12-2017

Archaeological Investigations at the Adams Bay Site (16PL8), Plaquemines Parish, Louisiana: Assessing Natural and Anthropogenic Effects to a Louisiana Coastal Archaeological Site

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by

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A Thesis

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree of

Master of Science in

Cultural Resources Management Archaeology

December, 2017

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Abstract

The Adams Bay site (16PL08), located in the coastal marsh of Plaquemines Parish, Louisiana, is a precolonial mound site containing an earthen mound on the north edge of a plaza and a remnant mound on the southern edge. The layout of the mounds in cardinal directions around the plaza suggests that this component of the site dates to the Coles Creek period. On the eastern side of the site an extensive, wave-washed and re-deposited oyster (*Crassostrea virginica*) and rangia (*Rangia cuneata*) shell midden contains diagnostic Coles Creek, Plaquemine, and Mississippian pottery. Archaeological research at the site was conducted to confirm the cultural affiliation of the mound group and midden, and to assess the effects of natural and anthropogenic processes and their impacts to the site. Surface collection yielded 102 pottery sherds that were collected and analyzed. Cores were collected along the edges of the mound, the plaza, as well as the eastern and western limits of the site in order to identify *in situ* archaeological deposits. The results of this investigation produced data that will allow archaeologists to more accurately compare precolonial coastal Louisiana and inland regions. Furthermore, this research will aid in identifying the geological and anthropogenic environmental stressors threatening Louisiana's coastal archaeological sites.

Acknowledgements

The author wishes to express gratitude to Dr. Rob Mann, and Dr. Debra Gold from the Department of Anthropology at St. Cloud State University, who provided positive support and guidance throughout this project. Dr. Charlotte Donald Pevny deserves special thanks for providing invaluable assistance with the field work of the project.

The author wishes to thank Richie Blink, the Plaquemines Parish Outreach Coordinator, for without his time, energy, thoughtfulness, and most importantly his boat, this project never would have been possible. The author is also indebted to Brian Ostahowski, who offered insight into the problems facing many of coastal Louisiana's archaeological sites. The author wishes to express appreciation to Dr. Charles "Chip" McGimsey, the Louisiana State Archaeologist and Director with the Division of Archaeology, for his patient consideration and invaluable assistance. Dr. Rebecca Saunders and Beverly S. Nuschler from the Louisiana State University Department of Geography and Anthropology deserve special recognition for allowing me the use of their total station. Also, for his insights into the ceramic identification, the author would like to extend his gratitude to Richard A. Weinstein.

Thank you to my parents, Jeffrey and Beverly Hale, and my in-laws, Hoyt and Kay Sanders. And to my wife, Ashley Hale, for without her support, assistance, and encouragement none of this would have been possible.

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Chapter 1: Introduction

This thesis examines the cultural affiliation of the Adams Bay site (16PL8), a precolonial mound and shell midden complex located at the southwestern end of Adams Bay, Louisiana (Figure 1.1). It also addresses the natural and anthropogenic impacts to the site. Plaquemines Parish is the southeastern most parish in Louisiana; it is peninsular in shape and surrounded by the Gulf of Mexico on three sides. The loss of wetlands and barrier islands in coastal Louisiana, and elsewhere along the Gulf Coast, has long been viewed as an environmental catastrophe (Couvillion et al. 2011), but rarely has the same attention been afforded to the loss of coastal archaeological sites. Louisiana's coastline has been impacted by the combined result of natural and anthropogenic processes, causing both erosion and subsidence; these same processes have affected archaeological sites located in the marshes and swamps of south Louisiana. At the Adams Bay site, these processes are rapidly destroying the site. When the site was initially recorded by Dr. Fred Kniffen in 1936, he described it as having three distinct mounds. However, over the years the site has gone through a devastatingly drastic transformation such that today only one of these mounds remains visible among the landscape. Currently, on the northeast side of the site, the bank-line has begun to erode away into Mound 1 (Figure 1.2) and artifacts, including aboriginal ceramics and faunal remains, are strewn across the beachfront (Figure 1.3). On the west and south sides of the site subsidence appears to have had the greater effect and these areas, including Mound 2, are now submerged (Figure 1.4). A remnant of Mound 2 is expressed by two decaying oak trees, similar to those covering Mound 1. The location in which Mound 3 was originally mapped by Kniffen is completely submerged by the bay.

I first visited the site in January 2016 and took several photographs. Comparing these photographs to photographs taken January 26, 2011, as part of the MC252 Oil Spill Response, reveals that erosion and subsidence has affected the site significantly in just five years (Figure 1.5). If this trend continues, the Adams Bay site will likely be lost for future study. Understanding the geomorphic and environmental impacts to archaeological sites located in Louisiana's wetlands and barrier islands is crucial to creating and implementing a successful plan to protect and preserve coastal archaeological sites.

Figure 1.1. Overview of the Adams Bay site (16PL8). (Modified from Google Earth, 2017)

Figure 1.2 and 1.3. Eroded bank line along Mound 1 (top) Aboriginal potsherds and shell beach (bottom).

The Adams Bay site has been understudied within the region, therefore, the first project goal was to perform a site evaluation. This evaluation should offer insight into the human occupation at the site and establish an associated site chronology. Accomplishing this goal should provide the information needed to achieve the overall goal of the project, which is to assess the impact of land subsidence and sea level rise on the archaeological deposits at the Adams Bay site.

The research questions addressed in this thesis are designed to determine cultural affiliation, physical conditions at the site, and how geomorphological and environmental stressors are impacting the site. To address these questions certain data was extrapolated from items collected and observed, including diagnostic artifacts such as ceramics, cultural features, stratigraphic profiles, site topography, and soil geomorphology. The project field methodology included surface collecting, soil coring, and mapping the site to determine the horizontal and vertical limits of the site, the effects of land subsidence, sea level rise and coastal erosion, as well as establishing site affiliations, site chronology, site integrity, and placing the site into the regional culture history.

Thesis Outline

As stated above, a large portion of this thesis is to help identify the cultural affiliation of the occupants of the Adams Bay site and to determine its place within the regional cultural history of the Lower Mississippi Valley (LMV). Chapter 2 explores the culture-historical sequence of Louisiana as outlined in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983) and other sources. The Adams Bay site (16PL8) lies within the coastal region of Plaquemines Parish, Louisiana. Plaquemines Parish is one of fourteen parishes located in the

southeastern portion of the state that make up Management Unit V as defined in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983). Management Unit V is characterized by low-lying swamps, natural and human-made levees, and coastal marsh and it is well represented throughout the Lower Mississippi Valley (LMV) prehistory (Smith et al. 1983). This chapter outlines the culture history of the LMV, with a focus on differences in patterns of subsistence, social organization, and technology. Chapter 3 discusses the physical and environmental setting of the Adams Bay site, including local geology/geomorphology as pertinent to site formation processes. Chapter 4 introduces the reader to the Adams Bay site (16PL8) and discusses previous research at the site, and studies within the Barataria Basin as they pertain to the Adams Bay site, as well as presenting the research questions. Chapter 5 outlines the field methods and results of the 2016 investigations. Chapter 6 summarizes and discusses the findings and conclusions of the research at the Adams Bay site as well as the implications of the geomorphic and environmental impacts on the archaeological deposits at the site. Finally, this chapter suggests how the findings of this thesis can aid in the development of strategies to manage and preserve coastal archaeological sites.

Figure 1.4. View of Adams Bay, looking northwest.

Figure 1.5. Photos comparing shoreline at the Adams Bay site 2016 (top) 2011 (bottom).

Chapter 2: Cultural Setting

The Adams Bay site (16PL8) is located in the southeastern portion of the state that makes up Management Unit V as defined in Louisiana's *Comprehensive Archaeological Plan* (Smith et al. 1983). The prehistory of Management Unit V extends from ca. 13,950- 250 B.P. and it is divided into four general archaeological stages (Smith et al. 1983). These stages (Paleo-Indian, Archaic, Woodland, and Mississippian) represent developmental periods that can be characterized by differing patterns of subsistence, social organization, and technology (Bense 1994).

There are eight cultural units used to characterize the precolonial cultural sequence associated with Management Unit V (Smith et al. 1983). These include: the Paleoindian (13,950-9,950 B.P.) Archaic (9,950-2,750 B.P.) Poverty Point (3,650-2,750 B.P.) Tchefuncte (2,750-1,850 B.P.), Marksville (2,050-1,550 B.P.), Baytown (1,550-1,250 B.P.), Coles Creek (1,250-750 B.P.), and Mississippian/Plaquemine (750-250 B.P.). This section offers a brief outline of the culture history for the LMV.

Paleoindian Period (13,950-9,950 B.P.)

The Paleoindian period encompasses the earliest well-documented presence of humans in North American and coincides with the Late Pleistocene and Early Holocene transition (Rees 2010). Paleoindians are considered the earliest human inhabitants to occupy this region and they produced a distinctive assemblage of lithic tools that include Clovis, Dalton, and Scottsbluff projectile points. Paleoindian peoples were mobile foraging groups organized into small bands or extended family groups. Most models suggest that Paleoindian peoples were skilled hunters of big game animals (megafauna), such as bison, mammoth, and mastodon

(Rees 2010). By the beginning of the Holocene, the megafauna had gone extinct and Paleoindian subsistence patterns in Louisiana began to focus more on small mammals, fish and other aquatic resources, wild plant foods, and seasonally available bottomland resources (Rees 2010).

A few Paleoindian sites have been identified in coastal Louisiana on relict Pleistocene-age terraces and on salt dome islands. There are also possible submerged Paleoindian sites in the Gulf of Mexico (Gagliano et al. 1977; Gagliano 1967, 1979; Weinstein and Kelley 1992). The reason sites from this culture period are scarce or non-existent is not due to a lack of effort from the archaeological community to discover and investigate them, but rather is the result of post-Pleistocene environmental changes that affected the Louisiana coastal zone (Rees 2010:36-40; Weinstein and Kelley 1992:30). Near the end of the Pleistocene, approximately 11,950 B.P., sea level may have been more than 100 m (328.10 ft.) below its present level (Lewis 2000:527). This lower seal level would have extended Louisiana's coast line somewhere between 80-100 km (49.72-62.15 mi) further south (Saucier 1994:49).

Archaic Period (9,950-2,750 B.P.)

The Archaic stage traditionally is divided into three subdivisions or periods: Early Archaic (ca. 9,950-7,950 B.P.), Middle Archaic (ca. 7,950-3,950 B.P.), and Late Archaic (ca. 3,950-2,750 B.P.). At the beginning of the Holocene, the postglacial trend of increasing temperatures continued into the Archaic, culminating in the Hypsithermal Interval between 8,950-3,950 B.P. (Steponaitis 1986). This warming trend profoundly influenced the environment in the Southeast, where sea-level rise impacted the coast line and changed the composition of Coastal Plain forests from deciduous stands to pine stands (Steponaitis 1986).

The Archaic stage is marked in the archaeological record by changes in tool technology and other aspects of material culture (Bense 1994).

In the LMV, using data from the archaeological record to define a transition from the Late Paleoindian to the Early Archaic period can be difficult as the cultural transition was gradual. (Rees 2010:53). Subsistence strategies and settlement patterns associated with the Early Archaic period resembled those of the preceding Paleoindian stage. Early Archaic peoples most likely traveled seasonally in small groups between a series of base camps and extractive sites, hunting deer and collecting edible plants (Smith 1986). Temporally diagnostic projectile point/knife forms associated with the early part of this period are the San Patrice, Keithville, and Pelican forms (Webb et al. 1971). Later Early Archaic types include the Cache River, Calf Creek, Kirk, and Palmer types.

J. Saunders (2010:63) proposes that "the Middle Archaic signals the beginning of riverine adaptation for fishing, hunting, and gathering people, a shift toward sedentism, the first construction of earthen mounds, and an elaborate material culture unique to the LMV and Louisiana." This shift occurs as northern glaciers retreated, which resulted in a warmer and drier climate as one moved south. Several technological improvements also occur in the Middle Archaic, with examples including the production of ground stone, bone, and antler implements. Middle Archaic projectile point/knife types tend to be stemmed rather than notched and are thrown with an atlatl (McGimsey 2002). The earliest mound building developed in the LMV in the latter half of the Middle Archaic period and examples include the LSU Campus Mounds (16EBR6), Banana Bayou (16IB24), Hornsby (16SH21), and Monte Sano Bayou mounds (16EBR17) (Gibson 1994; Russo 1994; J. Saunders 1999, 2003;

R. Saunders 1994; Saunders et al. 1994). J. Saunders (2010:70) has noted that fire-cracked rock among Middle Archaic mound sites is a common artifact. The use of heated rocks to prepare food (i.e., bake, steam, and boil) was common for this period as ceramic or stone vessels are not recovered in these archaeological contexts (J. Saunders 2010:70).

J. Saunders (2010:65) has identified four projectile point/knife types–Evans, Tangipahoa, Bulverde, and Sinner–that occurred during the latter part of the Middle Archaic period, and together comprise what he terms the "Evans Projectile Point Horizon." The components that produce Evans and related points typically exhibit a focus on the exploitation of locally available lithic resources, with little evidence for procurement of non-local materials.

The Late Archaic period includes intensification of mound building, inter-regional trade of exotic materials, the production of steatite stone vessels, and the advent of fiber-tempered pottery. Late Archaic period projectile point/knife types commonly found throughout Louisiana consist of stemmed and corner notched forms. Ground stone objects include celts/axes, banner stones, plummets, and steatite bowl fragments (Campbell et al. 1990; Jeter and Williams 1989). Additionally, there is evidence for widespread trade becoming a "significant component of the native economy" (J. Saunders 2010:74). Furthermore, J. Saunders (2010:74) adds that "coupled with the advent of trade emerges a regional cultural entity that reintroduces mound building on a colossal scale–the Poverty Point culture."

Poverty Point Culture (3,650-2,750 B.P.)

In the LMV, the transition from Archaic to later cultures is marked by the development of the Poverty Point Culture. The Poverty Point culture is named after the type site (16WC5), located in northeastern Louisiana. It is distinguished by the extensive earthworks built and occupied by Archaic fisher-hunter-gatherers between 3,650-2,750 B.P. (Gibson 2010) At the time of its construction, the Poverty Point site was the largest earthwork in the Americas (Gibson 1985) encompassing nearly 5 square kilometers (Pauketat 2007:65; Sassaman 2004:253, 2005:338) and contains numerous earthen constructions (Byrd 1991; Connolly 1999; Gibson 2001; Kidder 2002a; Neuman 1984; Webb 1982). One material feature of Poverty Point culture is the extensive presence of non-local lithic material within site assemblages (Gibson 2010). This presence of "exotic rock" is rather abundant, contributing to assemblages all over and include: novaculite, quartz crystal, greenstone, slate, shale, nepheline syenite, bauxite, and possibly hematite, magenite, fluorite, among many others (Gibson 2010:81). Subsistence was centered on fishing, hunting, and collecting, particularly of high-yield foods such as fish and aquatic roots, within adjacent or nearby river swamps (Gibson 2010:89). The acquisition of resources could be prolonged, especially fish, as they could be caught through holes in the frozen rivers and lakes through use of nets with plummet-weighted mud lines and the harvesting of edible roots became more efficient using hand-size hoes (Gibson 2010). Some interpretations have suggested that Poverty Point culture may represent the first chiefdom-level society to develop in the eastern United States (Gibson 1985; Muller 1978), although more recent assessments favor Poverty Point as a "thriving egalitarian" (Gibson 2001:207-215).

Diagnostic artifacts of Poverty Point culture include microtools (i.e., blades and perforators), fired clay cooking balls or Poverty Point objects (PPOs), tubular pipes, clay figurines, rough hoes and celts, and jasper beads. The ceramic types recovered from Poverty Point sites include St. John's, Wheeler, and Tchefuncte pottery. Bowls were also made of steatite and sandstone (Webb 1982:12-13). The use of spear-throwers is suggested by the presence of atlatl weights in the site assemblage at Poverty Point, although fishing was likely the primary way of procuring protein over hunting (Gibson 2001). Pitted stones and grinding basins are examples for the processing of nuts and seeds for food. The Claiborne site is the southern-most expression of Poverty Point culture and is situated in the marsh along a branch of the Pearl River (Gibson 2001). The artifact assemblage at this site is heavy with PPOs and is more similar to the Poverty Point site than almost any other Poverty Point settlement (Gibson 2001). At the time of its construction this would have been at the mouth of the Pearl River on the Mississippi Gulf Coast (Gibson 2010).

