DETECTING ARCHAEOLOGICAL SIGNATURES IN SHALLOW WATER:

A STUDY OF THE CHICAMACOMICO RACES BATTLESCAPE (1-5 OCTOBER 1861)

By:

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After the Confederate surrender at Forts Hatteras and Clark in August of 1861, the Union took control of Pamlico Sound. Confederate soldiers, however, remained in control of an outpost on nearby Roanoke Island. This was their last line of defense against Union dominance of eastern North Carolina. In September 1861, Union forces set up an outpost at Chicamacomico (present-day Rodanthe on Hatteras Island). Once the Confederates discerned the Union's presence at Chicamacomico, they launched an attack to retake Pamlico Sound. Both Union and Confederate forces engaged each other on land and at sea. There were few casualties and the balance of power did not shift between the two sides.

The "Chicamacomico Encounter" (also known as the "Chicamacomico Affair," and "Chicamacomico Races") has been documented in the historical record; however there has not been extensive archaeological study of the battlefield. This may be because it represents a challenge to battlefield archaeologists. The area of conflict is not only inundated with sand and vegetation, but it has also gone through drastic coastal change. Moreover, its marine battlescape is potentially expansive, and lies within exceptionally shallow water -- requiring the adaptation

and combination of terrestrial and underwater archaeological surveying techniques to study it. The present study is an archaeological analysis of the battlescape which utilized the principles of KOCOA survey techniques from the American Battlefield Protection Program (ABPP) to reconstruct battlefield behavior, analyze tactics and strategy, and in doing so considered the pros and cons of various surveying and remote sensing methodologies.

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Dedication

This thesis is dedicated to my wife and children. Without your support and understanding, this thesis would not have been possible.

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This thesis was a particularly challenging endeavor for me to undertake. This is due in part to my circumstances being different from most students who enter this graduate program. During course work and thesis writing, I commuted to campus from Orlando, Florida, while holding a full-time job in the process. With that said, many thanks are owed to Dr. Nathan Richards for his patience and understanding while I overcame several obstacles during this process. Additional thanks are due to Dr. Richards for his guidance and support while working on this thesis project. This thesis would not have been possible without his support and belief in my abilities. Thanks, are owed to my committee members for their patience and support while working on my final draft. Further thanks go out to Mark Keusenkothen, Jason Nunn, and East Carolina's Water and Dive Safety Office for facilitating the use of a research vessel for the fieldwork portion of my thesis. Thank you to John Morris and Nathan Henry of the North Carolina Underwater Archaeology Branch for assisting with the fieldwork permit process. Additional thanks to Emily Schwalbe and Scott Rose for their assistance with fieldwork. A special thank you to Adam Parker for his assistance not only with fieldwork but for also assisting with troubleshooting GIS and Hypack software. I would also like to thank the staff at the Outer Banks History Center for allowing me access to their research materials. Additionally, I would like to thank the UNC Coastal Studies Institute for allowing me to use their equipment for fieldwork and the facility as a staging area for fieldwork activities. I would also like to acknowledge the North Carolina Department of Transportation for providing the Coastal Studies Institute with a grant to survey the Rodanthe Ferry channel; this survey data was invaluable to this project. I would also like to acknowledge Mr. Richard Almond from Geophysical Software Solutions, who provided valuable guidance towards pBlock variables. A final-thank you, goes out to my wife, Jackie Kinsella,

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Introduction

Chicamacomico Races

The "Chicamacomico Races" was a brief skirmish during the Civil War that occurred along North Carolina's coastal barrier islands, the Outer Banks. This event involved the Union's 20th Indiana Infantry against the Confederacy's 3rd Georgia Infantry. The Union's 9th New York Infantry, and 20th New York Infantry Regiments and Confederate 8th North Carolina Infantry were also in the area during the event; however, were not directly involved in the Races. The Races was supposed to be a decisive battle between Confederate and Union forces for controlling Pamlico Sound as Confederates forces were trying to keep the Union army from advancing toward Roanoke Island from Hatteras Inlet. Occupation of Pamlico Sound would extend towards Roanoke Sound which provided access to Albemarle Sound and the back-door approaches to southeastern Virginia (Trotter 1989:1-2, 153; Carbone 2001:xxiv; Oxford 2013:15). Pamlico Sound is situated inside the Outer Banks of North Carolina, south of Roanoke Island (NOAA 2016a). Pamlico Sound is fed by the Neuse River as well as the convergence of both the Pamlico and Pungo Rivers, as well as several creeks (Figure 1).

Pamlico Sound was a strategic location during the early Civil War as both armies considered it a gateway to the rest of North Carolina. Navigable rivers run well into the state providing access to the railway network as well as the state's interior communications beyond the sound. Access to the rail and communication networks were considered one of the more important strategic factors during the Civil War and often influenced what events took place along North Carolina's coast. Thus, the Outer Banks was quite active during the beginning of the Civil War. In autumn 1861, Union and Confederate forces engaged each other at the village of Chicamacomico in what would later become known as the "Chicamacomico Races." The Chicamacomico Races is unique in that there were many Civil War firsts that took place; among them were the first amphibious assault made by the Confederate Army and Navy as well as the first Confederate capture of an armed Union vessel, USS *Fanny* (Trotter 1989:1; Oxford 2013:15).

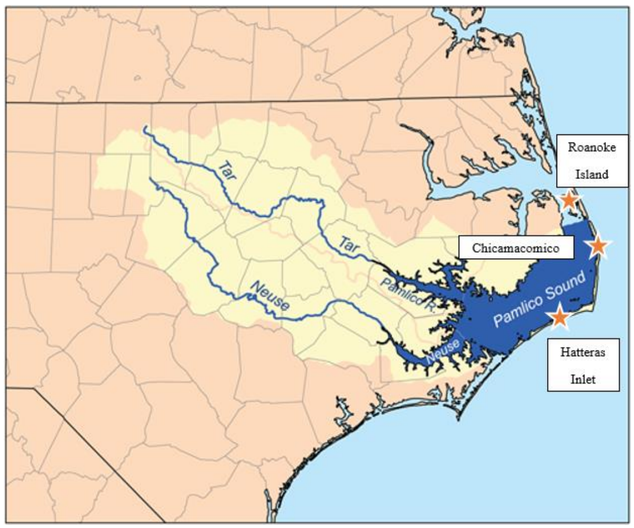

Figure 1. Map of Pamlico Sound showing the location of strategic locations during 1861 (by Karl Musser and USGS).

Outer Banks Natural History

North Carolina's unique coastline helped shape most of its early history. The coastline extends 300 miles between the borders of Virginia to South Carolina, and just off the coast, there is a chain of sandbank islands. These islands are not much wider than three miles at any point; they extend from the Virginia mainland and continue over 175 miles to the south. These sandbanks are collectively known as the Outer Banks (Carbone 2001:xv; Pompe 2010:1; Riggs et al. 2011:10).

Situated between the Outer Banks and the North Carolina mainland are several shallow bodies of water called sounds. These sounds include the Albemarle, Bogue, Core, Croatan, Currituck, Roanoke, and Pamlico. Various rivers such as the Alligator, Chowan, Neuse, Pasquotank, Roanoke, Pungo, and Tar-Pamlico empty from the mainland into the sounds. Pamlico Sound is the largest sound and among the largest wetland estuaries within the continental United States. It is directly west of Hatteras Island and drains into the Atlantic Ocean via four waterways, Oregon, New, Hatteras, and Ocracoke Inlets (Yearns et al. 1980:28; Pilkey, et al. 1998:39; Carbone 2001:xix; Powell 2006:857-58; Babits et al. 2015:3).

The Outer Banks are considered barrier islands to the sounds and mainland in the sense that they act as a natural energy buffer. The Outer Banks environment consists of large deposits of sand that form dunes on top of sedimentary rock formations where various types of plant life grow. Trees such as cedars, oaks, and pines can also be found throughout. Additionally, subtropical grasses grow throughout these islands where they thrive in the sandy soil, salt spray, and high winds. The Outer Banks are among the most dynamic land/water interfaces in the world and are considered particularly remarkable because they are continuously changing because the sand dunes comprising a large part of these barrier islands are constantly shifting (Pilkey et al. 1998:39, 49; Carbone 2001:xv; Riggs and Ames 2003:23; Babits et al. 2015:3). Additionally, the coastline outside the Outer Banks is shallow with shifting sediments and migratory inlets that can change in a matter of hours due to storms (Stick 1983:281; Carbone 2001:xix; Pompe 2010:5; Riggs 2011:24; Riggs et al. 2011:2-3). This is characteristic of Chicamacomico, an area made up of several sand dunes with limited plant life in present-day Rodanthe. The word "Chicamacomico" originates from the Algonquin language group meaning, "a land of disappearing sands" or "place swept over." It is also said among those of Croatoan descent that it means, "place of sinking down sand" (Powell and Hill 2010:11; Oxford 2013:65; Garrity-Blake and Amspacher 2017:125; Richards and Parker 2017:3). These are apt descriptions describing the Outer Banks at Chicamacomico. A Union soldier who was involved in the Chicamacomico Races described the area as follows;

> We trod North Carolina soil, or rather, I should say, sand, for the first time yesterday. I am not in the least disappointed at the dreary prospect, as it is just about the kind of place I expected to find; that is, a long, low strip of sand between two oceans, the actual coast of North Carolina not being in sight, producing just that impression. Some distance up there are evidence of trees or shrubbery, though what they can be from soil like this, is hard to imagine (Johnson 1861:46).

Previous Research

To date, this project is only the second archaeological investigation into the Chicamacomico area focusing on Civil War history. The first archaeological survey was conducted by a team led by Dr. Lawrence Babits in the fall of 2014. The intent was to investigate a possible Civil War fortification and camp in present-day Waves, North Carolina (Babits et al. 2015:i). Babits and team were looking to determine whether it was the site of Camp Live Oak. The survey, however, was inconclusive.

The fieldwork for the current project was conducted in Pamlico Sound just off Hatteras Island at Little Kinnakeet (present-day Avon) with the objective of capturing archaeological signatures using remote sensing equipment, specifically a side-scan sonar and a marine magnetometer, to digitally recreate USS *Monticello*'s bombardment of a cluster of Confederate vessels. Additional data was examined from secondary areas where data had already been collected and could be re-assessed for integration into this study. This includes an area surveyed in 2014 by the UNC-Coastal Studies Institute under a NC Department of Transportation (NCDOT) grant. Their objective was to assess the present-day Rodanthe to Stumpy Point Ferry channel and consider what innovative uses of dredged sediment could occur if the channel were widened and deepened (the need for the widening and deepening precipitated by periodic closures of Bonner Bridge which traverses Oregon Inlet). The interdisciplinary grant was geared more toward the geological and ecological consequences of dredging and subsequent deposition, but it also included a marine debris survey led by Dr. Nathan Richards utilizing side-scan sonar and magnetometer, as well as visual inspection and metal detection techniques in the area off present-day Black Mar Gut (see Richards and Parker 2017; White et al. 2017). The idea here was simple; reanalyze the data to deduce whether any anomalies found in the survey area were possibly ordnance from the Chicamacomico encounter as well as the gunboat *Fanny* capture.

Research Questions

With these objectives in mind, the project looked to answer questions about this Civil War naval encounter through a maritime archaeological survey, historical research, forensic analysis of projectiles, and recreation of the battlefield utilizing GIS. The study asked the question, "Using the military actions from the 'Chicamacomico Affair' as a case study, what are the best approaches for reconstructing ephemeral maritime battlefield events from the Civil War?" Additionally, different methodologies were implemented during fieldwork to answer the following secondary questions:

- What is the potential of magnetic remote sensing techniques (magnetometry and metal detection) for identifying the existence of ordnance and its pattern of distribution associated with a submerged Civil War battlefield?
- What is the potential of acoustic remote sensing techniques (side-scan sonar) for identifying the existence of ordnance and its pattern of distribution associated with a submerged Civil War battlefield?

- What is the potential of using visual search techniques (diver- or snorkel-based survey) for identifying the existence of ordnance and its pattern of distribution associated with a submerged Civil War battlefield?
- What is the benefit of utilizing a combination of remote sensing technologies to identify the existence of ordnance distribution within a submerged Civil War battlefield?

Thesis Structure

This thesis was challenged with analyzing the Chicamacomico Races by recreating the battle geospatially utilizing various archaeological field methods in conjunction with the historical record. After the introductory chapter, Chapter 2 contains discussions of middle-range theoretical frameworks that bridge the gap between the historical and archaeological records. Historical data pertaining to the Civil War leading up to the Chicamacomico Races is presented in Chapter 3. Chapter 4 describes the methodologies employed during this study. A detailed battle narrative and the results of data collection during archaeological fieldwork are discussed in Chapter 5. Chapter 6 presents a concise analysis of the combined data sets collated during this study through the analytical tools described in Chapter 2. Chapter 7 concludes this thesis with final remarks concerning the research questions set forth at the beginning of this study, a statement of difficulties and issues encountered with the study, and future research potential.

The Chicamacomico Races is an interesting case study because it provides an opportunity to study a Civil War battle through a set of middle range principles including examination of the battlescape through the lens of KOCOA and Battlefield Pattern analysis (both tenets of battlefield archaeology that will be discussed further in Chapter 2) coupled with behavioral archaeological perspectives focused on examining site formation processes. In this thesis, *battlescape* refers to the landscape within which the battle occurred (the area within which the archaeological signatures of a battle are created), and is differentiated from *battlespace,* which refers to the dimensions that must be understood in order to apply military force or complete the mission. Battlespace dimensions include: land, sea, air, space, time, electromagnetic and information (Libicki and Johnson 1995:5; Veninger 2015:20; Ministry of Defence 2013:1-2). Additionally, the Chicamacomico Affair was selected as a case study because of the skirmish's uniqueness as well as the unique geographical features that make up the area. Furthermore, it was selected to reassess the sparse historical data concerning the Chicamacomico Affair, as well as reconsider the military tactics used and potentially recreate the encounter based on archaeological findings and any new data.

Chapter 2
"A Consideration of Theoretical Paradigms for Investigating the Chicamacomico Races"

Introduction

This chapter examines the naval aspect of a Civil War military encounter with multiple theoretical applications, with the objective of determining which archaeological approach is best for detecting archaeological signatures of military actions (and to reconstruct the engagement's battlescape). As previously discussed, the Chicamacomico Affair was selected as a case study to reconsider the military tactics used and potentially recreate the encounter based on archaeological findings. To do this, this study, like other similar studies (see, for example: Bright 2012; Simonds 2013; Parker 2015), relied on analytical tools derived from battlefield archaeology (which grew from historical archaeology), and utilized concepts from behavioral archaeology.

Battlefield archaeology is concerned with the identification and study of sites where battle events occurred, and the archaeological signatures of those events (Carmen 2014:41-42). Battlefield archaeology as a field of study, has several different operational frameworks or analytical tools such as KOCOA, Battlefield Pattern, Principles of War and METT-T, that archaeologists use to develop a better understanding of military actions, decisions, and tactics on the battlefield (see Fox and Scott 1991; Babits 2010; McKinnon and Carrell 2011; Bright 2012; Simonds 2013; Parker 2015). Battlefield archaeology has its roots in historical archaeology, therefore as in most studies of this type the historical record provided the starting point for the project. From there, this study followed the same methodological approaches as Doug Scott, a historical archaeologist who began working on historic battlefields and whose research innovations in this area have significantly influenced the growth of battlefield-focused theory in dealing with terrestrial battlefield re-creation studies. His approach to battlefield studies is showcased in his work at the June 1876 Battle of Little Big Horn site. The book, *Archaeological Perspectives on the Battle of Little Big Horn* (Scott et al. 1989), outlines his implementation of historical-battlefield focused archaeology. Since this study is concerned with battlefield re-creation, Scott's approach of utilizing analytical tools from battlefield archaeology was determined to be the best approach to answer this study's research questions. Similar approaches have been successful in recent research conducted at East Carolina University (see, for example: Simonds 2013 and Parker 2015) as well as other battlescape studies (see, for example: Scott 1989; Haecker 2009; Heckman 2009; Babits 2010).

Approaches from Battlefield Archaeology

The initial phase of this study involved examination of both primary and secondary sources to identify where to focus this project's archaeological fieldwork activities. Scott et al. (1989) stated, "if history turns pages, then, archaeology turns the ground." Historical archaeology, as the name implies, does both. He further outlined that records and documents are crucial components in historical archaeology, but no more so than knowledge obtained from artifacts discovered in the archaeological record. In his Little Big Horn study, Scott (1989:5) stated that written records concerning the Battle of Little Big Horn were used in conjunction with archaeological findings, much in the same way a criminal investigation would be conducted. The "testimony or evidence" can then be tested by analyzing the archaeological record, which contains historical clues in the form of physical remains. Scott and his team claimed that these include artifacts and their contextual relationships. They further stated that these relationships and the spatial distribution of artifacts could tell a great deal about what happened at a site (Scott et al. 1989:5).

The study into the Chicamacomico Races took a similar approach to Scott et al. (1989) where the historical written records and maps were used as the "witness testimony" while the archaeological findings (in this case, the completed remote sensing site survey, the geospatial recreation, and the sitemap) served as the study's "evidence" to compare what was found in the historical record. At times, researchers have found that history and archaeology do not agree, which makes it necessary for revisions in current perceptions of historical events (Scott et al. 1989:5; Whitehorne 2010:3). As Scott (1989:5) put it, "historical archaeology provides an important mutual checks and balances between two data sets, allowing for a more complete approach to understanding historical events." This agrees with James Delgado's perspective on historical archaeology. Delgado (1991:90), stated that historical archaeology provides physical data that serve to confirm, augment, or revise the written record or fill major gaps in understanding the knowledge of past events where no written record is available. With that said, it was important to carefully analyze the data extracted from the historical record while researching this case study, as well as closely scrutinize data pulled from the remote sensing surveys representing the archaeological record. It was hoped that by analyzing the Chicamacomico Races through historical archaeology, a more accurate historical narrative could be provided.

