are equidistantly spaced eight to ten meters apart from one another, and suggest that they likely mark individual households. A density map of all 3,962 surface collected artifacts suggests that there are six distinct clusters, as well as clusters south of

the two water courts, and on the west edge of the site. Future systematic mapping of this area with a high-precision Total Station may reveal subtle topographic features, perhaps small house depressions or hearths like the ones mapped at Russell Key.

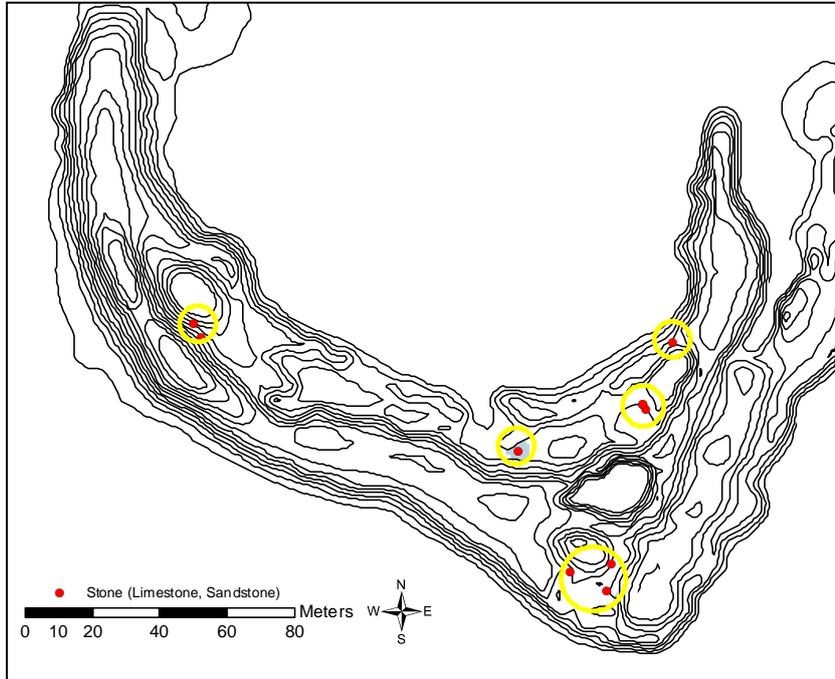


Figure 91. West Pass distribution of lithics.

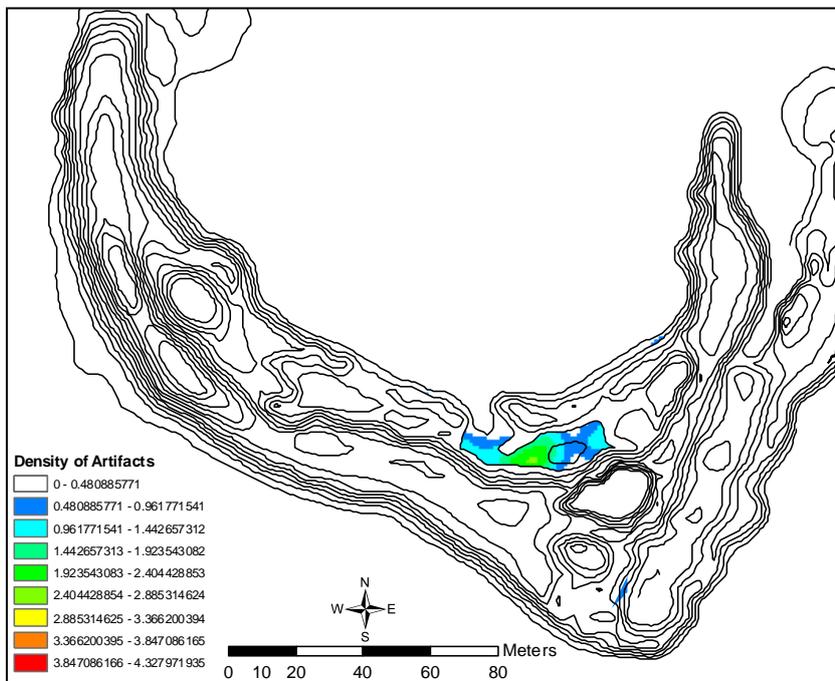


Figure 92. West Pass total density map of all surface collected artifacts.

Shell Fields EU: One excavation unit was placed in the south end of the shell fields to obtain data on strata and temporal associations. EU 4 was excavated to one meter below ground level. The unit contained mostly whole oyster shell in its upper levels, and at 50 cmbs contained a thin layer of oyster shell hash, suggesting a possible floor. At 58 cmbs in the northwest corner of the unit was a deposit of black earth and shell midden, containing dark, organic soil mixed with charcoal. It was unclear what this feature was, but it may have been a post, suggesting the presence of a structure in this location. Twenty modified shell tools were recovered (four shell vessels, columella hammers, a tool blank, three choppers) as well as two Glades Plain ceramics. Radiocarbon dates from 10 to 15 cmbs, and 100 cmbs resulted in dates of AD 310 to AD 590, and AD 230 to AD 550, dating to the Glades I to Glades I (late) periods.

Water Courts. Among the common features found at many shell work sites are water courts, and four are present at West Pass. This includes two small round courts found within the interior of the site, a small water court located on a separate small midden ridge north of the main part of the site, and a very large rectangular water court measuring ten by 80 meters located at the east end of the site. The large water court is very shallow, and lined with shell. A single radiocarbon sample was taken from the upper wall of the water court in order to date its construction. An oyster shell sample from 10 cmbs from the top of the wall resulted in a date of AD 440 to AD 740, the most recent and terminal dated feature at West Pass.

West Pass: Conclusion. Archaeological testing of West Pass included six tests, 3,962 controlled surface collected artifacts, and 12 radiocarbon samples. The radiocarbon dates suggest that West Pass was occupied from as early as BC 100 to AD 740, from the Glades I to the Glades I (late) period. With three separate dates that end at AD 740, and all others clustering between AD 500 and AD 600, it appears that West Pass' main occupation probably occurred between AD 240 and AD 600, and that the site

became abandoned before AD 740. It appears that for some time, West Pass and components of the Russell Key settlement were contemporaneous, but it remains unknown if, and how these sites were related and how they interacted.

The 3,962 controlled surface collected artifacts in the shell fields suggest that a diverse array of domestic activities took place within this area, mostly related to food preparation, cooking and consumption, shell tool production, and wood working. The distinct spatial clustering of artifact densities suggests the locations of at least six households.

The level of site construction, the time depth of occupation, and assemblage of artifacts from West Pass suggests that it was not merely a satellite site articulated with Russell Key, or a specialized processing or collection station, but was a permanent habitation site. The presence of four distinct water courts, one of which appears to be a fish trap, the others for which exact functions remain inconclusive, nevertheless, suggests that the residents of West Pass invested in landesque capital (Brookfield 1984), and this was likely a permanent community. Like Sandfly Key, West Pass was occupied from the Glades I to Glades I (late) period, and there is no evidence at either site of occupation after AD 650 (at Sandfly Key) and AD 740 (at West pass), with terminal occupations ending in the Glades I (late) period.

FAKAHATCHEE KEY 3

Fakahatchee Key 3 is located close to Fakahatchee Key, at 1.1 kilometers southwest in the central portion of the NP. This is a small shell work site, under 1.4 hectares in area, and is also considered to be a potential shell ring site due to its vaguely crescent-shaped configuration. This study provided the first survey, mapping, and testing of the site, including one excavation unit and five radiocarbon dates (Table 13, Figure 93).

Table 13. Results of Radiocarbon Sampling from Fakahatchee Key 3.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
EU 1, RC, S Wall, 10 cmbs	UGAMS-3819	1890	30	- 2.67	AD 450-AD 640
EU 1, RC, S Wall, 100 cmbs	UGAMS-3820	2500	20	- 3.49	BC 300-BC 70
RC Sample, Base/Foot of Ring, 20 cmbs	UGAMS-3821	1770	30	- 3.25	AD 590-AD 730
Sand/Shell Mound, 2 M El., Top, 1 cmbs	UGAMS-3822	1490	20	- 2.45	AD 880-AD 1030
Ring Arm Leading to Mound, 70 cm El., 20 cmbs	UGAMS-3823	2490	30	- 3.88	BC 300-BC 40

Fakahatchee Key No. 3 is divided into three areas, the largest area on the eastern side, consisting of a raised, amorphous-shaped shell midden. Survey of this area determined that the 0.6 hectare midden is disturbed, with several large depressions that appear to be borrow holes from looter's excavations, with mounded midden located around the depressions. A fisherman's shack still stands on the south side of the shell midden and this area was not tested due to this disturbance. The two other areas were investigated, and include a high, curvilinear midden ridge, and a low shell ring with a large, ovoid shell mound.

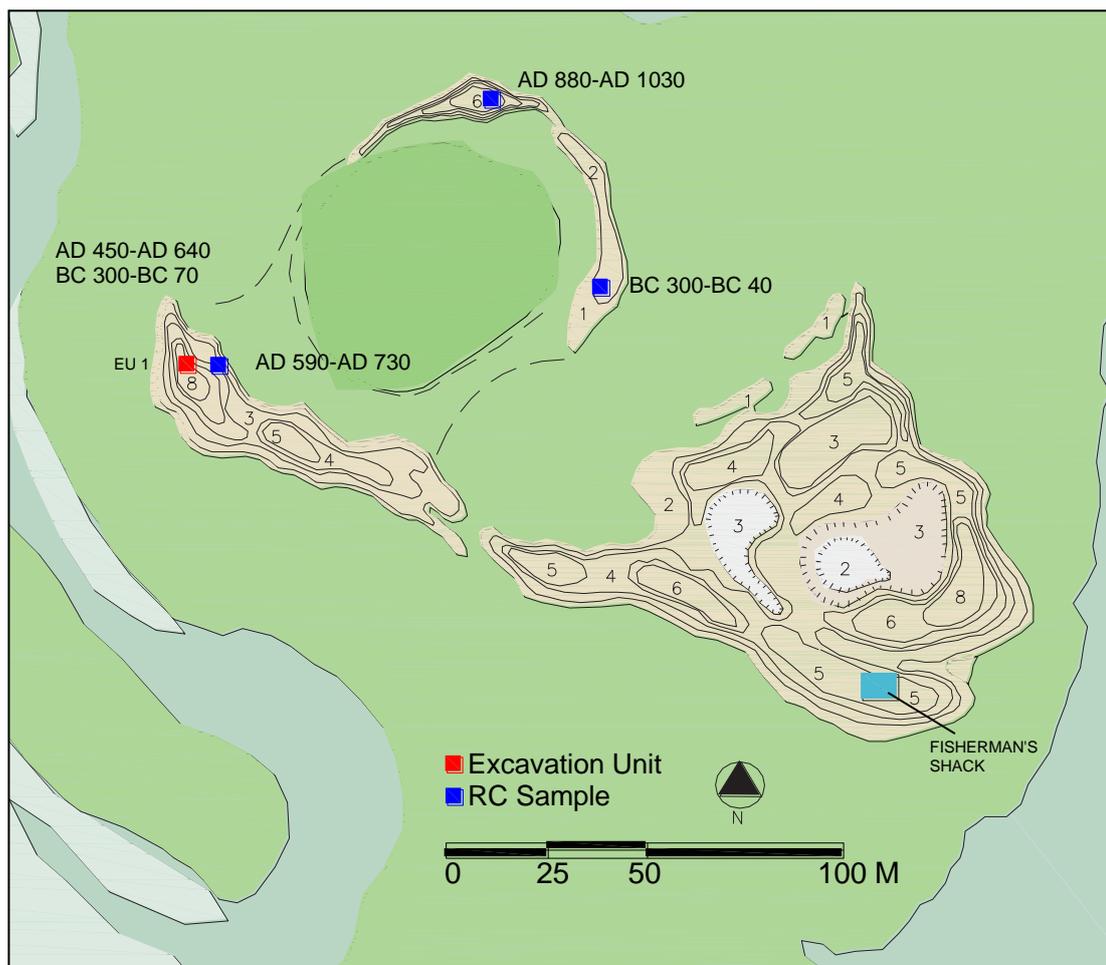


Figure 93. Site map of Fakahatchee Key No. 3 (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

Shell Ridge. The curvilinear shell midden ridge at Fakahatchee Key No. 3 is long and slightly crescent-shaped, and ranges from 1 to 2.7 meters in elevation. A single excavation unit was placed on the highest point of the ridge, about 2.5 meters in height, on the northwestern edge of the ridge. The unit was excavated to one meter below surface, and contained three distinct strata. Its upper strata (0 to 70 cmbs) consisted of a very loosely packed oyster shell midden mixed with a small amount of sand, and containing 11 Glades Plain sherds and two shell tools (untyped hafted hammers).