Woodland Period (2,750-750 B.P.)

The emergence of the Woodland stage in Louisiana is characterized by the widespread use of ceramic containers. In Louisiana, the Woodland stage is represented by the Tchula period, Marksville period, the Baytown period, and Coles Creek period.

Tchula Period/Tchefuncte Culture (2,750-1,950 B.P.) Tchefuncte culture is regarded as part of the Tchula period (Hays and Weinstein 2010). Sites from this time are few and scattered, with most occupations found in the coastal zone (Neuman 1984). These data are interpreted to suggest that the peoples of the Tchefuncte culture were largely seminomadic foragers (Neuman 1984:135). However, within areas such as South Louisiana, regional

artifact markers, primarily Tchefuncte type ceramics, are useful for recognizing occupations (Phillips 1970:7, 8, 15, 76) and possibly for defining regional populations (Shenkel 1984; Weinstein 1986).

Although fiber-tempered and some grog-tempered or temperless sherds have been recovered from earlier Poverty Point contexts (Webb 1982), the Tchefuncte initiated the wide spread manufacture of ceramics. Tchefuncte surface treatments are varied and rather sophisticated, while the paste is comparatively crude (Hays and Weinstein 2010). Common decorations on ceramic vessels were applied using fabric and cord impressions, punctations, narrow and wide line incisions with straight and curved lines, wiggled lines, drag-and-jab lines, and simple rocker stamping (Hays and Weinstein 2010). A variety of vessel forms occur, many with flat bases or with foot supports, including globular pots with shoulders, simple bowls, and, the most recognizable Tchefuncte vessel form, jars with slightly constricted necks and flaring rims (Hays and Weinstein 2010). Ceramic decorations and various percentages of these decorations have been used to create several regional phases of the Tchefuncte culture in the study area (Weinstein 1986).

Although lithic artifacts are much less commonly recovered compared to ceramic artifacts, they do occur on some coastal Tchefuncte sites. Common identified projectile point types recovered from Big Oak (16OR6) and Little Oak (16OR7) Islands were Pontchartrain, Ellis, Kent, Maçon, and Gary points (Hays and Weinstein 2010:104). Debitage, burins, notched pieces, and denticulates were also recovered (Hays and Weinstein 2010). Ground stone tools recovered from coastal Tchefuncte sites include plummets, hammerstones, bar weights, mortars, and occasionally soapstone fragments (Hays and Weinstein 2010).

Subsistence data recovered from coastal Tchefuncte sites point toward a dependence on riverine and coastal resources, including "abundant amounts of shellfish (most commonly brackish water clams [*Rangia cuneata*] but also including oyster [*Crassostrea virginica*])" (Haynes and Weinstein 2010:107). These data suggest the populations occupying Tchefuncte sites in eastern and coastal Louisiana were fisher-hunter-gatherers who lived primarily in small hamlets or villages almost all year round. Other evidence that supports an at least nearly year-round occupation of Big and Little Oak Islands is the recovery of over 50,000 pottery sherds and a wide variety of bone tools, as well as the documentation of numerous burials (Hays and Weinstein 2010).

Marksville Period (1,950-1,550 B.P.) Middle Woodland in the LMV is designated the Marksville Period, named after the type site (16AV1) located in Avoylelles Parish, Louisiana (McGimsey 2010). Due to the stylistically similar ceramic decorations recovered at 16AV1 to those found in Ohio mounds, Marksville culture is often regarded as a local expression of the Hopewellian tradition (McGimsey 2010). Marksville period sites in Louisiana are identified as such primarily based on distinctive ceramic attributes including incised geometric and zoned rocker-stamped designs; these sites tend to be located within the Mississippi Valley and adjoining uplands (McGimsey 2010). Marksville social structure has been identified by complex geometric earthworks, conical burial mounds for elites, and unique mortuary ritual systems. Burial items included pearl beads, carved stone effigy pipes, copper ear spools, copper tubes, galena beads, and carved coal objects.

The presence of broad-incised and zoned rocker-stamped ceramics in assemblages are synonymously Marksville; however, evidence suggests these attributes continued to be

applied long after this period (McGimsey 2010). Vessels recovered from burial contexts are distinctly smaller than their domestic counterparts, establishing a “distinctive mortuary assemblage” (McGimsey 2010:127). Marksville pottery also marks the start of the grog/grit tempered “Baytown” ceramic series.

There is no distinctive Marksville lithic assemblage, and Kent and Gary projectile point types continue to be used (McGimsey 2010). Other components of Marksville stone tool assemblages consist of knives, scrapers, drills, and ground stone atlatl weights and celts. The use of local gravel cherts is emphasized in the manufacture of points and bifaces, but usually there is a limited number of lithic tool types present in a Marksville assemblage. McGimsey (2010:127) states that while there is no evidence of a flake-tool industry during the Marksville period, some larger flakes exhibit minor use-wear indicating use as expedient tools.

Marksville habitation sites often consist of small artifact scatters. The sites that have been excavated show no evidence of a “hierarchical structure between them, based on differences in site size, complexity, or proximity to mound sites” (McGimsey 2010:128). McGimsey (2010) also notes that Marksville period cemeteries (e.g., Big Oak Island, Crooks, and possibly Veazey) indicate mass interments, with each burial apparently receiving the same level of ceremonial mortuary treatment. This contrasts with burials within the cemeteries at Marksville and Coral Snake Mound, however, where social segregation within these communities is clearly indicated (McGimsey 2010). Sites with Hopewell-related earthworks, burial mounds, and exotic artifacts are less represented and scattered throughout the region (McGimsey 2010:132).

McGimsey (2010:130) notes that Marksville subsistence strategies continue a trend in food procurement, dating to at least the Middle Archaic period as they relate to the hunting and gathering of local foods. Faunal variability between sites suggest the food collection was dependent on the local environments. A deficiency in the subsistence data collected during earlier excavations has left a void in the Marksville archaeological record as it pertains to subsistence patterns (McGimsey 2010). The data that has been collected infers that people throughout the Marksville period continued the trend of a foraging tradition (McGimsey 2010).

Baytown Period (ca. 1,550-1,250 B.P.) Lee (2010:135) states that "the Late Woodland period in the LMV is subdivided into two major culture historic units: Baytown and Coles Creek." Data collected by Neuman (1984:169), provided 23 C^{14} dates from 14 Baytown/Troyville sites in Louisiana, placing the beginning of the period at approximately 1,550 B.P. The tradition of building conical mounds for burial purposes continues from the previous period, however, flat-topped or platform mounds also begin to materialize for use in public ceremonies and civic events, becoming the fundamental configuration for mound construction during later periods (Lee 2010). Gibson (1996:59) sees this shift in mound architecture as "representing a dramatic expression of a new religious order" where "mound tops replaced mound interiors as staging grounds for communal ritual and civic activity."

Developments in agriculture and the technological refinement of the bow and arrow also occur during the Baytown period. Baytown period ceramics continue the grog/grit tempering tradition from the preceding period. Early Baytown projectile point/knives include

moderately large dart points with rounded or square bases, but these are supplanted in most regions following the development of the arrow point.

Lee (2010:137) states that “Baytown societies are thought to correspond with a tribal or local level of sociopolitical organization, with leadership positions achieved, rather than ascribed or inherited.” The mounds located at these sites would have served as a place to hold communal or ritual events (Lee 2010:137). One aspect of these rituals and ceremonies may have involved large, communal feasts, as indicated by the presence of large bathtub-shaped pits documented near mounds or along the peripheries of several mound sites. These pits have been associated with food preparation during civic ceremonies and burial rituals (Lee 2010; McGimsey 2004).

Baytown period settlements likely saw people living in small, dispersed hamlets or villages (Lee 2010). The data available to discern community planning is limited, however, the idea of a hierarchical settlement pattern has been inferred (Lee 2010). Faunal remains recovered from Baytown period sites indicate a broad-based diet of fish, deer, and smaller mammals (Lee 2010). Fleshy fruits, available seasonally, included persimmon, grapes, and berries, while the most commonly collected nuts from mast-producing trees were acorns, hickory nuts, and pecans (Lee 2010).

Evidence that Baytown populations continued to participate in long-distance trade networks initiated during earlier times with other Gulf Coastal Plain groups to the east is provided by the recovery of *Busycon* shell artifacts, shark teeth, and ceramics from Baytown sites (Lee 2010).

Coles Creek Period (ca. 1,250-750 B.P.) Coles Creek culture emerged from the Baytown period and Troyville culture in the LMV around 1,250 B.P. and existed during an era of significant economic and social change involving settlement patterns, mortuary practices, and ceramic technology and decoration (Roe and Schilling 2010). By the end of the Coles Creek period, large-scale mound construction was occurring and there is evidence for the resumption of long-distance communication, which can be seen in the similarities of mound construction throughout the Coles Creek region (Roe and Schilling 2010). These changes in mound construction, as well as cultural remains on mounds and the plan and architecture of mound sites are examples of social change during the Coles Creek period (Roe and Schilling 2010).

Roe and Schilling (2010:168) identify Coles Creek ceramics as "hard, well-made, and grog tempered." Coles Creek ceramic decorations exhibit regional similarities with rectilinear incised designs being among the most common. Along the coast, paddle-stamped pottery is common (Roe and Schilling 2010). Coles Creek ceramics share stylistic similarities along the coast of Louisiana and the eastern Gulf Coast and represent a long-standing interaction network among residents (Roe and Schilling 2010). Stone tool technology is observed to be "fairly simple and rather scarce within Coles Creek contexts" (Roe and Schilling 2010:166). Several small arrow point types are represented during the Coles Creek period and are the most common projectile point in Coles Creek deposits.

Roe and Schilling (2010:157) have noted that "settlements became less dispersed and more aggregated around mound centers throughout the Coles Creek period." There is also a trend throughout the Coles Creek period "towards more clearly delineated mound-and-plaza precincts" at mound sites (Roe and Schilling 2010:161). As with the preceding periods, most of

the population lived in non-mound settlements that gathered periodically at mound centers for rituals and social events (Roe and Schilling 2010).

Subsistence was based on wild plants and animals readily available within the region as Coles Creek subsistence followed the hunter-gatherer-fisher model of previous generations. Although the trend of foraging practices continued, the Coles Creek period saw an increase in consumption of starchy plants and domesticated native grasses, such as maygrass, chenopod, and knotweed (Roe and Schilling 2010). Along the coast, alligator and muskrat were available, along with deer and fish.

The Mississippi Period and Plaquemine Culture (750-250 B.P.)

The term "Mississippi" has been characterized as including a variety of interrelated regional cultures with shared material traits such as the spread of shell tempered ceramics and wall-trench housing, as well as systems of sociopolitical, economic, and religious organization (Steponaitis 1986). It is the last and most complex stage of precolonial Native culture in the Southeast (Bense 1994). The cultural tradition represented during this period in southeastern Louisiana is Plaquemine culture, which emerged from the preceding Coles Creek culture at approximately 750 B.P. (Rees 2010). During the last precolonial period in eastern North America, the southern portion of the LMV was the scene of major mound building activities (Brown 1985). Pyramidal platform mounds were constructed at hundreds of Plaquemine culture sites as both population and sociopolitical organization reached their peak (Brown 1985). The Plaquemine culture extended over a large portion of what are now the states of Mississippi and Louisiana.

The Plaquemine culture type site, Medora (16WBR1), was located on the Mississippi River floodplain at Manchac Point, south of Baton Rouge and was characterized by Quimby (1951) as a ceremonial center. Plaquemine culture traits include the construction of earthen mounds in association with an adjacent plaza, and a continuation of Coles Creek ceramic tradition that includes grog tempering, with some minor amounts of shell tempering (Rees 2010). According to Weinstein et al. (2012), Philips (1970) initially considered Plaquemine culture to have been an outgrowth of Coles Creek culture, where the interaction between Mississippian and Plaquemine cultures was represented in gradual changes to the Plaquemine ceramic tradition and settlement pattern. Furthermore, Philips (1970) stated that this gradual change ultimately resulted in Mississippian groups displacing the resident Plaquemine groups circa 550 B.P.. Kidder (2010:202) has also argued that that Plaquemine culture is an outgrowth of indigenous Coles Creek populations, "especially the elite, coalescing in response to external challenges." Brain (1989), however, viewed the sequence of events slightly differently. He argued that the LMV culture that experienced the initial Mississippian contact was Coles Creek, and that the resulting manifestation was Plaquemine culture (Weinstein et al. 2012).

This period also saw "social and political hierarchies manifest in public architecture, as civic-ceremonial centers began to proliferate across the region" (Steponaitis 1986:390). A typical center may have included a plaza with "one or more pyramidal mounds which may have contained an elite residence, charnel house, or other public building" (Steponaitis 1986:390). Period settlements may have manifested in a variety of forms and include large "mound and village complexes" with hundreds of inhabitants and fortified with walls and ditches, nucleated villages with no mounds, also fortified, civic-ceremonial centers with small resident

populations, and tiny farmsteads made up of a few families" (Steponaitis 1986:390). Various authors have suggested that these communities were linked by political, economic, and social ties to larger regional polities, which varied in size and complexity (Brown 2007; Rees 2010; Rees and Livingood 2007).

Baytown Plain ceramics, an undecorated grog-tempered type, comprises the majority of ceramic assemblages recovered from Plaquemine sites. Shell tempering has been used to indicate the distinction between Mississippian and Plaquemine culture and is the basis for "determining whether or not those who used one tempering agent or the other belonged to culturally distinct groups" (Kidder 2010:197). Other artifact types associated with Plaquemine sites include ceramic and stone smoking pipes, stone celts, discoidals or disks, and small, stemmed projectile points (Rees 2010).

Maize has been recovered from Plaquemine period sites, however, little is known about the relative dietary and economic significance of agriculture throughout the LMV (Rees and Livingood 2007). Subsistence remains recovered from Plaquemine period sites indicate both intensive and extensive use of wild plant foods such as acorn, pecan, hickory, and persimmon as well as animal resources including deer, fish, and other aquatic resources (Rees 2010).

The Delta Natchezan phase along the western coast represents "indigenous Plaquemine culture in the protohistoric period," and shows a "continuation of traditional trends in ceramics and other aspects of material culture" (Miller et al. 2000:343-348). In contrast, the Bayou Petre phase along the eastern coast, "recognizes a great increase in the use of coarse shell tempered wares, including Moundville and Pensacola culture decorative types"

in the region encompassed by St. Bernard and Plaquemines Parishes (Miller et al. 2000:343-348; Weinstein 1987). In general, non-local Mississippian artifacts, including various types of shell-tempered pottery, are less common and appear later in the southern part of the state (Rees 2010).

Mississippian culture, in contrast to Plaquemine culture, is not well represented in Louisiana archaeological site contexts (Neuman 1984; Rees 2010). Most mound sites with Mississippian components in south-central Louisiana are small and associated with Plaquemine culture, similar to those identified at the Adams Bay site. Rees (2010:182) interprets Mississippian culture in the state as “non-local and intrusive”.

Summary

Over time coastal cultures developed into distinct cultural entities, possibly as far back as the Paleoindian period, but most definitely by the Late Archaic. Subsistence patterns in this region diverge from those manifesting within the interior and is evidenced by the dependence on riverine and coastal resources such as shellfish and other marine animals as well as high, dry ground on which to live. As pottery stylistic varieties become more influenced from the east in areas of Mississippi and Florida, coastal assemblages begin to diverge from their interior counterparts. These traits help to define the precolonial cultures of coastal Louisiana and shed light into the diverse interaction amongst the peoples living in this unique environment. The material culture that began to manifest among the cultures along the Louisiana coast was a result of interaction in a diverse geologically active environment that will be discussed in the following chapter.

Chapter 3: Natural Setting

The Louisiana coastline is a dynamic and complex environment that saw its geologic development begin some 7,000 years ago (Britsch and Dunbar 1993). This period of development falls within the current interglacial stage, the Holocene epoch, 10,000 B.P.-present (Saucier 1994a). The Holocene is characterized by warmer and drier conditions than its predecessor the Pleistocene, with conditions similar to the present-day environment (Bense 1994).