Application of Battlefield Archaeology

Battlefields across the country and abroad often serve as symbols of national identity, and thus their landscapes have been preserved and studied extensively by archaeologists (Whyte 2013:58-59). Battlefield archaeology is a relatively new field but has steadily grown over the last 30 years and is sometimes considered the anthropological study of warfare (Geier et al. 2010:26). Since its inception, several battlefield archaeology studies have been completed (see, for example: Scott et al. 1989; Conlin and Russell 2006; Haecker 2009; Heckman 2009; Babits 2010; Bright 2012; Simonds 2013; Parker 2015).

Researchers using this approach within their respective battlefield studies strive to understand the factors that influence the outcome of historic battles (Conlin and Russell 2006:21; Simonds 2013:7). Recent battlefield archaeology projects focus on the event of a battle and the associated archaeology, viewing battlefields as a part of landscapes that may be analyzed with powerful terrain analysis tools such as GIS (Scott et al. 2009:3). This contrasts with military history which often focuses solely on the history, the causes of conflicts, or the politics surrounding the events (Sutherland 2005:7). Hence, battlefield archaeology is often specific and usually concerns the study of a single battlefield. For example, battlefield studies may focus on one aspect of a battle, such as weaponry or the movement of troops through a field of conflict (Carmen 2012:25).

The earliest battlefield archaeology studies were concerned with terrestrial battlefields (see, for example: Harrington 1957; Scott et al. 1989). It was not until recently that battlefield archaeology started to be implemented in a nautical context to examine military actions in naval warfare (see, for example: Lydecker and James 2005; Conlin and Russell 2006; Haecker 2009; Babits 2010; McKinnon and Carroll 2011). Additionally, the influence of battlefield archaeology upon underwater archaeology and maritime studies has been utilized in several East Carolina (ECU) MA thesis projects as well (see, for example: Bright 2012; Simonds 2013; Parker 2015).

The first ECU MA study, titled "The Last Ambush: An Adapted Battlefield Analysis of the U-576 Attack Upon Allied Convoy KS-520 Off Cape Hatteras During the Second World

War" conducted in 2012 by John Bright, focused on adapting terrestrial battlefield survey techniques to analyze a naval engagement. Bright's study used the 15 July 1942 attack on the KS-520 as a case study for his research. The second study conducted by Lucas Simonds in 2013, titled, "'A Determination Worth of a Better Cause': Naval Action during the Battle of Roanoke Island, 7 & 8 February 1862," had two objectives study and assess cultural resources left from the battle and compare two battlefield archaeology analytical tools and their usefulness in naval warfare studies. The third battlefield archaeology graduate student study conducted at ECU was conducted by Adam Parker in 2015. The study titled "'Dash at the Enemy!' The Use of Modern Naval Theory to Examine the Battlefield at Elizabeth City, North Carolina," focused on an archaeological analysis of the battlescape. Parker's objective was to apply the KOCOA analysis to the battle of Elizabeth City to explore whether KOCOA was useful in analyzing naval battlescapes over other battlefield archaeology analytical tools. Additionally, he sought to use these analyses to verify or augment the historical record.

As discussed, battlefield archaeology has various operational frameworks or analytical tools (KOCOA, Battlefield Pattern, Principles of War and METT-T) that archaeologists utilize to interpret archaeological data from battlefield sites. These analytical tools assist researchers with organizing information pertaining to battle to help understand battle events. Each has similar methodological approaches but are very distinct because they address different research objectives. For example, the Battlefield Pattern analysis primarily focuses on the overall progress of battle by analyzing both the spatial and temporal aspects of a battle (Fox and Scott 1991:92). This was the approach Scott utilized at Little Big Horn, as he was concerned about re-creating the movements of troops based on material evidence (such as bullets and shell cases) discovered. KOCOA (an acronym that stands for Key Terrain, Observation and Fields of Fire, Cover and Concealment, Obstacles, and Avenues of Approach), on the other hand, seeks to understand the battle elements by examining command decisions based on landscape and other physical factors (Lowe 2000:7; Fonzo 2008:2). Since this study will analyze the signatures of material evidence (potential ordnance thought to be representative of battle) as well as physical battlescape factors to recreate the battle (to address research questions) it will utilize both the KOCOA and Battlefield Pattern analytical tools.

Battlefield Pattern

As previously mentioned, Battlefield Pattern analyzes the temporal and spatial characteristics of battle where the focus is on individual and unit behaviors discerned through examination of the archaeological record. Battlefield Pattern utilizes two different patterns outlined by Fox and Scott (1991:93): gross patterning and dynamic patterning. Gross patterning refers to the systemic-fixed location of material evidence. From here, interpretations about unit or individual behavior can be made from the distribution of material culture. For instance, if there is a cluster of objects in one area, that could be indicative of a stationary encounter. If the material evidence is more spread out, this could be evidence of a more active event or perhaps mobile fighting (Fox and Scott 1991:93). Dynamic patterning, on the other hand refers to the "signatures" of battle and is concerned with having a thorough understanding of projectiles fired during an engagement through comparative analysis (Fox and Scott 1991:92-93). In this study, the pBlock modeling tool (more on this later) serves as a comparative tool to analyze the signatures of material evidence representative of battle. Additionally, Battlefield Pattern integrates history and archaeology where the historical record facilitates research questions and guides planning of archaeological fieldwork. Furthermore, analysis through this framework provides clues on why certain behaviors were carried out by units and individuals (Fox and Scott 1991:92).

KOCOA

The KOCOA analytical tool is used by the National Park Service's (NPS) American Battlefield Protection Program (ABPP) for surveying and documenting battlefields (Lowe 2000:7). KOCOA, (originally known by OCKOA) is an acronym developed by the U.S. Army for quick assessment of battlefield terrains (Simonds 2013:13). The military use of this acronym puts observation and fields of fire first, then cover and concealment, before identifying key terrain. Archaeologists changed the acronym from KOCOA because the ABPP places a lot of emphasis on the landscape, therefore putting Key Terrain first. Additionally, this was done because it was easier for archeologists to remember (Lowe 2000:1; Babits 2010:7; Parker 2015:16).

Within the ABPP there are three goals that any study engaged in battlefield research must strictly adhere to, this study being no exception. First and foremost, protect battlefield sites that influenced the course of American history. Second, encourage preservation and the interpretation of historic and archaeological sites. Last, raise public awareness of battlefield site preservation. This allows the archaeologist to view the battle through a military lens, or as David Lowe (2000:13) puts it, through soldier's eyes, and ensures that battlefield studies are comparable for ABPP. The KOCOA evaluation system is a set of five elements; Key Terrain, Observation and Fields of Fire, Cover and Concealment, Obstacles, and Avenues of Approach which are helpful in assisting those without military training to be able to grasp the fundamental concepts with a better understanding of tactical military planning (Lowe 2000:13; Simonds

2014:8). This study relied on previous ECU studies as guides towards adapting the principles of KOCOA to naval warfare (see Bright 2012; Simmonds 2013; Parker 2015).

The first element in the KOCOA framework is Key Terrain. This is described as the portion of the battlefield that gives an advantage to the possessor; examples are high ground, bridges, and road junctures (Lowe 2000:14; Fonzo 2008:2). Adapting this element to a nautical context could be described as having the "weather gauge" in early naval warfare. In a modern context, it could also be described as water depth or tidal behaviors. Terrestrial terrain features usually remain consistent across time; however naval features do not. They are subject to wind and tidal changes, often on an hourly basis. Dr. Lawrence Babits (2010:3) stated that key terrain is often very subtle in the coastal plain areas, where many naval engagements occurred. A naval terrain feature can be a dune ridge's height, which can enhance or deter visibility across tidal flats (Babits 2010:3). This element can also be applied to navigable rivers and creeks because they can provide vessels with easy access to terrestrial targets within their fields of fire.

The second element in the KOCOA analysis is Observation and Fields of Fire. In a report submitted to the National Park Service in 2008, Stephen Fonzo described this as any point on the landscape that allows observation of movements, deployments, and activity of enemy forces that is not necessarily key terrain. He further stated that this offered opportunity to see over an area to acquire targets and noted that high ground is an example of this element (Fonzo 2008:2). The description from Fonzo mainly applies to a terrestrial study. In terms of this study, this element was amended for use in nautical analysis. For a naval battle, Babits (2010:3) stated that observation is less important than it would be in a terrestrial battle. Ships are highly visible in open water where observation by the enemy is usually uninhibited. Instead, Babits (2010:3) states that fields of fire are more complex in a naval battle and that it refers more to the capabilities of a ship's weapons and the ability to bring the ship to a tactical position to engage the enemy. He further adds that this may fluctuate during battle due to winds, tidal behavior, channel obstructions, and enemy fire (see also Parker 2015:137).

The third element in the KOCOA framework is Cover and Concealment. Here, cover is considered protection from enemy fire whereas concealment is protection from enemy sight. Features such as landforms or landscapes can act as both but at times only work as one. Examples of this element are riverbanks, forests, and trenches (Fonzo 2008:2). In a nautical context and in instances of naval warfare the vessel itself could be considered cover and concealment. Dunes, forts, and ridges could also be considered cover and concealment if it is a land-sea engagement (Babits 2010:3). The fourth element, Obstacles is any feature or element that hinders movement and affects the course of battle. Examples of this element are rivers, forts, and walls (Fonzo 2008:2). In a naval setting, obstacles can range from sandbars, wind, and even the water itself, as tidal behavior can become an obstacle for any ship in a naval battle (Babits 2010:3). The fifth and final element of KOCOA is Avenues of Approach and withdrawal/retreat. This element represents corridors used for troop movement and transport. In a terrestrial battlescape, examples of this element are roads, canals, rivers, and railroads (Fonzo 2008:2). In a naval setting, this element is considered the channel or anywhere where the tides, depth, and wind give access to approach or withdrawal (Babits 2010:4).

Usually, terrain features in a terrestrial land engagement do not change much over time. However, Lucas Simonds' thesis (2013), stated that this is not the case in naval engagements, as terrain can vary between different types of naval engagements as he demonstrated with shoreline changes along Roanoke Island between 1862 and today. Furthermore, the differences can be offshore versus nearshore or from shore to offshore, and they can also vary across time. Simonds (2013:8) further stated that naval engagements vary across space and time due to rapid increases in naval technology and previous researchers have had to amend or redefine the KOCOA framework so that it could be tailored to a naval study, such as Babits in his 2010 study.

This study was no different and followed suit by amending the principles of KOCOA to assist with analysis of the "Chicamacomico Affair" and its shallow water landscape. Doing this was just one avenue for understanding the events that transpired at Chicamacomico as well as the battle-related signatures which gave insight into interpreting the site formation process. Furthermore, outlining these elements spatially provided reference points for ship positions and fields of fire. By having this spatial outline, remote sensing activities were planned with more certainty and precision.

Approaches from Behavioral Archaeology

Behavioral archaeology, a product of processual archaeology from the 1970s is concerned with archaeological site formation processes. It is the study of how artifacts move from their systemic (use) context to their archaeological context (the state they are found in when examined by archaeologists) (Johnson 2010:65). Michael Schiffer, the founder of this body of knowledge, discussed how the archaeological record is a "distorted reflection of past behavioral systems." (1976). Distortions result from the physical formation process; learning to understand these distortions assists in creating a comprehensive image. In doing so, it enhances the researcher's understanding of an archaeological site. Simply put, Schiffer believed that the challenge was to eliminate distortion to gain a more accurate understanding of human behavior (Schiffer 1972:156-165; Trigger 2006:426). Schiffer concluded that the site formation process for any site consists of two factors, both of which are equally important while conducting research or fieldwork at an archaeological site. The first factor influencing the site formation process is culturally influenced or created, these are referred to as "c-transforms." C-transforms refer to human behavior and can be any type of human activity such as warfare, settlement, or hunting. The second type of site formation processes are "natural" or "non-cultural" in origin, these are referred to as "n-transforms". N-transforms could be weather-related phenomenon or geological occurrences that may affect a site's formation or condition (Schiffer 1983:692; Trigger 2006:426-428).

The analysis of the Chicamacomico battlescape was concerned with an interpretation of both categories of site formation process. Understanding n-transforms of the survey area was necessary because the Chicamacomico landscape is heavily influenced by frequent geological changes (Riggs and Ames 2003:23; Riggs 2011:24). The elements of KOCOA can also be directly analyzed by a thorough understanding of non-cultural site formation process of Chicamacomico. There was also focus placed on c-transforms because the areas that were surveyed have been heavily affected by human activity for the last several hundred years. Fishing and crabbing activities are very prevalent throughout the sounds; therefore, the likelihood exists that these activities have affected the site's formation, post-deposition. Additionally, this area was quite with warfare activity during the Civil War's early years. This study was concerned with understanding the signatures of battle that influenced the site formation process, therefore analyzing any possible debris or ordnance from the battle provided a better understanding of events that transpired. Other studies have taken a similar approach (see, for example: Scott et al. 1989; Sivilich 1995; Reeves 2010).

Utilizing the KOCOA framework provides an understanding of human behaviors (c-transforms) that occurred on the battlescape. In addition, historical records may provide information about climate or terrain factors (n-transforms) that influenced certain human behaviors (c-transforms). Together, these forces create the battlescape -- they are the transformational processes that shift the systemic (battle) context into the archaeological (site or record) context. Once that occurs, over time other "c" and "n" transforms could alter the archaeological deposits/record. Therefore, by utilizing the principles of KOCOA, signatures of battle, and site formation process, there is a stronger likelihood of successfully recreating the battlescape.

Remote sensing was the primary methodology carried out during fieldwork. "Remote sensing" is the recording, observing, and sensing of objects in far-away places (Bowens 2009:217; Weng 2009:1). In a way, the remote sensing data was used as a middle range theory, meaning a magnetic signature may represent a cultural anomaly that might equate to evidence of the Chicamacomico Races which would then allow for battlescape assessment (and the site formation processes that created it). Remote sensing signatures can be directly related to the signatures of site formation, as it is often used as a tool for studying the site formation process. Initially, remote sensing in the form of metal detection was used in a prospecting capacity (see Scott et al.1989 Little Big Horn study), meaning the activity was primarily concerned with locating and discovering artifacts and features of archaeological interest (Thompson et al. 2011:195). In the case of maritime studies, the traditional activity concerned with remote sensing applications has been the location and discovery of shipwrecks. Within the scope of this study, remote sensing will be utilized differently, where it will be used as a means of searching for potential ordnance. Thompson et al. (2011:195-196) stated that as technological advances have been made, remote sensing has become more common in archaeological work and for this application to be more widely accepted, it must be linked with broader theoretical concepts. They have termed this inquiry-based *archaeogeophysics* (Thompson et al. 2011:195-196).

This study differs because it is concerned with battlefield recreation using battlefield archaeology (KOCOA and battlefield pattern analysis) and site formation theories, making the application of remote sensing both prospecting and inquiry-based. The project has specific research questions that pertain to inquiry-based archaeology; however, it is conducted in much the same way as the (1989) Little Big Horn study. Where this study will utilize a side-scan sonar, a magnetometer, and hand-held metal detectors to search for potential ordnance representative of battle, Scott utilized hand-held metal detectors to locate weaponry. He then mapped the distribution of ordnance to recreate the battlescape, which this study also intends to do. In addition to this technology being utilized as a tool for site formation studies in maritime studies (see, for example: Anuszkiewicz 1989).

John Broadwater (2010) stated that physical remains on land are invaluable to interpreting actions that occurred on land. The same holds true for physical remains under the sea (Broadwater 2010:177-179). Therefore, remote sensing has become an extremely important tool within archaeology because it gives the archaeologist the ability to observe the archaeological record without excavation, or at least with minimal site disturbance. It has proven to be an invaluable tool to the underwater archaeologist because it serves as the eyes and ears to observe objects unreachable by humans on SCUBA applications (see, for example: Ballard and Archbold 1987). Additionally, it gives archaeologists the ability to gather data without having to excavate artifacts because of depth limits or artifact size. Furthermore, remote sensing applications such as side-scan sonar and magnetometry have the potential to be great resources for searching for objects embedded in the sea floor or for examining site formation processes.

Productive use and application of remote sensing tools in archaeology usually involves specific archaeological questions, such as the ones outlined in this study. This goes back to Thompson et al.'s (2011) argument that these types of research agendas must be linked with broad theoretical concepts. They further proposed three categories of research that relate to this topic. The first is continuity and discontinuity in the use of space. Secondly, there is construction variation and constancies in the use of space. Lastly, there is the study of both natural and cultural modifications over time and space (Thompson et al. 2011:195, also see Schiffer 1983).

Conclusion

During the Civil War, there was a shift in the cultural and physical landscapes throughout the United States. These include where armies were present and how the landscapes were drastically altered as a result (Balicki 2010:57). Sites could range from the earthen forts seen at Fort Fisher in North Carolina to the remnants of small temporary campsites such as Camp Live Oak at Chicamacomico. Many sites, such as Chicamacomico, extend out into the maritime landscape, therefore, researches must pay attention to both their terrestrial and maritime components. This necessitates the need for various methodologies and theoretical applications to adequately study the archaeological record.

This study contributes to the growing field of nautical battlefield archaeology and provides an opportunity to recreate a battlescape of an ephemeral Civil War skirmish. Utilizing a theoretical framework allows the author to pose research questions that could offer new insights into the movements of regiments involved, troop placement, ship placements, and fields of fire concerning the Chicamacomico Affair.

Chapter 3
Precursor to the Chicamacomico Races: an historical discussion of events leading to the 'affair'

Introduction

This chapter will present a brief historical narrative of events preluding the Chicamacomico Races to include the capture of *Fanny*. The first portion of this chapter discusses the strategic importance of coastal North Carolina and the objectives both sides sought in the Outer Banks. The discussion then shifts to focus on preparations made for coastal defense, as well as the battle for Hatteras Inlet, which although a much larger event, was a precursor to the Chicamacomico Races. The capture of *Fanny* just offshore Chicamacomico and the fall out will also be discussed during this chapter.

The historical narratives purpose is to present the historical research, provide context to the reader, and detail troop and ship movement during the races. This will provide a foundation for the GIS model used to recreate the battlescape geospatially, which was used to plan and coordinate archaeological fieldwork activities. The historical data compiled within this chapter was pulled from a wide array of sources, including both primary and secondary. The processes and methodologies for conducting research and gathering data will be discussed in Chapter 4.