The bottom strata consisted of a crushed oyster shell hash mixed with sand that appears to have been a former living floor. The shell hash layer was 22 cm thick, and overlaid another stratum containing whole oyster shell mixed with shell hash. No artifacts were recovered below the shell hash/floor. Two radiocarbon dates, from 10

cmbs, and from 100 cmbs, resulted in dates of AD 450 to AD 640, and BC 300 to BC 70 (Glades I (late) and Glades I).

In order to obtain a deeper basal radiocarbon sample for the site, a single shovel test was placed near EU 1, but at the inner foot of the ridge, at ground level. A single sample from 20 cmbs resulted in a date of AD 590 to AD 730 (Glades I (late)), which appears to be out of sequence with the other, higher elevated midden ridge dates. It is probable that slope wash from the upper part of the midden may have been deposited at the bottom of the ring, and that the sample was not taken from a primary context. Nevertheless, the midden ridge appears to date from the Glades I (late) period.

Shell Ring and Mounds. Located at the northern end of the site is a low, shallow shell ring, which faces southwest, and encircles a deep pond. The west half of the ring is very low, at 30 to 70 centimeters above the surrounding swamp. This half of the arm is also very flat, and appears as if it were a walkway or ramp leading to a large, ovoid shell mound located on the west center of the shell ring.

A single radiocarbon sample was taken from the south end of the ramp, from 20 cmbs. The test determined that the ring, or walkway, consists of a highly crushed oyster shell mixed with sand. This suggests that perhaps sand was brought in to mix with the shell as a material to use for the ring/walkway. The highly crushed nature of the shell suggests that it was trampled from walking. No artifacts were observed on, or within, the ring. The radiocarbon sample resulted in a date of BC 300 to BC 40, dating to the Glades I period. The fact that the ring is so low, and that this is possibly just the upper crest of a deeply buried ring suggests the possibility that deeply buried basal deposits may date to the Terminal or Late Archaic periods.

The ring or walkway gradually leads to a small ramp that accesses an isolated ovoid shell mound. The mound measures 10 by 25 meters, and reaches a height close to two meters. The top of the mound is conical in form, with another ramp extension on

the opposite side. A single radiocarbon sample was taken from the top, center portion of the mound at just below the surface. The top mound strata consisted of dark gray sand and oyster shell. The radiocarbon sample resulted in a date of AD 880 to AD 1030 (Glades IIa to IIb), suggesting that the mound post-dates the ring by over 900 years. Significantly, much like Russell Key's earlier shell ring and post-occupation flat-topped mound, it appears that early ring features were re-used by later inhabitants. Perhaps these constructions mark or memorialized ancestors with the placement of a sacred mound or monument structure on top of these abandoned rings, or mark territories or boundaries on the landscape.

Fakahatchee Key 3: Conclusion. Though Fakahatchee Key 3 is a much smaller shell work site and does not contain the elaborate shell works present on other works sites (e.g., shell finger ridges, water courts, large mound districts, canals, etc.), archaeological investigation of the site determined that it does contain several distinctly phased features, such as a Glades I shell ring, a later-dated mound with ramps superimposed on the earlier ring feature, and a curvilinear midden. The curvilinear midden is reminiscent of the one found at West Pass, but it is appreciably smaller, and did not contain the shell fields that West Pass has (though shell fields may have been present in the disturbed area around the modern fishing shack). Fakahatchee Key 3's shell ring is consistent temporally with those dated at Fakahatchee Key, Dismal Key, and Russell Key, and suggests that this regional inter-site pattern is temporally significant. As with other sites, the basal levels of the shell ring are potentially deeply buried, and may date earlier, perhaps to the Terminal or Late Archaic.

Lastly, the isolated mound superimposed on an earlier ring is similar to that at Russell Key, and perhaps at Fakahatchee Key and Youman's Mound. That latter inhabitants constructed monuments, perhaps sacred in context on earlier shell work features suggests that shell works evidence a materially significant persistence of

memory marked upon the landscape, and complex negotiations between past and present were taking place at these sites.

ARCHAEOLOGICAL TESTING: POTENTIAL SHELL RINGS

DISMAL KEY SOUTHEAST RING

The Dismal Key Southeast Ring is the closest site to Dismal Key, located only 750 meters southeast, within a small, dense mangrove island. The site is a large “C”-shaped ring that encompasses about 5.3 hectares. Appearing much like Dismal Key’s inner shell ring, the Dismal Key Southeast Ring faces northeast, and is roughly the same size, at about 270 meters wide from outer arm to outer arm. One excavation unit, one shovel test, and three radiocarbon dates (Table 14, Figure 94) were obtained from the site.

Table 14. Results of Radiocarbon Sampling from Dismal Key Southeast Ring.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
EU 1, RC, SW Corner, 80 cmbs	UGAMS-3790	2530	20	-2.36	BC 330-BC 120
EU 1, RC, W Wall, 10 cmbs	UGAMS-3791	2440	30	-2.24	BC 190-AD 10
Base Shell Ring Interior, 5 cm Above Mangroves, 30 cmbs	UGAMS-3792	2450	20	-2.55	BC 190-BC 20

A single 1-meter-square excavation unit was placed in the highest, central portion of the ring, and excavated to a depth of 80 cmbs. The midden contained loosely packed whole oyster shell mixed with a small amount of whelks and other small, broken shell. At 30 to 40 cmbs, a concentration of small land snails was noted. No ceramics were found, but two shell tool fragments were recovered. Two radiocarbon dates, from 10 and 80 cmbs, resulted in dates of BC 190 to AD 10 and BC 330 to BC 120, dating to the Glades I period.

In order to test the basal portion of the shell ring, a shovel test was placed at the interior base of the shell ring close to the present pond level, a difference in elevation of about two meters lower than EU 1. The base of the midden contained pure oyster shell coated in a mucky clay. A radiocarbon sample from 30 cmbs resulted in a date of BC

190 to BC 20. The two meters of shell midden separating the top and bottom radiocarbon samples, and an age difference of only 30 years suggests very rapid deposition of shell.

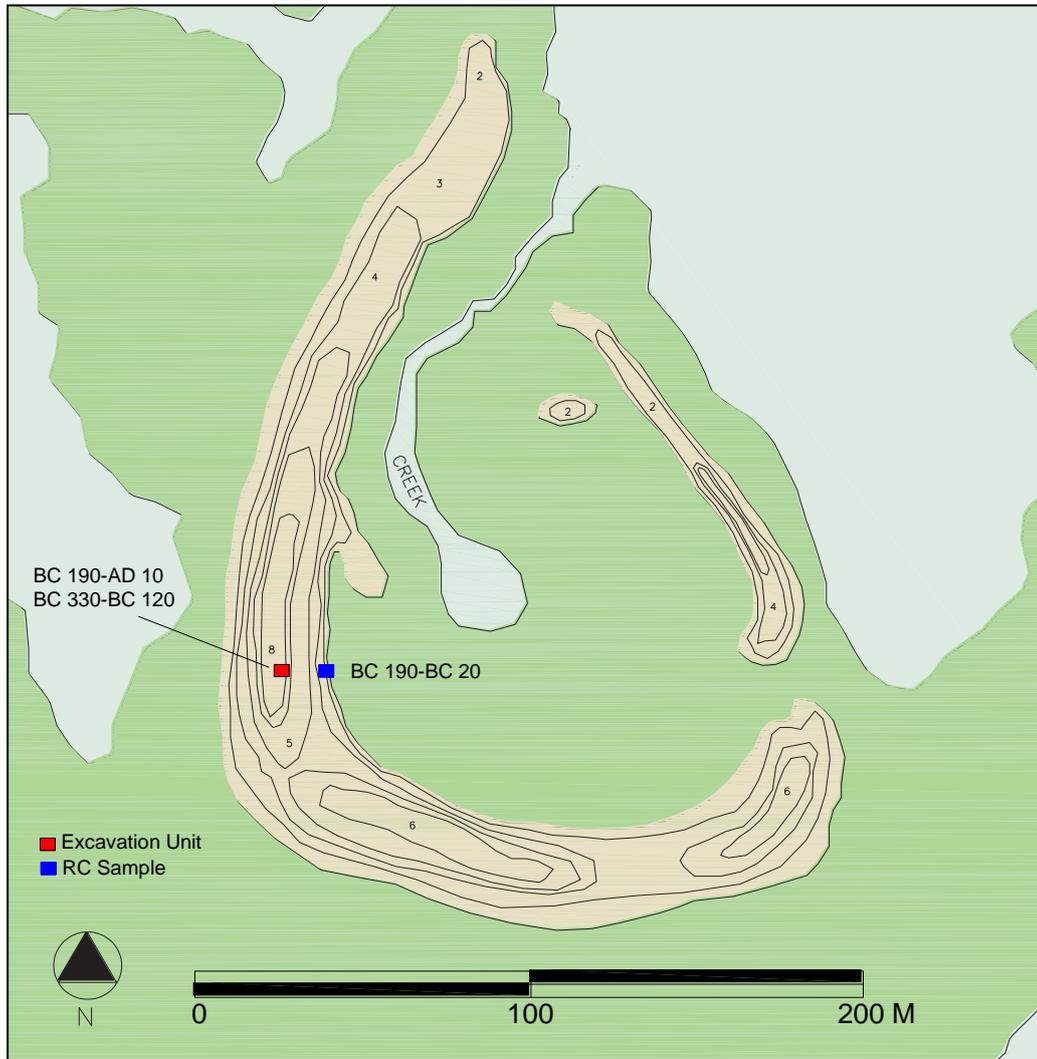


Figure 94. Site map of Dismal Key SE Shell Ring (Adapted from John Beriault, Archaeological and Historical Conservancy, Inc.).

Dismal Key Southeast Ring: Conclusion. Archaeological testing of Dismal Key Southeast Ring was very limited, but still provides valuable baseline temporal data indicating that the ring's upper levels and terminal occupation date from about BC 330 to AD 10, placing the site within the Glades I period, and very close to the Terminal Archaic period. The fact that no ceramics were found within the ring, and that the ring's size and shape are consistent with other known Florida southeastern coastal shell rings supports the possibility that this is a Late Archaic period construction that was used,

and/or occupied into the Glades I period. The portion of the site sampled was the top stratum, and basal levels for the site are likely deeply buried and remain un-sampled. It is likely that future sampling of basal layers of the site will produce earlier dates for this ring, potentially extending into the Late Archaic.

EVERGLADES CITY NO. 7

Prior to this study, Everglades City No. 7 had not received any archaeological testing. The site consists of two crescent-shaped shell ridge features situated within the mangroves. During this study, the site was surveyed, mapped, and four radiocarbon samples taken to date the two rings (Table 15, Figure 95).

Table 15. Results of Radiocarbon Sampling from Everglades City No. 7.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Shell Ring, SW Corner, 40 cmbs, 50 cm site elevation	UGAMS-2896	2880	40	-2.1	BC 770-BC 510
Shell Ring N End, Ramp, Surface to 5 cmbs, 10 M to Water	UGAMS-2897	2250	40	-3.1	AD 20-AD 250
Shell Ring, SE Edge, Shorter Arm, 50 cmbs, 20 cm site elevation	UGAMS-2898	2960	40	-2.7	BC 860-BC 610
Ridge 1, SW Edge, Surface	UGAMS-2899	2010	40	-2.6	AD 290-AD 540

North Shell Ring, Ramp. The north “J” shaped shell ring is slightly smaller than the southern ring, and slightly lower in elevation, at 0.75 to 1.5 meters in height. This ring has a 40 meter long walkway, or low ramp that leads south from the edge of the water, through the mangroves, directly to the ring. A radiocarbon sample taken from the end of the ramp contained oyster shell in a loam soil matrix, resulting in a date of AD 20 to AD 250 (Glades I).



Figure 95. Everglades City No. 7 site map.

The north ring is constructed of whole oyster shell, and survey of its surface did not identify any surface scatter of artifacts. A shovel test was excavated near the highest part of the ring along the down slope, at an elevation of about 0.5 meters. The ring consisted of pure whole and crushed oyster shell midden, with no other shell or artifacts present. A radiocarbon date taken from 40 cmbs resulted in a date of BC 770 to BC 510, dating to the Terminal Archaic. A second sample taken 28 meters east of the first sample from 50 cmbs resulted in a similar date of BC 860 to BC 610. These two dates suggest that the ring was constructed within the Terminal Archaic, and the ramp was probably a later addition.