The natural cycles of change have been drastically altered by human activity in the region resulting in devastating land loss. Within the last 80 years coastal Louisiana has undergone a net loss in land area of about -1,883 square miles (mi^2) (Couvillion et al. 2011). Couvillion et al. (2011) calculate that if this were to occur at a constant rate, it would equate to Louisiana losing an area the size of one football field per hour. The natural and anthropogenic processes that are having a devastating consequence to the coastline are equally devastating to the archaeological sites situated within these landforms. As sites sink or erode away we are left with a void in the archaeological record. Therefore, it is imperative we begin to understand the effect these processes of change have on archaeological sites, in particular the Adams Bay site, and devise strategies which serve to preserve these sites and the information they offer to the archaeology of coastal Louisiana.

Wetlands loss in these marshlands is not a modern phenomenon. However, hitherto, loss in one area was offset by natural marsh creation in another area from channel switching, providing new sediment distribution from the Mississippi River. However, with feats of human engineering now controlling the flow of the Mississippi, the river is regulated to

distributing sediment off the edge of the continental shelf, waters so deep that new marsh cannot be created along the coast.

Coastal Regions

Louisiana's coast consists of three major regions: the Deltaic Plain, the Alluvial Valley, and the Chenier Plain (Figure 3.1). During the Early and mid-Holocene the Deltaic Plain was continually reshaped by channel movement and distributary formation, eroding some Pleistocene surfaces while also leaving others on abandoned channels or levees (Rees 2010, Saucier 1994a, Smith 1986). The end result of this long period of deltaic sedimentation has been the formation of a vast expanse of marshlands separated by active and abandoned distributaries (Britsch and Dunbar 1993:324). The Deltaic Plain materialized as delta complexes distributed sediment westward along the coast and were eventually deposited from overbank flooding along the existing shoreline as mudflats and narrow wooded beach ridges (Owen 2008). Numerous cycles of deposition and erosion have been responsible for creating the alternating ridges separated by marshlands which are characteristic of the Deltaic Plain (Britsch and Dunbar 1993:324). The processes that lead to the formation of ridges and cheniers, which are oak tree belts that mark the distribution of the ridges, made coastal habitation more suitable for humans given the availability of resources, the creation of trade routes, and protection from storm surge and flooding (Cloy and Ostahowski 2015). The current study area for this project rests within the Deltaic Plain.

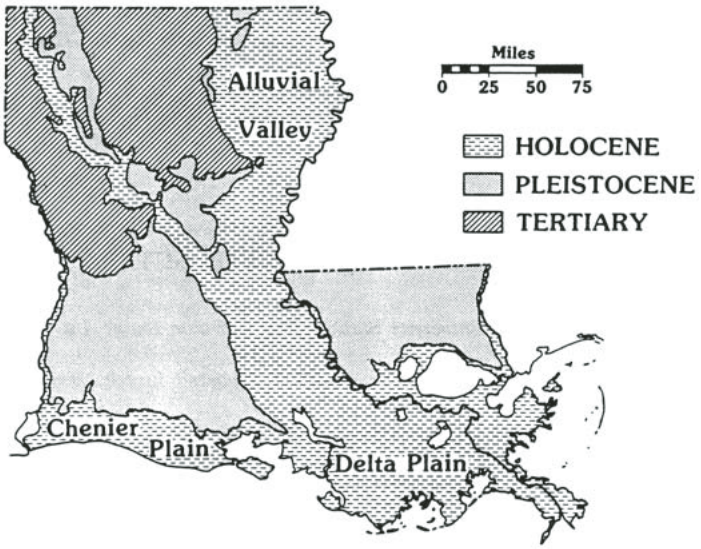

Figure 3.1. Geologic map of Louisiana (From Penland and Suter 1989).

The Deltaic Plain

The Deltaic Plain is the southernmost segment of the LMV and consists of four subregions: the Atchafalaya Basin, the Pontchartrain Basin, the Barataria Basin, and the Terrebonne Marsh (Saucier 1994a). The Adams Bay site is in the Barataria Basin. Geographically, the Deltaic Plain separates from the Alluvial Valley, a landform that consists primarily of Wisconsin and Holocene deposits, along the Donaldsonville–Franklin line, named for the town that approximates its limits (Saucier 1994a). Geologically, the Deltaic Plain starts further inland, some 80 miles, to the head of the Atchafalaya River, a stream that represents the first and most upstream Mississippi River distributary flowing into the Gulf of Mexico (Saucier 1994a).

This vast expanse of deltaic environment is the result of delta cycles in which new delta lobes are created as river sediment is deposited along its banks. This progradation and degradation creates new landforms while eroding away others (Saucier 1994a). The deltaic

cycle operates on the level of the subdelta, with several occurrences of progradation and degradation forming a single delta lobe complex (Hunter and Reeves 1990). As this happens, we are left with a dynamic and ever changing environment in which plants and animals can thrive. The Deltaic Plain has an approximate elevation of 1.5 m (5 ft.) due to large expanses of intertidal marshes. These marshes are maintained by low energy flooding and organic deposition (Saucier 1994a). Due to these low lying elevations, prominent ridges in the surrounding area may be visible for many miles, thus making for ideal areas of which to habitat.

Five delta complexes prograded during the Holocene (Saucier 1994a): the Maringouin (7000-6000 B.P.), Teche (6000-3000 B.P.), St. Bernard (4500-3000 B.P.), Lafourche (3500-1500 B.P.), and Plaquemines (Balize or Modern delta) (1000 B.P.-Present). The continuing changes occurring during these delta complexes helped in shaping the Deltaic Plain (Saucier 1994a). Around 1000 to 800 B.P. there was an apparent increase in discharge past New Orleans, initiating the development of the Plaquemines Complex (Saucier 1994a). The progradation continued rapidly until approximately 500-400 B.P. Using this information in concurrence with the current understanding of the cultural occupation (Figure 3.2) in the region, it is very likely that the Plaquemines Complex provided the landform on which the Adams Bay site resides. Although there is ample evidence for occupation of the Louisiana coast for approximately the last 11,500 years, the current surface of the majority of the landforms in the Deltaic Plain are geologically too recent to have been occupied before about 4,500 years ago (Cloy and Ostahowski 2015). Sites older than that are now buried beneath the naturally deposited sediment or have been destroyed by the erosion process.

Saucier (1994a:14) notes that archaeological sites have immense importance as "chronostratigraphic" markers, providing reliable evidence to the age of a landform. Artifacts associated with a particular cultural period can often provide age estimates to within several hundred years (Saucier 1994a). Additionally, when items such as wood, charcoal, bone, and other organic matter are recovered, the landform can be dated through radiocarbon assays. Further complicating the issue is the lack of landscape stability in the region. Changes in the physical landscape and biological communities operating on the Deltaic Plain are constantly altering the environment. Therefore, an understanding of the types and rates of these natural and anthropogenic processes and the effect to the geomorphic setting become critical to predicting where past cultures may have lived, how they subsisted, and where their cultural remains may be preserved.

As archaeological sites submerge and are encapsulated by new sedimentary deposits this provides an unintentional form of preservation. Examples of this level of preservation has been witnessed at shipwreck sites as well as the Severn Estuary site in Great Britain and Little Salt Spring in Sarasota, Florida (Bell and Neumann 1997; Clausen et al. 1979). Once these sites are underwater, excavation needs to become more specialized. Using a coring device provides the means to test for undisturbed sequences in cultural midden deposits. As these buried archaeological sites are exposed, either through erosion or human activity, there needs to be a rapid response in order to provide the opportunities for data recovery.

Time Interval	Period	Culture
250 B.P.	Historic	Various Cultures
750 B.P.	Mississippi	Natchezan Mississippian/Plaquemine
950 B.P.	Coles Creek	Transitional Coles Creek
1250 B.P.		Coles Creek
1550 B.P.	Baytown	Troyville-like
1949 B.P.	Marksville	Marksville
2450 B.P.	Tchula	Tchefuncte
3450 B.P.	Poverty Point	Poverty Point
4950 B.P.	Archaic	Late Archaic
6950 B.P.		Middle Archaic
7950 B.P.		Early Archaic
9950 B.P.	Paleo-Indian	Late Paleo
11,950 B.P.		Early Paleo

Figure 3.2. Cultural sequence of coastal Louisiana (From Cloy and Ostahowski 2015; based on Weinstein and Gagliano 1985 and Weinstein and Perrault 1994).

Processes Effecting Change on Deltaic Plain

There are several physical processes that are actively changing the Louisiana coastline and the archaeological sites occupying it. Two of the major geologic factors at work are sea-level rise and land subsidence (Lewis 2000). These processes affect shoreline location and create a condition over time in which wave reworking can cause complete destruction of archaeological sites (Figure 3.3 and 3.4) which were once protected by now subsided marshes (Cloy and Ostahowski 2015). The two photographs below were taken in the same location four months apart and provide visual evidence of how continued wave reworking erodes the landscape.

Figure 3.3. Photo showing wave reworking of east bank at 16PL8, July 2016, facing southwest.

Figure 3.4. Photo showing wave reworking of east bank at 16PL8, November 2016, facing southwest.

The major causes of change in the relative elevation of land and sea are eustatic, isostatic, and tectonic processes. Eustatic processes occur on a global scale as waters rise and fall in the interconnected seas and oceans. The process is most commonly a result of melting glaciers. Isostatic processes are more localized and produce effects related to the sinking and rising of the land caused by glacial rebound, fluid withdrawal, and other geological processes. The combined result of these processes is referred to as relative sea level change. Tectonic processes influence the composition of the atmosphere leading to slowly evolving environmental changes that directly and indirectly lead to a wide range of climate change. Although tectonic processes may be a more gradual change, they can have a lasting effect to the climate.

The combined effect of sea-level rise and land subsidence is often to bury archaeological sites more or less intact beneath the muck, sand, and water rather than wash

them away (Lewis 2000:525). Therefore, these sites would potentially offer the same research potential as unburied sites (Lewis 2000) they are now just harder to access. Along the Louisiana coast, as the relative sea-level rises, the marshes sink leaving many archaeological sites distinguishable only by the oak tree covered tops of mounds along the landscape. The ground surface on which these mounds were constructed is now potentially buried beneath the present marsh level. The information recovered from these submerged sites will aid in further understanding the cultural occupations of the region.

Current Environment

The Adams Bay site is in the saltwater marsh of Adams Bay (Figure 3.5). Adams Bay lies within Barataria Bay, an estuary of the Gulf of Mexico that is approximately 15 miles long and 12 miles wide. This coastal environment is frequently exposed to erosion due to wind, currents, gravity, and other phenomena (Saucier 1994a). The principal cause of erosion in Adams Bay is water, where wind, waves and currents are the dominating force along coastal zones (Saucier 1994a). Human development has also caused coastal erosion in Adams Bay and these processes include oil and gas exploration, as well as the channeling of navigation routes. The Adams Bay site has suffered great deterioration and as the environment succumbs to geomorphic processes and human impacts it will become more difficult for researchers to access. Figure 3.6 depicts the current conditions at the Adams Bay site. The information gathered from this site for this thesis may be the last acquired before the site is either washed away and/or completely submerged.

The exposed portions of the Adams Bay site measure approximately 110m N/S x 50m E/W. Mound 1 is currently about 1.2 m high and has water encroaching from the north and

east. Several live oak trees (*Quercus virginiana*) are currently growing on the mound summit. The south and west sides of Mound 1 are covered with *Spartina* marsh grass which dominates the landscape. Other vegetation present are wax myrtle bushes *(Myrica cerifera*), common reed, and black mangrove (*Avicennia germinans*). Mound 2 seems to have completely subsided, leaving only the remnants of two live oaks. The northern and eastern boundaries of the site are marked by a shell beach midden. This midden is comprised predominately of oyster (*Crassostrea virginica*) and rangia (*Rangia cuneata*) shells, but also contains minor amounts of other marine mollusks. Extant fauna witnessed during field survey include fish, otters, dolphins, oysters, and various birds.

Figure 3.5. Aerial view of the Adams Bay site showing the site location and layout. (Image modified from Google Earth 2016).

Southeast Louisiana lies within a humid subtropical climate, with long, hot, humid summers and short, mild winters. These subtropical climatic characteristics are influenced by the Gulf of Mexico and results in annual rainfalls of 152-165 centimeters (cm) (60-65 in) per year as well as a warm climate with temperatures averaging 20.3° C (68.5° F). The climate is relatively hospitable to human occupation; however Louisiana is susceptible to river floods and hurricanes (Gagliano 1979). In the United States, Louisiana ranks third in terms of recorded hurricane landfalls (Cloy and Ostahowski 2015; Rohli et al. 2013).

Figure 3.6. Current conditions at the Adams Bay site. Photo taken July 2016, facing approximately southeast.

Summary

As the discussion above implies, the natural and anthropogenic processes occurring in Adams Bay, are having devastating consequences at the Adams Bay site. As delta formation

and sea-level rise have buried and redeposited Louisiana's oldest archaeological sites, those sites remaining along the coast are set to suffer a similar fate. Therefore, it becomes imperative to further understand the effects these processes have along Louisiana's coastline and develop the necessary models that help to identify and preserve these rapidly disappearing sites. Furthermore, the process of delta formation, as it is currently understood, would not have occurred this far down river until the Plaquemine delta began ca. 1000-800 B.P., making habitation in these marshes not possible before that time. This would appear to be corroborated by the results of previous investigations at the Adams Bay site as discussed in the next chapter.

Chapter 4: Previous Investigations

The Adams Bay site (16PL8) is a precolonial mound and shell midden complex in the Deltaic Plain of southeastern Louisiana. The site is located about 97 km (60 mi) south-southeast of New Orleans, on an unnamed marsh island of Adams Bay in Plaquemines Parish, Louisiana. The multicomponent site includes possible Mississippi period and Protohistoric period, Pensacola and/or late Plaquemine cultural components (late Bayou Petre and/ or Delta Natchezan phase) ca. 450-250 B.P. and unknown historic components (Cloy and Ostahowski 2015).

During their 2011 archaeological investigations (Figure 4.2) in support of the MC252 (Deepwater Horizon) oil spill response, HDR Environmental, Operations and Construction, Inc. recorded the Adams Bay site as encompassing an area 0.97 ha and measured 180 m north-south x 70 m east-west. Cloy and Ostahowski (2015) documented the site relief as level, with topographic elevations ranging from 0-1.5 m (0-5 ft) above mean sea level. The soils mapped in 2011 at the Adams Bay site consisted of Bellpass muck (very poorly drained organic soils and water). Vegetation at the Adams Bay site consists of marsh grass *Spartina* sp., live oaks (*Quercus virginiana*), wax myrtle (*Myrica cerifera*), black mangrove (*Avicennia germinas*), and Roseau cane (*Phragmites australis*) (Cloy and Ostahowski 2015).

The Adams Bay site was first recorded by Dr. Fred Kniffen on April 12, 1936. Kniffen (1936) identified it as an earthen mound and shell midden site surrounded by marsh. Kniffen's sketch map (Figure 4.1) from 1936 shows three mounds–a northern mound (Mound 1), a west-central mound (Mound 2), and a southern mound (Mound 3)–near the shore of Adams Bay. Ceramics (n=8) collected during this survey were identified as "clay-tempered plain."

According to Cloy and Ostahowski (2015:566), Saucier and McIntire appear to have examined the sherds in 1953 and identified them as plain clay tempered (n=6), “unidentified” (n=1), and “Haynes Bluff type (limestone tempered)” (n=1). Cloy and Ostahowski (2015) concluded that the Haynes Bluff sherd’s limestone temper was in fact blocky shell temper, and therefore the sherd may actually have been Graveline *var. unspecified* or Guillory Plain *var. unspecified*, which Fuller (1996) recognizes as a ware class of shell-tempered ceramics in Pensacola culture areas.