Strategic Advantage of North Carolina's Outer Banks

In May 1861, North Carolina was the penultimate state to secede from the Union and join the Confederate States of America. The decision was met with a reluctant response as well as a lack of enthusiasm among the general population, especially from those along the coast (Yearns et al. 1980:18; Carbone 2001:1). Shortly after North Carolina joined the Confederacy, it was a frequent stage for Civil War activity and would remain so throughout the war. Much of this activity occurred along the coast in the Outer Banks, as both sides fought for control over the state's strategic assets. The Outer Banks barrier islands were considered important points during the war as they protected inland waters that were considered access points to the state's assets as well as the backdoor to Norfolk (*Harpers Weekly* 1861b:599; Trotter 1989:1-2; Oxford 2013:58, 93).

Both the North and South believed that North Carolina had great strategic importance, and both sides felt that gaining control over North Carolina would give them a useful advantage. The Union naval base at Hampton Roads' proximity to the mouth of Chesapeake Bay, gave the Union a unique vantage point, as it put them within easy striking distance of Confederate forces in North Carolina. The Union's campaign for the Outer Banks resulted from Confederate privateering raids against Union shipping that originated in the sounds and the Federal counter to them. Privateering raids additionally sought to interdict transportation and supply up and down the coast as well as prevent the Union from accessing the North Carolina mainland. Furthermore, the privateering raids sought to protect the state's waterways, communication networks, and the state's rail system which had grown to become a major supply route during the war. The belief was that whoever controlled access to the sound also controlled the rivers, thus giving them access to the coastal railway system, especially the bridges. Union domination of Southern railway systems would be a huge strategic victory as it would choke resources coming to Richmond from other Confederate states. On the other hand, if the Confederacy maintained control of coastal North Carolina, then it retained a valuable gateway to foreign sources of aid, the resources of rich agricultural inland counties, and a communication network suited for delivering food and supplies (Trotter 1989:1-2; Carbone 2001:xxiv; Babits et al. 2015:13).

Although the state had significant strategic importance during the Civil War, this was not always the case. The unusual geographical configuration created by the Outer Banks resulted in North Carolina initially failing to develop a large stable commercial economy before the Civil War. For this reason, North Carolina was unable to create a successful entrepôt in the upper Outer Banks and did not enjoy the same wealth that came into the ports of Charleston, South Carolina, and Chesapeake, Virginia (Carbone 2001:xxi).

The state's economic plight changed, however, prior to the Civil War, when North Carolina made attempts to boost its economic position among fellow states. This was accomplished by improving transportation along the coast via railroads and waterways. The investment into the transportation infrastructure by establishing railroads was one of the state's biggest improvements toward developing a flourishing commercial network along the coast. This made control of North Carolina a key objective during the war as railroads now connected the larger port states, such as South Carolina and Virginia, to North Carolina. The result was a huge surge in North Carolina's foreign export trade as the state had a valuable agricultural production system as well as high antebellum productivity in the shad and herring fisheries. Labor was also considered an important resource and was an important contribution to the Confederate war effort as one-ninth of the Confederacy's population lived in North Carolina. Building up the rail network also added to North Carolina's importance as agricultural production, antebellum productivity, and labor were transported via the railroads to southern ports such as Louisiana, South Carolina, and Florida (all with ports accessing foreign trade). Furthermore, the railroads became a valuable supply route for Confederate forces in Virginia, where it was believed supplies and resources were needed the most, making the state more valuable to defend (Powell 1989:309; Trotter 1989:1; Carbone 2001:xxi-xxiv; Browning 2011:17).

In addition to building up the railroad infrastructure, North Carolina also invested in its waterways by utilizing the Pamlico and Albemarle Sounds to create an extensive intra-coastal waterway system for easier commerce and travel. Both Pamlico and Albemarle Sounds are natural bodies of water situated between the North Carolina mainland and the Outer Banks. These sounds link the Atlantic Ocean with the state's coastal rivers. Albemarle also connects to Virginia via the Great Dismal Swamp Canal as well as the Albemarle and Chesapeake Canal. The Dismal Swamp Canal was created by a joint venture between North Carolina and Virginia when the two states came to an agreement that resulted in digging and dredging the canal to connect the two coastal regions. The Albemarle and Chesapeake Canal also served as a route to Virginia. It was created further to the east was and served as a more direct route to Norfolk by connecting the Elizabeth River with Currituck Sound. These canals were considered strategic access points to Norfolk, Virginia, which made securing the canals a key objective for the South. Likewise, gaining access to the canal was a key objective for the North (*Daily National Intelligencer* 1861b:2; Trotter 1989:1-2; Carbone 2001:xxi-xxiv).

If the North succeeded in gaining control over North Carolina's Outer Banks, they would gain a significant edge over the South as they would have access to the states internal communication and transport networks as well as threaten the Confederate's position at Roanoke that provided backdoor access to Norfolk. Furthermore, if the North were to take Hatteras, they would effectively gain control of main access points throughout the sound, which would allow them to stop the privateers and establish a port for blockaders. The South knew this and understood that the Outer Banks were extremely important, unfortunately, they did not prioritize this importance when it came to North Carolina's coastal defenses (Barrett 1963:42; Trotter 1989:1-2, 153; Oxford 2013:93).

Preparation for Coastal Defense

The Confederate command structure was based in Norfolk where they created two departments for coastal defense. These were supervised by Brigadier Generals Walter Gwynn and Theophilus Holmes, who oversaw the northern coastal defenses for the Confederacy (Babits et al. 2015:13). As mentioned, the South did not prioritize coastal defense of North Carolina in the way that they should have. Instead, emphasis was placed more on Norfolk rather than coastal North Carolina. There were those in the Confederacy, however, who realized the Outer Banks (Roanoke Island specifically), was a valuable position to protect because it stood between Albemarle and Pamlico Sounds and thus covered access to Norfolk, Virginia, as well as North Carolina's interior, and thought it should be protected (Oxford 2013:93).

By May 1861, troops arrived at Hatteras Island to defend the coast and to protect the lighthouse, however, their numbers were not adequate, as there were less than 600 soldiers allocated to defend the entire Outer Banks (Yearns et al. 1980:28). Nevertheless, the objective for the South was to secure the five freely navigable inlets along the Outer Banks. From north to south, these include Oregon Inlet, New Inlet, Hatteras Inlet, Ocracoke Inlet, and Beaufort Inlet (Carbone 2001:xix). These became a priority for Confederate forces to protect, so construction immediately began on several coastal forts (Trotter 1989:134-135; Sauers 1996:17-18; Pullen 2001:23; Babits, et al. 2014:13). Most of these forts were of earthen mound construction because soil was readily available; brick and wood were not, thus they were constructed quickly (Eldridge 1996:36-37). Additionally, construction of earthen mound forts consisted of walls made of earth and sand supported with wooden timbers, sandbags, mudbrick, and wickerwork because these were on hand. Earthen forts proved to be more resilient than brick and masonry forts because they absorbed the energy from artillery projectiles rather than transmit it throughout the structure, which usually resulted in much more damage (Trotter 1989:134-135; Eldridge 1996:36-37). The fort's construction was described by one of Hawkin's Zouaves in a diary entry:

> The forts are constructed of swamp-turf or sod (peat), brought from some distance above, and no better material can be found to resist either ball or bombshell, it being spongy yet strong and as solid as bailed cotton or India rubber (Johnson 1861:47-49).

Fort Fisher in Wilmington at the mouth of the Cape Fear River was the first of these types of forts built due to its strategic location for foreign ships (Carbone 2001:5). Several additional forts were strategically constructed near unguarded inlets throughout the Outer Banks which gave Confederate forces control over the access points to Pamlico Sound. Fort Oregon was constructed at Oregon Inlet and Fort Ocracoke was constructed inside Ocracoke Inlet. On 9 May 1861, construction began on two additional forts at Hatteras Inlet, named Fort Clark and Fort Hatteras. Fort Hatteras was completed first, followed by Fort Clark in late June. The two were considered the most important of all the forts built in the Outer Banks because they guarded the main and most-reliable deep-water inlet to the sounds (*Harpers Weekly* 1861b:599; Sloan 1883:109; Merrill 1952:207; Yearns et al. 1980:28; Carbone 2001:5, Pullen 2001:23). The forts were situated in a way that they would be able to catch enemy ships in a crossfire as they attempted to navigate Hatteras Inlet (Merrill 1957:17).

In addition to the small number of forts defending the coast, the state created a small naval flotilla which served as their second line of defense. This small fleet, later nicknamed the "Mosquito Fleet," acted in the sounds and rivers and were instructed to seize all enemy shipping interests (primarily Union merchants) that might venture into these waters. The Mosquito Fleet originally consisted of four vessels: *Winslow, Ellis, Raleigh,* and *Beaufort*. *Winslow* was a side-wheel steamer considered the most notorious privateer operating in the sounds, while the last three were small, propeller-driven riverboats that confined their operations to sounds and rivers (Merrill 1952:208; Barrett 1963:35; Yearns et al. 1980:28; Carbone 2001:5).

This small fleet was soon turned over to the Confederacy and became part of the Confederate States Navy. In addition to this small flotilla, several other light-draft vessels were eventually contracted for service by the South and armed with various types of guns. These included the CSS *Curlew*, CSS *Cotton Plant*, CSS *Empire*, CSS *Junaluska*, and the CSS *Sea Bird*. These vessels, along with the newly commissioned CSS *Raleigh,* were commanded by Captain William F. Lynch. Under his command, these vessels except *Ellis* and *Winslow* ventured into Pamlico Sound on 1 October 1861 and captured the USS *Fanny*, instigating the affair known as the Chicamacomico Races (Oxford 2013:94-97).

Battle for Hatteras Inlet 'a precursor event to the events at Chicamacomico'

As the South became more focused on protecting the Outer Banks coastline, the Union was aware of their presence, as well as the construction of the earthen forts and the small flotilla. Eventually, Confederate privateering against Union vessels became a point of contention in Washington as several Northern vessels were captured and seized, resulting in Northern merchants having difficulties ensuring vessels and cargo. This put immense pressure on the Union government to act against the Outer Bank forts that guarded the privateering bases

(Merrill 1952:208; Barrett 1963:36; Yearns et al. 1980:28). In response, Union forces looked to put a stop to this by seizing the forts at Hatteras and the surrounding barrier islands in to control the inlet, thus denying the privateers use of water passage to the Atlantic (*Harpers Weekly* 1861b:599; Butler 1892:282; Silverstone 2001:xiii). The assault was a combined operation of both the Union Army and Navy that later became known as the "Butler Expedition." The force was comprised of USS *Cumberland*, USS *Fanny*, USS *Harriet Lane*, USS *Minnesota*, USS *Monticello*, USS *Pawnee*, USS *Susquehanna*, and USS *Wabash* (*Harpers Weekly* 1861a:578; Sloan 1883:168; Butler 1861:581-86; Scharf 1887:372; Merrill 1952:210; Barrett 1963:37, 44; Yearns et al. 1980:28-29; Olson 2006:10-12; Oxford 2013:47).

On 26 August 1861, the expedition rendezvoused off Hatteras Inlet, roughly 15 miles below the cape and waited until the following morning to attack. On the morning of 27 August 1861, Colonel Hawkins' 20th New York Infantry attempted a landing while the fleet provided cover fire. Heavy surf prevented the infantry from landing at their planned position, therefore, they landed three miles away, and then, only a small number of men made it ashore successfully (*Harper's Weekly* 1861a:578; Whitney 1866:53; Oxford 2013:47). Although few infantrymen landed, they managed to be effective. Fort Clark fell when Confederate forces ran out of ammunition which allowed Union forces already ashore to advance on the fort. Overwhelmed by this assault, Confederate forces fled to nearby Fort Hatteras (*Harpers Weekly* 1861a:578; Sloan 1883:170; Merrill 1957:21; Barrett 1963:43; Sauers 1996:17-18). Unfortunately for the Confederates, they were unable to put up much of a defense against continuous, close-range fire from the Union fleet just off the beach; Fort Hatteras surrendered on 29 August 1861 (Figure 2) (Scharf 1887:372-373). The Confederate commander, Flag Officer Samuel Barron accepted and formally signed the terms of surrender. By the next day, the Federal plan of suppressing the

Confederate forces at Hatteras came to fruition as they took control of Fort Clark and Fort Hatteras (*Harpers Weekly* 1861a:673; Whitney 1866:53; Butler 1892:284; Clark 1901:629; Barrett 1963:43-44; Trotter 1989:34; Olson 2006:10-12; Tucker 2006:81-84; Oxford 2013:47; Babits et al. 2015:14;).

News of Union victory at Hatteras Inlet broke immediately; the Union was overjoyed with this victory as they had just suffered an embarrassing defeat at Bull Run (referred to as Manassas throughout the South). The North considered the South's surrender at Hatteras to be a decisive victory, as they now had a foothold on the Outer Banks. Holding Hatteras meant they now controlled the main inlet into Pamlico Sound and now held a strategic position to bolster their blockading efforts (*Harpers Weekly* 1861b:599; Merrill 1952:204-205; Barrett 1963:45).

In the South, however, the situation was grim; Congress was irate and demanded answers for the surrender of Forts Hatteras and Clark as it was considered a crushing defeat for them. Although casualties were low, some 700 men were captured and supplies such as cannon and munitions were now in Union hands. This defeat also put an end to Confederate privateering. Further frustration came when they realized that the only presence between the Union and the backdoor to Norfolk was at Roanoke (Merrill 1952:204-205; Barrett 1963:45).

After the loss of Hatteras, Confederate forces abandoned their forts at Oregon and Ocracoke Inlets and withdrew to Roanoke Island in hopes of concentrating their force to hold the Outer Banks. The Confederate Army was fully aware of what the loss of Pamlico Sound meant for their chances of maintaining control over eastern North Carolina. Thus, they established a position at Roanoke Island where they started to build up their numbers. This force allowed them to maintain control over both Croatan and Roanoke Sounds, which linked Pamlico and

Albemarle Sounds, and posed a threat to Union traffic in and out of Pamlico Sound. Additionally, this base served as the last forward defense against Federal advances and their seizing full control of the sounds and access to the eastern North Carolina mainland (Hawkins 1861a:607-09; Barrett 1963:48-49; Yearns et al. 1980:29; Babits et al. 2015:14; Zatarga 2015:47).

Figure 2. View of Fort Hatteras just before the surrender on 29 August 1861. (Original image published in Harper's Weekly September 21, 1861. Image courtesy of Outer Banks History Center).

Occupation of Hatteras Inlet gave the North a strategic advantage in the Outer Banks because they now controlled the main access point to Pamlico Sound, which was the first step in occupying the rest of the state. Originally, General Butler was to remain at Hatteras and oversee using Fort Hatteras as a base for future naval operations inside the Outer Banks. Instead, he opted to leave Hatteras for Washington to deliver news of the expedition's success. In his stead, he left Colonel Hawkins in command with the 9th and 20th New York Regiments (Butler

1861:583-584; Barrett 1963:48; Trotter 1989:33-38; Sauers 1996:19-21; Oxford 2013:47; Babits et al. 2014:14). Colonel Hawkins stationed himself at Fort Clark and appointed Colonel Max Weber to oversee operations at Fort Hatteras while allocating part of the 20th New York to accompany him (Hawkins 1861a:607-9; Whitney 1866:54; Graham 1900:84; Oxford 2013:47).

Once situated at Hatteras, Hawkins proclaimed that he would restore peace and order throughout the Outer Banks by suppressing Confederate forces he viewed were promoting rebellion amongst the locals (Hawkins 1861b). To accomplish this, the Federals set their focus towards the enemy's position at Roanoke Island as those in command understood that to fully control Pamlico Sound, they must take Roanoke Island (Rowan 1861a:240-41; Zatarga 2015:47). Colonel Hawkins believed Confederate forces were increasing their numbers at Roanoke. He was concerned their intent was to launch a counteroffensive against Hatteras to recapture the forts and predicted they would attempt to land forces at Chicamacomico. He further suspected they would move south to destroy the lighthouse. His suspicions were validated the morning of 21 September 1861, when two fugitives, claimed that they had regular contact with a colonel from the 3rd Georgia Regiment and, allegedly, that they were privy to a planned attack on Hatteras Island (Hawkins 1861a:617-20; Oxford 2013:49-53).

With the new intelligence, Colonel Hawkins realized the enemy was building up their fleet to launch an assault. He speculated that the attack would occur at the northern end of Hatteras. As a result, Hawkins moved a force up the island to maintain outposts. In September 1861, Hawkins established one outpost at Chicamacomico. Located north of Hatteras lighthouse, the village of Chicamacomico was just south of Loggerhead Inlet. Around this same time, two additional ships were ordered to join the Union flotilla at Hatteras; the USS *Ceres* and the USS

General Putnam. Hawkins was certain that the enemy was going to attempt a landing at Chicamacomico and he was adamant about protecting his position on Hatteras Island as well as the local inhabitants (Welles 1861:234; Whitney 1866:59; Barrett 1963:48-49; Olson 2006:12; Oxford 2013:54, 58). He made the following declaration:

> To-night I shall start for Chicamacomico for the purpose of selecting a suitable ground for a camp, after which I shall return and send up all the force I have to spare, with two pieces of artillery. This force will be encamped there permanently, unless otherwise ordered by yourself. I know that there is great objection to separating so small a command as mine, but these people, who have taken the oath of allegiance, must be protected, though at the cost of every life under my command. What may not be said of a government which is too weak or unwilling to protect its own loyal subjects its own rebels?... I hope you will send me at least 1,000 men within the next four or five days, and one or two rifled guns, if you have them to spare (Hawkins 1861a:619).