South Shell Ring. The southern ring is slightly larger than the northern ring. The extreme western edge of the ring was sampled at the surface, and resulted in a more recent date of AD 290 to AD 540, dating to the Glades I period.

Everglades City No. 7: Conclusion. Though cursory, testing at Everglades City No. 7 suggests very different construction dates for the rings. The upper strata of the north ring dates to the Terminal Archaic, while the south ring appears to date to the Glades I period. These top samples likely suggest terminal occupation dates, and it is probable that deeply buried basal deposits will date earlier, perhaps to the Late Archaic.

EVERGLADES CITY NO. 9

This site was first recorded by Taylor (1984:281), who interpreted it as a natural relic shell ridge. A single surface-collected shell from the site was submitted for radiocarbon dating, returning a calibrated date of BC 1680 to BC 1360, placing it within the Late Archaic period. However, Taylor never acknowledged the results of the date in any report, and concluded that the site was likely a natural formation with a minor surface scatter of midden from a minor, temporary camp. No other archeological testing has ever been conducted to confirm whether this is a natural or cultural feature until this study.

The site received a cursory survey, limited testing and radiocarbon sampling as part of this study (Table 16, Figure 96). It was noted that the site was located very far from the current shoreline, at about 135 meters inland, and there was no evidence of a beach wash-over zone, or any indication that this was a former beach or shoreline. The shell ring rises abruptly from the mangrove swamp, and is vegetated with tropical hardwood species. The surface of the ring contained frequent shell tool debris, such as shell vessels and perforated bivalves. No ceramics were noted.

Table 16. Results of Radiocarbon Sampling from Everglades City No. 9.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
Surface	BETA-10294				BC 1690-BC 1280
E Edge Ridge, 10 m W Edge, 60 cmbs, 60 cm site elevation, tannic	UGAMS-2900	2410	40	-2.1	BC 170-AD 60
W End Ridge, 3 M from End, 10 cmbs, 10 cm site elevation	UGAMS-2901	3630	40	-1	BC 1660-BC 1430
Middle of Site, South Slope, Surface	UGAMS-2902	3450	40	-1.6	BC 1450-BC 1220

A shovel test was placed at the edge of the east ring, and excavated to 60 cmbs. The top of the ring contained a very crushed, ashy shell deposit. The test revealed that several thin alternating layers of crushed and whole oyster shell, whelks and scallops are present in this end of the ring. Many of the shells were noted to be stained an orange color, probably from tannic staining due to inundation by mangrove water. A radiocarbon date from 60 cmbs resulted in a date of BC 170 to AD 60, Glades I period.

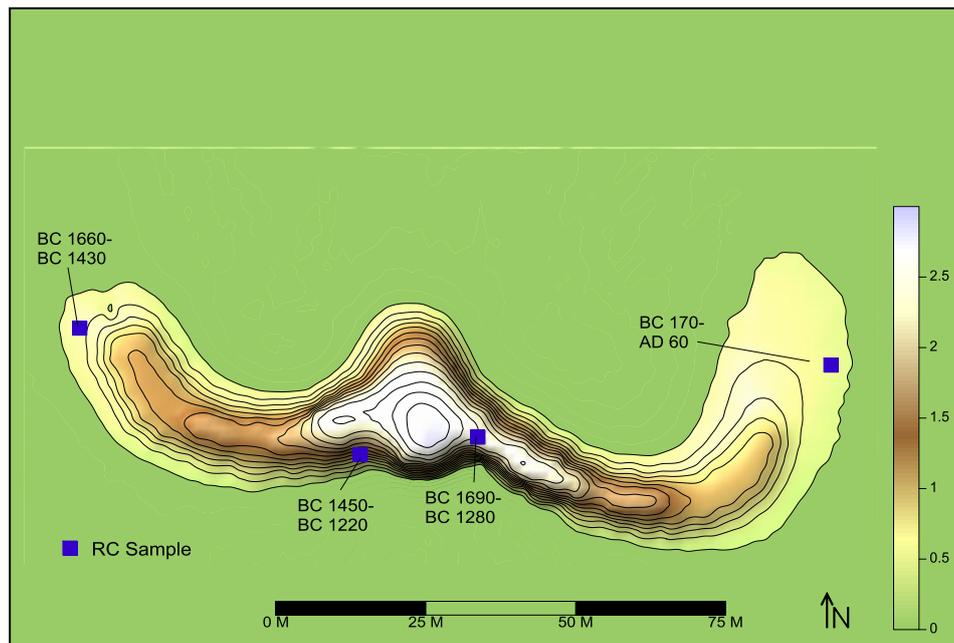


Figure 96. Site map of Everglades City No. 9.

A surface collected shell was obtained from the central, highest portion of the ring near where Taylor had collected his sample in the 1984. The sample returned a date of BC 1450 to BC 1220, and is very close in age to Taylor's sample from this portion of

the site. Together, these two dates suggest that this portion of the ring was likely occupied in the Late Archaic period.

The west end of the ring was sampled with a shovel test located in a very low part of the ring, at only about 10 cm in elevation. The test was excavated to 10 cmbs, and contained highly crushed oyster shell mixed with small, whole oyster shells. A radiocarbon sample submitted from a depth of 10 cmbs resulted in a date of BC 1660 to BC 1430, and is consistent with the two dates from the middle of the ring, suggesting that the shell ring dates to the Late Archaic period.

Everglades City No. 9: Conclusion. Four radiocarbon dates obtained from the surface and subsurface tests at this site suggest that this is a Late Archaic period feature. A sample from the eastern edge of the site suggests that the site may have been occupied up through the Glades I period, or was revisited and re-appropriated.

EVERGLADES CITY NO. 10

This is another site classified by Taylor (1984:282) as a "relic shell ridge of natural origin." After Taylor's initial recording of the site, no archaeological testing or mapping of the site was conducted until this study, which includes a cursory survey, partial mapping, and three radiocarbon samples (Table 17). The site contains two possible rings, but only the northern ring was mapped and tested for this study, as the southern midden was very low and barely visible (and therefore not represented on Figure 97).

Table 17. Results of Radiocarbon Sampling from Everglades City No. 10.

PROVENIENCE	LAB CODE	CRA	SD	C12/ C13	CALIBRATED 2 SIGMA
North Ridge, Northwest Ring, Treefall, 40 cmbs	UGAMS-2903	3360	40	-2.5	BC 1370-BC 1100
NE Inside Interior Shell Ring Arm, 10 cmbs, 60 cm site elevation	UGAMS-2904	2940	40	-2	BC 820-BC 570
Ridge 1, E End, Top Ridge, Surface	UGAMS-2905	1910	40	-1.7	AD 430-AD 630

North Shell Ring. This is an interesting site which contains a fairly high shell ring that has two distinct rings located on the east and west sides of a long, linear ridge. Several shell tools were noted to be scattered on the surface of the ridge and rings. A radiocarbon sample was taken from the bank of the west end of the shell ring, on its north end, from a tree fall which had uprooted and exposed a clean wall of midden. The profile was carefully examined, and noted to consist of mostly whole oyster shell, with no ceramics evident. The sample was taken directly from the wall of the outside bank, at 40 cm below the top of the ring. A date of BC 1370 to BC 1100 indicates that the ring is a Late Archaic period construction.

A second sample was taken from the northeast shell ring at an elevation of 60 cm above the mangroves, and 10 cm below surface. The ring consisted of whole and crushed oyster shell which appeared to be fairly degraded in appearance. A date of BC 820 to BC 520 suggests that this shell ring was constructed within the Terminal Archaic.

South Shell Ring. Though not mapped, a radiocarbon sample was taken from the surface of the south ridge, along the east end of the ridge. This resulted in a date of AD 430 to AD 630 (Glades I to Glades I (late) periods), and suggests that this ridge post-dates the north ridge and rings by nearly a thousand years.

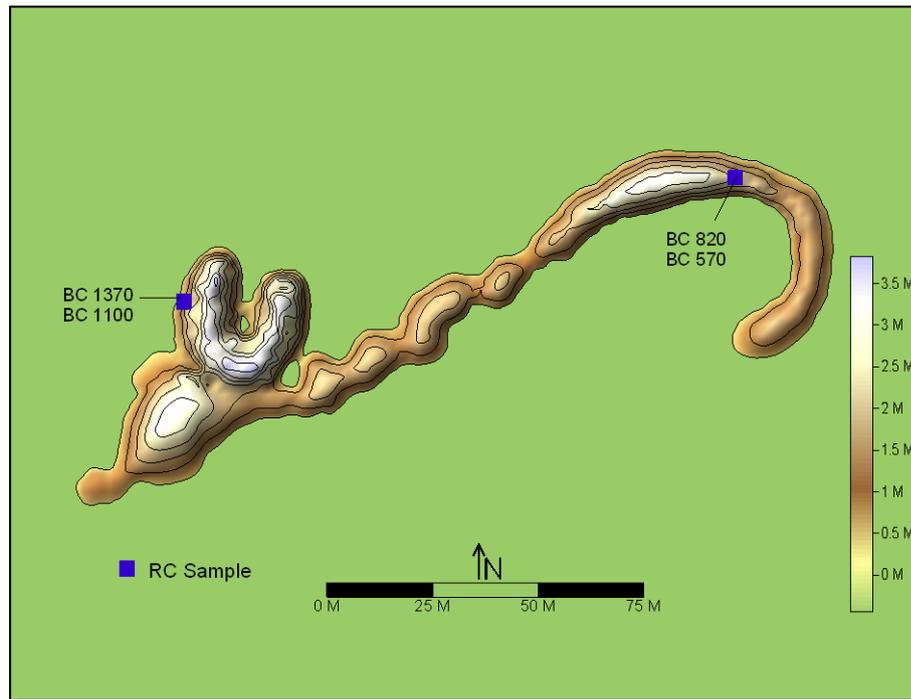


Figure 97. Site map of Everglades City No. 10 north ridge and rings.

Everglades City No. 10: Conclusion. While only the north ridge and rings of the site were mapped, and both north and south ridges tested with a total of three radiocarbon dates, investigation of the site determined that it is not a natural formation. Shell tools present on the surface, examination of strata in an exposed profile wall, and distinctly shaped shell rings on either ends of the north ridge indicate it is a cultural construction, dating to the Late Archaic and Transitional Archaic periods. The south ridge date suggests that the north ridge and rings perhaps were abandoned sometime after BC 570, and a new ridge constructed about 40 meters south and occupied sometime around AD 430 to AD 630.

CONCLUSION

Central to this study is the question that throughout the region, are differently shaped and sized shell work forms, such as small shell rings and large shell works islands, contemporaneous or not? The second question is, are particular features present at certain shell work sites (e.g., finger ridges) coeval, or do they date differently? Are

these similar features found at multiple shell works islands built synchronically throughout the region, or at different times at different sites? Archaeological testing and investigation of a sample of shell works, ring sites and features have provided substantial data to answer these questions, as well as help interpret the nature, composition, formation processes, and most importantly, the temporal association of shell works.

Investigation of four major shell work sites, two small shell work sites, and four shell ring sites demonstrate temporally sensitive inter-site and intra-site variability among differently shaped and sized shell work forms and features. Throughout the region, sites range from small, isolated shell rings, to massive, complete islands constructed with complex arrangements of shell. Testing and comparison of features at multiple sites confirm that certain spatial features have distinct temporal components, and reflect phases of changing community settlement patterns over time.

Pure shell ring sites, such as Dismal Key Southeast Ring, Everglades City No. 7, Everglades City No. 9 and Everglades City No. 10 are architecturally simple, and do not contain the elaborate shell architecture of the later shell work sites, such as canals, finger ridges, water courts, and shell mound districts. All have dates that range from the Late Archaic, Terminal Archaic to Glades I periods, from BC 1690 to BC 300. All sites have deeply buried deposits, and their true basal layers remain un-sampled, which potentially date much earlier in time.

Major and some small shell work sites also have smaller, ring-shaped middens present in a nested configuration within the apex of the site, such as documented at Dismal Key, Fakahatchee Key, Russell Key, Sandfly Key, and Fakahatchee Key No. 3. In all cases, shell ring features are the earliest dated site features found at those sites and anywhere within the region.

At some sites, such as Russell Key, Fakahatchee Key and Fakahatchee Key No. 3, more recently dated, isolated shell mounds are sometimes found superimposed on top of older, abandoned shell ring features, suggesting that inhabitants later constructed these mounds as monuments, to mark and memorialize past landscape features or former communities, or to access or appropriate them. This suggests that TTI inhabitants may have maintained deep ties to the landscape that persisted over generations, and that group efforts were coordinated to maintain a material expression of memory, identity or social history.