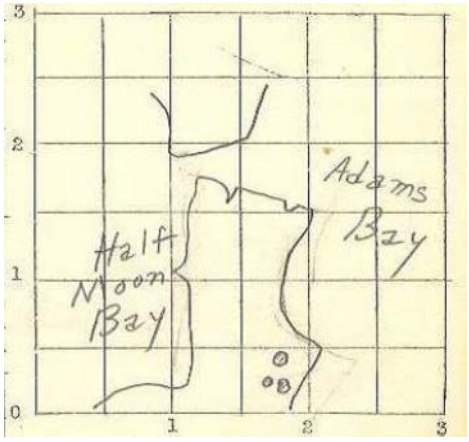

Figure 4.1. Kniffen's sketch map of 16PL8 from his 1936 site card depicting the Adams Bay mounds: Mound 1 (uppermost), Mound 2 (lower-left), and Mound 3 (lower-right). (Site Form on File at the Louisiana Division of Archaeology).

Others have visited the site since Kniffen and have made contributions to our understanding of the Adams Bay site. William McIntire (1958) may have visited the site in the 1950s as it is included on Plate 8b from his thesis to reconstruct the prehistoric settlement pattern of coastal Louisiana (Cloy and Ostahowski 2015). Gulf South Research Institute (GSRI) revisited the site in 1975 during their survey of a proposed pipeline, noting one mound surrounded by marsh (Saltus et al. 1975). GSRI recorded the mound as measuring approximately 65 ft. in diameter and 5 ft. high. GSRI also collected “plain clay tempered and

incised sherds of unknown types" which Cloy and Ostahowski (2015) have concluded are likely Baytown Plain ware. Robert W. Neuman (1977) noted that 16PL8 comprised "shell mounds and midden." He reported the dimensions of Mound 1 as 89 x 54 ft. and 5.5 ft. high (Cloy and Ostahowski 2015). Neuman identified the Adams Bay site as a Plaquemine site and assigned it to the Bayou Petre phase, apparently because it had yielded some Mississippian ceramics (i.e., Moundville, Ft. Walton, or Pensacola Incised or limestone-tempered Fatherland or Natchez Incised) (Cloy and Ostahowski 2015:568). Dave D. Davis and associates (1978) revisited the site in 1978 as part of a hurricane protection levee survey and relocated the three mounds but found no evidence of the shell middens, which Cloy and Ostahowski (2015) noted may have subsided sometime after Kniffen recorded the site. HDR revisited the site in 2011 in support of the MC252 (Deepwater Horizon) oil spill response. HDR archaeologists discovered a small, sherd-bearing beach deposit and a large mound about 25 m north on an unnamed marsh island (Cloy and Ostahowski 2015). HDR recovered a total of 55 precolonial ceramics from the beach deposit, including 10 incised sherds (Cloy and Ostahowski 2015). Eleven sherds were surface finds and 44 sherds were recovered from the beach deposit's shell/shell hash stratum. The type-variety of precolonial ceramics include; Baytown Plain, *var. unspecified* (n=45), Unidentified Incised (n=5), Leland Incised, *var. unspecified* (n=3), and Buras Incised, *var. unspecified* (n=2) (Cloy and Ostahowski 2015). Cloy and Ostahowski (2015:574) concluded that a component dating to the late Mississippi or Protohistoric period, Pensacola and/or late Plaquemine culture (late Bayou Petre and/or Delta Natchezan phase), ca. 450-250 B.P., is indicated. Four bone fragments were also recovered from the beach collection and include two long bone fragments from an unidentified large

mammal, a mandibular fragment from an unidentified small mammal, and a probable tibia fragment from an unidentified large bird (Cloy and Ostahowski 2015:574). Furthermore, they indicate that the artifacts appear to be secondary deposits that were eroded and subsequently wave washed onto the current shore. They base their conclusion on the condition of the sherds, which are moderately to severely wave-worn, and the presence of oyster shell and barnacles attached to two of the bone fragments recovered (Cloy and Ostahowski 2015:574).

There has been little comprehensive cultural resources survey within Adams Bay and Plaquemine occupation with minor Mississippian interaction (Brown 2012). The site consists of an extensive, wave-washed and re-deposited shell midden containing diagnostic Coles Creek, Plaquemine, and Mississippian pottery. The data that Brown's study provided coupled with the data that was acquired for this thesis, will add to the paucity of literature pertaining to Louisiana's coastal archaeological sites, providing future archaeologists the base line data to continue to investigate this region. Realizing the deficiency of literature relating to the studies of archaeological sites in the region led to the development of research goals that drove this project and are organized below.

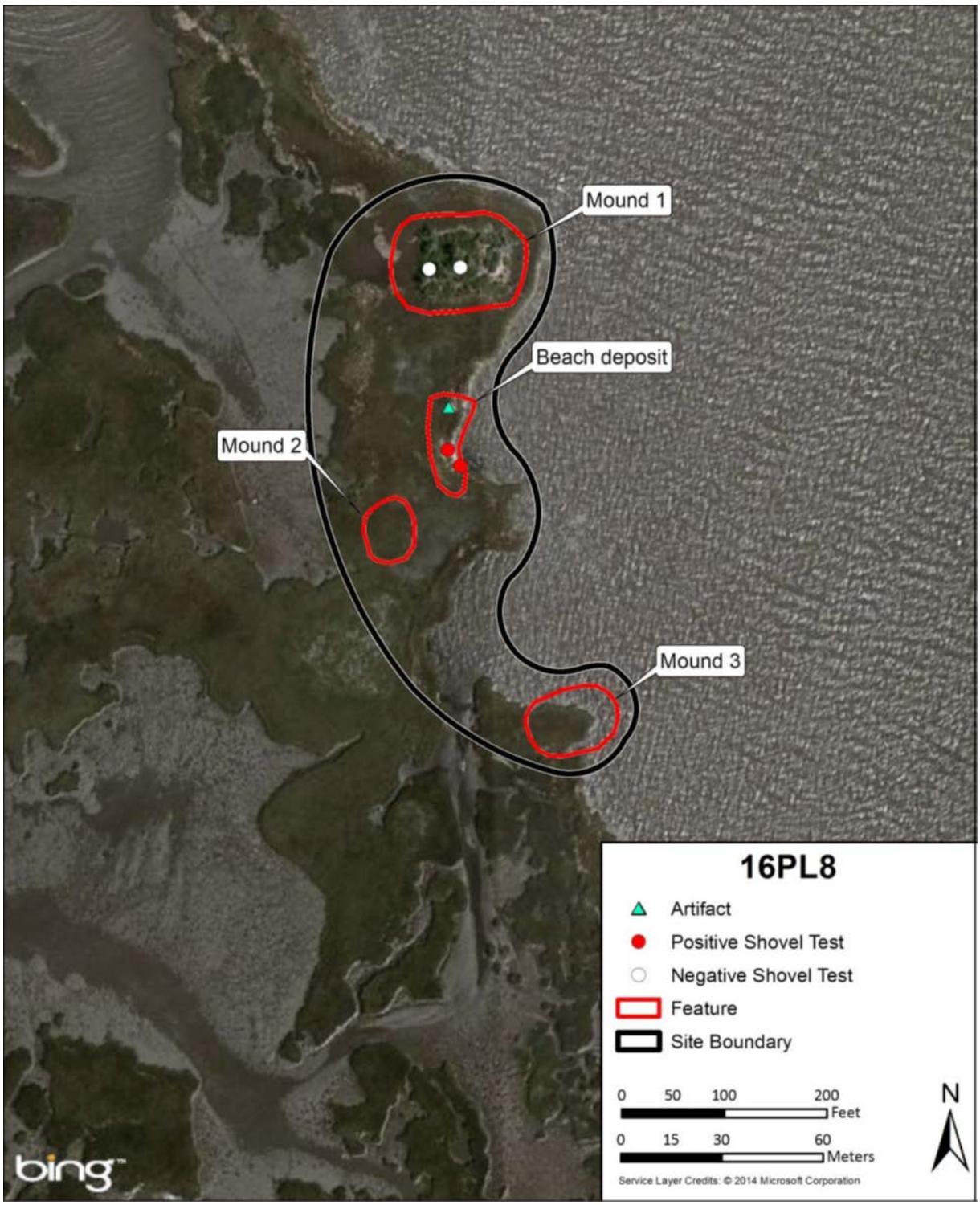

Figure 4.2. Site sketch map completed by HDR in January 2011. (Site Form on file at the Louisiana Division of Archaeology).

Research Goals

With the site perishing due to natural and anthropogenic stressors it is imperative to document these impacts as well as the occupational sequence of the site. Therefore, this project set out to accomplish two goals. With little systematic archaeological research conducted at 16PL8, the first goal was to determine the horizontal and vertical limits of the site, the site affiliation(s), site chronology, site integrity, and site's place in the regional culture-history.

In an effort to create a cultural understanding of the Adams Bay site, I sought to address the following questions:

- What is the site's horizontal and vertical extent?
- Is there a single or multi-component occupation at the site?
- If it is a multi-component site, can I determine the different cultural affiliations and place them into the regional culture-history?
- Does the site retain any depositional integrity?
- If the site retains integrity, can I determine a site chronology?

The second goal was to identify the natural and anthropogenic impacts to the Adams Bay site (16PL8) and to assess the effects of these processes, such as sea level rise, land subsidence, and erosion to the archaeological record at the Adams Bay site. Submergence refers to the permanent flooding of the coast caused by a rise in global sea level and/or subsidence of the land (Morton et al. 2003). It is argued that the combined effect of eustatic sea level rise and land subsidence on low energy coasts, consistent with those found in Louisiana, often submerges archaeological sites beneath muck and sand rather than eroding or

redepositing the sites (Lewis 2000). These submerged sites, it has been argued, should remain viable and retain the same research potential as terrestrial sites because the overlying layer of muck and sand act as a de facto form of preservation (Gagliano 1984:28; Gagliano et al. 1977: :29-30; Lewis 2000). Submergence occurs in an area in which the vertical accretion in the marshes cannot keep pace with coastal submergence (R.D. DeLaune et al. 1983). The process of coastal erosion consists of a steady depletion of wetlands along the coastline in marshes, swamps, and barrier islands, particularly affecting the alluvial basin surrounding the mouth of the Mississippi River at the foot of the Gulf of Mexico (Saltus et al. 2003). Coastal erosion is the result of various factors, one of which involves the lack of traditionally occurring deposits of fresh water and silt from the river caused by man-made levees (Saltus et al. 2003). As submergence increase, marshes turn to open-water bodies as relative sea levels rise. Further complicating the issue is that submergence accelerates coastal erosion as it facilitates greater inland penetration of waves (Morton et al. 2003). These impacts are almost certainly affecting other coastal sites in Louisiana and along the Gulf Coast. By understanding how these processes affect archaeological sites we can begin to create a preservation plan for future management of these cultural resources in a coastal environment. Therefore, it is imperative to address the following issues:

- Does the subsided portion of the Adams Bay site retain depositional integrity?
- If integrity is present, can I associate the deposits with the terrestrial portion of the site?
- Are eroded and wave-washed artifacts present on the shoreline?

- If so, are these secondary deposits associated with the mound group at the Adams Bay site?
- Have the mounds and other site features at the Adams Bay site retained the orientation, formation, and integrity initially identified by Kniffen in 1936?

The methods presented in the following chapter sought to answer these questions and provide a more complete understanding to the cultures that occupied this site as well as understanding the natural and anthropogenic processes affecting the current landscape and the cultural materials that were identified.

Chapter 5: Methods and Results

Adams Bay is a vast area of shallow flats and oyster beds stretching west and south of the Empire Bridge in Plaquemines Parish, Louisiana. Situated in the southwest portion of this bay is the Adams Bay site (16PL8), located on an unnamed marsh island (Figure 5.1). Subsidence has inundated a significant portion of the western shoreline of Adams Bay (Cloy and Ostahowski 2015). Along the eastern edge of the site, erosion is having devastating consequences (Figure 5.2). Prior to this research, it was known that pottery collected by Neuman (1977) identified the site as Plaquemine and was assigned to the Bayou Petre phase as it had yielded some Mississippian ceramics (i.e., Moundville, Ft. Walton, and/or Pensacola Incised and/or shell-tempered Fatherland or Natchez Incised). During their 2011 archaeological investigations in support of the MC252 (Deepwater Horizon) oil spill response, HDR archaeologists recovered ceramic artifacts dating to the late Mississippi period from the Pensacola and/or late Plaquemine culture (late Bayou Petre and/or Delta Natchezan phase), ca. 40-250 B.P.. They also noted that the orientation, formation, and overall shape of the three mounds had remained largely unchanged since Kniffen initially identified the site in 1936 (Cloy and Ostahowski 2015). The lone exception was Mound 3, which was partially submerged in Adams Bay and thought to retain intact deposits (Cloy and Ostahowski 2015). When the field work for this thesis began in July of 2016, only Mound 1 was visible in the current landscape. Mound 2 has submerged and was identified by the decaying stumps of two oak trees similar to those covering Mound 1 and Mound 3 had been lost to open water.

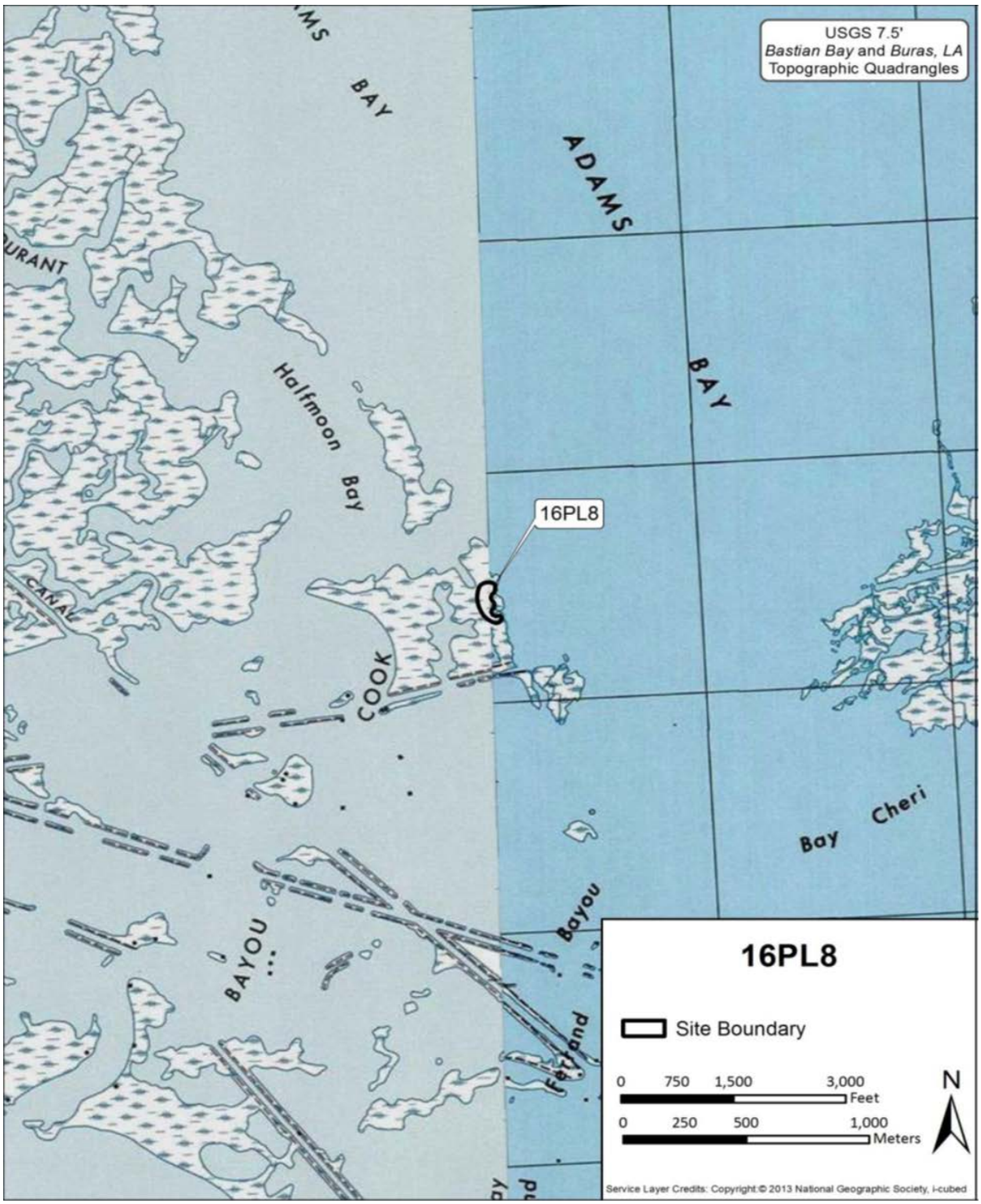

Figure 5.1. USGS 7.5" quadrangle map of site area (Site Form on file at the Louisiana Division of Archaeology).