Meanwhile, Confederate forces at Roanoke were indeed building up their numbers and planning an assault on Hatteras Island in a joint venture with the Confederate Navy. If the opportunity presented itself, they would push on to attack Hatteras Inlet and retake the forts. They were joined by the 3rd Georgia Infantry commanded by Colonel Ambrose R. Wright (Oxford 2013:77-84; Babits et al. 2015:14). The 3rd Georgia Infantry arrived at Roanoke Island to assist in building fortifications, which proved quite an endeavor as evidenced by a letter written by Asa Winn from the 3rd Georgia on 4 October 1861 (Winn 1861). Morale in the 3rd Georgia was high because they knew that if they could muster up enough support and personnel, they could regain control of Hatteras Inlet, thus they were eager to engage the Union Army (Babits et al. 2014:15). The following is a response to the Union outpost in Chicamacomico illustrating the 3rd Georgia Infantry's eagerness, "as soon as I can …will endeavor to capture the Federals encamped at Chicamacomico" (Wright 1861:597).

Capture of the Union Gunboat, Fanny

In response to the growing Confederate force at Roanoke, Hawkins arranged to have the 20th Indiana Infantry from Fort Monroe establish an outpost at Chicamacomico. Hawkins viewed this as a top priority and as soon as possible, the 20th Indiana made their way towards Hatteras aboard the USS *Spaulding*. *Spaulding;* however, had too deep a draft to get through Pamlico Sound all the way to Chicamacomico. Therefore, three armed steamers (*Fanny*, *General Putnam*, and *Ceres*) were ordered to take them from Hatteras to Chicamacomico. All but seventy-five men were transferred to the armed steamers. They arrived at Chicamacomico with few tents and only two days' food and supplies (*Daily National Intelligencer* 1861a:3; Merrill 1869:486; Oxford 2013:63).

The 20th Indiana were outnumbered and outgunned by enemy forces situated at Roanoke. Tension within the camp began to mount when they realized how far away their supporting forces were. The closest back up was over 40 miles away at Forts Clark and Hatteras. In addition to being far from reinforcements, they also lacked adequate artillery and rifles (Brown 1861a; Logansport Journal 1861). The tension was felt most by Colonel Brown who was concerned about the lack of support, men, and artillery. He realized the chances of holding Chicamacomico were in jeopardy and felt they were unable to successfully maintain their position at Camp Live Oak let alone launch any kind of offensive against the enemy without additional support. Colonel Hawkins attempted to ease tensions when he guaranteed Colonel Brown that he would supply the 20th with additional men, cannons, and gunboats (Oxford 2013:70).

Unfortunately, Camp Live Oak, Colonel Hawkins' promises for additional support to Colonel Brown and his men were embellished as he was unable to muster the support he promised. Hawkins inflated the number of men he stated were coming from Fort Monroe. He also led them to believe that additional artillery and supplies were on the way but had two pieces of field artillery available; any additional artillery was either not ready for battle or unavailable. To make matters worse, ammunition at Hatteras was in short supply. The ammunition they had on hand, had been waterlogged from the landing during the assault on the forts at Hatteras. The situation was further exacerbated for Colonel Brown and his men as they were running low on food rations. They arrived at the camp with only two days' worth and they were now approaching day three (Oxford 2013:70, 75).

Union forces at Hatteras realized that they needed to expedite supplies and support to Chicamacomico, so they sent the USS *Fanny* (*Daily National Intelligencer* 1861a:3; Barrett 1963:49). *Fanny* was a small tugboat, that was pressed into service by the Union army in 1860. *Fanny* had an iron hull with dimensions of 145 tons, 115 long, and 18 feet wide (Oxford 2013:55). Sources differ on what artillery *Fanny* was equipped with while in Union service. Some sources state *Fanny* was equipped with one 6-pounder James Gun and one 9-pounder Sawyer rifled cannon (Moore 1861:155). The *Richmond Daily Dispatch* (1861b) indicated *Fanny* was equipped with a single 24-pounder rifled cannon. According to the Naval History and Heritage Command (NHHC) (2015) online database, *Fanny* was equipped with one 32-pounder on the bow and one 8-pounder on the stern after it was captured by Confederate forces. Regardless of armament, sending supplies aboard *Fanny* was a risky venture as there was a shortage of capable navy men and officers. Therefore, Union forces were unable to send assistance with *Fanny* resulting in the small gunboat heading north alone. *Fanny* was at a further disadvantage as its Sawyer gun was transferred to the USS *General Putnam*. *General Putnam* was ordered to stay in Croatan Sound to enforce a blockade, leaving *Fanny* vulnerable and without naval support (Moore:1861:156; Rowan 1861b:270-71; see also Oxford 2013:71, 75-76).

Meanwhile, Confederate forces continued to gain strength on Roanoke Island as Flag Officer William F. Lynch took command. Lynch fully understood the military importance of Roanoke's proximity to Norfolk. He knew that if Roanoke were to fall, the enemy would have easy access to Norfolk. Therefore, he made it a top priority to hold Roanoke (Oxford 2013:93-94). On 1 October 1861, Lynch received credible intelligence that there was an enemy gunboat near the shore, south of Chicamacomico (Yellowley 1861; *The Richmond Daily Dispatch* 1861f; Turner 1864; Scharf 1887:377; see also Oxford 2013:96). This prompted Lynch to send three gunboats to engage the vessel. The expedition consisted of some 200 men from the 3rd Georgia regiment dispersed aboard CSS *Curlew*, CSS *Raleigh*, and CSS *Junaluska*. Within a few hours, as they approached Chicamacomico, the Union gunboat (*Fanny*) came into view (*The Richmond Daily Dispatch* 1861f; Turner 1864; Andrews 1865; Scharf 1887:377-378; Wright 1891:596-7; Barrett 1963:49-50; Trotter 1989:44; Olson 2006:13; Oxford 2013:96-99).

Earlier that day, the Federals at Hatteras loaded *Fanny* with supplies and additional troops and sent the vessel alone towards Camp Live Oak (*Daily National Intelligencer* 1861a:3). On the way to Chicamacomico, *Fanny* met up with the *General Putnam* steaming south from Croatan Sound. Together they made way to a point roughly three miles off Chicamacomico at around 1:00 p.m. and anchored in 6-8 feet of water (*Harpers Weekly* 1861c:668; Mansfield 1861:595; Morrison 1861:276; *The New York Herald* 1861; Ridgely 1861). Based on a report to Hawkins, the windmill towards the north was visible from their position. The windmill in reference was reportedly adjacent to Camp Live Oak and has been referenced as a marker to the alleged location of the Union encampment (Oxford 2013:99-100, 195-96).

General Putnam's commander, Master Hotchkiss, had orders to remain with *Fanny* while supplies were unloaded at Camp Live Oak. While at anchor, Hotchkiss returned the Sawyer gun which he borrowed earlier. Once the gun was returned, Hotchkiss raised anchor and left for Hatteras Inlet, ignoring orders to stay (Mansfield 1861:595: Oxford 2013:100). Thus, *Fanny* was left alone in the sound without adequate support. A few later, at 4:00 p.m., in a turn of unfortunate circumstances for *Fanny* and those on board, they encountered a small Confederate flotilla (Lynch's fleet). Before they could unload many supplies and ammunition, they were engaged by the Confederates. There was a short artillery exchange between *Fanny* and the Confederate flotilla which ultimately led to *Fanny's* capture (Figure 3). It is speculated that those aboard *Fanny* managed to offload some supplies destined for Camp Live Oak before *Fanny* was captured. The 20th Indiana watched helplessly from shore as *Fanny* was taken (*Daily National Intelligencer* 1861a:3; *Harpers Weekly* 1861c:668; Johnson 1861:54; Mansfield 1861:595; Morrison 1861:276; *The New York Herald* 1861; Whitney 1866:59-60; Barrett 1963:50-51; Trotter 1989:43-45; Olson 2006:13; Babits et al. 2015:15).

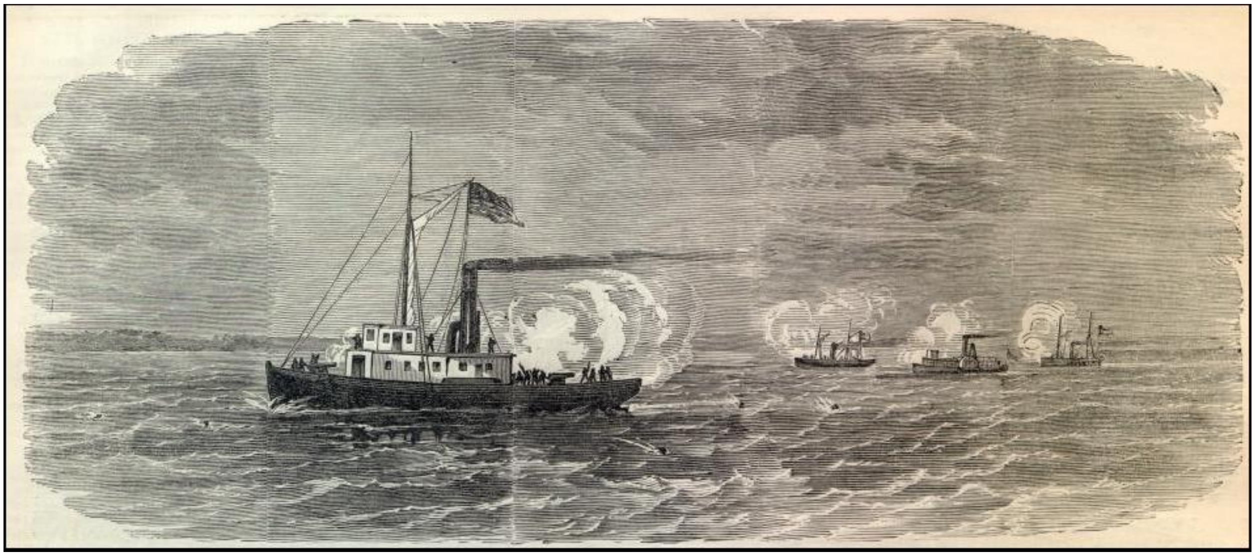

Figure 3. Illustration of USS Fanny's *capture on 1 October 1861 (Harpers Weekly 1861c:668).*

During the capture, *Curlew* began the assault on *Fanny,* followed up by *Raleigh. Junaluska, however,* was unable to get into range to effectively fire (Morrison 1861:276; *New York Herald* 1861; *The New York Herald* 1861; Oxford 2013:106). Unfortunately for *Fanny,* there was no viable escape route because it had been run aground. Outgunned by the enemy, *Fanny* only fired nine shots with no effect before succumbing to Confederate forces. (*Daily National Intelligencer* 1861a:3; *Harper's Weekly* 1861b:668; *The Richmond Daily Dispatch* 1861f; Scharf 1887:379; Oxford 2013:106-108; Parker 2015:48-49).

During the chaos of *Fanny's* capture, the crew and some soldiers pitched supplies overboard so that they would not be taken. This was stopped before the guns and additional ammunition could be tossed overboard. Soon after, the civilian crew managed to escape in a small boat. In the aftermath, over 40 prisoners were taken after *Fanny* ran aground. Additionally, supplies, including winter overcoats for an entire regiment, meant for those at the camp fell into Confederate hands (Comly 1861; *Daily National Intelligencer* 1861a:3; *Harpers Weekly* 1861c:668; Johnson 1861:54; Morrison 1861:276; *The New York Herald* 1861; *The*

Richmond Daily Dispatch 1861b,f; Rowan 1861a:275-76; Scharf 1887:379; Barrett 1963:50-51; Trotter 1989:44-45; Oxford 2013:108-111; Parker 2015:48-49).

The *Fanny* capture was a significant blow to Union forces and certainly discouraging for the 20th Indiana, who watched helplessly from shore while waiting for the much-needed supplies. Although a setback for the Union, this was a major victory for the Confederates and the first capture of a Federal vessel by the Confederacy (Barrett 1963:51; Trotter 1989:45). The significance of *Fanny*'s capture was illustrated by Colonel Claiborne Snead from the 3rd Georgia when he wrote, "This was the first naval success in North Carolina, the first capture made by our arms of an armed vessel; and more than all, it was a naval victory achieved by infantry marines" (Scharf 1887:379; see also Oxford 2013:110). Additionally, they considered capturing *Fanny* a huge success because it was General Butler's flagship (*The Richmond Daily Dispatch* 1861b; Trotter 1989:45; Oxford 2013:111). There were expectations among some that a Union attack or some form of retaliation against their forces at Roanoke was eminent (*The Richmond Daily Dispatch* 1861f).

Union soldiers, on the other hand, witnessing the capture of *Fanny* from shore saw this as a devastating blow which resulted in further deteriorated morale within the camp. They watched helplessly as their fellow soldiers were attacked and subsequently captured. Furthermore, the supplies they desperately needed were now in Confederate hands (*New York Times* 1861b; Barrett 1963:51; Trotter 1989:45; Oxford 2013:111).

Fallout from the Fanny *capture*

During the capture of *Fanny* over forty men were taken prisoner in addition to equipment and provisions meant for the 20th Indiana at Camp Live Oak. These included overcoats, blankets, and shoes, as well as medical supplies, food, and ammunition. The captured goods were estimated to be valued as high as $100,000 (Comly 1861; *The New York Herald* 1861; *The Richmond Daily Dispatch* 1861a, c, f; Barrett 1963:50-51; Trotter 1989:45; Oxford 2013:116). After the capture of *Fanny*, Flag Officer Lynch decided to anchor at the site instead of making way back to Roanoke, deciding that they would head back the next day with their prize. *Fanny* became the newest addition to his small fleet and was commissioned as CSS *Fanny* (Oxford 2013:113-14).

After *Fanny's* capture, Lynch and his men were more determined and ready to engage the small Union force at Chicamacomico. They knew that Chicamacomico was the last post between Roanoke and the Federal position at Hatteras. Lynch's plan involved a multiple step approach. First, he intended to land a force north of the Twentieth's position close to the inlet, then land another force further south near Kinnakeet. He hoped to sandwich the Indianans between the two landings. The next phase involved marching further south to destroy the Hatteras lighthouse. The final phase involved an attack on Union-held Forts Clark and Hatteras to retake the inlet (Yellowley 1861; Andrews 1865; Barrett 1963:51-53; Trotter 1989:45; Oxford 2013:125).

Meanwhile, at Forts Hatteras and Clark, Union forces were blockading the inlet when news arrived about *Fanny's* capture. Those at the forts were startled by the news and were eager to retaliate as evidenced by the following statement from Charles Johnson from the 9th New York;

> Our camp has just been startled by the intelligence that the tug Fanny has been captured by the enemy while underway with the quartermaster's commissary stores for the Twentieth Indiana at Chicamacomico. Well we have been quiet so long, what if we should have a little excitement, say I (Johnson 1861:54).

Upon hearing the news, Colonel Brown sent word to Hawkins that the enemy took prisoners and supplies during the assault on *Fanny*. He also relayed to Hawkins that there were several sick men at the camp and they were unable to adequately provide care for them (Oxford 2013:119).

In response, Hawkins requested that a regiment be sent to Chicamacomico at once to reinforce the 20th Indiana at Camp Live Oak, and the Federals forces spent the day preparing for this expedition as well as possibly retake the gunboat *Fanny*. Hawkins recruited twenty-five men, two officers, and the tugs USS *Ceres* and *General Putnam*. He put Lieutenant J.P. Bankhead from the USS *Susquehanna* in command with orders to steam for Chicamacomico the next morning (Rowan 1861a:275-76; Goldsborough 1861:260; Merrill 1869:488; see also Oxford 2013:120).

Union forces land at Chicamacomico

Bankhead's small expedition consisting of *Ceres, General Putnam,* and one of *Susquehanna's* small boats towed by *Ceres*, arrived at Chicamacomico on the afternoon of 3 October. Once on site, they unloaded provisions, tents, and supplies. As the 20th Indiana welcomed the newly arrived provisions, Colonel Brown began loading the sick aboard *General Putnam* and *Ceres*. Varying accounts suggest that during this time, a rebel steamer became visible and *General Putnam* and *Ceres* chased it away. Other reports suggest they saw nothing and simply returned towards Hatteras or were given other tasks. Either way, the two vessels were reportedly not seen again by anyone at Camp Live Oak (*New York Tribune* 1861b; Merrill 1869:488; Oxford 2013:120-121).

Conclusion

The events leading up to the Chicamacomico Races was the result of two opposing strategies which involved controlling the sounds inside the Outer Banks. After the events at Hatteras Inlet, there were those within the Confederate command who now fully understood the importance of coastal North Carolina. They realized the position at Roanoke was the only thing between Norfolk and invading Union forces now situated at Hatteras Inlet. Likewise, the Unionists fully understood the importance of holding Hatteras Inlet, for they knew it effectively eliminated Confederate privateering activities as well as giving the Union a strategic position from which they could threaten interior North Carolina. The Northern expansion began by establishing an outpost at Chicamacomico (Camp Live Oak) in response to growing enemy forces at Roanoke. Once Confederate forces learned of a Union presence at Chicamacomico, they directed a small fleet of boats to engage, and capture, *Fanny*, while it was on a routine supply mission to Camp Live Oak. This resulted in one of the most confusing encounters of the entire Civil War, the Chicamacomico Races.

Chapter 4
Methodological Approach to Investigating the Chicamacomico Races

Introduction

This thesis was concerned with determining and assessing the best archaeological approaches (theory, methodologies, and tools) for detecting archaeological signatures of a naval engagement in shallow water. Similar studies (see Simonds 2014 and Parker 2015) have conducted surveys within North Carolina's shallow waters, the key difference here is that this study conducted an archaeological survey in extremely shallow water (1-4 feet deep). The archaeological data was then used to recreate the Chicamacomico Races naval battlescape. A multistep methodological approach was necessary, corresponding with the theoretical approach discussed in the previous chapter. These steps included: historical research, integration of Geographic Information System (GIS) software, archaeological fieldwork, consisting of a visual shoreline inspection coupled with three-fold remote sensing and final analysis. The fieldwork consisted of hand-held metal detection and towed remote sensing surveys utilizing side-scan sonar and magnetometer technology.

With the principles of KOCOA in mind, the first step was creating a historical narrative from primary and secondary sources to create a GIS model representing the Chicamacomico Races battlescape. This model illustrated the activity that occurred at Chicamacomico during the period of 1-5 October 1861 as well as the potential fields of fire during the engagement. This was done to determine the best places to conduct survey activities to search for ordnance. Since the analysis is vessel focused, the focus of the surveys included only areas where potential ordnance would have landed. The next phase involved the archaeological fieldwork which consisted of two parts: visual shoreline inspection coupled with handheld metal detection and a remote sensing survey over water.