Small shell work sites, such as West Pass and Fakahatchee No. 3 also lack the elaboration of shell work features seen at major shell work sites. At West Pass, several water courts are present, but no distinct mounds, finger ridges or other features are present. At Fakahatchee No. 3, no water courts or finger ridges are present; however, a more recent conical mound with ramps is superimposed on top of an earlier shell ring feature.

Shell fields are present at all major shell work sites (and at some smaller sites), and appear to be temporally significant, dating to the Glades I to Glades IIa periods. Investigation of shell fields at several sites suggest that they were purposefully kept flat, relatively clean and open, but reflect evidence of intensive use and specific activities, and likely functioned as habitation areas or designated community activity areas.

At major shell work sites, distinct shell mound districts that consist of multiple elaborate mounds, ridges and canals, arranged in an arc and facing interior shell field areas are often present, and are temporally significant, dating from the Glades I (late) to Glades IIc periods. Large mounds may have functioned as monuments, elite domiciles, or as community constructions to house special function structures.

Finally, at the largest of the major shell work sites, the last distinct phase of activity involves the construction of finger ridges, water courts and canals. While the

specific purpose and functions for these shell work features remain open to interpretation, their form, structure and internal composition suggest that they likely functioned to support corporate shellfish and fishing activities. Regionally, these features consistently date from about AD 900 to AD 1290, and their temporal significance suggests an important regional shift in intensification. By AD 1300, TTI shell work sites are abandoned.

Investigation of shell work sites clearly demonstrates that distinct temporal and spatial patterns occur over time, and that these patterns are evident on site-specific (intra-site) and regional (inter-site) scales. The next chapter presents a multi-scalar, synchronic and diachronic landscape interpretation of shell works, and examines shell work sites as individually constructed features, as human centered social landscapes, and as a reflection of changing community organization on a regional scale.

CHAPTER 7

INTERPRETATION OF RESULTS

INTRODUCTION

In the previous two chapters, spatial and archaeological analysis of shell work and ring sites demonstrated significant trends in spatial and temporal patterns. Regionally, they show strong temporal similarities in site structures, forms and layouts that suggest settlements were socially connected communities at certain times, and must have shared similar social, political and ideological characteristics that became manifested within these similarly constructed landscapes.

Worldwide, I argue that shell work sites represent a unique, prehistoric architectural tradition, of massive landscape terra-forming with shell. While massive shell midden complexes and shell mound building traditions are known to have occurred throughout the world (e.g., sambaquis of Brazil; Emory Mound in San Francisco; mega-middens in Africa and Australia; etc.), no other examples of shell midden sites have documented the intensity and complexity of landscape terra-forming and shell-built architecture found at shell work sites.

The following chapter provides an interpretation of the data generated from this study. Shell work features and their various formation processes are summarized, and a landscape perspective is offered to illustrate the dynamic and recursive relationship between communities and their landscapes, the potential for recognizing ritual and ceremonial landscapes, and evidence that shell work landscapes reflect changing community organization on a regional scale. A preliminary diachronic settlement pattern model of the TTI is offered, and it is argued that evidence for changes in the spatial and temporal characteristics of shell work sites reflect changes in community organization over time, supporting evidence for the emergence of social complexity within the region.

FORMATION PROCESSES

Archaeological investigation of TTI shell works determined that they are complex landscapes reflecting rich, multifaceted histories, and were formed or constructed in a variety of ways.

Internally, some deposits contain evidence of relatively clean shell deposits, while others contain organic-rich shell middens, both of which may have been the result of a multitude of activities with divergent intentions (e.g., primary or secondary specialized shellfish processing waste dumps; intensive shellfish feasting episodes; primary individual household refuse accumulations; primary or secondary refuse used purposefully to shape and construct features, monuments and the greater landscape, etc.). Some evince gradual accumulation while others were formed or constructed rapidly; and some evince distinct punctuated use, construction, and abandonment histories. Shell works may be formed from either clean shell midden, organic-rich middens, or combinations of these.

Mounds, such as the flat-topped mound at Russell Key, often evince construction with mostly clean, secondary fill (perhaps basket loads), with no evidence of any soils and very few artifacts, suggesting rapid construction. Features such as the flat-top, quadrilateral form and ramp suggest that shell work features like these were purposefully designed architectural structures, constructed with organized, coordinated labor.

Evidence of the borrowing of older shell for shell work construction was also noted in some cases. At the Youman's Mound complex, one of the tall conical mounds evinced much older shell at its summit, suggesting that older shell fill had been borrowed and placed at the top of the mound.

Other features, such as a shell finger ridge at Russell Key, showed distinct construction episodes as shown structurally by a series of clean shell midden,

alternating with very thin layers of crushed shell. No soils, and no artifacts were found within the finger ridge, suggesting that the finger ridge was built in discrete stages of dumping primary or secondary clean shell (probably from shellfish processing), while alternately functioning as a platform, pier, or walkway. This suggests that shell ridges were purposefully planned and constructed features that functioned as structures.

Likewise, water courts mostly appear to have been constructed out of primary or secondary refuse, probably by building up mounded rings on formerly flat areas of the site. Evidence from testing several water courts demonstrated chronologically ordered shell with very short time intervals between thick deposits. This suggests that water courts were likely community constructions that were built rapidly with contemporaneous shell refuse, and not by slow, primary *in situ* accumulation of refuse. In other cases, older water courts may have been re-worked or enhanced with borrowed shell.

In many other cases, chronologically ordered and dated *in situ* strata demonstrates that many shell work features were formed in place with primary refuse. Evidence of primary habitation is found in shell middens containing layers of dark, organic sediments, faunal remains, post holes, fire pits, and usually a variety and high density of utilitarian artifacts indicating slow, accumulative living debris.

While the exact formation processes of shell works varies by individual feature and by site (e.g., primary accumulative shell midden, secondary dumping of clean shell, or borrowing and filling with older shell, etc.), it has been demonstrated that shell work sites were not constructed at a single point in time (Widmer 1988:256), but "emerged" gradually through a series of spatially distinct occupational phases. These constructed landscapes reflect a dynamic and recursive relationship between communities and their landscape, as a collective work in progress (Morphy 1995; in Strang 2008). Shell works demonstrate not only community settlement patterns and reflect changes in organization

over time, but that the landscape is also a repository for social memory and history (Kuchler 2003; Read 1996; Schama 1995; Strang 2008; Stewart and Strathern 2003), and may be imbued with meaning and significance, connected to a larger system of monuments and ceremonial landscapes (Bradley 1998a).

While TTI shell work sites are indeed formed from shell midden, shell works equal much more than just the sum of their parts— and are much more than just massive shell midden accumulations, amalgamations of shell mounds, or assemblages of midden features. Shell works are complex sites, akin to palimpsests, and demonstrate that they were rich, socially constructed landscapes that reflect distinct community organizations that changed over time.

MEMORY, RITUAL AND CEREMONIAL LANDSCAPES

Shell works not only reflect community organization, but also ceremonial, ritual (e.g., Ashmore 2008; Richards 1996; Stein and Lekson 1992) and sacred landscapes (e.g., Bradley 1998a; Buikstra and Charles 1999; Crumley 1999; McNiven 2003, 2008; Oubina *et al.* 1998). Fakahatchee Key 3 shows evidence of a ritual landscape, suggested by the placement of a conical mound with two ramp projections on an earlier shell ring feature of the site. This association with earlier monuments suggests that the builders of the conical mound found some type of significance in the earlier shell ring feature, perhaps reflecting a material persistence of memory marked on the landscape. The mound may represent a communal mortuary monument, perhaps to memorialize ancestors, or it may mark a boundary or territory for the settlement. A similar association is also found at Russell Key, with a flat-topped mound and ramp superimposed on an earlier shell ring. These monuments may have served as special structures for elites, housed religious structures, or served as mortuary memorials.

Sandfly Key's pair of conical burial mounds, out of view and deeply hidden within a mangrove swamp, is surrounded by an extensive ring of shell midden and separated from the rest of the site by water. The hidden nature of the mounds suggest a sacred context, and their placement within a watery swamp may have symbolic significance, as water is often viewed as sacred or as a supernatural barrier or portal to another world (Brady and Ashmore 1999). This area of Sandfly Key is highly suggestive of a ritualized landscape, with the conical mounds serving as mortuary landmarks in part of a larger, ceremonial landscape.

The Youman's Mound complex is perhaps the best example of a ritual or sacred landscape, with its isolated position suggesting secrecy, and its long, winding shell ramp suggestive of a processional route into the complex, introducing an element of choreography and performance to access and ascend the mound. The two steep-sided conical mounds located within an arena-like complex, and the site's separation by water also suggests symbolic importance, and that it was purposefully separated from secular areas. Human remains reported from the mounds and found within the plaza of the site suggest that it served special mortuary functions for the community.

Many of these ceremonial landscapes may have served as landmarks of "cosmic mapping and ritual practices," meant to evoke a sense of awe, power, and respect (Tacon 1999). Flat-topped mounds and conical burial mounds may be monuments, but also part of a larger, ceremonial landscape. These landscapes may be destinations for prescribed visitation, or places of avoidance or taboo, and movement towards them may take the form of a ritualized procession that may tie together larger ceremonial landscapes (Bradley 1991, 1993; Parker Pearson *et al.* 2006), such as suggested at Fakahatchee Key 3, Sandfly Key, and Youman's Mound.

This raises the question as to why some earlier rings were abandoned with no reuse of their rings (e.g., Dismal Key Southeast Ring, Dismal Key's shell ring); other

rings were incorporated into larger shell work sites (e.g., Fakahatchee Key, Youman's Mound); others evince appropriation by adding newer monuments (e.g., Russell Key ring, Fakahatchee Key 3 ring); and still others reflect efforts to expand sites with newer, separate rings that seem to mimic older forms (e.g., Everglades City No. 7), yet distance the newer forms respectfully away from older forms. It is difficult to speculate why, but these differences probably reflect variations in how past communities perceived the landscape as imbued with a materiality of memory, and their connection to these former sites as places of respect, avoidance or taboo, differentially affecting settlement, abandonment, and re-appropriation of past landscapes.

SETTLEMENT PATTERNS

One of the most critical determinations from this study is that shell work sites comprise prehistoric landscapes that were constructed over time through spatially distinct occupational phases, and that the maximal extent of any one shell works site was not utilized at a single point in time, as Widmer had predicted (1988:256). This recognition allows for a multi-scalar, synchronic and diachronic analysis of sites and features, and for regional level interpretation of intra-site and inter-site patterns.

Beginning with the first site forms found within the region, isolated shell rings are located south of the larger shell work sites, closer to the outer margins of the open water. Many have very low elevations, suggesting that they likely have deeply buried, earlier basal deposits, perhaps dating to the Late Archaic, and have since become inundated by rising sea level. This is consistent with other known and predicted early and middle Holocene Gulf of Mexico sites that are now fully or partially drowned by post-depositional sea-level rise (Faught 2004).

Shell ring settlements are located at relatively equidistantly placed intervals within the southern portion of the NP, from 1.5 to 2.95 km apart, which may reflect how

communities divided up territories or access to resources. This also suggests that shell ring communities were likely related, and interacted with one another, perhaps on a daily basis. Though shell rings are architecturally simple, and do not contain the elaborate shell work features found at later shell work sites, there is a consistency in site layout, form and size (Figure 98, Table 18) that suggests settlements shared a common community plan and social structure. The nine new TTI shell ring sites identified in this study are consistent in size and shape with the eight previously recorded Florida shell rings (Russo and Heide 2001:491-492), though some of the TTI shell ring sites are the largest yet recorded.

While Widmer (1988:256) and Griffin (2000:278) thought that small ring-shaped shell middens likely represent specialized small fishing or collection stations that were contemporaneous with the larger shell work sites, testing of shell rings determined that they were not, and in fact, mostly predate them. Due to logistical restraints, no basal dates were obtained from any shell ring, but the earliest date obtained is BC 1690 (Late Archaic), with others ranging from the Late Archaic, Terminal Archaic and Glades I periods (Figure 99).