Figure 5.2. View of east bank erosion.

Field Methods

Research at the Adams Bay site was conducted over a six-month period beginning in July of 2016 and ending in December 2016. Goals for this project included the mapping of soils profiles in eroded bank-lines, core samples for geomorphology and stratigraphy analysis, producing a topographic map, and controlled surface collection along a shell midden. The purpose of the surface collection was to obtain information about the spatial distribution of the different pottery types and to acquire diagnostic artifacts to determine the cultural affiliation(s) of the site. The soils data would aid in identifying the effects subsidence, coastal erosion, and rising sea levels have on archaeological resources. Furthermore, soils collected would aid in the identification of carbon, midden deposits, flora and faunal, the amount of

wave deposited shell present at the Adams Bay site, the structure of the landform, and depositional site formation processes. Mapping of the site using a total station was needed to provide an accurate topography of the site, as the Adams Bay site had not previously been mapped. This fieldwork should not be viewed as a complete understanding of the site; however, it does provide basic information in understanding the cultural historical setting in the late precolonial period along the coast.

Surface Collection

A surface collection was conducted along the shell beach midden during a low tide event. The shell midden consists of wave-washed, redeposited rangia and oyster shell, Native ceramics, faunal remains, and actively eroded shell from the site (Figure 5.3). Rangia shell middens are also common features found at coastal sites and while rangia and oyster are highly visible in the archaeological record, fish probably provided the bulk of calories and protein (Brown 1985). No Native ceramics were noticed eroding from the site. Collection was conducted within a 5 m x 2.5 m grid across accessible shell beach. The grid was divided and mapped into four manageable surface collection units using a tape measure along a compass heading that provided the greatest coverage along the beach for the collection of artifacts. The angle was approximately due north with grid units extending both east and west.

Figure 5.3. Wave washed redeposited shell and aboriginal ceramics along shell beach midden.

Units were assigned a provenience number based on their direction along the grid (Figure 5.4). The extent of each unit conformed to the eroded bank along the north, south, and west of the shell beach and along the water to the east. The tide thus created variability to some extent as pertained to unit size. Priority was given to the collection of those ceramics that showed variety in size, temper, and decoration to indicate differences in type frequency, perhaps indicating cultural influence. As a result, it should be kept in mind that this sample contains biases.

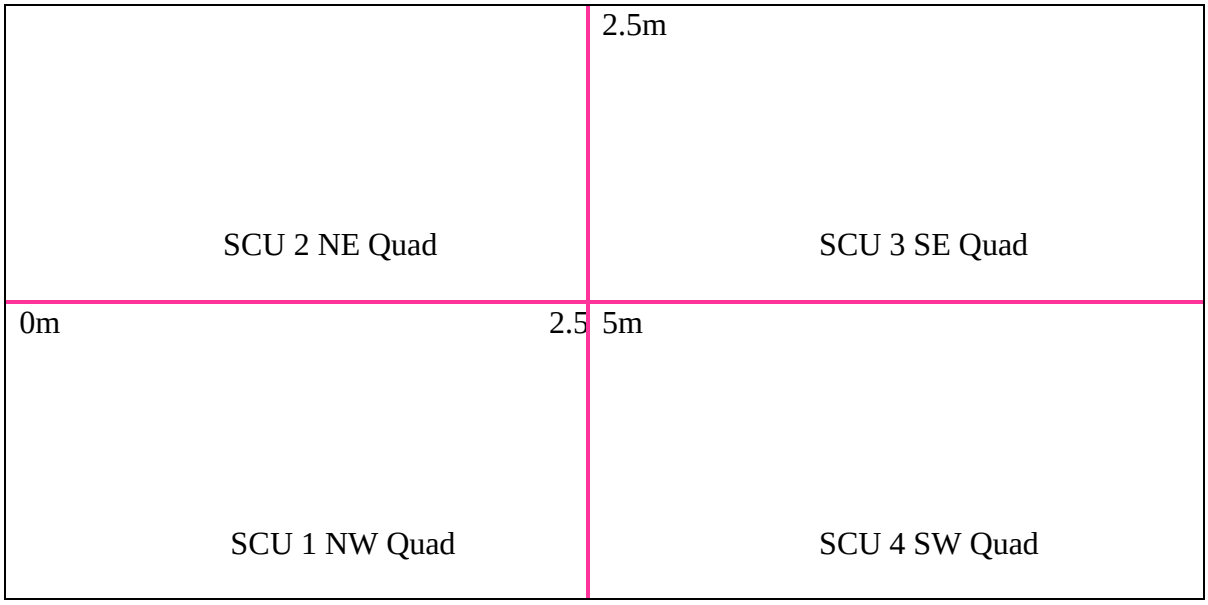

Figure 5.4. Example of SCU numbering.

Collection of artifacts was conducted within each unit for a minimum of five minutes. These parameters were set to ensure sufficient collection. In addition, given the wide variability in the size of rangia and oyster shell, the largest and smallest rangia and the largest and smallest oyster were collected to record the range. Artifacts and shell from each unit were bagged and assigned a field specimen number (FS).

Coring

Coring was done using 1 ¼ inch diameter PVC pipe, hard driven into various places across the site (Figure 5.5). These areas were chosen based on proximity to the mounds, bank lines, and plaza. This data was collected to compare stratigraphy at the site. A total of seven cores were collected. Once collected, the cores were halved, photographed, assigned a Munsell value, chroma, and hue, drawn and digitized to evaluate mound construction sequences, presence/ absence of archaeological materials, and depositional integrity.

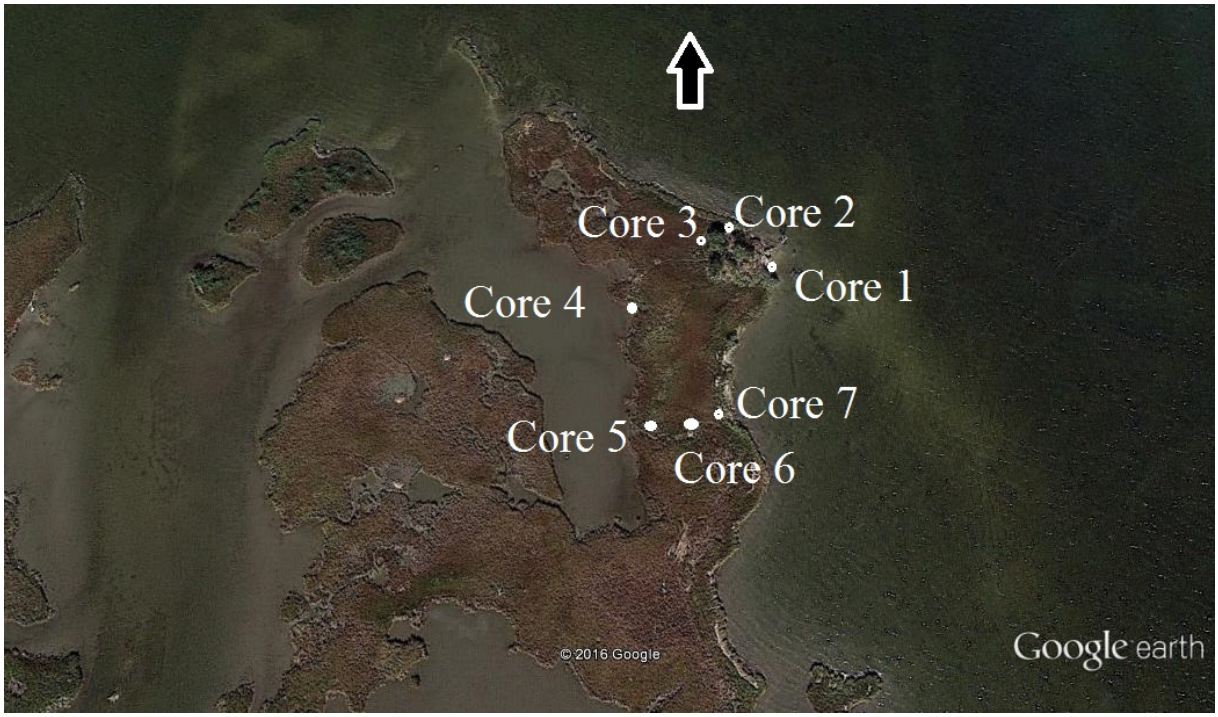

Figure 5.5. Core locations at 16PL8. (Image Modified from Google Earth, 2017).

Mapping

A topographic map was created to show site layout using a Topcon GTS-229 Total station (Figure 5.6 and Figure 5.7). The topographic map shows: a single mound to the north with a possible submerged second mound, located along the southwestern edge of the plaza. Topography shows no evidence for a third mound.

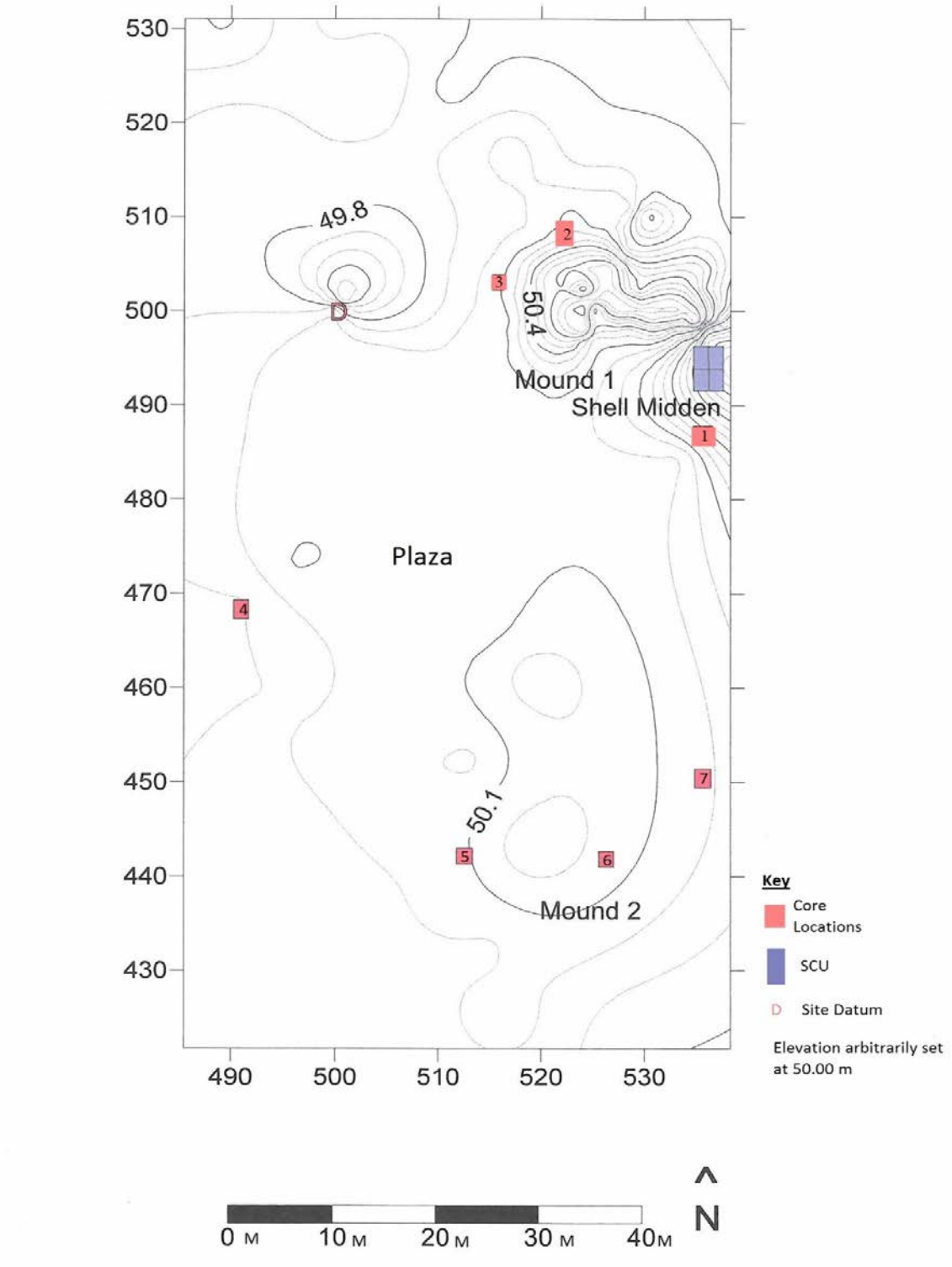

Figure 5.6. Topographic map of the Adams Bay site.

Figure 5.7. Setting up the total station. View from Mound 1, west.

Profiling

Along the east bank of Mound 1 is the area that is most susceptible to wave erosion (Figure 5.8). Because of this erosion, a surface feature, a former living surface and mound fill was visible in this bank line. Therefore, a 2 m long profile was cleared using a trowel and shovel and was photographed (Figure 5.9) and drawn (Figure 5.11). Once the profile was cleaned, a hearth feature and episodes of basket loading became more pronounced (see discussion below) (Figure 5.10) A soil sample was collected from the midden as well as the feature fill for possible radiocarbon dating, flotation of flora and faunal remains, and optically-stimulated luminescence (OSL) dating.

Figure 5.8. Erosion at Mound 1 exposing the mound fill. Facing west.

Figure 5.9. East bank profile.

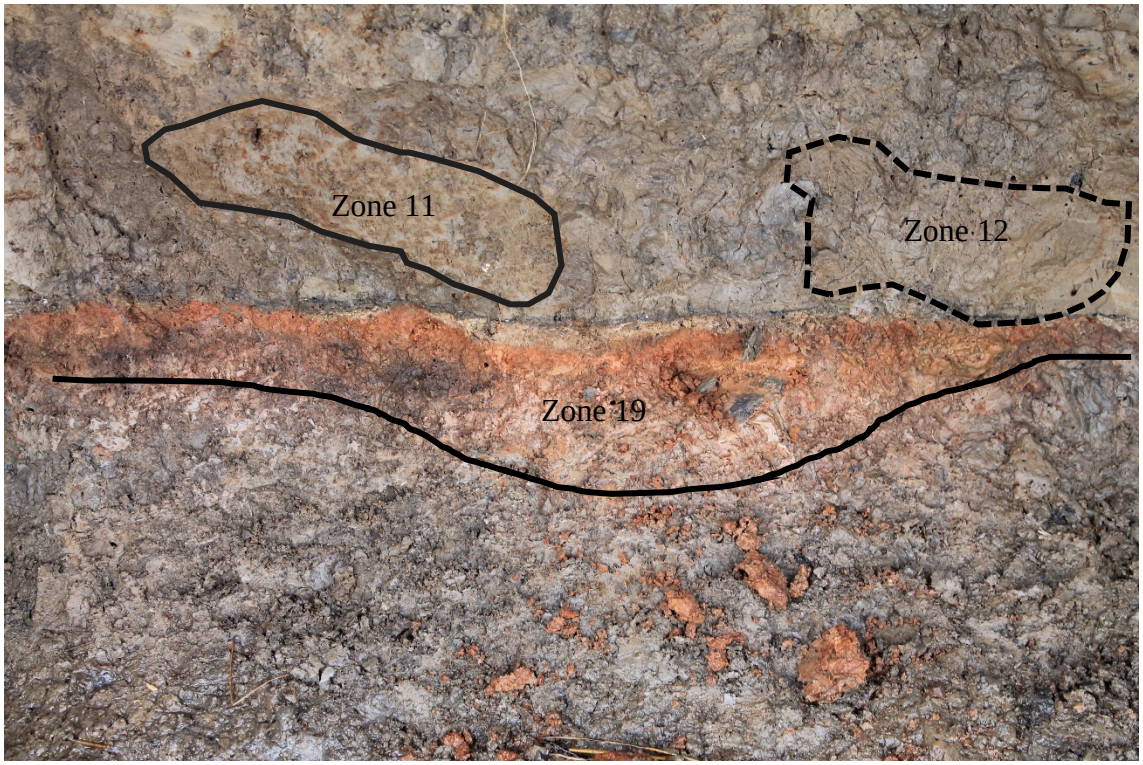

Figure 5.10. Surface hearth feature and basket loading in Mound 1.