The final phase involved integrating archaeological survey data into the GIS model for analysis which allowed for a final battlescape re-creation using the operational frameworks outlined in Chapter 2. This had two purposes, validate or disprove the historical record and determine which archaeological approach was the best method for detecting archaeological signatures of a naval battlescape in shallow water. This analysis will be discussed in more depth in Chapters 5 and 6.

Historical Research

Research into the Chicamacomico Races proved to be quite challenging as there is not much historical discussion concerning the event. Furthermore, primary source material on the event is particularly sparse in comparison to other North Carolina engagements such as the Battle at Hatteras Inlet. Therefore, much time was spent meticulously examining research material available at both Joyner Library at East Carolina University (ECU) and Randall Library at the University of North Carolina-Wilmington (UNCW) to gather information in the form of letters, official reports, officer statements, and maps.

While visiting university libraries as well as reviewing their online databases, the following sources were frequently consulted: The United States War Department's, *The War of the Rebellion Official Records of the Union and Confederate Armies* (1880-1901) and the United States Naval War Record's Office's, *Official Records of the Union and Confederate Navies in the War of the Rebellion* (1894-1921), which proved to be great sources of information. There were several other primary sources available through the universities such as *Harpers Weekly*

1861, *New York Times* 1861, *New York Herald* 1861, *The Richmond Daily Dispatch* 1861, Charles Andrews' (1865) *Third Georgia Regiment: History of its Campaigns from April 26th 1861 to April 9th 1865*, Matthew Graham's (1900) *The Ninth Regiment New York Volunteers* (Hawkin's Zouaves), *Being a History of the Regiment and Veteran Association from 1860 to 1900*. Additional sources investigated include, *Battles and Leaders of the Civil War: Being for the Most Part Contributions by Union and Confederate Officers* (available through the library of General Rush C. Hawkins, of New York via ECU library), J. Thomas Scharf's (1887) *History of the Confederate States Navy from its Organization to the Surrender of its Last Vessel*, John A. Sloan's (1883) *North Carolina in the War Between the States*, and J.H.E. Whitney's (1866) *The Hawkin's Zouaves (Ninth N.Y.V.) Their Battles and Marches*. The Henry T. King collection (1825-1865; 1887-1931) was used, which included the Edward C. Yellowley papers and the Confederate States of America, as well as North Carolina Infantry Regiment, 8th, and Edward C. Yellowley's (1901) "Chicamacomico, 4 October 1861.", and Letter dated Roanoke Island, 8 October 1861, "Histories of the Several Regiments and Battalions from North Carolina in the Great War 1861-'65."

Visiting the Outer Banks History Center in Manteo, North Carolina proved to be fruitful in searching for information regarding the Chicamacomico Races as transcripts of handwritten accounts of soldiers were available in the archives. These include Asa Win (September 6, 1861 and October 4, 1861), 8th North Carolina Infantry Letter (October 8, 1861), and William Miller (November 14, 1861). Additionally, there was access to the September 14, 1861 and September 21, 1861 editions of *Harper's Weekly* newspaper which contained information on events leading up to the battle. Other newspapers such as *Frank Leslie's Illustrated Newspaper*, November 2, 1861, and the *New York Herald*, October 13, 1861, were consulted as well.

With limited primary source material on the topic available, much of the research into the Chicamacomico Races relied on any secondary sources that mentioned the affair to shape the historical narrative. Examination of secondary research material was challenging because several authors touched on the subject briefly while covering a much larger topic (see Merrill 1952, 1957; Trotter 1989; Carbone 2001; Pullen 2001; Zatarga 2015). Secondary sources consulted include Rodney Barfield's (1995) *Seasoned by Salt: A Historical Album of the Outer Banks*, John Barret's (1963) *The Civil War in North Carolina*, Judkin Browning's (2011) *Shifting Loyalties: The Union Occupation of Eastern North Carolina*, John Carbone's (2001) *The Civil War in Coastal North Carolina*, Drew Pullen's (2001) *Portrait of the Past: The Civil War on Hatteras Island, North Carolina: a Pictorial Tour*, James Merrill's (1952) article, "The Hatteras Expedition, August 1861" in *North Carolina Historical Review* and (1957) *The Rebel Shore: The Story of Union Sea Power in the Civil War*, Richard Sauers' (1996) *A Succession of Honorable Victories: The Burnside Expedition in North Carolina*, William Trotter's (1989) *Ironclads and Columbiads: The Civil War in North Carolina The Coast*, Buck Yearn and John Barrett's (1980) *North Carolina Civil War Documentary*, and Michael Zatarga's (2015) *The Battle of Roanoke Island: Burnside and the Fight for North Carolina*. These sources provided only a brief outline of the affair, and the *Fanny* capture often dominated the discussion. Most neglected or only touched on the subsequent events such as the USS *Monticello* assault upon Confederate troops at Kinnakeet. Collectively their discussions into the affair seemed to provide a transitional discussion of events between the Battle of Hatteras Inlet Batteries (1861) and the Battle for Roanoke Island (1862). Furthermore, it is often portrayed as a comical event where there was no clear victor and no ground was gained by either side.

None of the secondary sources reviewed gave the Chicamacomico Races the same focus as Lee Oxford (2013) did in his book, *The Civil War on Hatteras: The Chicamacomico Affair and the Capture of the U.S. Gunboat* Fanny. Oxford put together a comprehensive historical account of the Chicamacomico Races utilizing a wide variety of primary and secondary sources and discussed the capture of *Fanny*, the amphibious assault by the Confederate Army and Navy, and the Union encampment at Live Oak. This source proved to be invaluable in the historical research phase as it was the only secondary source solely dedicated to the Chicamacomico Races and *Fanny*'s capture. Additionally, it proved to be a great guide for further research into this skirmish. The decision on where to coordinate archaeological activities was largely based on historical research and information contained within Oxford's book. Oxford identified the skirmish area in the following three figures (Figures 4-6). These figures essentially delineate the extent of the entire event. Critically, he identified a concentration of activity at Camp Live Oak and pinpointed its location as having been at the north end of Chicamacomico, at present-day Rodanthe (Oxford 2013:196). Oxford also identified the location of Midyett's Windmill which was known to have been at, or near, Camp Live Oak (Figures 4 and 7).

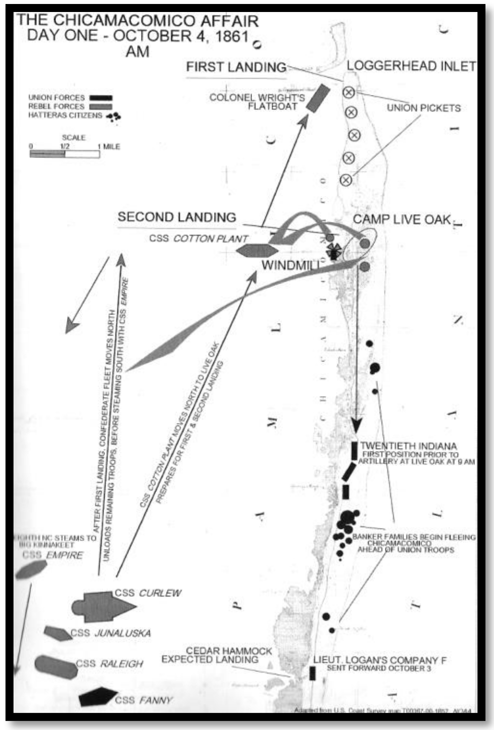

Figure 4. Lee Oxford's depiction of "The Chicamacomico Affair, Day One -- October 4, 1861, AM" (Oxford 2013:149)

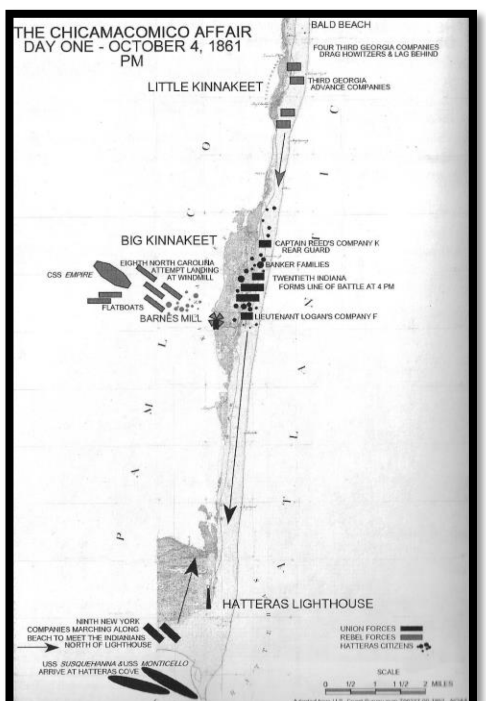

Figure 5. Lee Oxford's depiction of "The Chicamacomico Affair, Day One -- October 4, 1861, PM" (Oxford 2013:150)

The location of this windmill has been heavily debated by a local historian, Mr. Mel Covey, and was the subject of a terrestrial archaeological investigation led by Dr. Lawrence Babits (Babits et al. 2014). This search for an alternative location of Camp Live Oak at Waves, North Carolina, eventually ruled out the Covey theory of Waves being the site of Camp Live Oak. Dr. Babits' study is relevant because, in the process of spelling out a logical narrative, it tends to confirm Oxford's initial identification and establishes an important area of the conflict.

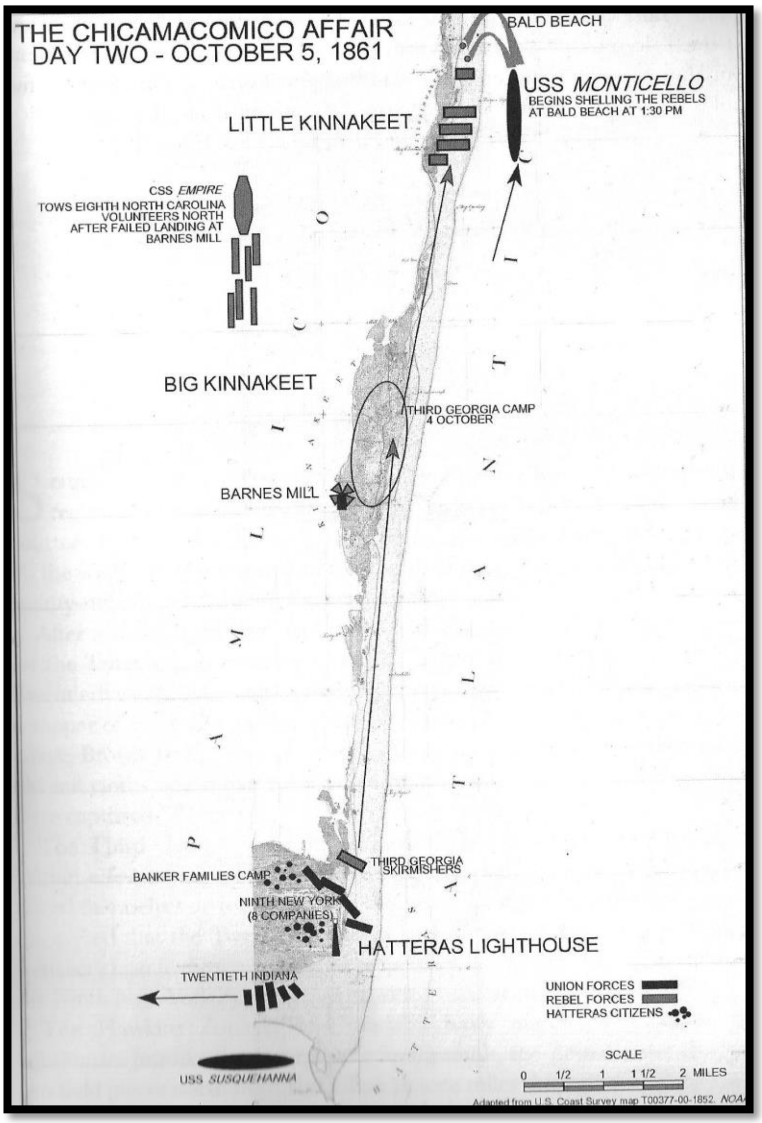

Figure 6. Lee Oxford's depiction of "The Chicamacomico Affair, Day Two-- October 5, 1861" (Oxford 2013:151)

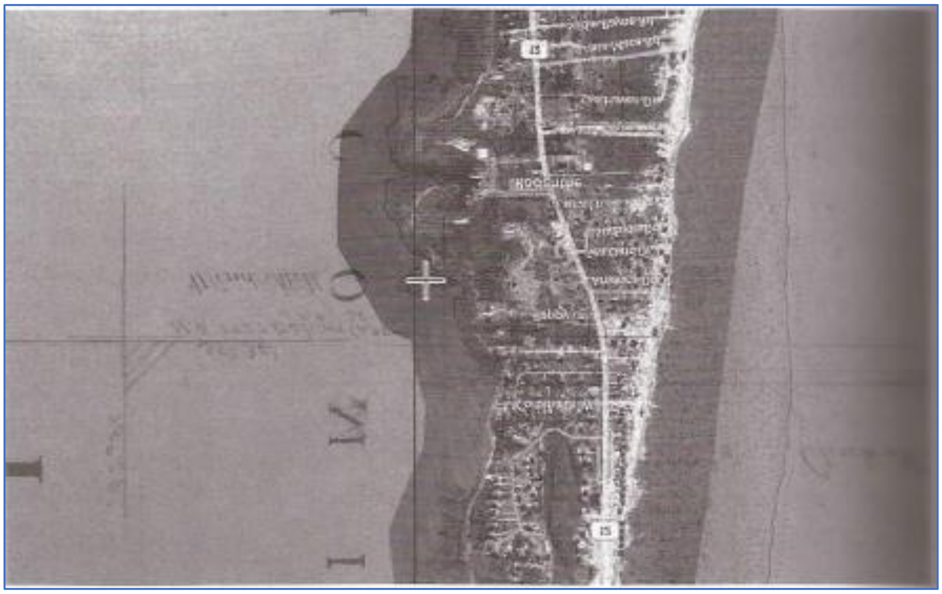

Figure 7. Location of Midyett's windmill as illustrated in Oxford (2013:196).

Oxford concluded that Camp Live Oak was immediately north and east of the windmill, which stood at 35° 35' 54.5" North to 75° 28' 19.3" West (Figure 7 above). He reached this conclusion by having a composite map prepared by NOAA's Office of Coast Survey that includes the 1852 Hull-Adams coastal survey map overlaid with a 2012 satellite image (Oxford 2013:196). The historical data available places part of the 20th Indiana Regiment in this location in October 1861, so it is reasonable to assume this area is part of the historic Chicamacomico Races battlefield site. Additionally, the present study found that the historical evidence lends support to Lee Oxford's theory on the location of Camp Live Oak, as well as supporting evidence from Dr. Babits' archaeological findings, which exclude any other location for the camp. Therefore, archaeological fieldwork activities for this project were based on historical research and Oxford's theory on the location of Camp Live Oak.

One last piece of historical research that was carried out before creating the GIS model focused on researching the capabilities of artillery involved in the affair. This was an important step since the primary goal of this project was to investigate which method is best suited for detecting archaeological signatures of a naval engagement in shallow water. It was necessary to determine the capabilities and ranges of artillery utilized during the battle so that this information could be incorporated into the GIS model to create the fields of fire and narrow down survey locations. The archaeological fieldwork carried out for this project was primarily concerned with the events of 5 October 1861, when the USS *Monticello* bombarded on retreating Confederate troops, therefore the research focused on the USS *Monticello*'s artillery capabilities. Additional sources were consulted to assist with setting up the fields of fire in the GIS model. These sources were especially useful in discussing naval aspects of the affair. These include Eugene Canfield's (1960 and 1969) works, *Notes on Naval Ordnance of the American Civil War, 1861-1865* and *Civil War Naval Ordnance*, Donald Canney's (1998) *Lincoln's Navy: The Ships, Men and Organization 1861-1865*, Kevin Dougherty's (2010) *Strangling the Confederacy: Coastal Operations of the American Civil War*, U.S. Navy History Division's (1959) *Dictionary of American Naval Fighting Ships, vols. 1-4*, Christopher Olson's (2006) article, "The *Curlew*: The Life and Death of a North Carolina Steamboat, 1856-1862" in No*rth Carolina Historical Review*, Paul Silverstone's (2001) *The Civil War Navies, 1855-1883*, Spencer Tucker's (2006) *Blue and Gray Navies: The Civil War Afloat*, Spencer Tucker et al. (2011) *The Civil War Naval Encyclopedia*, and the US Navy Historical Center's (2011) *Confederate Ships Afloat*.

GIS Model

Before conducting any archaeological fieldwork, a GIS model representing the Chicamacomico Races was created based on the historical narrative to illustrate points of interest, theorized ship placement, and fields of fire to narrow down where to conduct archaeological survey activities. This proved a challenging task because of scant primary source material available as well as the lack of information in secondary source material. Therefore, the

GIS model was heavily influenced by the location of Camp Live Oak as noted on the 1852 Hull Adams map. This map (Figure 11) shows the Windmill at Chicamacomico and was used by Oxford in his historical account of the battle (Oxford 2013:195-196). As a result, the GIS model looked very similar to the battlefield overview created by Oxford (Figures 4-6) but allowed for an assessment of other factors, such as proximity to other landmarks and bathymetry, that were incorporated into the cartographic (GIS) representation. Landmarks and bathymetry factors also assisted in determining areas of high probability to have in situ cultural material where remote sensing operations should focus. The GIS model focused on an expansive area that included present-day Rodanthe southward toward Frisco (Figure 8). Within this area the events of 1 October 1861 through 5 October 1861 were illustrated; these included the capture of *Fanny*, the assault on Camp Live Oak, and the USS *Monticello*'s bombardment upon the withdrawing 3rd Georgia.