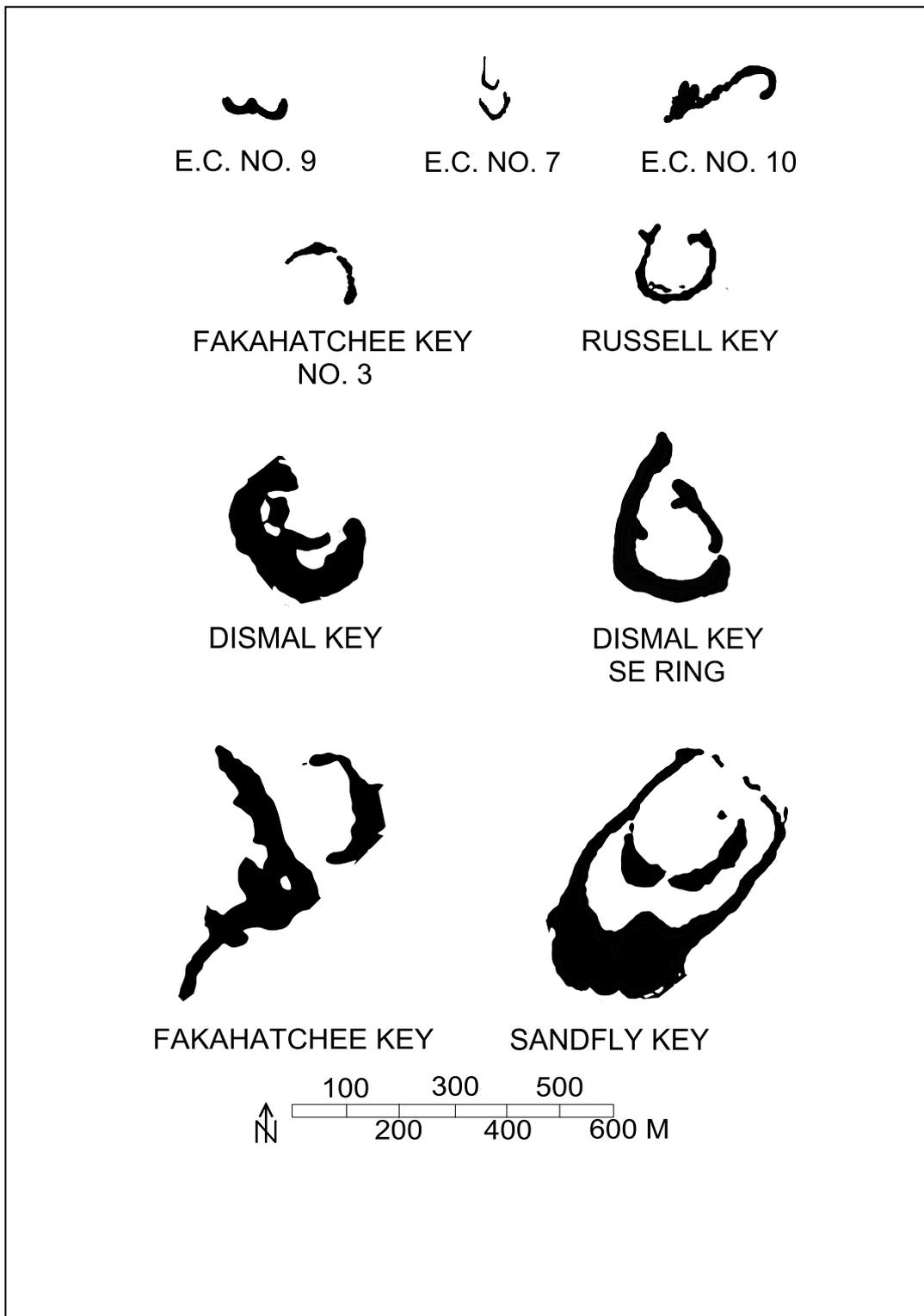


Figure 98. Outlines of TTI shell rings and shell ring components from shell work sites.

Table 18. TTI Shell Ring Metrics, Radiocarbon Dates and Cultural Sequences.

SITE	SHAPE	RING FACES	DIAM . (M)	CAL 2 SIGMA DATE RANGE	CULTURAL SEQUENCE
Fakahatchee Key Ring 1	Crescent	W	400	BC 350 - AD 260	Glades I
Fakahatchee Key Ellis Ring	Crescent	W	190	AD 190 - AD 540	Glades I- Glades I (late)
Dismal Key	Crescent	NE	275	BC 460 - BC 50	Glades I
Russell Key	Hexagon	N	143	BC 380 - AD 60	Glades I
Sandfly Key Ring 1	Crescent	NE	300	BC 830 - BC 50	Terminal Archaic- Glades I
Sandfly Key Ring 2	Crescent	NE	230	n/a	n/a
Fakahatchee Key 3	Crescent	SW	70	BC 300 - BC 40	Glades I
Dismal Key Southeast Ring	Crescent	NE	320	BC 330 - AD 10	Glades I
EC 7 North Ring	Crescent	N	33	BC 860 - BC 510	Terminal Archaic
EC 7 South Ring	Crescent	N	62	AD 290 - AD 540	Glades I- Glades I (late)
EC 9 West Ring	Crescent	N	62	BC 1660 - BC 1220	Late Archaic
EC 9 East Ring	Crescent	N	72	BC 1690 - AD 60	Late Archaic- Glades I
EC 10 North East Ring	Crescent	SW	65	BC 820 - BC 520	Terminal Archaic
EC 10 North West Ring	Crescent	N	30	BC 1370 - BC 1100	Late Archaic- Terminal Archaic
EC South Ring	n/a	SW	n/a	AD 430 - AD 630	Glades I- Glades I (late)

Temporally, all nine shell rings site identified during this study are contemporaneous with the eight previously recorded Florida shell rings (see Russo 2006). This is significant, as the dates from this study are biased towards top dates, and the previously studied Florida shell ring sites are biased towards basal dates. In order to have meaningful spatial and temporal comparisons, researchers should obtain both basal and terminal dates from all sites investigated.

Some Late and Terminal Archaic shell ring sites have multiple shell rings or site components that also date to the Glades period, strongly suggesting a cultural continuity between the Archaic and Glades period. In support of this is the fact that many shell work sites also have smaller, ring-shaped middens present in a nested configuration within the apexes of sites, such as documented at Dismal Key, Fakahatchee Key, Russell Key, Sandfly Key, and Fakahatchee No. 3. In all cases, these are the earliest dated features found at shell work sites, and are contemporaneous with many of the

isolated shell ring sites. These earlier shell ring features appear to have fallen into disuse and to have become abandoned in favor of more expansive and elaborate shell work features, which marks a shift in community and social organization. In at least two cases (Russell Key and Fakahatchee Key 3), earlier shell rings were reused as special places to construct mounds and monuments with sacred and ceremonial contexts, signifying efforts to memorialize or maintain deep social memory or connections to these former landscapes.

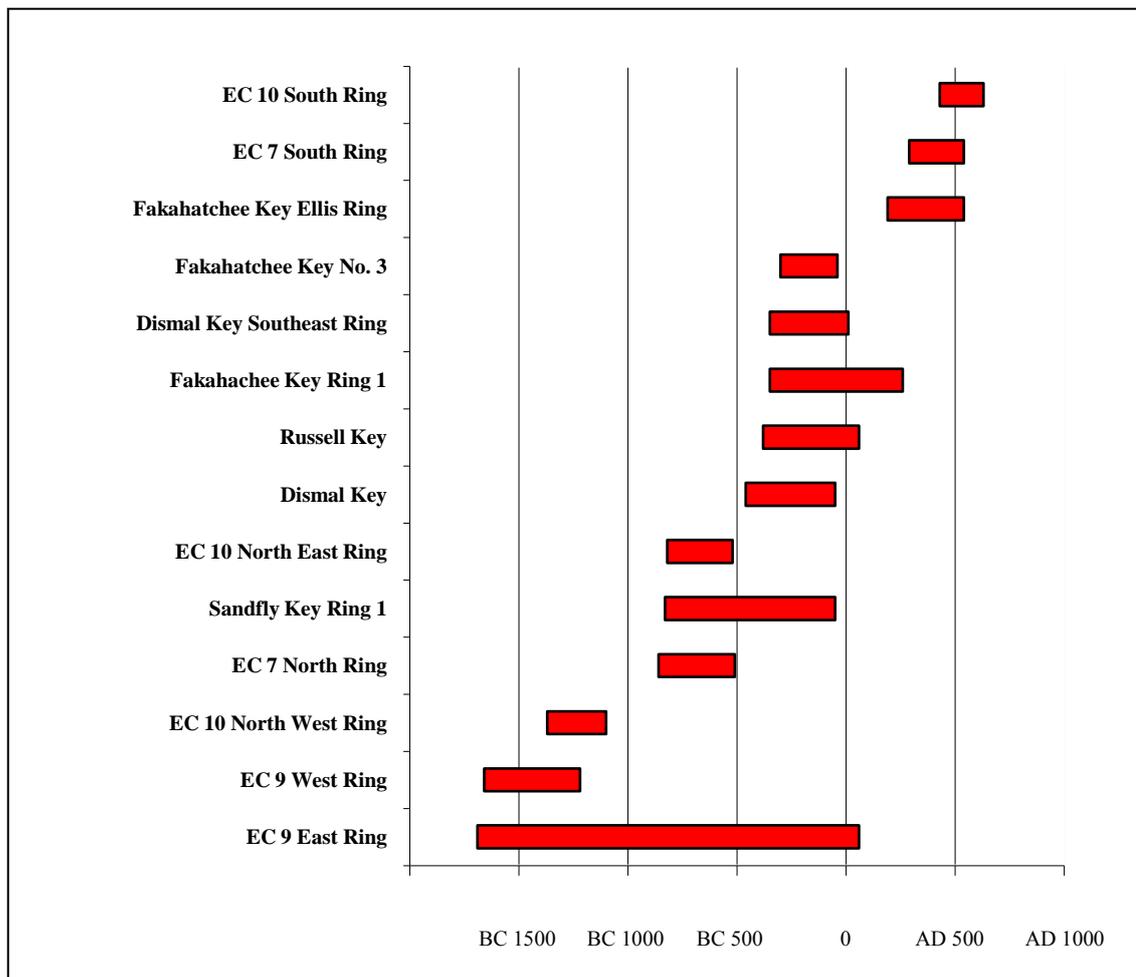


Figure 99. Radiocarbon dates of shell rings.

Investigation of TTI shell rings was preliminary in nature, and it remains inconclusive as to their exact purpose, functions and formation processes, but it is probable that they reflect an earlier, distinct community pattern dating to the Late

Archaic, Terminal Archaic and Glades I periods. Their simple ring forms and internal structures likely relate directly to community organization and social structure, much like other Southeastern shell rings that are viewed as the remains of non-complex, egalitarian fisher-hunter-gatherer habitations, or the locations of collective band-level community feasting and aggregation sites. The distinct ring shape of these communities reflects an egalitarian social structure, as the circular layout of the community affords every individual relatively equal access for communication with one-another, with no one individual taking a visually dominating position over any other (Grøn 1991).

Interpretation of the function and purpose of Late Archaic shell rings in the greater Southeast also remains unresolved, with some interpreting shell rings as the remains of house and village foundations (Thompson 2006; Trinkley 1980), and others contending that shell rings represent large-scale ceremonial feasting monuments (Russo 2006). Archaeological testing of several shell rings in the TTI suggests that they appear to have been built rapidly, and while some may be the results of feasting or aggregation episodes, evidence from some rings, such as Dismal Key's, suggests that the ring was occupied and likely had a structure on its summit. The artifact assemblage also suggests a possible ceremonial context, and the presence of human remains in the ring's plaza implies a mortuary context, indicating that this may have been a permanent settlement.

Some shell ring sites, like Everglades City No. 7 and 10, have pairs of rings of markedly different dates. In both cases, the smaller northern rings date to the Late and Terminal Archaic, and the larger southern rings are more recent, dating to the Glades I period, suggesting that occupants may have abandoned the first ring in favor of new locations. This may be related to expanding populations, in which case an already established semi-circular community would be difficult to expand (Yellen 1977:125), as the sizes of the ring and the interior space it enclosed appear to have been dictated by the maximum number of individuals that met or lived there at the time of planning ring-

shaped communities (Brown 1997:477; Yellen 1977:127). Any accretion in the size of the group would not allow for additional space in the interior, and so new, or additional rings may have been added to settlements to accommodate additional participants or growing populations.

We can conclude that shell rings are the earliest site forms within the region, probably reflecting non-complex, egalitarian fisher-hunter-gatherer habitations, or the locations of collective band-level community feasting and aggregation sites that persisted throughout the region from the Later Archaic, up until the Glades I period. The terminal dates of occupation for shell ring communities marks a temporally significant shift in settlement patterns in the region, with substantial changes in community structures and site layouts seen throughout the region.

Small shell work sites, such as West Pass and Fakahatchee Key 3 reflect this change in settlement types and community organization, which shifted from former simple ring communities towards larger, crescent-shaped permanent settlements with small investments in landesque capital (Brookfield 1984), such as water courts. At West Pass, occupation spanned from BC 100 up to AD 740, and the presence of features such as multiple water courts, a large curvilinear midden ridge, and the distinctly patterned shell fields argues for increased investment in landesque capital, and in a permanent settlement.