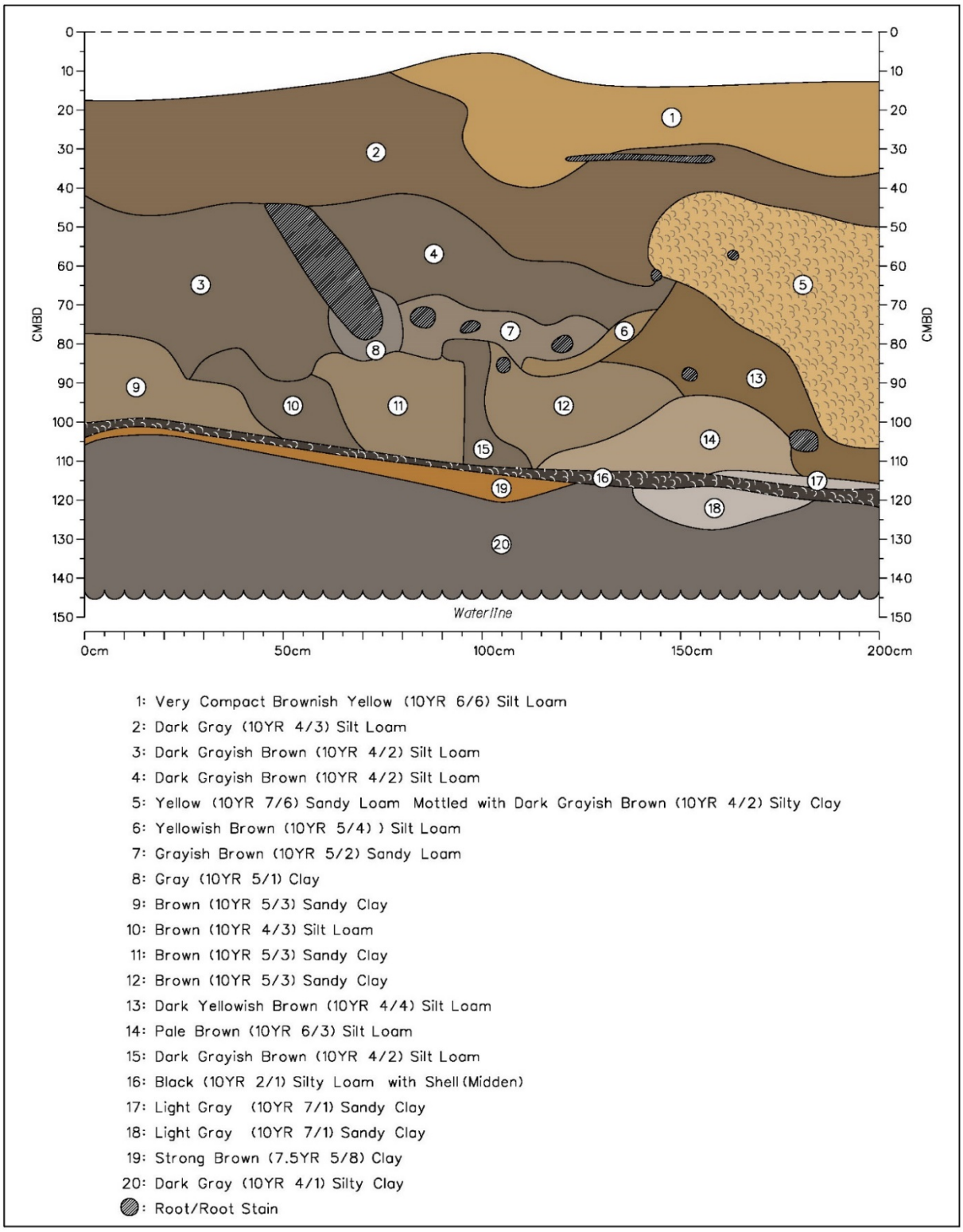

Figure 5.11. East bank mound profile.

Analytical Techniques

Artifacts recovered from the Adams Bay site consisted primarily of ceramics. The purpose of the ceramic analysis is to provide information to the cultural affiliation and occupational sequence at the site while also placing 16PL8 into the larger culture history of the Lower Mississippi River Valley and Louisiana Gulf Coast. These aboriginal potsherds can be incorporated into a culture-chronology already in place in the region (Weinstein et al. 2012). The classification system is derived from the type-variety system established by Wheat et al. (1958). According to Weinstein et al. (2012:149) it was modified for, and introduced into, the Lower Mississippi Valley by Phillips (e.g., Phillips et al. 1951; Phillips 1970) and has seen substantial augmentation since, including contributions from; Williams and Brain (1983), Belmont (1989), Steponaitis (1974), Brown (1985), Brain (1988), Toth (1988), and more locally by Weinstein and Rivet (1978), Giardino (1984, 1994), Kidder (1995), Fuller (1996), Wells et al. (1995), Miller et al. (2000), and McCarthy et al. (2010).

A total of 121 sherds were collected and analyzed. Ceramic sherds were sorted, recorded, and organized by type, variety, surface decoration, vessel portion, and vessel form. Paste characteristics were identified using an eye loupe with a 30x and 60x power magnifier. Count and total weight were recorded for each category. Pottery classification was performed to provide information regarding the age of Native ceramics at the Adams Bay site and in the Gulf Coast region.

Based on previous collections from the Adams Bay site, much of the pottery was expected to be grog-tempered, representing possibly a small Coles Creek component and a more prominent Plaquemine culture component. A small component was expected to be shell-

tempered and from the Mississippi period and include Pensacola and/ or late Plaquemine culture (late Bayou Petre and/ or Delta Natchezan phase) ceramics. The results of this project are presented briefly below, with a more thorough discussion in the next chapter.

Results

Mapping. As currently delineated, the Adams Bay site is approximately 110 x 50 m with an area of 0.40 ha (0.96 ac). During their 2011 investigations, HDR archaeologists recorded the site as 180 x 70 m (0.97 ha). Site relief is level, with topographic elevations ranging from 0-5 ft above mean sea level (0-1.5m). Mound 1 remains visible and is situated above a surface hearth feature and pre-mound midden indicating a depth of approximately 140 cmbs of intact archaeological deposits. The current shoreline is eroding into the eastern portion of Mound 1. Mound 1 is roughly rectangular in outline (~27 m east-west x ~20 m north-south) and rises approximately 1.5 m above the surrounding marsh grass. Cores taken in the plaza (see figure 5.6) show an absence of archaeological material indicating that the plaza was kept clean of debris, a common mound dwelling practice (Rees 2010). Although there is evidence for burial mounds in the area (e.g., Buras Mounds), evidence of human remains was not recovered nor observed at 16PL8. Furthermore, the level of archaeological investigation conducted at this site was not sufficient to confirm or deny the evidence of associated structures on the mound. However, Roe and Schilling (2010:164) note that some Coles Creek flat-topped mounds did not support wooden-post buildings. The lack of mound features may be indicative of the social and religious importance of the mounds, the people and communities that constructed them, or to the leaders that organized their construction (Roe and Schilling 2010). When Kniffen first recorded the site, he noted three mounds arranged

around a central plaza. This mound layout is typical of a Coles Creek mound settlement, which consisted of mound-and-plaza arrangements (Roe and Schilling 2010). This type of construction would have necessitated a detailed degree of planning and coordination for their completion (Roe and Schilling 2010). Furthermore, given the widespread locations of Coles Creek mound-and-plaza arrangements and the similarities in construction and layout indicates intent in meaning and function (Roe and Schilling 2010). Rees (2010b) notes that Plaquemine mound-and-plaza sites along the coast more closely resemble Coles Creek than Mississippian mound sites in layout and design.

Profiling. The east bank profile, which is currently eroding into Mound 1, offers an exposed profile that was mapped and provides a summary of the stratigraphy and construction sequence of the mound (Figure 5.11). The uppermost northern portion of the profile was designated as Zone 1 (~5-40 cmbd) and consisted of mound fill that is a very compact brownish yellow (10YR 6/6) silt loam with minimal root inclusions. The uppermost southern portion of the construction of the mound was designated Zone 2 (~15-65 cmbd) and extends the length of the profile was a dark gray (10YR 4/3) silt loam. Zone 2 graded to Zone 3/4 in the southern portion and Zone 5 in the northern half. Zone 3/4 (~40-90 cmbd) consisted of dark grayish brown (10YR 4/2) silt loam with minimal compaction. Zone 5 (~45-105) was mottled a yellow (10YR 7/6) sandy loam and dark grayish brown (10YR 4/2) silty clay, covering a sizable portion of the northern profile. Zone 6 consisted of a yellowish brown (10YR 5/4) silt loam and appears to represent basket loading. Zones 7-15 all appear to represent basket loading based on the variation in soil composition and color situated above a pre-mound midden deposit (Zone 16) and a pre-mound surface hearth that may have been

burned for ceremonial purposes prior to the construction of the mound (Zone 19). The surface hearth is characterized by the intensity of *in situ* burning represented by the strong brown (7.5YR 5/8) clay and is thickest in the center of the mound and thins towards the edges. Zones 17 and 18 seem to represent a scatter of burnt soil and charcoal that was possibly scraped out of the hearth prior to, or at the time of mound construction. The fired surface extends to the southernmost edge of the profile. Zone 20 was a dark gray (10YR 4/1) clay and does not seem to exhibit any characteristics of an A horizon. That is, Zone 20 consists of Pleistocene clay soils that retain little if any of the parent material and have been stripped of the overlying A horizon, either naturally or culturally. Furthermore, given the sharp boundary represented by Zone 16/19, this feature likely represents the base of the mound and may indicate a common mound-building construction technique of stripping the A horizon prior to construction. For example, Schilling (2010) states that at Cahokia, engineering considerations such as the stripping of A horizon soils were secondary to cultural aspects like symbolic soils and their location on the mound.

Surface collection. As noted above, a surface survey was conducted over a shell midden that was divided into a 2.5m x 5m grid. This survey resulted in the collection of 121 pottery sherds weighing a total of 1,673.3g. The undecorated pottery consisted of Baytown Plain, *var. unspecified*. Fuller (2003) notes that the late varieties of Pensacola culture ceramics in this region tend to occur on Baytown Plain ware rather than the Addis Plain that distinguishes those cultures further to the north in the Natchez Bluffs and the Lower Yazoo Basin. Assigning pastes to varietal status can be rather problematic for archaeologists in the LMV who work with collections dominated by clay-tempered Baytown Plain sherds. This

proves especially true with collections from the Coles Creek/Plaquemine boundary, specifically those sherds with Baytown Plain, *var. Addis* and non-*Addis* pastes. Joanne Ryan's (2004) study of Hedgeland site ceramics in the Tensas Basin has proven useful in dealing with such issues. Ryan was able to differentiate between several varieties of Baytown Plain and create reproducible categories using a microscopic study to examine temper size and shape. This level of analysis was untenable for this thesis and paste analysis considered only temper type including the presence/absence of shell. Middle River Incised, *var. Halfmoon Pass*, Coles Creek Incised, *var. unspecified*, Guillory Plain, *var. St. Bernard*, Owens Punctated, *var. unspecified*, Avoyelles Punctated, *var. unspecified*, Mazique Incised, *var. unspecified*, Carter Engraved, *var. unspecified*, and Coleman Incised, *var. unspecified*, L'Eau Noire Incised, *var. unspecified*, and Leland Incised, *var. unspecified* represent the decorated pottery types collected. Two Unclassified Incised sherds with grog temper and one Unclassified Punctated sherd with grog temper were also collected. A summary of counts and weights is provided in Table 5.1. Other artifacts observed and not collected on the beach include two wave-worn aquamarine glass shards, three colorless glass shards, one ferrous metal fragment, and five faunal fragments that were avoided in the case they were human remains, given the proximity to the mound. Temporal affiliations based on ceramic analysis for the Adams Bay site range from the Coles Creek period through the Mississippi period and include Plaquemine (Bayou Petre/ Barataria Phase) cultures. The ceramic types and varieties identified from Adams Bay are discussed below in alphabetic order by type.

***Avoyelles Punctated, var. unspecified* (n=*1*)**. The type Avoyelles Punctated (Figure 5.13b) includes ceramics that have vertical or slightly slanted rectilinear bands of punctations, usually around the rim or shoulder of the vessel (Phillips 1970). One sherd of Avoyelles Punctated was recovered during this study. This sherd was collected from SCU #2 and exhibited small punctations bordered by fine zoning lines along the top and left portion of the sherd. Avoyelles Punctated has a long history, beginning in the Coles Creek period and continuing into the Mississippi period (Phillips 1970; Williams and Brain 1983).

***Baytown Plain, var. unspecified* (n=*104*)**. As a type, Baytown Plain encompasses great spatial and temporal variation, being seen from the Marksville period to the middle Mississippi period (Phillips 1970). Baytown Plain included all plain sherds with clay or grog inclusions and was the standard plainware found in all surface collection units. As expected, most of the pottery found at the Adams Bay site during the 2016 field seasons was Coles Creek and Plaquemine equivalents of Baytown Plain, however, Coles Creek and Plaquemine varieties of Baytown Plain could not be reliably sorted. It is worth noting that ceramic technology and decorative styles indicate that Plaquemine pottery is rooted in Coles Creek culture (Rees 2010:174; Roe and Schilling 2010:169). Most Plaquemine ceramics are grog-tempered and, as in the Coles Creek period, the most common type of pottery found is Baytown Plain (Rees 2010). Phillips (1970:48) recognized Baytown Plain to be an overextended type with little utility coming from the then-current methods of sorting. In the time since, modest improvement has been made to clarify this issue (e.g., Ryan 2004).

***Carter Engraved var. unspecified* (n=2)**. Williams and Brain (1983) established this type after disputing Phillips' super-type L'eau Noire Incised. Carter is identified by the presence of "multiple parallel lines in dry paste incision or 'engraving' arranged in simple curvilinear patterns" (Phillips 1970:103). The rarity of Carter Engraved in the Delta makes assignment of these ceramics to known varieties impossible (Miller et al. 2000:321). The two sherds collected have open, well executed multiple parallel lines. The incisions are narrow and moderately deep, and form meandering scrolls or looping swirls. These two sherds Figure 5.12a and b) are executed on a coarse clay tempered paste and have incurvate rims.

***Coleman Incised var. unspecified* (n=2)**. These sherds fall into the Coleman type (Coles Creek–Mississippian periods) due to the presence of wide-line incisions with curvilinear motifs on medium-fine, grog-tempered pastes. Coleman Incised, *var. unspecified* (Figure 5.14a) sherds were found in SCU #4 of the site.

***Coles Creek Incised var. unspecified* (n=1)**. This type consists of incised lines placed around the rim and upper body of bowls, jars and beakers. Incisions were generally narrow and always were made with a sharp, pointed stylus (Miller et al. 2000:331). This sherd was too water worn and anomalous to fit into established varieties of Coles Creek Incised. Chronologically, this sherd could date anywhere from the Coles Creek period up to the early historic period.

***Guillory Plain var. St. Bernard* (n=1)**. This sherd was executed on coarse, blocky shell. This lone sherd was recovered from SCU # 1. The rim is flat and direct and likely from a bowl. Guillory Plain is a diagnostic Mississippian type- variety (Brown 2012).

***L'Eau Noire Incised var. unspecified* (n=1)**. The single example of L'Eau Noire Incised (Figure 5.14b) has a complex rectilinear motif and was executed on a grog tempered ware. L'eau Noire Incised is a diagnostic Plaquemine type-variety (Rees and Livingston 2007).

***Leland Incised var. unspecified* (n=1)**. This sherd is grog tempered, and is decorated with rectilinear incisions situated alongside a curvilinear incision. (Figure 5.15a) The sherd is severely wave worn, but the design does seem to favor the hand-eye motif, a common design motif indicative of Mississippian symbolism associated with the Southeastern Ceremonial Complex (SECC) (Rees 2010).