In a manner similar to previous maritime battlefield studies conducted at East Carolina University, the historical data was integrated into the GIS model to create a geospatial presentation of the battle (see, for example: Bright 2012, Simonds 2014, and Parker 2015). ArcMap 10.4, a software program developed by ESRI and licensed by East Carolina University for student use, was utilized to generate the GIS model. This process involved integrating the historical data, georectifying historic maps with modern National Oceanic and Atmospheric Administration (NOAA) charts, digitizing both modern and historic landscapes and bathymetry, and creating imagery showing vessels involved for placement in their approximate locations based on historical data and supporting theories by Oxford. The final step involved in recreating the affair in the GIS model was to create the fields of fire.

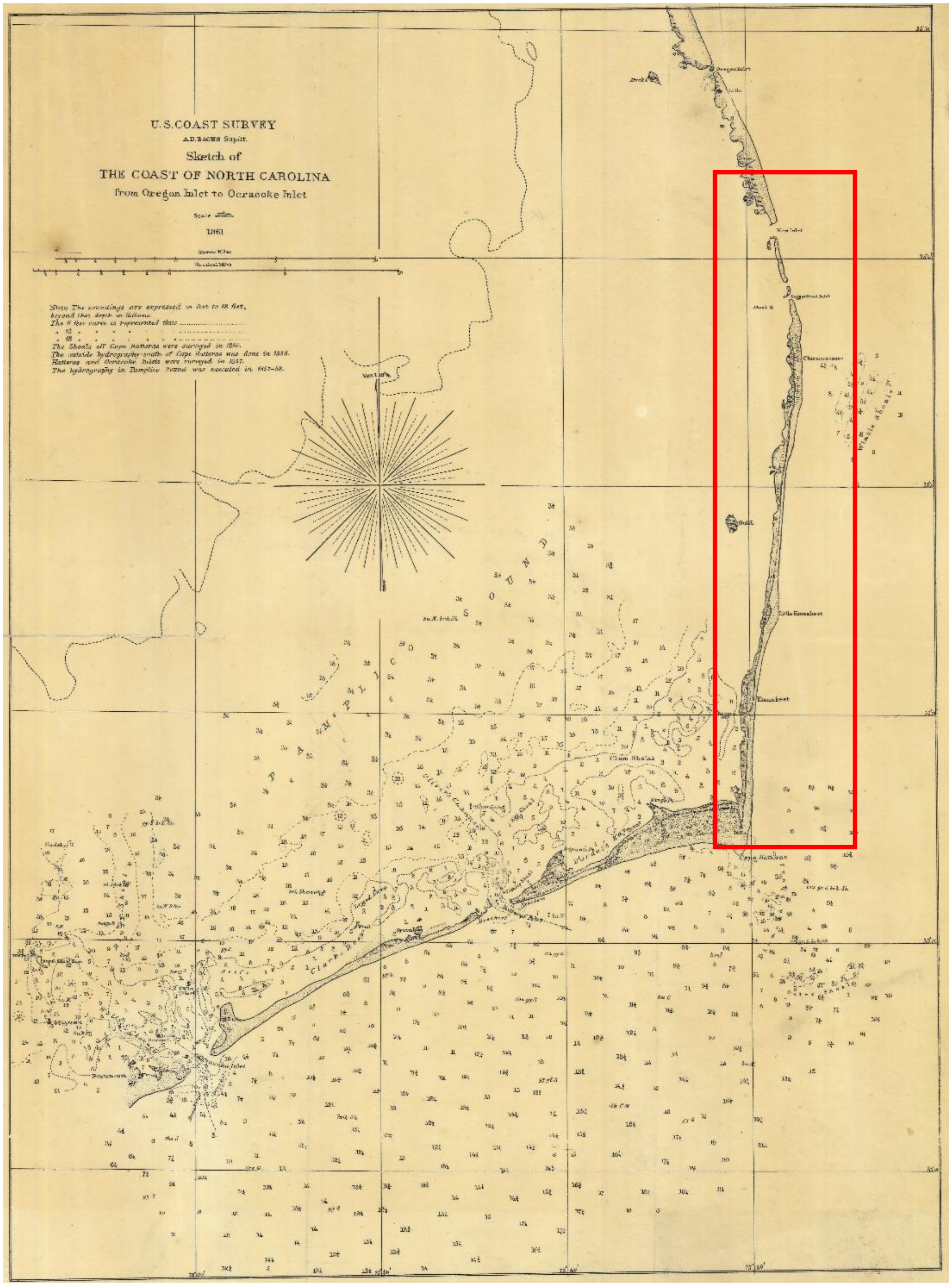

Figure 8. 1861 U.S. Coast Survey (USCS) chart depicting the Coast of North Carolina, with the "Chicamacomico Races" area highlighted (USCS 1861), with amendments by the author.

The first aspect within the GIS model illustrated activity that took place on 1 October 1861; the engagement and eventual capture of *Fanny*. Based on the historical narrative, the point where *Fanny* was engaged by the Confederate flotilla is believed to have occurred two to three miles west of Camp Live Oak's location. The point at which the vessel was eventually captured is approximately five miles south-southwest of that point, which would put its capture approximately three miles west of present-day Salvo (Mansfield 1861:595; Merrill 1869:488; Oxford 2013:195-196).

No major naval activity occurred on 2-3 October 1861, so the next model increment illustrates activity that occurred on 4 October 1861. It should be noted here that although a GIS model was created for the entire engagement (including *Fanny*'s capture), archaeological activities were planned based only on naval events of 4 October 1861 and 5 October 1861.

The GIS model for 4 October 1861 shows the two successful and one attempted Confederate landings on Hatteras Island. The first landing occurred near Union pickets in proximity to Loggerhead Inlet which was north of Camp Live Oak. The second landing was at Camp Live Oak itself while a third was attempted below Kinnakeet. The final aspect of the GIS model illustrated activity that occurred on 5 October 1861. This shows the USS *Monticello* firing on the retreating 3rd Georgia beginning at Bald Beach in Kinnakeet.

Ship placement in the GIS model is approximate based on primary accounts. When referring to primary accounts such as Lieutenant Braine's, (commanding officer of *Monticello*) account of the distance from shore off Kinnakeet, a degree of caution is warranted. *Monticello* could have been closer to shore or slightly further away (Braine 1861:291-292; Johnson 1861:54; Trotter 1989:44-45; Oxford 2013:151, 171). The same holds true for all ship locations within the

GIS model. As mentioned in previous studies (Simonds 2013:28; Parker 2015:62-63, 138), a certain degree of error is expected when utilizing GIS models to illustrate and interpret historic battlefields. There are certainly limitations present when creating GIS models as is emphasized by the following statement from Lucas Simonds' (2013:28) study:

> First and foremost, the purpose of compiling data into a GIS was to produce an approximate digital model of the landscape of the battlefield [in its historic context]. This digital model serves primarily as a means of exploring the relationship between the elements of that landscape and the combatants to better understand the influence of those relationships on human behavior during the battle. The model is based on historic charts and descriptions from primary accounts and is not intended to present a perfectly accurate representation of the details of the historic landscape (also quoted by Parker 2015:62).

Parker (2015:63) adds, "imperfections between the modern landscape and the historic landscape are to be expected." He further states, "GIS models are not without merit…" and that they "… are interpretive tools based off historical data and archaeological evidence".

Creating the Historic Landscape in a Digitized Format

The first step in the actual GIS creation involved extracting the correct modern-day charts of the study area for a base map; this required two base maps. The northern point of the study area is where the two base maps meet. Both base maps were readily available through the National Oceanographic and Atmospheric Administration (NOAA) (NOAA 2016, charts 11555 and 12204). These charts provided modern-day depth and landscape information, as well as navigational aids. They depict the area from Roanoke Island southward towards Hatteras Inlet, as well as Pamlico Sound and the Atlantic Ocean (Figures 9 and 10). Historic maps were also available for downloading through NOAA's historic map database. For this study, the 1852 Hull Adams US Coast Survey map was used as well as the 1861 US Coast Survey map and the 1883 Pamlico Sound Coast Chart No. 142.

The next phase required georectifying historic maps to the modern-day NOAA base maps. This was completed by downloading the historic maps as raster images and importing them into the GIS model template (Figures 11-13). These charts did not include any geospatial information within them so georectification required the images to be rectified (rubber-sheeted) to an extent so that they could match up with the modern charts. The 1852 Hull Adams map was the first to be georectified. This proved an easy task because this map depicted a smaller area than the 1861 map; therefore, distortions were not as drastic. Although this map depicted a small area (the northern end of Hatteras Island), it was necessary to include because it referenced Midyett's windmill. This is important because primary source material places the location of Camp Live Oak slightly north-northeast of this windmill.

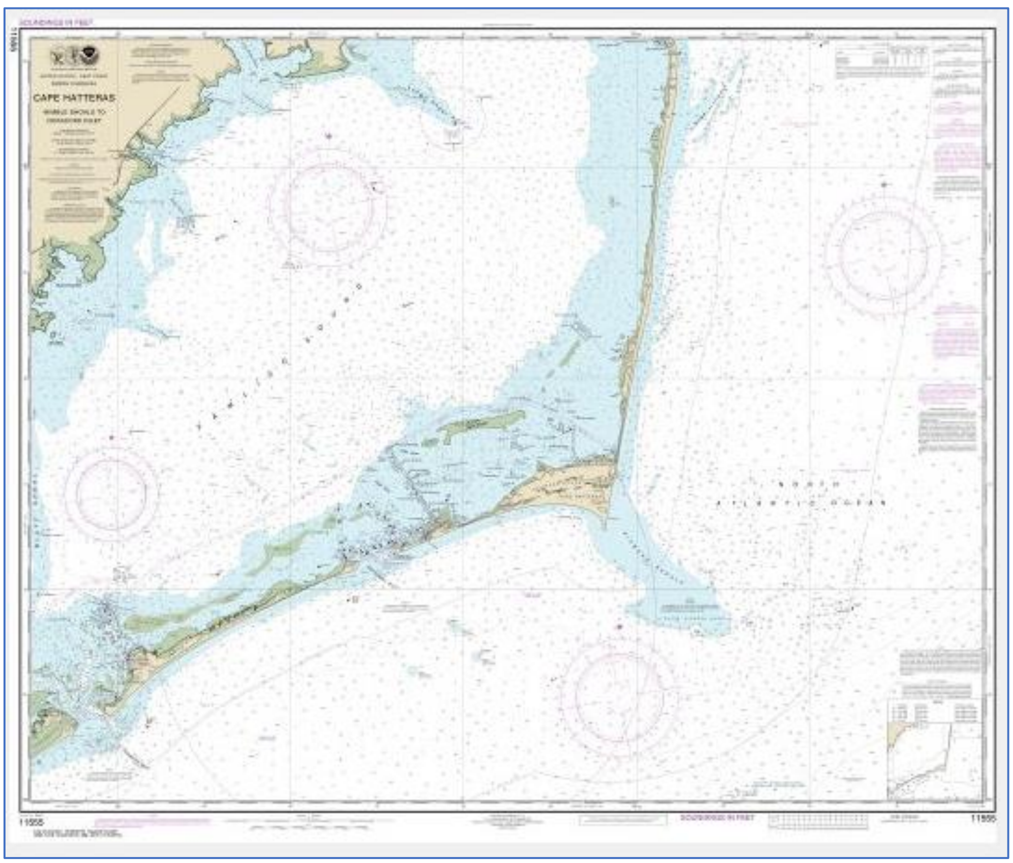

Figure 9. NOAA Coastal Chart 11555, Cape Hatteras-Wimble Shoals to Ocracoke Inlet (NOAA 2016).

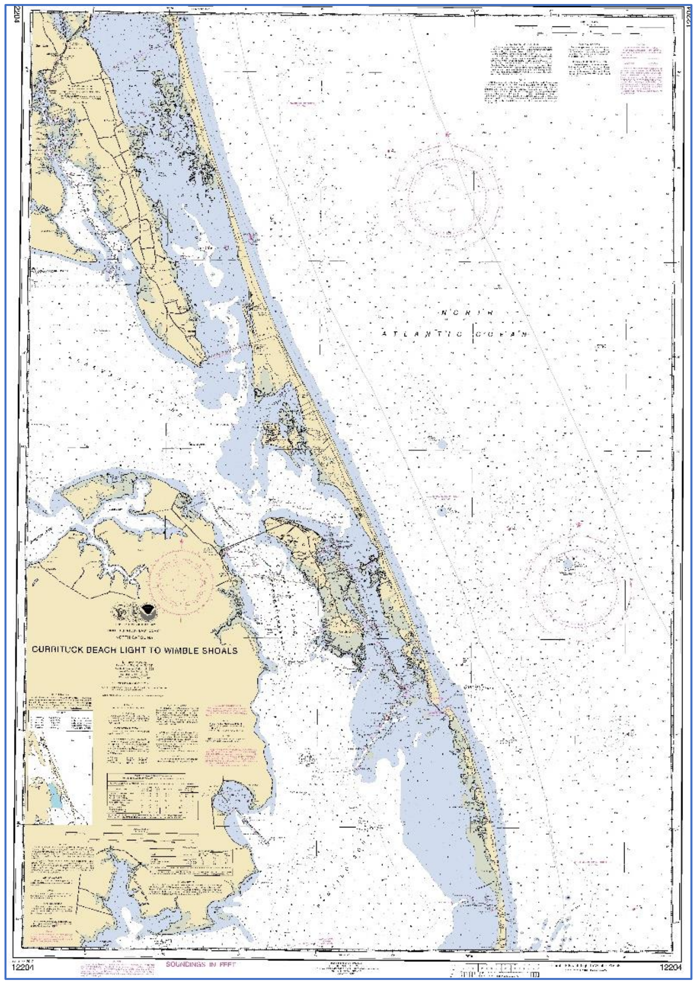

Figure 10. NOAA Coastal Chart 12204, Currituck Beach Light to Wimble Shoals (NOAA 2016).

The next step was to geo-rectify the 1861 chart. This map was used because it was published very close to the when the Chicamacomico Races occurred, therefore, it was deemed the best to represent the area from that time. The 1861 raster image proved to be a bit more difficult to geo-rectify to the NOAA base map. It took several points to georeference it, and in the end, it was still not perfect. The distortions and imperfections are evident in the map that shows Hatteras Inlet. Several attempts were made to correct this; however, attempts proved futile, in part because of the dynamic nature of the inlet, as corrections would distort the map's north end. As a result, it was decided to match the north end near Rodanthe as close as possible since this is the primary area of study.

Figure 11. (Left) 1852 Hull Adams US Coast Survey Map from NOAA historic chart collection (NOAA 2016), (Right) 1852 Hull Adams US Coast Survey Map georectified to modern-day NOAA base maps.

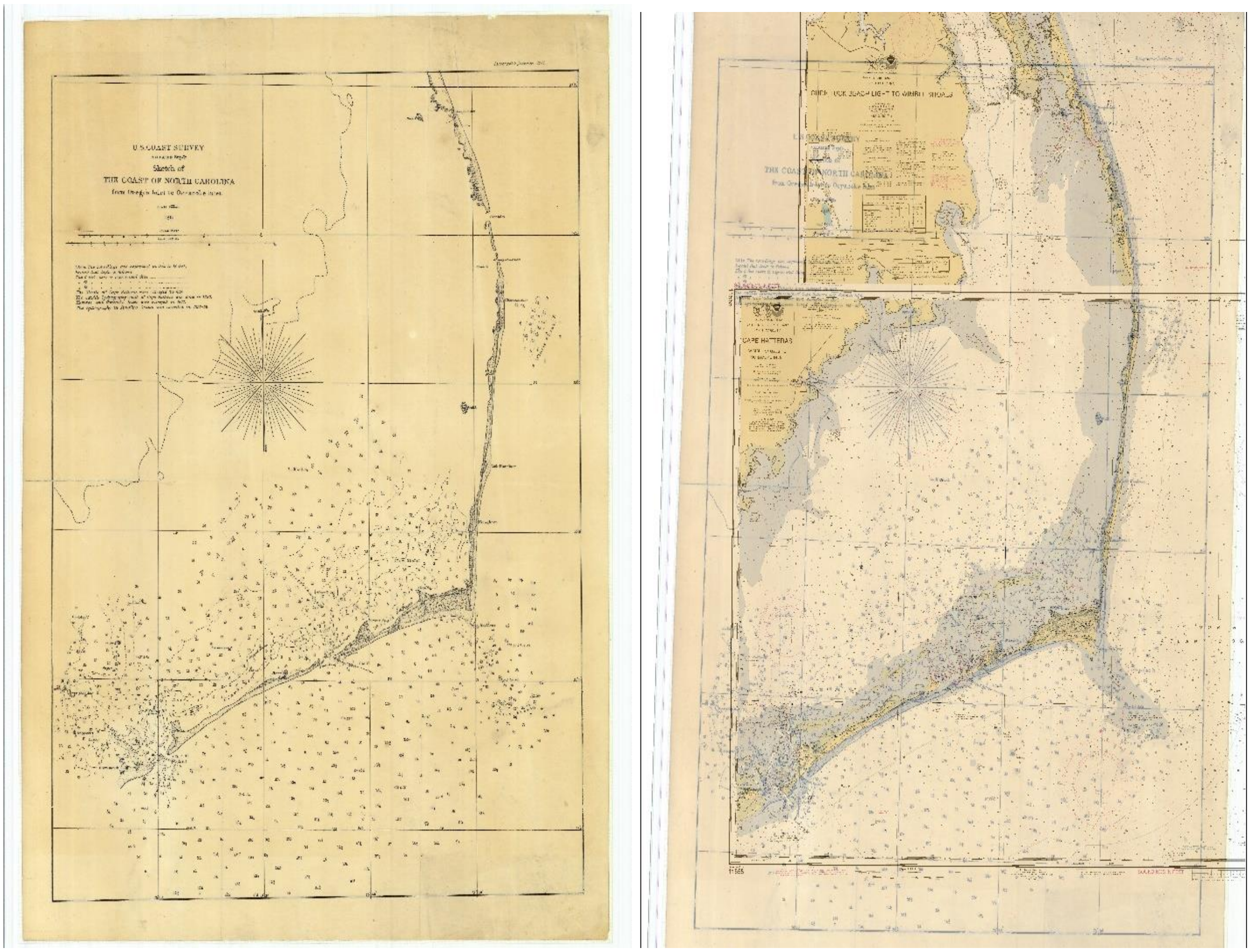

Figure 12. (Left) 1861 US Coast Survey map from NOAA historic chart collection (NOAA 2016). (Right) 1861 US Coast Survey map geo-rectified to modern-day NOAA base maps.