The settlement layout of West Pass still suggests that of an egalitarian community, however, this is one that is reflected in a larger, curvilinear site layout that contains no elaborate shell works, distinct monuments, mounds, or other elite structures. An egalitarian community is suggested by six to eight houses arranged equidistantly in a semi-arc within the interior of the site, marked by discrete density clusters of artifacts. The high density of artifacts, great depth of deposits, and evidence of continual

habitation up until abandonment also argues that this was a permanent settlement which became abandoned just prior to AD 740, and before the shift to building of finger ridges.

Some contend that small shell work sites like West Pass and Fakahatchee Key 3 probably represent specialized collecting or fishing stations that articulate with the larger shell work sites (Griffin 2000:278; Widmer 1988:256-257). Testing of the two sites suggests differently, and that they were not seasonal or temporary collecting or fishing stations, but were likely smaller, permanent communities.

At Fakahatchee Key 3, a similar large curvilinear midden ridge is contemporaneous with West Pass, dating from BC 300 to AD 730. While there are no water courts or finger ridges present at the site, an earlier ring feature has a more recently-dated superimposed conical mound with ramps. The conical mound suggests a level of effort, coordination and investment of labor to construct the mound and ramps, and the conical form and presence of sand suggests the possibility of a burial mound. These also argue for a permanent settlement, and not a specialized collecting or fishing station.

Just how the West Pass and Fakahatchee Key 3 settlements interacted with the larger, nearby Russell Key and Fakahatchee Key settlements remains unknown, but at the time of West Pass and Fakahatchee Key 3's occupation, only small portions of Russell Key and Fakahatchee Key were occupied. It is unclear why West Pass and Fakahatchee Key 3 settlements were abandoned, but it is possible that they merged with the larger nearby settlements at around AD 750 (Glades IIa). Many of the major shell work sites demonstrate a proliferation of shell work features and major site expansion at this time, which may support the possibility that outside populations were nucleating at the larger sites, and areal site growth increased at the larger shell work sites to accommodate expanding populations.

Major shell work sites contain a consistent patterning of shell work features that were found to be temporally significant, and suggest further changes in settlement patterns within the region (Figure 100). At some sites like Fakahatchee, Dismal, Russell and Sandfly Keys, an overall bilateral symmetry to the site plan strongly suggests a level of community site planning that is shared on a regional scale. The bilateral symmetry may reflect social organization and residence rules, such as distinct residence zones comprised of clans or moiety divisions.

Overall site forms tend to be crescent-shaped, with small shell rings (the earliest components) located at one end of the site, and an expanding body of shell works that include expansive shell fields, districts of mounds and tall ridges, and a series of radiating shell finger ridges, canals and water courts at the opposite ends. This pattern is present at the five largest shell work sites (Chokoloskee, Fakahatchee, Dismal, and Russell Keys). The sixth largest site, Sandfly Key, possesses most of these attributes, but lacks the distinct finger ridges so common on the larger sites. This might be explained by Sandfly Key's abandonment by AD 650, which was prior to the proliferation of shell finger ridge constructions found on other shell work sites. The recurrence of spatially and temporally distinct shell work features and site layouts throughout the region strongly suggests that settlements thus shared a common community structure.



Figure 100. Outlines of TTI shell works and shell ring sites.

Shell fields are present at all major shell work sites (and at some smaller sites), and appear to be temporally sensitive, dating from the Glades I to Glades IIa periods (Figure 101). Investigation of shell fields at several sites suggest that they were purposefully kept flat, relatively clean and open, but reflect evidence of intensive use and specific activities, and likely functioned as habitation areas or designated community activity areas.

The shell fields at Russell Key functioned as purposefully designed and maintained community space. Archaeological testing of the shell fields suggests that while certain artifacts are frequently found on the surface of shell fields (ceramics, shell tools and infrequently lithics), these are found in association with small depressions that may mark permanent structures (Waselkov 1987:145), represent households, roasting pits, or group hearths. Organic refuse and bone was completely absent from the surfaces and within strata in the shell fields, suggesting that shell fields were maintained as flat, open areas, and kept relatively free of certain types of debris. The artifacts left on the surface probably represent *de facto* refuse related to community activities that took place in the shell fields, prior to abandonment.

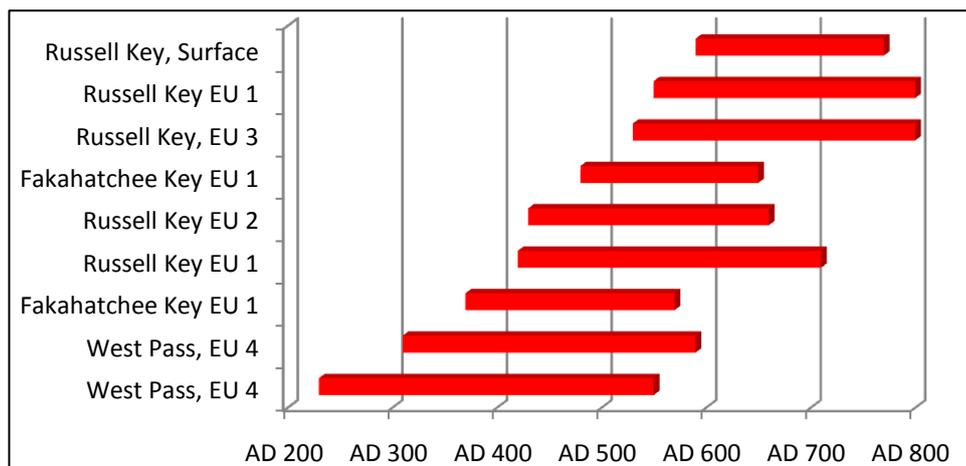


Figure 101. Radiocarbon dated shell fields.

At major shell work sites, distinct shell mound districts that consist of multiple elaborate mounds, ridges and canals, arranged in an arc and facing interior shell fields are often present, and are demonstrated to be temporally significant, dating from the Glades I (late) to Glades IIc periods (Figure 102). Large mounds may have functioned as monuments, elite domiciles, or as community constructions to house special function structures.

At Dismal Key, the centrally placed tallest mound and main canal suggest the mound was positioned to signify some type of central importance for the site, perhaps the residence of a leader or someone with differential status or power, who was afforded the most prominent mound in the community. This signifies a new shift in social organization, with a differentiation between types and sizes of structures, and suggesting an increased need for organized, coordinated labor to construct and maintain these types of shell work features.

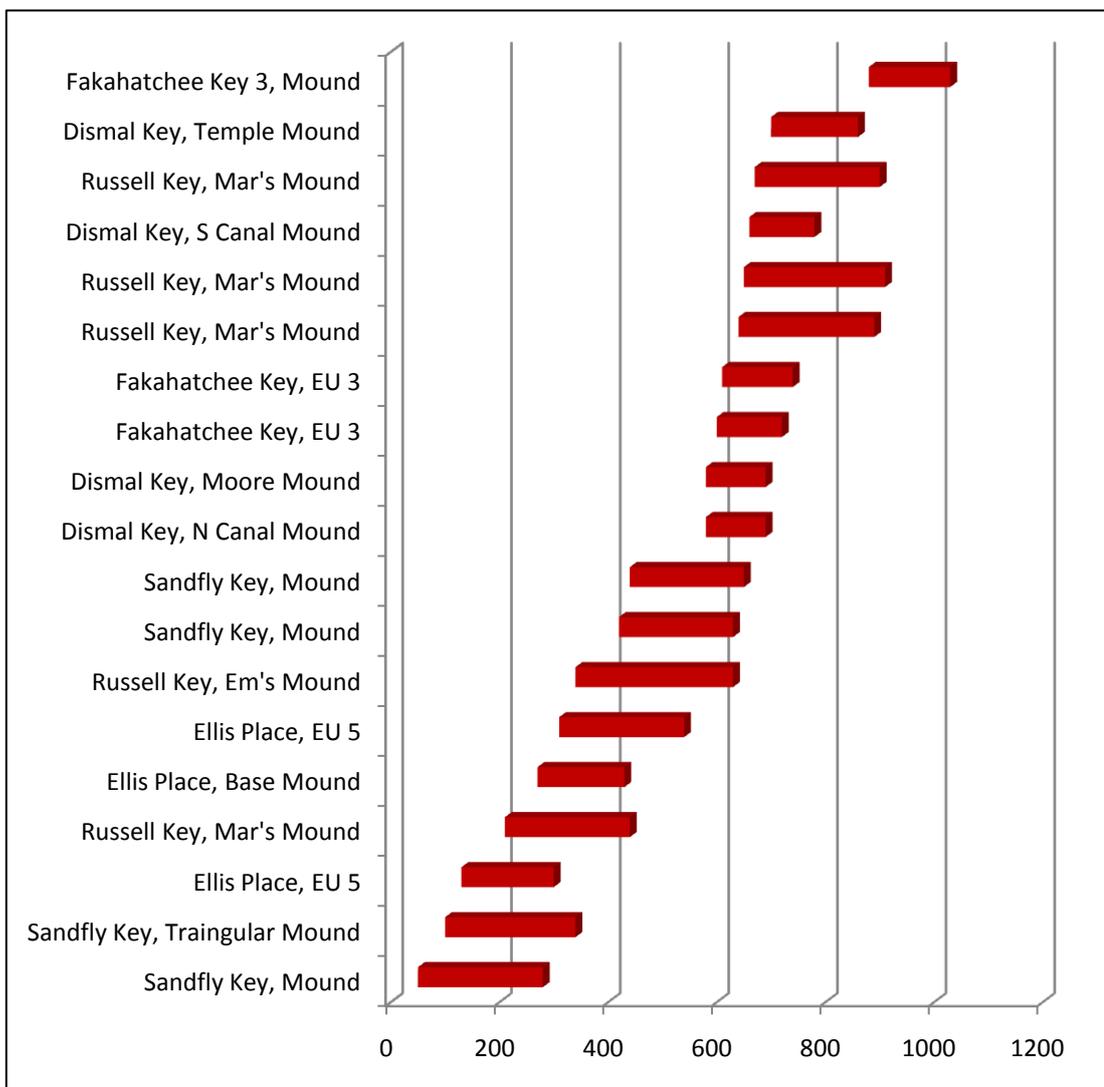


Figure 102. Radiocarbon dated mound features.

The last phase of shell work features present at TTI shell work sites are the series of shell finger ridges, water courts and canals. While the specific purpose and functions for these shell work features remain open to interpretation, regionally, they consistently date from about AD 600 to AD 1400 (Glades I (late) to Glades IIIa) for water courts (Figure 103), and AD 900 to AD 1290 (Glades IIb to Glades IIIa) for finger ridges (Figure 104), and their appearance and presence on all major sites at this time suggests an important regional shift in shell work settlements. While some water courts may begin to appear by AD 200, and several dates from Russell Key suggest that shell finger ridges may have been constructed around the same time, the majority of dates for these features begin at AD 600, with many clustering around AD 900. Shortly thereafter, by about AD 1300, TTI shell work sites were abandoned.

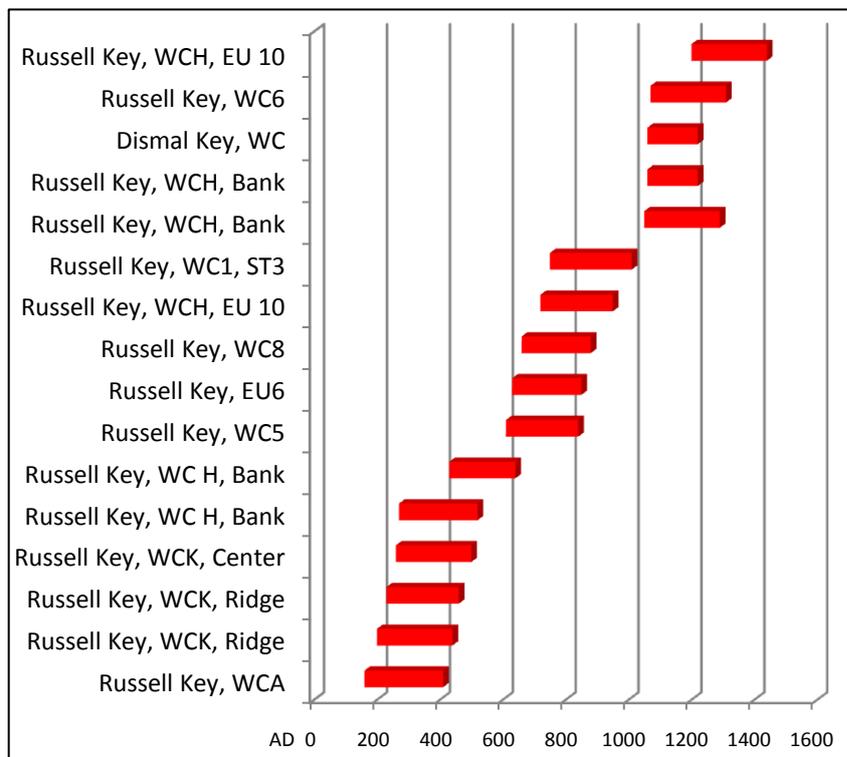


Figure 103. Radiocarbon dated water courts.