***Mazique Incised var. unspecified* (n=1)**. This type, while at home in the late prehistoric Plaquemine assemblages of the Lower Mississippi Valley, generally is not common in contemporary contexts in the Delta (Miller et al. 2000:364). Mazique Incised was the third most common type at Medora (Quimby 1951). Mazique is a Plaquemine type and that it is more at home in Lower Mississippi Valley contexts than in those to the east (Miller et al. 2000). The sherd collected from the Adams Bay site was executed on a grog temper ware and the decorative preference was rectilinear incision perpendicular to the incurvate rim of the vessel.

***Middle River Incised var. Halfmoon Pass* (n=1)**. The sherd identified as Middle River Incised *var. Halfmoon Pass* is executed on a shell tempered paste and has rectilinear incision both parallel and perpendicular along the body (Figure 5.15b). A mend hole is also present. Fuller (2003:47) notes that Middle River Incised is a coarseware contemporary of the Pensacola A1 subset. Fuller (2003:47) describes the Pensacola A1 subset as "manifesting

some stylistic ties to Moundville, is a true component of Gulf Coast Mississippian culture". Those attributes that set the Pensacola A set apart from the Moundville component are: the absence of trailed incision, minimal use of black filming, the absence of engraving except as cross hatched or hatched fillers within incised zones, a greater frequency of interior incising, and a predominance of the horizontal hand-eye motif over all other SECC designs (Fuller 2003:47).

Owens Punctated var. unspecified **(n=1)**. A single sherd of Owens Punctated (Figure 5.13a) was found at the Adams Bay site. The sherd was executed on a shell tempered paste and is decorated with rectilinear incisions. Situated under an excurvate rim are zoned punctations. Owens Punctated has been classified as a Plaquemines type-variety.

Figure 5.12. Carter engraved (a and b).

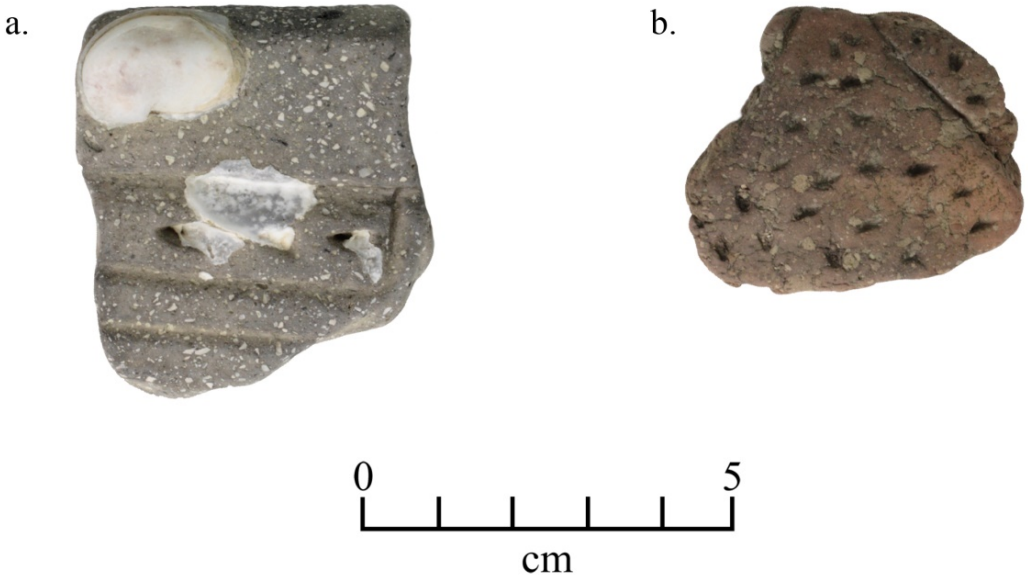

Figure 5.13. Owens punctated var. *unspecified* (a) and Avoyelles punctated *var. unspecified* (b).

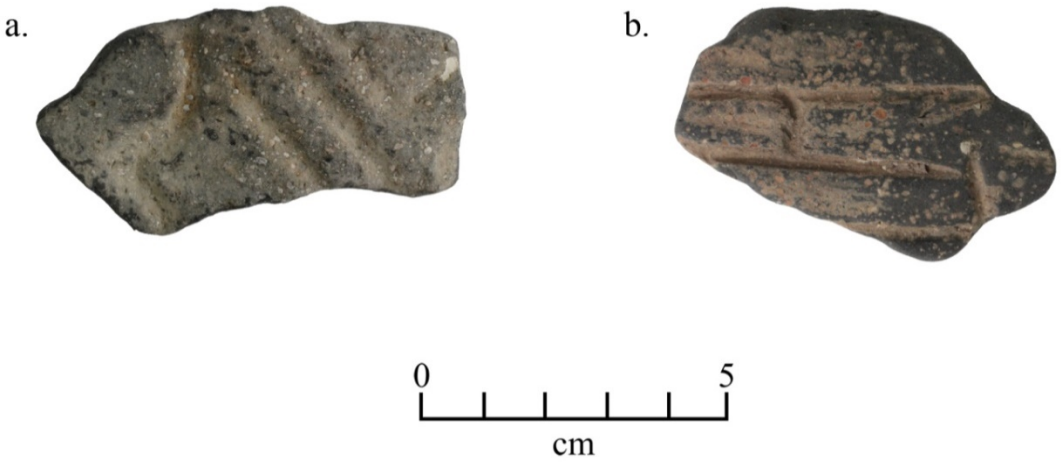

Figure 5.14. Coleman incised *var. unspecified* (a) and L'Eau Noire incised *var. unspecified* (b).

Figure 5.15. Leland **i**ncised *var. unspecified* (a) and Middle River incised *var. Halfmoon Pass* (b).

Table 5.1. Aboriginal ceramic material recovered from the beach surface collection.

SCU #	TYPE	VARIETY	Vessel Portion	TOTAL	WEIGHT (g)
1	Baytown Plain	*var. unspecified*	Body	20	237.0
1	Baytown Plain	*var. unspecified*	Base	1	8.5
1	Middle River Incised	*var. Halfmoon Pass*	Body	1	5.0
1	Coles Creek Incised	*var. unspecified*	Rim	1	8.7
1	Guillory Plain	*var. St. Bernard*	Rim	1	42.4
1	L'Eau Noire Incised	*var. unspecified*	Body	1	18.5
1	Leland Incised	*var. unspecified*	Body	1	11.5
2	Baytown Plain	*var. unspecified*	Body	25	359.7
2	Baytown Plain	*var. unspecified*	Base	1	18.6
2	Baytown Plain	*var. unspecified*	Rim	1	10.6
2	Owens Punctated	*var. unspecified*	Rim	1	32.0
2	Avoyelles Punctated	*var. unspecified*	Body	1	14.5
2	Unclassified Incised (grog tempered)		Body	1	6.3
2	Unclassified Punctated (grog tempered)		Rim	1	7.1
3	Baytown Plain	*var. unspecified*	Body	31	411.1
3	Unclassified Incised (grog tempered)		Rim	1	17.1
3	Mazique Incised	*var. unspecified*	Rim	1	34.9
4	Baytown Plain	*var. unspecified*	Body	24	288.5
4	Baytown Plain	*var. unspecified*	Rim	1	20.1
4	CarterEngraved	*var. unspecified*	Rim	2	33.8
4	Coleman Incised	*var. unspecified*	Rim	1	20.8
4	Coleman Incised	*var. unspecified*	Body	1	20.3
4	Unclassified Incised (grog tempered)		Rim	1	35.0
4	Unclassified Incised (grog tempered)		Body	2	22.8

Coring

A 1 ¼ inch core was removed from offshore along the eroding east bank, approximately 1m south of the shell beach to a depth of 90 centimeters below surface (cmbs) (Figure 5.6) The soil in the core was approximately 45 cm in length, the loss of sediment volume is due to compression in the corer and equals a compression value of 47% (Figure 5.16). (See Table 5.2 below for core legend)

Figure 5.16 Core 1.

The top 10 cm, represent the current marsh ground surface, and was a (10YR 3/2) very dark grayish brown silty clay loam with some rangia shell fragments. From 10-25 cm, the core was a (10YR 4/1) dark gray clay loam, becoming increasingly compact from 20-25 cm. From 25-45 cm, the core consisted of a (10YR 5/1) gray clay. No archaeological deposits were present throughout the core. Furthermore, other than the top 10cm which contained the shell, no other materials were obtained from the core. The bottom 35 cm of the core was covered almost in its entirety with a black oily residue with the pungent smell of petroleum. This may be indicative of oil sheen, commonly found in areas with a high influx of oil and gas platforms and buried pipelines, pipeline leaks/spills and heavy nautical traffic. This core does not exhibit archaeological integrity as it pertains to the site.

The second core was taken approximately 1m due north, at the toe of Mound 1 (Figure 5.6). The location of this core was chosen to test for construction sequence of Mound 1. The

core was driven to an estimated 90 cmbs and the soil in the core measured 40 cm (compression 44%) (Figure 5.17).

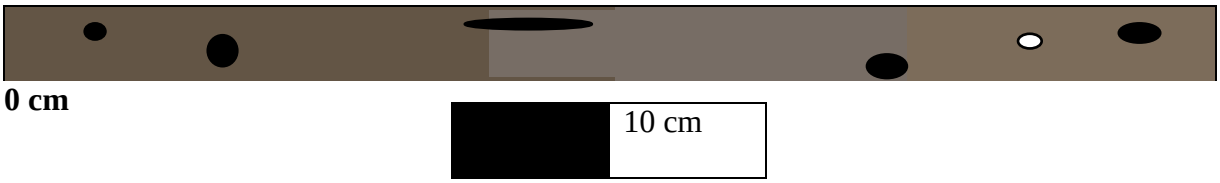

Figure 5.17. Core 2.

The top 17 cm represent the current ground surface, and was a (10YR 3/2) very dark grayish brown silty loam and contain insignificant amounts of charcoal. From 17-30 cm, the soils were a (10YR 4/1) dark gray silty loam and contained trace amounts of charcoal. These soils may be indicative of mound construction as they share a similar matrix and texture to Zone 3, which was part of the mound construction sequence. The core was a (10YR 4/2) dark grayish brown silty clay loam from 30-40 cm and contained trace amounts of shell and charcoal. No cultural materials were recovered from Core 2. This core does contain intact archaeological integrity.

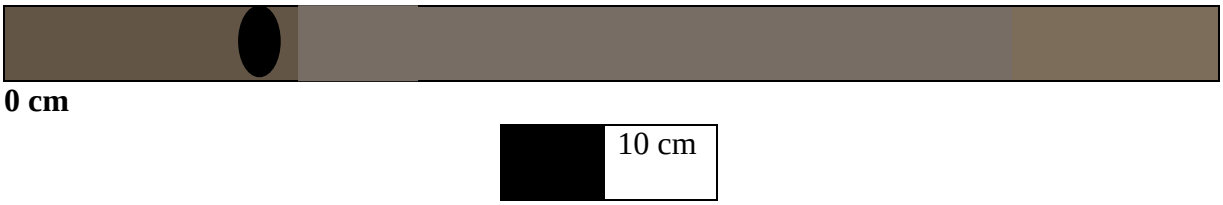

Figure 5.18. Core 3.

Core 3 was taken approximately 5 m northwest of the base of Mound 1 (Figure 5.18). This core was driven to an estimated 90 cmbs and contained 63 cm of soil in the core (compression 7%). The top 15 cm were a (10YR 3/2) very dark grayish brown silty loam and contained trace amounts of charcoal and small roots. From 15-50 cm, the soils were a (10YR

4/1) dark gray clay loam with no inclusions. The bottom 10 cm were a (10YR 4/2) dark grayish brown clay. Core 3 contained the same black sheen that was seen on Core 1. No cultural materials were recovered from Core 3. Furthermore, Core 3 does not exhibit characteristics associated with mound construction nor does it contain any other archaeological deposits.

Core 4 (Figure 5.19) was driven into the ground along the western bank of the plaza (Figure 5.6). The location of this core was chosen to test for submerged archaeological deposits. The core was driven to approximately 140 cmbs, and collected 55 cm of soil in the core (compression 39%). The top 10 cm were (10YR 2/2) very dark brown mixture of humus and duff with shell fragments. From 10-30 cm, the core soils were (10YR 5/1) gray clay loam. From 30-35 cm, the soil is a (10YR 3/2) very dark grayish brown silt loam with small roots. The core soils from 35-45 cm are a (10YR 4/1) dark gray sandy clay. From 50-53 cm, the soils are a (10YR 3/4) dark yellowish brown silt loam. The soils at this level are similar in matrix and texture to those identified as Zone 13 in the Mound 1 profile. Furthermore, they are located at approximately similar depths. As this core was taken on the west side of the mound, this could potentially be related to the mound construction. From 53-55 cm, the soils are a (10YR 5/1) gray clay. No cultural materials were recovered from this core.

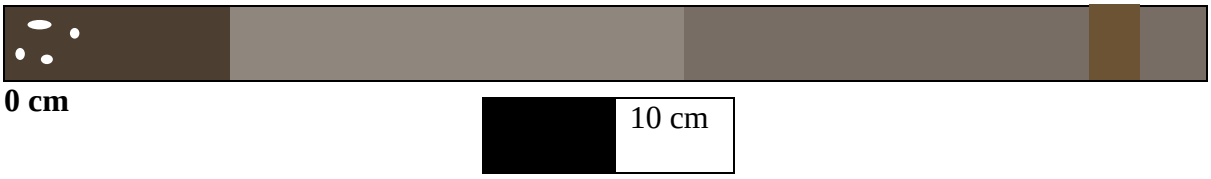

Figure 5.19. Core 4.

Core 5 (Figure 5.20) was placed along an area thought to be the western side of the submerged Mound 2 (Figure 5.6). This core was driven in to approximately 140 cmbs and collected approximately 60 cm of soil in the core (compression 42%). The top 25 cm of the core was a (10YR 3/2) very dark grayish brown mixture of humus and duff. From 25-40 cm, the soils are a (10YR 4/2) dark grayish brown clay with some minor charcoal inclusions. The soils in Core 5 from 40-50 cm are a (10YR 5/1) gray sandy loam and contain trace amounts of charcoal. Soils with a similar matrix and texture were also observed in Zone 7 of the mound profile. The bottom 10 cm are a (10YR 5/2) grayish brown clay and mottled with a (10YR 6/6) brownish yellow sandy clay with minor amounts of charcoal inclusions.

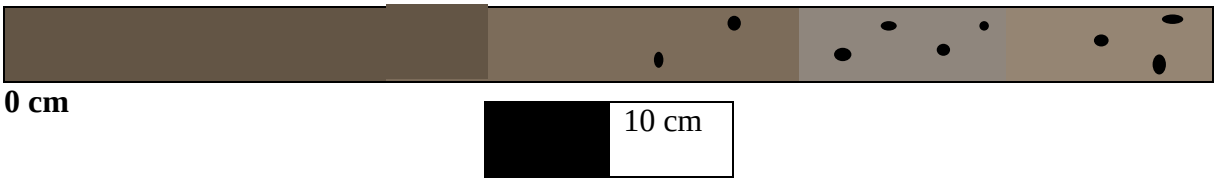

Figure 5.20. Core 5.

Core 6 (Figure 5.21) was placed approximately 10 m to the east of Core 5 to test the east side of the submerged Mound 2 (Figure5.6). Core 6 was driven approximately 130 cmbs and collected soils that measured approximately 70 cm in the core (compression 53%). The top 20 cm are a (10YR 3/2) very dark grayish brown mixture of humus and duff. From 20-45 cm, the soils are a (10YR 4/1) dark gray clay with charcoal inclusions. From 45-55 cm, the soils are a (10YR 5/1) gray sandy loam and contain trace amounts of charcoal. These soils appear to correlate to Zone 7 in the mound profile and may represent mound construction. The soils from 55-60 are a (10YR 3/3) silt loam. The soils from 60-70 cm are a (10YR 5/2)

grayish brown clay and mottled with a (10YR 6/6) brownish yellow sandy clay with minor amounts of charcoal inclusions.