The final historic map to geo-rectify was the 1883 Coast Chart No. 142. (See Figure 13). This map was used because it contained sounding data necessary to understand the historic bathymetry to assist with ship location when creating fields of fire. Although the Outer Banks have been known to change physically in short periods of time, this map was the closest useable map containing depth information for the time-period in this study. Like the 1861 map, it was challenging to geo-rectify. It took several points to georeference the map to the modern-day NOAA charts. It was, however, a more successful georeference than the 1861 map.

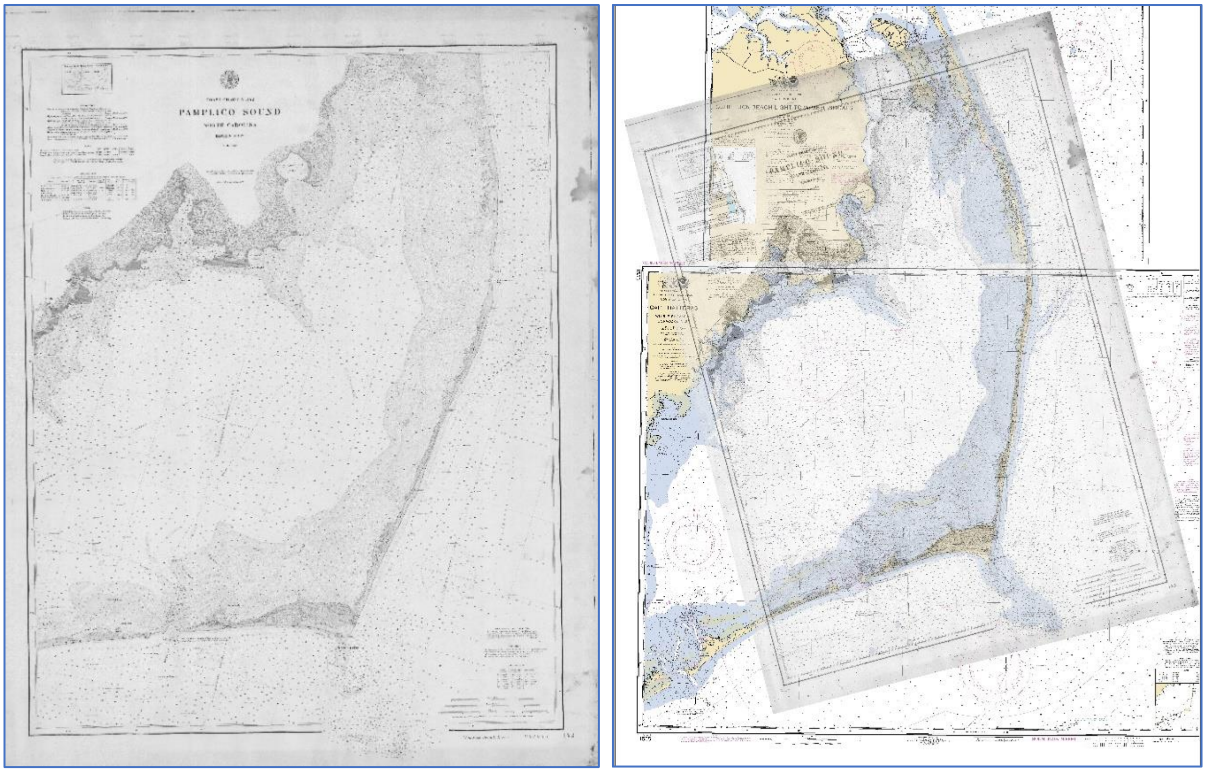

Figure 13. (Left) 1883 Pamlico Sound Coast Chart No. 142 from NOAA historic chart collection (NOAA 2016) (Right) 1883 Coast Chart No. 142 geo-rectified to modern-day NOAA base maps.

Once the 1852, 1861, and 1883 maps were geo-referenced as closely as possible to the modern-day NOAA charts, the next step was to illustrate the historic landscape. This was done in a fashion similar to Parker's (2015) methodology for his GIS model of the Battle of Elizabeth City, North Carolina. This involved creating several different layers which included; water, land, marshland, and trees. For this task, the "Feature to Polygon" tool was utilized. The water layer was the first. The transparency was set to 50% so that charts underneath could be seen when creating the additional layers. The next layers were completed in the following order using a combination of the polygon and freehand drawing tool: land, marshland, and trees (Figures 14 and 15).

Additional layers, such as roads and historic points of interest, were then added to the GIS model. Roads were not illustrated on the 1852 Hull Adams map; they were, however, illustrated on the 1861 historic chart. For this reason, roads were included into the GIS model. The roads were created utilizing the line feature in ArcGIS. There were additional points of interest included in the GIS model which were based on the historic maps. The 1852 map depicts a windmill north of modern-day Black Mar Gut in present-day Rodanthe. Working from Lee Oxford's theory and primary source material this is allegedly Midyett's Windmill (see Oxford 2013:195-196). As mentioned earlier the Union encampment (Camp Live Oak) is reported to have been near the mill.

The next point of interest included in the GIS model is the approximate location of Camp Live Oak sited using the 1852 Hull Adams map depicting the windmill's location as well as the Oxford (2013:195-196) maps. Additional points of interest included in the GIS model include the gunboat *Fanny's* location during its capture. Oxford (2013:195) states that the 1852 Hull Adams map was used in planning the Civil War marker located approximately at mile marker 53.6 in Salvo. The first point of interest marks the actual marker's location at 35°32'3.6" North latitude. Oxford points out that the marker contains an error; it includes an arrow illustrating "you are here," but that point on the map does not match coordinates on the actual marker. The "you are here" on the marker points to the coordinate 36°34'41.1 North Latitude; this has been marked as a point of interest in the GIS model. With that said, there is a margin of error of roughly 2 miles between the two points. These markers are important because they are supposed to illustrate that *Fanny* was finally captured three miles west of the correct point after having drifted from its original point two miles off Camp Live Oak (Oxford 2013:195). This was included in the GIS model for a couple reasons; first and foremost, it shows how events of 1 October 1861 may have transpired. Secondly, these points were selected as a secondary survey area for archaeological fieldwork if the first area did not work out due to extremely shallow water depths. Furthermore, it is good to record these points of interest for anyone considering an additional archaeological investigation into the Chicamacomico Races and *Fanny* capture. The points of interest were plugged into the GIS model by using the go to XY feature to plug in the coordinates of each point of interest.

Hatteras Lighthouse was also added to the GIS model as a point of interest. Shortly after the fall of Forts Hatteras and Clark, the lighthouse became a target for Confederate forces. Earlier that summer, the lighthouse Fresnel lens had been removed by Rebel forces (Oxford 2013:39). During the Chicamacomico Races, the lighthouse is where the 20th Indiana set up camp after retreating from Camp Live Oak on 4 October 1861. Civilian residents of Chicamacomico also arrived here after fleeing invading Confederates (Oxford 2013:133-135). Adding this point of interest to the GIS model proved to be challenging for a few reasons. First, the lighthouse depicted in the modern-day NOAA chart that stands in Hatteras today is not in its 1861 original site. In 1999, Hatteras Lighthouse and surrounding structures were successfully moved 2900 feet from their original locations. To complicate things even further, this is not the original lighthouse. The existing lighthouse was built in 1870, the original lighthouse had fallen into severe disrepair after the war. The original lighthouse was located 600 feet north of the original location for the present-day lighthouse (Lighthouse Friends 2001; National Park Service 2016). The original lighthouse is shown on the 1861 map. Further complications arose while trying to include this point in the GIS model. This is, in part, because the 1861 image proved to be extremely difficult to geo-rectify to the modern-day NOAA chart.

The last important point of interest included in the GIS model was Bald Beach. As pointed out earlier, Bald Beach is the approximate location where the USS *Monticello* began firing on the sound side Southern steamers and the retreating 3rd Georgia Regiment (Oxford 2013:151, 156-159). Neither the historic maps nor the modern-day NOAA charts included Bald Beach, therefore the author had to generate the coordinates. The coordinates were input into the GIS model using the Go To XY tool in GIS.

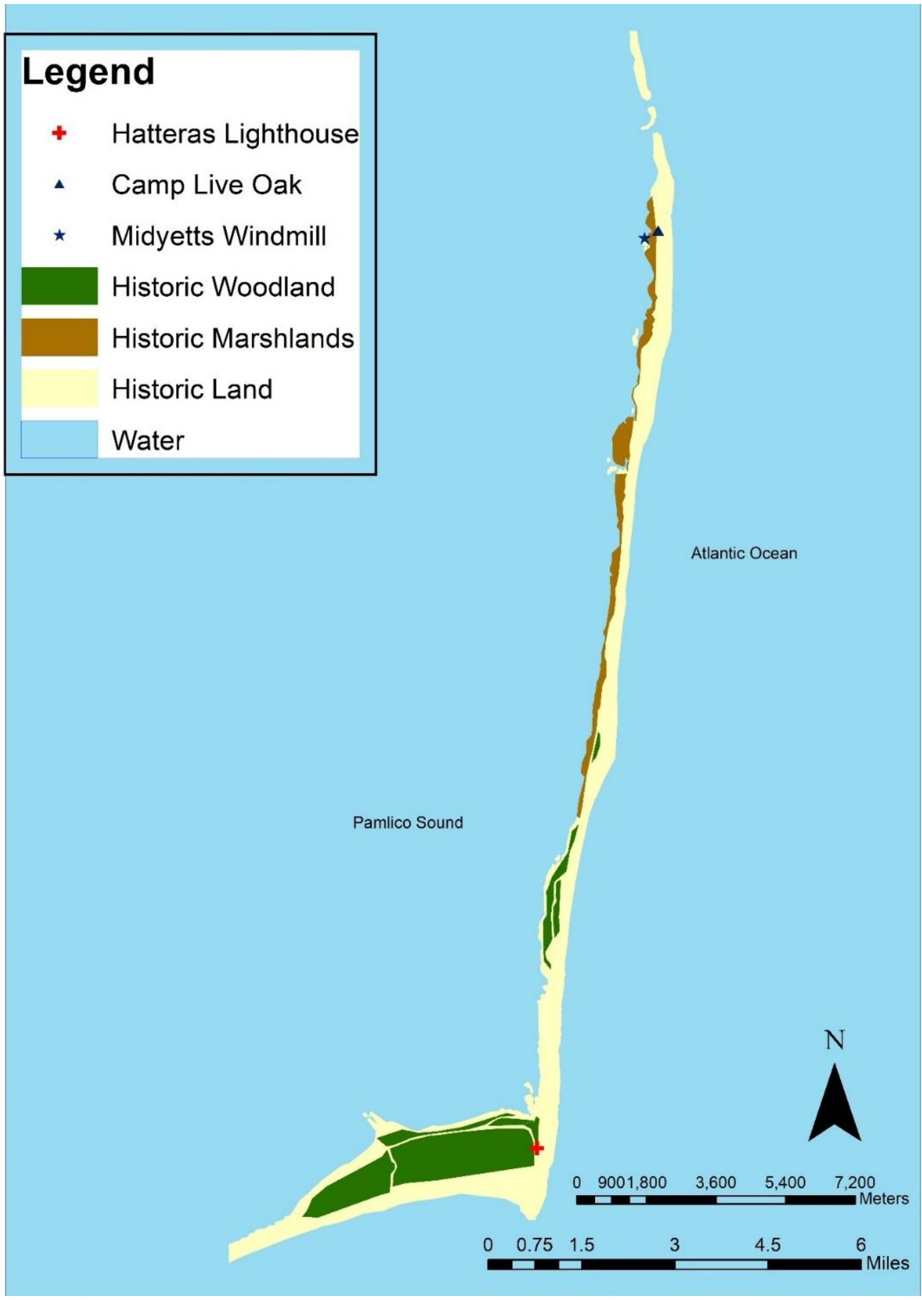

Figure 14. Historic Landscape of Hatteras Island (including Chicamacomico and Kinnakeet) circa 1861 digitized (By Jim Kinsella).

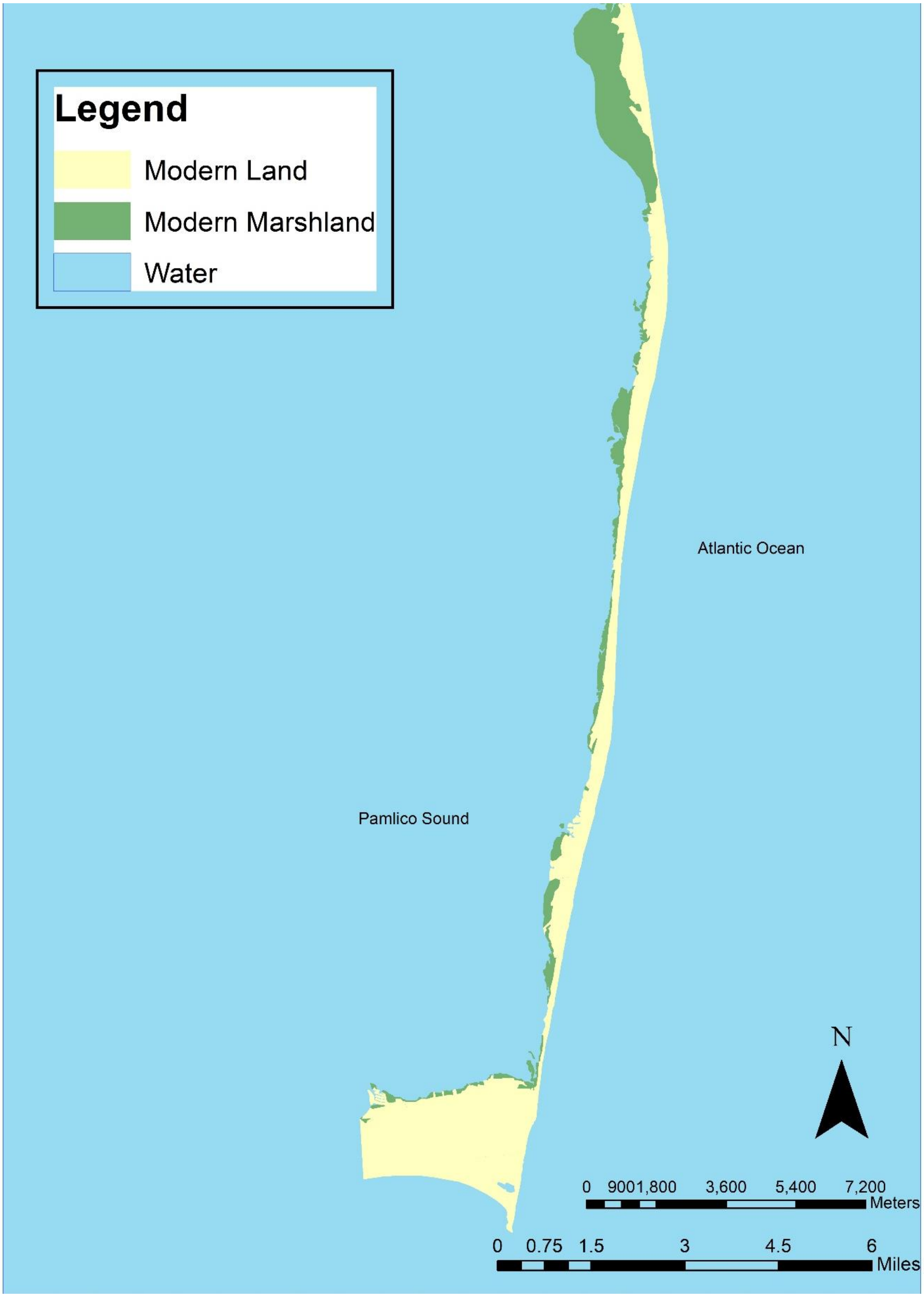

Figure 15. Digitization of Modern Landscape of Hatteras Island (including Chicamacomico and Kinnakeet) (By Jim Kinsella).

Creation of Bathymetry Models

After digitizing the Civil War landscape into the GIS model, the next step involved creating the bathymetric models depicting both modern and historic sounding data. This was a necessary step because to successfully recreate the historic naval battlescape an understanding of the bathymetry was needed. This allowed more accurate placement of Union and Confederate ships into the model. Each vessel had certain limitations pertaining to their individual draft, so knowing the sound's depths allowed for a more accurate battlefield creation. As with Parker's 2015 study, modern bathymetry was compared to the 1861 bathymetry for any changes from natural occurrences or dredging operations. As previously discussed, this area experiences rapid geological change (Riggs et al. 2011:2-3). The likelihood of dredging operations occurring in the Kinnakeet survey area was unlikely; however, Rodanthe's waters had extensive dredging due to the presence of the Rodanthe Emergency Ferry Channel (Richards and Parker 2017:37).

Creating the bathymetric models proved challenging and required multiple attempts. The first involved trying to import electronic nautical charts (ENC) with sounding data from the NOAA website. The goal was to use the vector metadata embedded within each chart to create the models. This ultimately failed because the ENC charts only included ocean side sounding data. A second attempt, following methodologies spelled out in Parker's 2015 study, allowed the model to be completed. First, the modern-day model was created (Figures 17 and 19). To do this the present landscape was digitized. This was done the same way as the historic landscape although contemporary charts only included land and marshland information. The next step involved creating an attribute table, then the shoreline was manually assigned points with an attribute of zero indicating that there was no depth in this area. Attribute data was then assigned to the modern-day charts. Once attribute data was input, the Natural Neighbor tool was utilized to interrelate all attribute data. After the modern-day bathymetry model was completed, the same process was completed for the historic model (Figures 16 and 18). As soon as both models were completed, the two maps could be analyzed side by side. Once the comparative analysis was completed, ships were inserted into the model that combined bathymetry, historical narrative, and Oxford's theory.