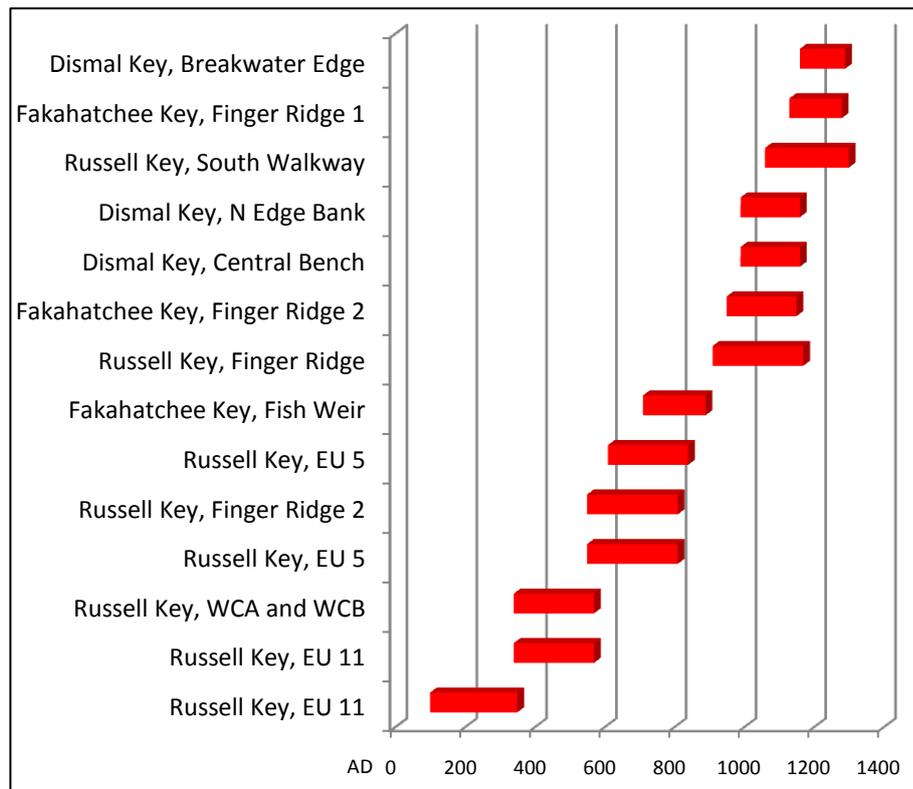


Figure 104. Radiocarbon dated finger ridges and canals.

SETTLEMENT PATTERNS AND COMPLEXITY

Economic equality in egalitarian communities is thought to be reflected in consistently sized and shaped structures, often uniformly situated on the landscape, such as found at West Pass, and at shell ring sites. With increasing societal complexity, the use of space becomes increasingly segmented, differentiated and complex among increasingly complex societies (Kent 1990:129-130; Rapoport 1990:17-18; Whitelaw 1991:158). Structures become progressively more differentiated (Trigger 1968), with elite structures increasing in size, prominence and elaboration, such as those found at the shell mound districts of major shell work sites. Larger mounds may have functioned as monuments, elite domiciles, or as community constructions to house special function structures, and differentially sized and placed mounds, such as those found at Dismal

and Russell Keys supports an interpretation of differential status and an increase in social complexity.

In complex societies, there is also an increase in the variety of special-purpose structures, with the development of specialized production or workshops, storage places, and public structures, as well as monuments (Trigger 1990). As noted earlier, it may be difficult to differentiate materially between structures and features that are simply the result of expanding populations building larger and more complicated communally-constructed features, from those which are executed under politically organized leadership that reflects hierarchy and differentiated, organized labor. Nonetheless, I argue that increases in the number, frequency, size and complexity of specialized structures within a community does reflect *some* level of increased social complexity, regardless of whether this is the result of integration of the community towards building larger, communally-built structures; or if this is a result of changing social trajectories moving towards organized, hierarchical leadership.

Though not directly dated, small numbers of water courts begin to appear on small shell work sites, such as the four found at West Pass, sometime between AD 240 and AD 740. At Sandfly Key, the four water courts are associated with dated features ranging from AD 50 to AD 650. At the major shell work sites, water courts increase in number, such as the 18 found at Russell Key. Some are situated as a series of bilaterally arranged water courts on the east and west sides of the site, and appear to have been constructed between AD 200 and AD 1010, but most dates cluster around AD 600 to AD 880.

At Russell Key's Water Court 6, a sluice was found on the edge of the water court facing the water, suggesting that this particular example functioned as a fish trap. A single large rectangular water court, the largest water court recorded at the site, is also located at the extreme southern end of the site, and dates from about AD 1070 to AD

1310. The presence of one large water court as the latest component of the site, in contrast to the two earlier, bilateral groupings of six individual water courts on the east and west edges of the site, suggests a possible shift towards the centralization or control of resources. Not only is this the largest water court found on Russell Key, but evidence of artistic elaboration or symbolism was found, with several large *Busycon* shells placed inverted in rows into the inside and outside walls of the water court.

An elaborate “Y”-shaped water court at Dismal Key dates from AD 1060 to AD 1220, suggesting that water court forms may have changed, but that they persisted through time at many settlements. As some contend, social ranking may have been expressed in the construction and maintenance of water courts that have been interpreted to have functioned as cisterns (Patton 2001:123; Widmer 1988:263-265), which would have reinforced nucleation of populations to access water resources.

Water courts always occur around the margins of a site, and range in shape, size and depth. Some water courts currently hold hyper-saline water and are filled with mangroves, while others remain completely dry. In the dry water courts, surface scatters of artifacts are always noted, including ceramics and a variety of shell tools, such as shell hammers, cutting-edged tools, and vessels, such as shell scoops and cups.

Based on the variety of shapes, sizes, and their distribution around different areas of each site, it may be that water courts served a variety of purposes, such as fish traps, impoundments, or ponds for aquiculture, or to capture and store live marine food resources. It is also possible that these features served to store freshwater, however this remains problematic, since shell is permeable and probably would not have held freshwater without the addition of an impermeable barrier, such as a clay lining.

Archaeological testing of two water courts did not evidence any lining, nor did it indicate any subsurface features such as floor layers, hearths or pits. It should be noted, however, that since freshwater is less dense than salt water, if undisturbed, freshwater

can “float” on top of saltwater (known as the Ghyben-Herzberg lens). It remains possible then that these basins were constructed with this knowledge, effectively engineering a device to tap into, capture and store freshwater. This is not unfeasible, as strong evidence exists for successful, sophisticated engineering knowledge of water control devices found throughout the region, for example the large-scale prehistoric canals that effectively controlled water levels and flow over long distances (Luer 1989). Another possibility is that water courts were constructed to tap into sources of freshwater springs, which have been documented in other nearby marine and estuarine locations, such as on Useppa Island (Dietler 2008:303); Key Marco, Caxamabas, Chokoloskee and Sandfly Keys (Davis 1998:26-29); and the Everglades and Biscayne Bay.

At major shell work sites, water courts are usually associated with a series of long, linear finger ridges (with the exception of Sandfly Key). Finger ridges are usually complex arrangements of dozens of protruding shell fingers that radiate out from the site towards the water. Finger ridges vary in shape and size, but all are linear, commonly 20 to 40 meters in width and 70 to 80 meters in length. The tops of the ridges are level, suggesting that they may have served as platforms or walkways. Testing of one shell finger ridge at Russell Key indicates its internal construction consists of clean shell midden alternating with very thin layers of crushed shell. No sediment and no artifacts were found within the finger ridge, suggesting that the finger ridge was not a habitation structure, and was built in discrete stages of dumping secondary clean shell, while functioning as a platform, pier, or walkway.

In-between most of the shell ridges are canal-like troughs, some of which are presently filled with water, but are now filled in with sediment and mangroves. Some appear to have extensions or partial enclosures built with shell, suggesting that they could have functioned as fish traps or weirs. Ethnohistoric accounts of the Southeastern

Guale fishers describe fish weirs adjacent to oyster beds, as oyster shell provided a stable substrate for posts (Crook 1986:27-28, in Patton 2001). Other accounts describe natives using a poison shrub to dose fish in a shallow pond in order to catch them (Jones 1999:327). Kikuchi (1973) observed that fishtraps in Hawaii were usually associated with small enclosures that functioned as holding ponds to store excess fish for a very brief time, and this is probably the function of the water courts.

I contend that the location of water courts and finger ridges along the perimeters and edges of each site, their form, structure and internal composition, and their association to one another suggests that they represent a system of fish weirs, fish traps, and fish ponds. This investment in landesque capital (Brookfield 1984) by intensive fisher economies is considered to be a form of aquaculture, and suggests a significant shift in social complexity at shell work sites at this time, indicating organized corporate shellfish and fishing activities and long-term investment in infrastructure to support this intensive economy. This shift towards labor invested into cooperative aquacultural projects, architecture, and coordinated labor occurred on multiple settlements at the same time throughout the region, and indicates widespread communication and interaction among settlements. These changes in architecture, spatial patterning, community organization and labor investments reflect significant changes in social complexity at shell work settlements.

HUNTER-GATHERER COMPLEXITY

I have argued that changes in shell work landscapes reflect changes in community organization, and thus social complexity, over time. However, some of the arguments for evidence of increases in social complexity are lacking for the data at hand, for example those needed to support the presence of institutionalized labor and

hereditary inequality as organizational characteristics (Arnold 1996c; Marquardt 1988), and there is little evidence for intensive exchange and long distance trade.

Other correlates for increased social complexity are present, and include higher population densities, territoriality, sedentism, a delayed-return economy, intensive subsistence practices, storage, and elaborate technology (Price 1995:141; Sassaman 2004:233). Major shell work sites demonstrate shifts in shell work features and community plans which are associated with these and other correlates for complexity (see Peebles and Kus 1977). This includes settlements located in highly productive areas; organized labor beyond the household group; evidence for resource intensification; the presence of storage facilities; and the development of a procurement technology indicative of specialized tools or devices supporting corporate production.

The investment in water courts and shell finger ridges supports these correlates, as well as a general shift to a delayed-return economy, which hold rights over and control of valuable resources, allows for delayed yields on labor, and increases investments in technical facilities for production, such as fishweirs, boats, nets, and food storage (Woodburn 1982). The system of water courts, fish weirs and traps reflects distinct shifts in foraging economies that allows for the mass capture and storage of marine resources. This indicates a shift in different organizational levels of human labor invested into cooperative aquacultural projects and architecture (Kolb and Snead 1997; Peebles and Kus 1977), arguing for increased social complexity.

Other possible patterns supporting changes in complexity are segregation of elite from residential habitations, and the presence of isolated elite mortuary areas with major ritual displays (e.g., Youman's Mound). In the nearby Caloosahatchee region, a similar increase in mound building seen after AD 500 is argued as evidence of the formation of Calusa complexity (see Dietler 2008; Marquardt 1992:48; Patton 2001; Widmer 1988). The presence of flat-topped platform mounds is often cited as evidence for elevated

temples or high-status residences (Patton 2001:51). Changes in mortuary traditions and burial mound forms in south Florida may also indicate changes in social complexity, with evidence of regional changes occurring around AD 900 (Luer 1999). In the Caloosahatchee area, isolated sand mounds become common after AD 900 (Patton 2001:50), and high-status residence mounds are expected to be bifurcated in shape (*ibid.*:52). In the TTI, some mortuary complexes appear much earlier, within the Late to Terminal Archaic, and up through the Glades I periods. However, the flat-topped mound at Russell Key and the conical mound at Fakahatchee Key 3 are contemporaneous with those found in the Caloosahatchee region.