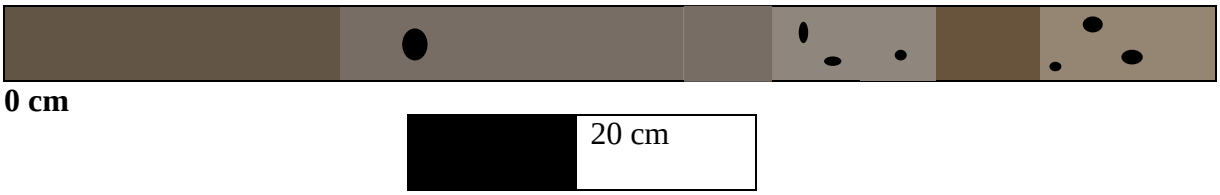

Figure 5.21. Core 6.

Core 7 (Figure 5.22) was placed approximately 1 m west of the eroding east bank (Figure 5.6). This core was driven to 140 cmbs and collected approximately 70 cm of soil within the core (compression 50%). The top 10 cm are a (10YR 3/2) very dark grayish brown humus and duff mixture, with shell hash, roots, and some charcoal. From 10-50 cm, the soil is a (10YR 4/1) dark gray silty clay loam with charcoal inclusions. From 50-70 cm soils are a (10YR 5/2) grayish brown sandy clay loam with charcoal inclusions. Core 7 soils exhibit characteristics mapped in the Mound 1 profile, which are situated above the pre-mound midden and represent episodes of basket loading as characterized in Zones 9, 11, and 12.

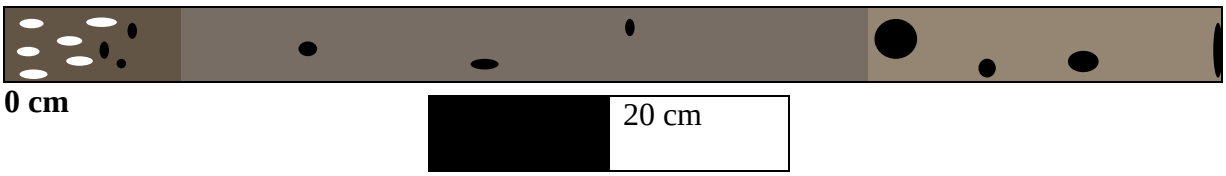

Figure 5.22. Core 7.

Table 5.2. Core legend.

	**Rangia Shell**
	**Charcoal**

Figure 5.23. Author hard driving core mechanism along the shoreline. View to the south.

Soil Samples

After the profile was cleaned and mapped, soil samples (n=2) were collected in 1.5 liters specimens from the pre-mound surface midden (n=1) and the surface hearth (n=1) for potential radiocarbon (C14) dating, and potential soil flotation for flora and faunal remains. Until these samples may be tested they are being stored in a lab refrigerator. Unfortunately,

the ability to test these samples for this thesis proved unattainable due to limited funding for research.

Curation

At the completion of the project, materials slated for curation will be prepared, packaged and labeled, following the Collection Standards of the Louisiana Office of Cultural Development, Division of Archaeology and stored with the Division of Archaeology.

Summary

As the discussion above implies, research at the Adams Bay site was conducted over a six-month period beginning in July of 2016 and ending in December 2016 in an effort to acquire the necessary data to answer the research questions posed for this thesis. Research goals met for this project included the mapping of soils profiles in eroded bank-lines, core samples for geomorphology and stratigraphy analysis, producing a topographic map, and controlled surface collection along a shell midden. Discussion of these research questions and their implications will be discussed in the following chapter.

Chapter 6: Discussion and Conclusion

This thesis examines the cultural affiliation of the Adams Bay site (16PL8), a precolonial mound and shell midden complex located at the southwestern end of Adams Bay, Louisiana. It also addresses the natural and anthropogenic impacts to the site. The research questions addressed in this thesis are designed to determine cultural affiliation, physical conditions at the site, and how geomorphological and environmental stressors are impacting the site. With little systematic archaeological research conducted at 16PL8, the first goal was to determine the horizontal and vertical limits of the site, the site affiliation(s), site chronology, site integrity, and site's place in the regional culture-history.

To create a cultural understanding of the Adams Bay site, I addressed the following questions:

- What is the site's horizontal and vertical extent?
- Is there a single or multi-component occupation at the site?
- If there is a multi-component site, can I determine the different cultural affiliations and place them into the regional culture-history?
- Does the site retain any depositional integrity?
- If the site retains integrity, can I determine a site chronology?

Research at the Adams Bay site was also conducted to identify the geomorphic and anthropogenic impacts (Figure 6.1) to the Adams Bay site (16PL8) and to assess the effects of these processes, such as sea level rise and land subsidence, to the archaeological record at the Adams Bay site. Submergence refers to the permanent flooding of the coast caused by a rise in global sea level and/or subsidence of the land (Morton et al. 2003). These submerged sites,

it has been argued, should remain viable and retain the same research potential as terrestrial sites because the overlying layer of muck and sand act as a de facto form of preservation (Gagliano 1984:28; Gagliano et al. 1977:I:29-30; Lewis 2000). Submergence occurs in an area in which the vertical accretion in the marshes cannot keep pace with coastal submergence (R.D. DeLaune et al. 1983). As submergence increase, marshes turn to open-water bodies as relative sea levels rise. Further complicating the issue is that submergence accelerates coastal erosion as it facilitates greater inland penetration of waves (Morton et al. 2003). These impacts are almost certainly affecting other coastal sites in Louisiana and along the Gulf Coast. By understanding how these processes affect archaeological sites we can begin to create a preservation plan for future management of these cultural resources in a coastal environment. Therefore, it is imperative to address the following issues:

- Does the subsided portion of the Adams Bay site retain depositional integrity?
- If integrity is present, can I associate the deposits with the terrestrial portion of the site?
- Are eroded and wave-washed artifacts present on the shoreline?
- If so, are these secondary deposits associated with the mound group at the Adams Bay site?
- Have the mounds and other site features at the Adams Bay site retained the orientation, formation, and integrity initially identified by Kniffen in 1936?

Results of the 2016 field season at the Adams Bay site and their implications are discussed below.

Primary Causes of Coastal Land Loss	
Natural Processes	
Agent	**Examples**
Erosion	waves and currents storms landslides
Sediment Reduction	climate change stream avulsion source depletion
Submergence	land subsidence sea-level rise
Wetland Deterioration	herbivory freezes fires saltwater intrusion
Human Activities	
Agent	**Examples**
Transportation	boat wakes, altered water circulation
Coastal Construction	sediment deprivation (bluff retention) coastal structures (jetties, groins, seawalls)
River Modification	control and diversion (dams, levees)
Fluid Extraction	water, oil, gas, sulfur
Climate Alteration	global warming and ocean expansion increased frequency and intensity of storms
Excavation	dredging (canal, pipelines, drainage) mineral extraction (sand, shell, heavy mins.)
Wetland Destruction	pollutant discharge traffic failed reclamation burning

Figure 6.1. Common physical and anthropogenic causes of coastal land loss. (From Morton et al. 2003)

Site Limits

The Adams Bay site measured approximately 110 x 50 m with an area of 0.40 ha (0.96 ac). Horizontal archaeological deposits observed in the Mound 1 profile reached a maximum depth of 125 cm below datum (cmbd). Kniffen (1936) had originally recorded this site as containing three mounds and surrounded by marsh. In its current state, the Adams Bay site retains a single mound, a remnant of Mound 2, and Mound 3 is now eroded or submerged in the bay. The site is no longer surrounded by marsh, but rather open water.

Cultural Affiliation

Archaeological investigations at the Adams Bay site were expected to recover a considerable amount of pottery. The distinctive pottery types are used to place local cultures within a temporal span within a specific geographic context. Coastal Plaquemine cultures have been recognized by the continuation of Coles Creek ceramic traditions and mound-and-plaza complexes, as well as some influence by Mississippi period ceramic traditions (Rees 2010). Regional variation begins to become clearer when we begin to apply more broad generalities to the communities of Coles Creek, Plaquemine, and Mississippian beliefs, subsistence, exchange, and political aspects along the Gulf Coast. Lithics are not abundant in coastal Plaquemine contexts due to poor levels of source material, therefore tools were typically made from bone or shell, which is more locally available. Unfortunately, no such artifacts were recovered as part of these investigations. Exactly 121 ceramic sherds were recovered from the shell midden and analyzed. The results show moderate shell tempering as well as what appears to be Southeastern Ceremonial Complex designs that would confirm a Mississippian culture influence from the east to the Plaquemine occupation as represented in components identified traditionally as Pensacola culture (Bayou Petre phase). Wave–washed, worn, and redeposited ceramics are abundant at the Adams Bay site and the pottery assemblage suggests continuous late Coles Creek to Plaquemine occupation with minor Mississippian interaction.

Pottery Type-Varieties

Using information gathered from previous research, much of the pottery found at the Adams Bay site was expected to be related to a late Plaquemine cultural occupation and to

consist of grog tempered plain wares equivalent to Baytown Plain, with a small shell tempered component relating to Mississippian cultural influence. After analyzing the ceramic assemblage the decorated types as well as the use of shell temper indicate that this assemblage is indicative of a multi-component site and spans the Coles Creek and Mississippi periods. Diagnostic Mississippian types outlined in the region are indicated by Owens Punctated, Carter Engraved, and Coleman Incised. Diagnostic Plaquemine type varieties outlined in the region and recovered include Mazique Incised, L' Eau Noire Incised, and diagnostic Pensacola culture artifacts recovered include Middle River Incised *var. Halfmoon Pass*, L'Eau Noire Incised. Diagnostic Coles Creek type-varieties are represented by Coles Creek Incised and the Avoyelles Punctated, which has a long history of use, beginning in the Coles Creek period and continuing through the Mississippi period. The pottery collected for this thesis contains biases in the way it was collected and therefore should not be viewed as a reliable means to isolate a specific cultural habitation. However, as the amount and temporal use of shell-tempered wares varies in the region from site to site, it does provide valuable insight as to the extent of outside influence or intrusion into the area during the Mississippi periods.

The spread of shell-tempered ceramics provides a baseline understanding of interaction and movement along the Gulf Coast during the late precolonial period. As previously stated, these movements likely came west from the Bottle Creek culture within the Mobile-Tensaw Delta to this region and created a variable ceramic assemblage within the LMV. The arrival of shell-tempering ca. 950 B.P. (Weinstein and Dumas 2008) as well as stylistic similarities of ceramics at the Adams Bay site, suggests an interaction between late

precolonial cultures within the region. Sites in the Baratatia Bay, such as the Adams Bay Site, Toncrey, and Buras Mounds may have served as "Gateway Communities" to the LMV and helped in the expansion of trade and interaction within the region. These "Gateway Communities" – communities which are potentially aligned through kinship, politics, trade/exchange, or other population movements - seek to aid in the control of exchange relationships of resources and their redistribution throughout a region (Hirth 1978). These types of communities may suggest an alliance between groups of people who depended on the rich resources provided along the coast as well as access to travel routes (Brown 2008). Pensacola type-variety ceramics present at Adams Bay provide evidence that cultural interactions and the movement of people and goods throughout the Barataria Bay were likely occurring during the Plaquemine culture occupation. Although the exact relationship between these cultures remains undetermined, the presence of the shell tempered ceramics collected during this research may help researchers to understand the nature of the interaction among people in the region.

Mound Stratigraphy

With erosion exposing mound stratigraphy it provided an opportunity to identify the sequence in which this mound complex was constructed. The Mound 1 profile exposed from erosion exhibits a pre-mound surface midden and a pre-mound surface hearth. This appears to be the surface on which the mound was constructed. The soils below this surface exhibit characteristics of a B horizon, represented by a clay surface in which the overlying A horizon has been removed either naturally or culturally and are shown in both the mound profile and the soil cores. Above this B horizon there is evidence of basket loading episodes as part of the

mound construction and can be viewed in Zones 6-15 of the Mound 1 profile. Cores 5 and 6 were taken from the remnant of Mound 2 and contained similar soil sequences observed in Zone 7 of the Mound 1 profile, suggesting that the fill of the two mounds were borrowed from a pit containing similar sandy soils. The depositional integrity of Mound 1 remains, currently, intact. Had adequate funds been allocated for radiocarbon dating, there currently are sufficient intact deposits with which to be tested in order to determine the age of charred deposit.

Natural and Anthropogenic Processes

The future of the Adams Bay site is bleak. At the current rate of erosion (Figure 6.2) the site will be lost to the Gulf within the next several years. There are several factors relating to the state of the Gulf coast, most notably the combined efforts of sea-level rise and land subsidence. The most noticeable effects at the Adams Bay site are those resulting from wind driven waves that have encroached the site due to submergence and mean sea level rise, leading to coastal erosion. These wind driven waves break along the east side of the site and at the exposed portion of Mound 1, creating a backwash that further erodes the mound. These exposed areas of the coast are at the greatest risk of land loss. This long-term land loss is not only detrimental to the many marsh islands in the region but also to the archaeological sites located on these land forms. The other processes impacting archaeological deposits at the Adams Bay site deal with subsidence. Land subsidence when combined with sea-level rise at coastal sites often tends to bury archaeological sites beneath redeposited soils, thus preserving them intact. These buried sites then have the potential to provide researchers contextual information regarding occupation at these sites. The research undertaken and information gathered at the Adams Bay site should provide future archaeologists the ability to assess

localized rates of sea-level rise and the effects it has on archaeological sites in the region. Elevation levels collected during this study and comparing them to future readings will provide the data necessary to determine just how quickly these sites submerge into the marsh bottoms. Furthermore, the photographic documentation can be used alongside continued documentation of not only the Adams Bay site, but similar documentation of those sites facing similar fates. However, human activities related to navigation channeling, river levees, and the practices related to the oil and gas industry are further exacerbating these effects. The areas of the site that are subjected to land subsidence do appear to retain intact archaeological context as evidenced by similarly mapped soils across the site as well as small pieces of shell and charcoal observed in the core samples (Cores 2, 4, 5, 6, and 7). However, the portion of the site that is exposed to wave action is rapidly deteriorating as evidenced in several of the photos. Further evidence of erosion is evidenced in Core 1 where there is no cultural horizon, only the Holocene clays are left *in situ*. The archaeological context exposed to wave erosion along the eastern bank does not maintain integrity.

Figure 6.2. Overview of the Adams Bay site, looking southwest.

Implications

This multi-component site indicates a cultural affiliation beginning in the Coles Creek period. Plaquemine communities sustained these cultural practices and beliefs inherited from their Coles Creek ancestors and were likely influenced by an emergent political and spiritual interaction with people from the east that is expressed as Mississippian influence, evidenced by Pensacola culture ceramics indicative of the Bayou Petre phase. The decorative Mississippian and Plaquemine type-varieties collected from the Adams Bay site are similar to assemblages observed at the Bottle Creek site in the Mobile Bay region and may indicate a culture spread from east-west along the Gulf Coast. This spread of shell tempered ceramics

may have originated by Mississippian peoples from Moundville southward into the LMV (Weinstein and Dumas 2008).

Conclusions

The objective of this research was to better understand the occupational sequence of the Adams Bay site within the local cultural regional history and to assess the effects of natural and anthropogenic processes to the archaeological deposits at the site. Ceramic analysis provided details to the possible origins of shell tempered ceramics recovered at the site. Research at the Adams Bay site determined the cultural affiliation of those occupying the site and gathered information necessary to interpret how relationships may have originated. The ceramic materials collected during this investigation should help to aid future archaeologists better understand the reach of Mississippian influence in the region.

The results provided in this thesis will also provide base line elevations and current mound conditions at the site so as to better understand the long-term effects of sea-level rise and land subsidence. Results from the Adams Bay site will hopefully shed light onto the devastating effects that erosion is having on Louisiana's coastal archaeological sites. It is imperative that archaeologists both current and future develop and implement important preservation models that adequately protect this nonrenewable resource of culture history. These models may include records research to identify those sites that are most threatened along the Gulf Coast. Compiling this information coupled with revisiting these sites, if only to document their current state by photographing and taking GPS points, will aid in better understanding the state of the coast and the archaeological sites scattered among the landscape. The archaeological evidence lost to this destruction is a disservice to us all. By

better understanding the processes that are rapidly eroding our coastlines we may be able to not only protect future generations from sure climatic devastation, but we might also provide them with a better understanding of those who lived in these regions before us.

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