Widmer's argument that chiefdoms were extant in south Florida after AD 800 is widely accepted (see Dietler 2008; Patton 2001). Patton argues that "almost all south Florida sites have components dating from after AD 800, while only some have earlier components" which is viewed as evidence of social complexity through fissioning and the rapid establishment of new villages (Patton 2001:121; Widmer 1988:217). However, in the TTI, many shell work sites show the contrary, with all sites examined having components that pre-date AD 800, many of which became abandoned prior to AD 800 (e.g., Sandfly Key, West Pass and all shell rings). In the case of Fakahatchee Key 3, Sandfly Key and West Pass, it is possible that these settlements merged and nucleated with larger settlements around AD 740, which is consistent with the idea of increased social complexity, though through fissioning from smaller settlements and nucleation at larger, pre-existing village sites. Thus, TTI sites potentially evince signs of social "cycling," reflecting dynamic, variable social trajectories that change through time, including cycles of growth, emergence, integration, fragmentation, and collapse (Anderson 1990b; Johnson and Earle 2000; Parkinson 2002b). In summary, if increased social complexity can generally be agreed to mean "a movement toward greater organization, greater differentiation of structure, increased specialization of function,

higher levels of integration, and greater degrees of energy concentration” (White 1949:367), then changes in shell work settlements over time certainly provide evidence for increases in social complexity. As Fitzhugh argues (2003:2), social complexity is “a condition in which a system is composed of greater internal differentiation (of component parts) than another system to which it is being compared.” Ten Thousand Island shell works and ring sites demonstrate a definite temporal and spatial shift in community structures, site layouts, and shell work features over time, which certainly supports the contention of increasing social complexity.

CHAPTER 8

SUMMARY AND CONCLUSIONS

The prehistoric coastal foragers of south Florida are a rare example of a sub-tropical, non-agricultural society with a subsistence based on coastal resources (Marquardt 1986, 1987, 1988, 1992; Walker 1992). The Ten Thousand Islands contain the remains of their well-preserved landscapes, consisting of small, simple shell rings, and enormous, complicated shell works, which represent a unique, prehistoric architectural traditions of massive landscape terra-forming with shell. These sites provide an invaluable testament to how coastal foragers persisted for millennia within the region, how they may have adapted to environmental, social and political changes, and how their constructed landscapes reflect changes in community organization and social complexity over time.

This investigation demonstrates that shell work sites are prehistoric landscapes with multiple meanings and histories. Shell works and rings are comprised of individual and groups of constructed features and sites that reflect socially engaged landscapes, and a dynamic and recursive relationship between communities, their environment and the landscapes they create. Shell work landscapes also reflect community organization at both the site level and on a regional scale, and evince changing community organization and social complexity. Lastly, shell works provide great potential for recognizing interconnected landscapes of monuments, ritual and ceremonial landscapes, and seascapes.

Shell work sites reflect purposeful planning and construction, and regionally, they show strong similarities in forms that suggest communities were connected, and shared similar social, political and ideological characteristics, manifested within their landscapes. Throughout the region, sites range from small, isolated shell rings, to massive, complete islands constructed with complex arrangements of shell. Testing and

comparison of features at multiple sites confirms that certain spatial features have distinct temporal components, and reflect changing community settlement patterns over time.

TEMPORAL SIGNIFICANCE

As noted previously, there appear to be several temporally significant trends in shell ring and shell work settlements within the Ten Thousand Islands. The most significant trend is that of large scale, regional settlement shifts. The first significant pattern is that shell rings first appear during the Late Archaic, and persist up to the Glades I (late) period, which then become abandoned. Changes in settlement types shift from simple ring-shaped communities to larger, crescent-shaped sites with increasing investments in landesque capital. This occurs at small shell work sites, such as West Pass and Fakahatchee Key 3, which persisted from the Glades I through the Glades I (late) period, but became abandoned by AD 740, at the end of the Glades I (late) period. This coincides with regional changes seen in ceramic types and styles, as well as increases in settlement sizes at major shell work sites, possibly suggesting nucleation at larger sites and population growth.

Many major shell work sites demonstrate temporal trends and distinct site phasing of features, such as in the construction and use of shell fields, shell mound districts, and series of water courts, canals and finger ridges. I argue that some of the structures constructed during this phase of shell work occupation indicate public works, and increased coordinated labor to build, maintain and use these types of features, suggesting an increased level of social complexity compared to that seen in the earlier ring sites.

These temporally significant site forms are found among numerous Ten Thousand Island shell work sites, and date roughly from AD 600 to AD 900. This

coincides with introduction of new ceramic styles, and is contemporaneous with a florescence of mound building seen in the neighboring Caloosahatchee region, which many interpret as evidence for the emergence of the Calusa chiefdom (e.g., Patton 2001; Widmer 1988). Many of these trends can be explained as settlement shifts to accommodate increasing population, the introduction and widespread adoption of large scale corporate fishing strategies (fishweirs, traps and water courts), and the development of economies that include short (or long) term storage of excess foods.

However, the most significant and unexplained temporal trend is the regional abandonment of shell work sites just prior to AD 1300. It is unknown what caused such large scale regional abandonment at this time, but it may be related to degradation of resources, changes in sea level or new settlement adaptations influenced by world-wide climactic change that began around that time by the Little Ice Age (Fagan 2000). Alternatively, abandonment of shell work settlements occurred because of internal, cultural shifts in communities, or shifts in subsistence economies (agriculture?), or perhaps influence or pressure from outside groups (the Calusa?).

ARCHAIC AND GLADES CULTURES

The question of how and when south Florida first became settled is usually eclipsed by interest in Calusa complexity, or the arrival and persistence of the Glades culture. Goggin considered evidence of an earlier Archaic group present in small numbers within the region, which he named the Pre-Glades (1948:106), and which he viewed as an outside group, unassociated with the subsequent Glades people.

Cockrell (1970) followed in this thinking, viewing the deeply stratified Pre-Glades sites as small temporary campsites, first settled by Archaic peoples who resided in such campsites, and who were not efficiently adapted to a marine environment. These people, he argued, were supplanted by the Glades culture, who successfully learned how

to adapt to and exploit the marine environment, and which led to their long occupation of the area and eventual achievement of socio-political complexity.

Lastly, work at Horr's Island focused on the Archaic components of the site, with the goal of defining Late Archaic settlement patterns, in lieu of examining the subsequent Glades period components present in some of the shell work features. Research at Horr's Island failed to address the question of how the two seemingly different prehistoric populations were historically connected; Russo concluded they were not, and were vastly different (1991:500, 503).

Data from this study suggest differently, as many Late Archaic and Terminal Archaic shell ring sites evidence a cultural continuum with the Glades I period. Additionally, most major shell work sites evince small, earlier shell rings that date close to the Terminal Archaic, and perhaps un-sampled basal layers that date to the Late Archaic. In summary, it appears likely that TTI Late Archaic and Terminal Archaic groups were not different groups that migrated in and out of the region before the Glades cultures, rather, they were the same group, and changes in settlements, artifact assemblages and subsistence strategies demonstrate broad scale, *in situ* cultural changes that occurred throughout the region over time.

EVIDENCE FOR CHIEFDOMS?

As argued in the previous chapter, an extensive system of water courts, finger ridges and canals present on major shell work sites suggest they represent a system of fish weirs, fish traps, and fish ponds. This investment in landesque capital (Brookfield 1984) is considered a form of aquaculture, and suggests a significant shift in social complexity at shell work sites at this time, indicating organized corporate shellfish and fishing activities and long-term investment in infrastructure to support this intensive economy.

That this shift in labor invested into cooperative aquacultural projects, architecture, and coordinated labor occurred on multiple settlements at the same time throughout the region argues for widespread communication and interaction among settlements, and reflect significant changes in social complexity at shell work settlements.

But were these settlements chiefdoms? This remains inconclusive, as many more data are needed to answer this question. To date, there are no data to support (or refute) that these settlements were led by hereditary, organized economic and political leadership through an individual or a lineage group. Data that may support the possibility of chiefdom settlements are the presence of many relatively large permanent settlements with substantial investments in infrastructure, storage facilities, and monuments. However, most settlements appear to have equally sized and shaped communities, with the same types of features, and no hierarchy of communities with a single principal center is obvious (Hayden 1995). Two possibilities, however, are that Chokoloskee Key (now destroyed) was the pinnacle site. Alternatively, Fakahatchee Key may potentially have operated as the pinnacle site, with Youman's Mound representing an isolated elite mortuary area designed for major ritual displays. Perhaps future investigation of TTI sites will be able to answer these questions.

CALUSA AND TEN THOUSAND ISLAND TRIBES

While evidence for the emergence of social complexity occurs on shell work settlements in the TTI, it remains unknown if the TTI groups were part of the Calusa chiefdom, or a separate tribe that were possibly tributary to them. If the Ten Thousand Island region were separate but tributary to the Calusa, when and how did this relationship occur, and what is the archaeological evidence for this?

Several lines of evidence suggest that the TTI groups were independent of the Calusa, including evidence for very different ceramic trajectories (Austin 1987; Carr and Beriault 1984:3; Pepe 1999; Widmer 1988), shell tool traditions (see Dietler 2008), site types, and distinct and separate estuarine systems. These lines of evidence support separate regional culture areas for the TTI and Caloosahatchee regions for some time. However, it is not known what happened to TTI shell work settlements post AD 1300, and it should be noted that around AD 1300 to AD 1400, distinct TTI ceramic types (e.g., Surfside Incised and Glades Tooled) begin appearing in Caloosahatchee sites, suggesting that trade (or tribute) is moving north from the TTI to the Caloosahatchee region. It is not understood at this time how this interaction affected TTI groups, but it does suggest that the two groups at this time were connected in some way, which may correlate with the large-scale regional abandonment of shell work sites that seemed to have occurred just prior to AD 1300. This suggests that populations may have migrated north at this time.

RECOMMENDATIONS FOR FUTURE RESEARCH

Prior to this study, virtually nothing was known about TTI shell work sites. While many data have been generated by this study, it is still coarse in scale, and requires much more additional data to further strengthen the regional spatial and temporal trends so far elicited. It is therefore recommended that future research consider the spatial and temporal trends suggested herein, and that additional testing of multiple shell work features and sites rigorously test for significant spatial and temporal trends that will help answer questions about cultural phasing, migration, nucleation and abandonment at sites within the region.

The data generated to date was also limited by several factors, most substantially the inability to reach true basal levels at all sites in order to obtain primary dates for site

occupation. Since shell work and ring sites have such deeply buried, thick deposits, it has been impossible to extract deeper samples. It is possible that portable pneumatic cores may be the solution, and it is highly recommended that alternative testing methods be used in order to obtain basal dates from all sites. Concomitantly, it is recommended that shell ring researchers take top date samples from shell rings as well as the usual basal samples, because final occupation dates are just as important as determining the earliest age of site use and construction.

Another line of evidence that is critical for understanding how shell work communities may have changed over time is that of subsistence patterns, and this is sorely lacking in this study. It is highly recommended that systematic zooarchaeological investigations are conducted on a sample of features and site types, to elicit dietary trends, resources targeted, and to infer possible environmental changes that may have occurred within the region over time. Future quantitative shell midden analysis and sediment size analysis will most certainly greatly improve our definition and characterization of shell midden deposits, and help to strengthen weakly defined (but still useful) terms such as "clean shell." Interdisciplinary environmental research is highly recommended, and will be critical in helping to understand complex environmental and human relationships, such as how fluctuations in sea level, climate and resource availability may have affected settlement patterns.

To that end, it is critical to be aware of the importance of short-term (50-200 years) climate fluctuations on food availability in shallow-water estuarine environments, and the potential role of environmental archaeology has in investigating these relationships (see Marquardt 1992, 2010; Walker 1992a, b). Marquardt argues that climate change was a major player in the demise of the Terminal Archaic, and advises researchers to explore a dialectical approach to human landscapes and climate change (Marquardt 2010).

Future work should also focus on answering specific questions about when and how settlements came to be established, when and how they became abandoned, and how, when and why settlements fissioned or nucleated. Structures and features identified as possible structures, household units, and hearths should be investigated to determine the nature and construction of these features, which in turn will help to strengthen interpretation of specific community plans.

Last, it is recommended that the Southern Province of the TTI be investigated using the same research approach, in order to date shell work features and settlements, and to help determine if temporal and spatial trends are replicated in that part of the region as well. Investigation of the shell works and rings in the Southern Province of the TTI may also help to determine if this is a separate sub-region, or just appears environmentally different.

In conclusion, shell work sites are one of the world's most unusual and important prehistoric landscapes. Shell works offer to document an important history of fisher-hunter-gatherers' long and connected relationship with the sea, their dynamic and recursive relationship with the environment and landscape, the persistence of memory marked materially within the landscape, and how communities organized to build meaningful homes, places, and landscapes in this bountiful environment.

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