Ship Placement into the GIS model

Placement of individual ships into this GIS model relied on primary source material as well as Oxford's narrative of the 1 and 5 October 1861 events. Historic bathymetry played a key role in ship placement. The Outer Banks coastline is very shallow, and due to the various ships' dimensions, some could not get close to shore. This was evident during the gunboat *Fanny* capture as well as *Empire*'s attempt to land troops at Kinnakeet. In both instances, the primary sources show the vessels could not get close to or on shore due to shallow depths (Mansfield 1861:595; *The Richmond Daily Dispatch* 1861f).

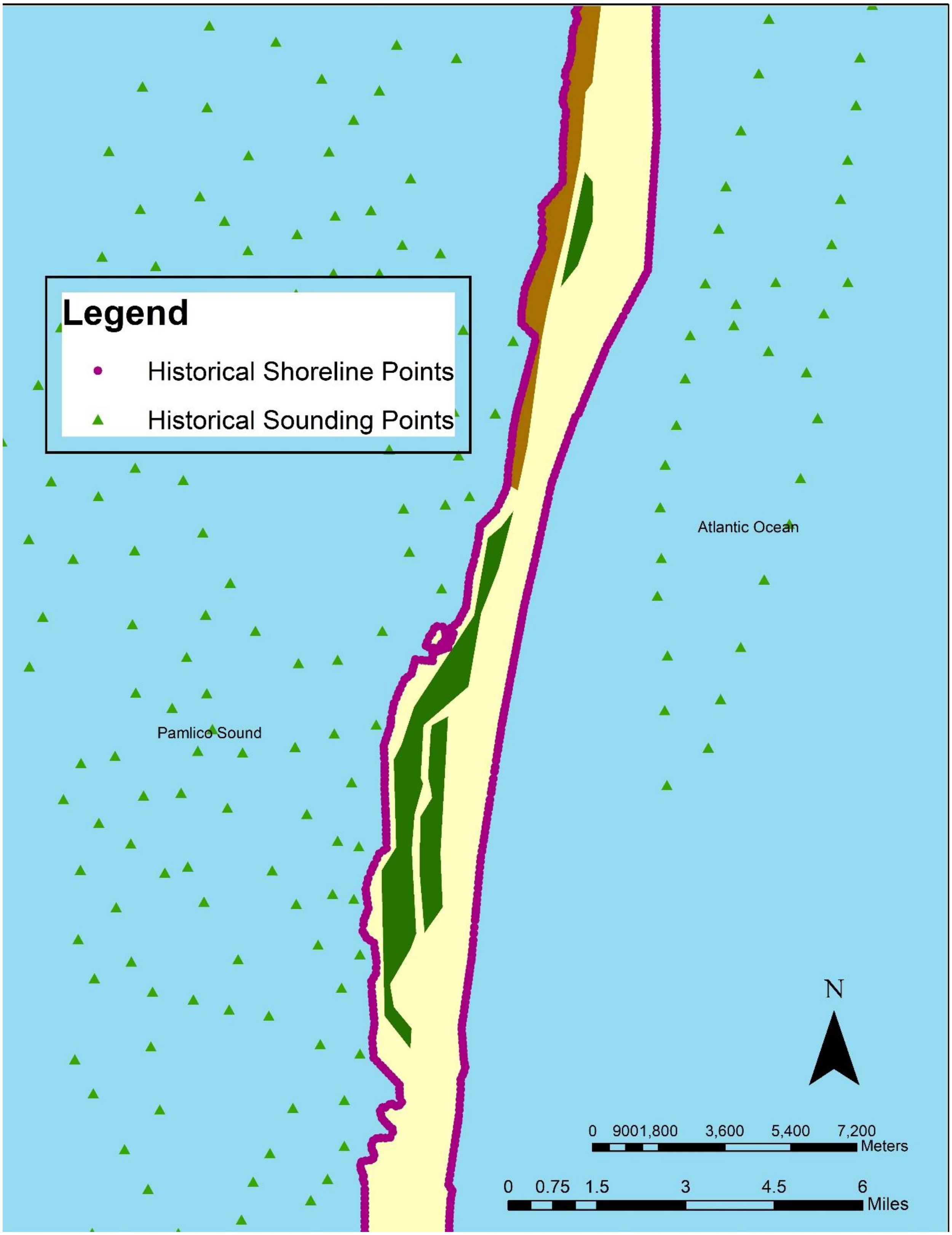

Figure 16. Historic Bathymetry Points (By Jim Kinsella).

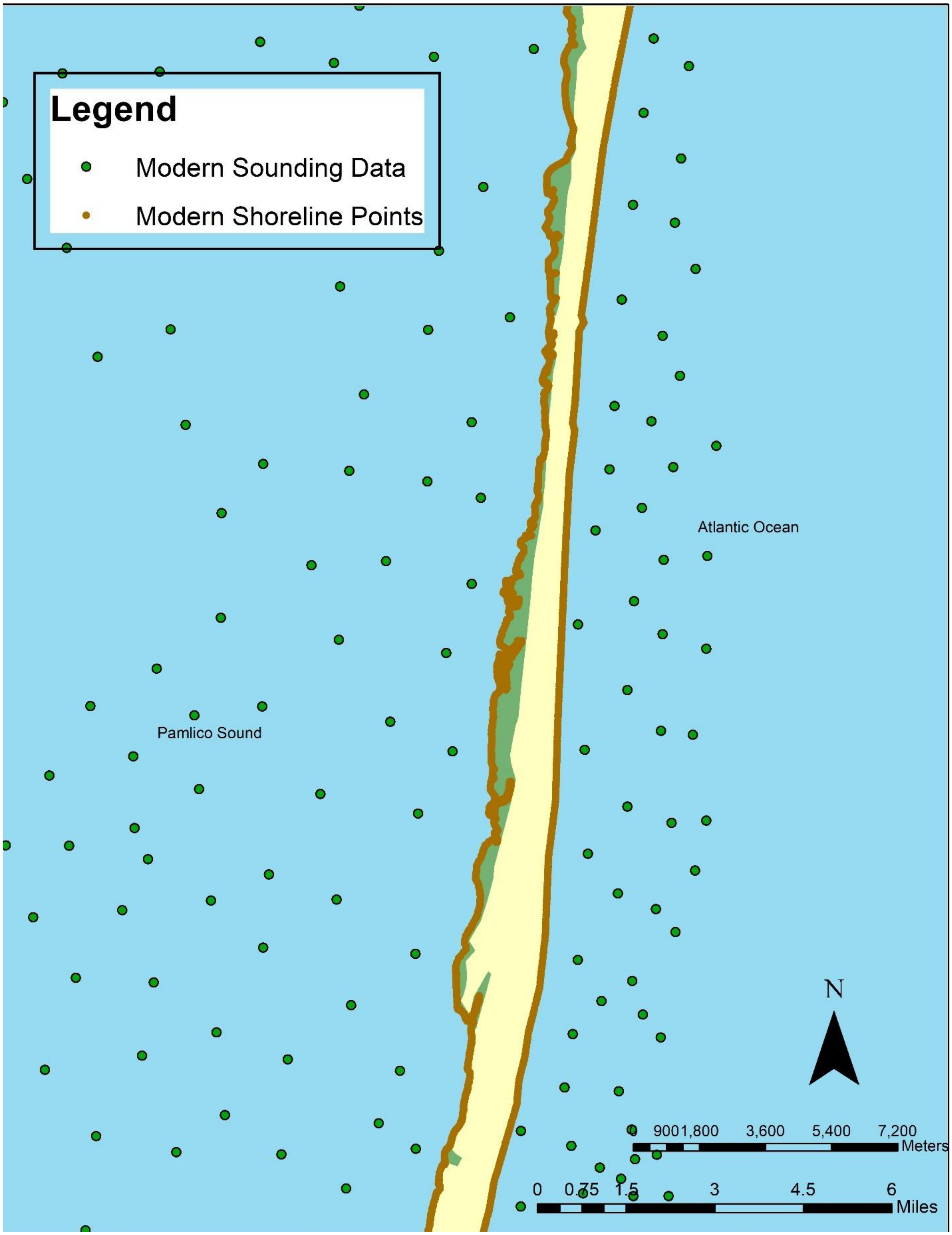

Figure 17. Modern Bathymetry Points (By Jim Kinsella).

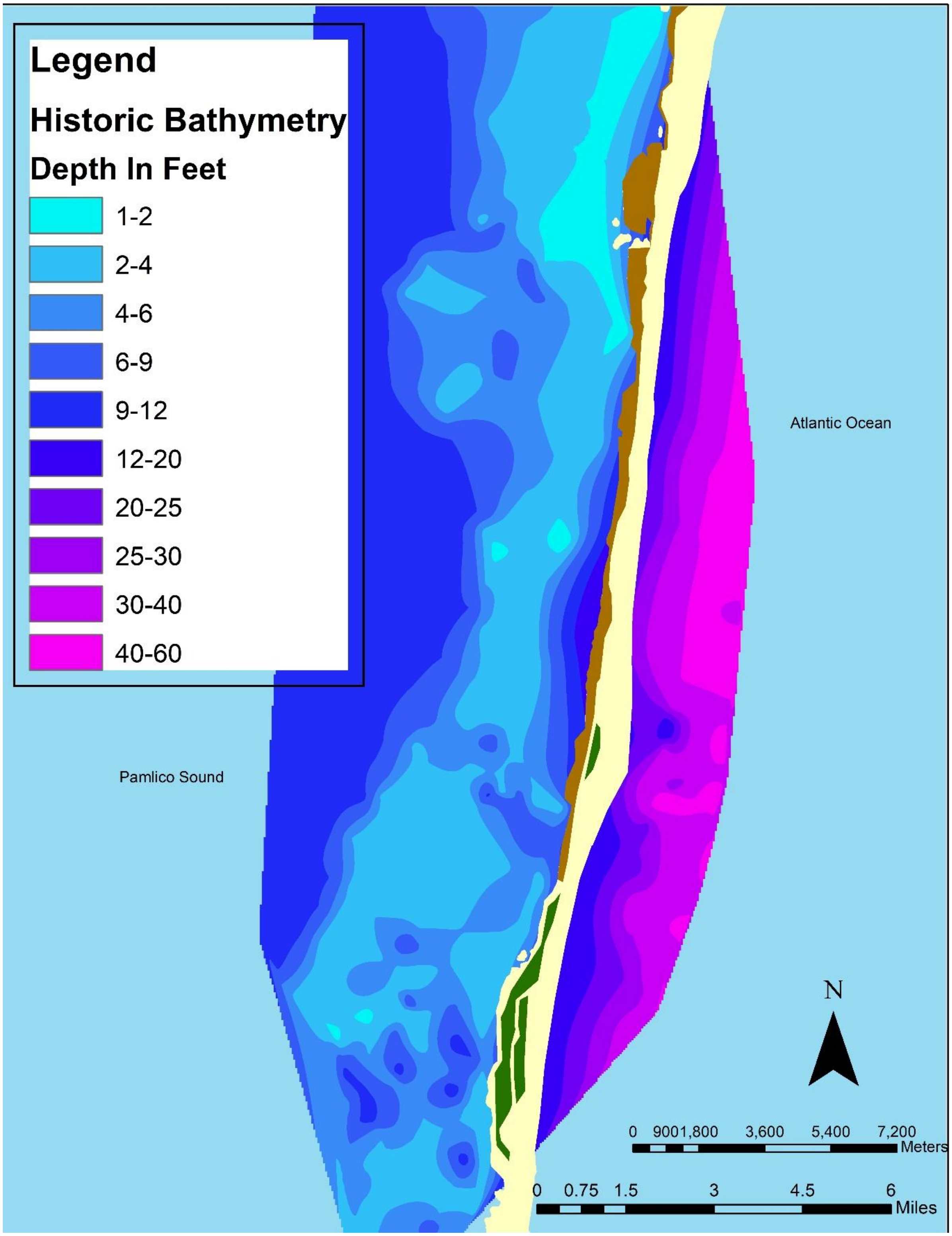

Figure 18. Image of Historic Bathymetry Map after using Natural Neighbor tool (By Jim Kinsella).

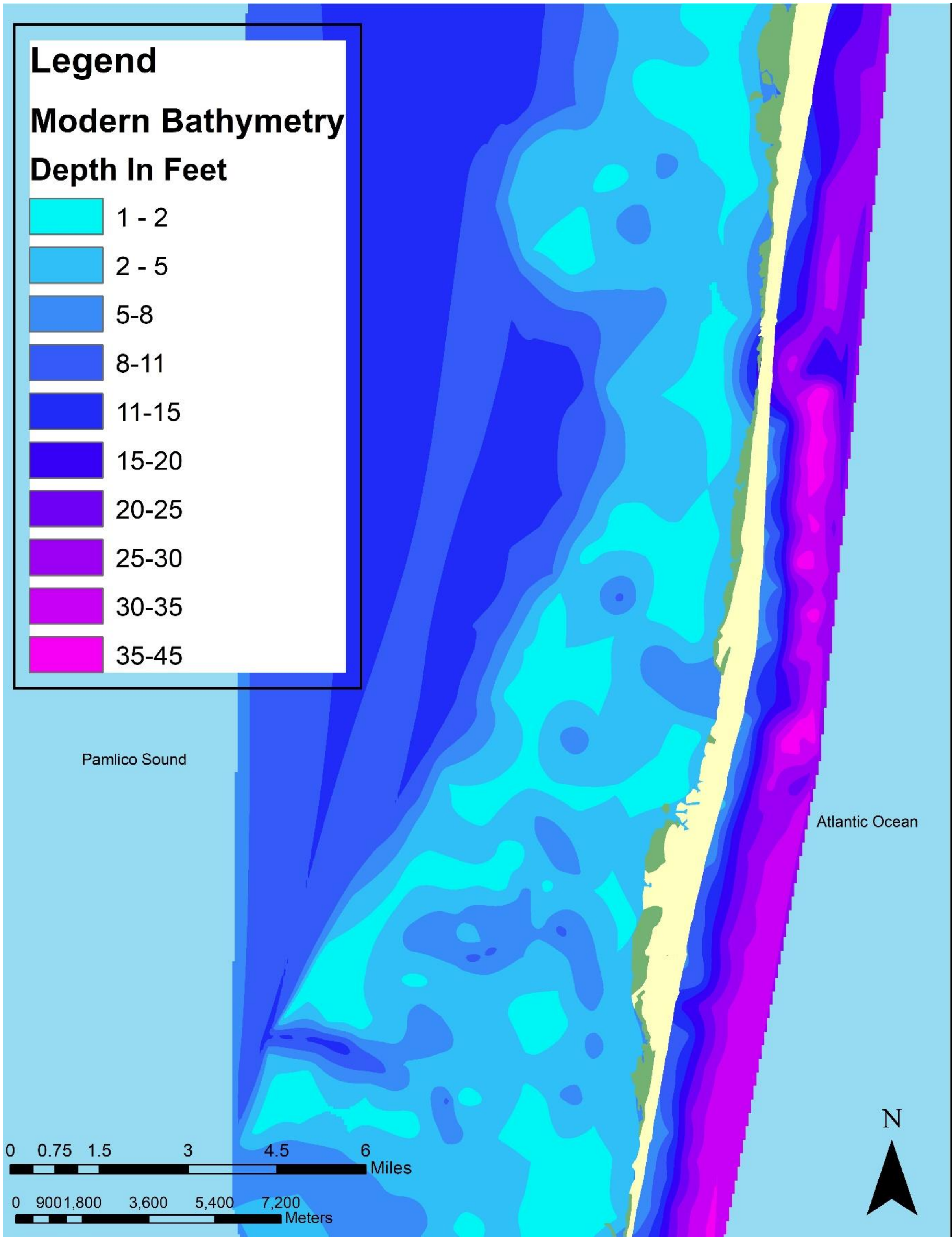

Figure 19. Image of Modern Bathymetry Map after using Natural Neighbor tool (by Jim Kinsella).

Ship positions during the Chicamacomico Races were based on primary resources referring to the location of Camp Live Oak and Midyett's Windmill. Per Oxford, *Fanny* was engaged and eventually captured by the CSS *Junaluska*, CSS *Raleigh*, and CSS *Curlew* roughly two to three miles west of Camp Live Oak (Harpers Weekly 1861c:668; Oxford 2013:106-110). Oxford's version is derived from primary documentary materials. Colonel Rush Hawkins's reports from Commodore Lynch, Sergeant Major Peacock, and General Mansfield place *Fanny's* location two to three miles due west of Camp Live Oak and adjacent to Midyett's Windmill (Mansfield 1861:595; see also Oxford 2013:99). Therefore, the GIS model was created by placing *Fanny* and its captors' due west of the windmill. Confederate ship positions off Camp Live Oak on 4 October 1861 were once again based on the interpreted location of Camp Live Oak and the windmill. *Cotton Plant* was positioned within a mile directly west of Camp Live Oak; with *Empire* further south where they fired upon the 20th Indiana (*New York Times* 1861c; Yellowley 1861).

The events of 5 October 1861 were concerned with the withdrawing 3rd Georgia and the subsequent bombardment at Bald Beach by the USS *Monticello*. As with the 1 October 1861 GIS model, ship positions were also based on Oxford's theory and supported by documentary and bathymetric evidence. Oxford's interpretation and accounts from the 3rd Georgia place the USS *Monticello* three-quarters of a mile off Bald Beach when it began firing (Braine 1861:291-292; Barrett 1963:55; Oxford 2013:157, 171). As mentioned earlier, a degree of caution is warranted when examining witness accounts from primary source material of ship placement. *Monticello's* location cannot be definitively pinpointed because the only clue from the historical record states that it was approximately ¾ of a mile from the shore (Braine 1861:291-292; Barrett 1963:55; Oxford 2013:157, 171). This was merely an observation made by the *Monticello's* captain in the heat of battle; it could have been closer or possibly further out. As discussed, the GIS tool is merely an interpretation of evidence in the historical record, therefore, for this model segment, the position of three-quarters of a mile off Bald Beach was used. Once the coordinates of Bald Beach were determined, the distance measurement tool was used to locate a point three quarters of a mile from Bald Beach the potential *Monticello* position sited. Ship placement within the GIS model was accomplished using the measurement tool in the GIS model as well as the historic bathymetry data (Figure 20).

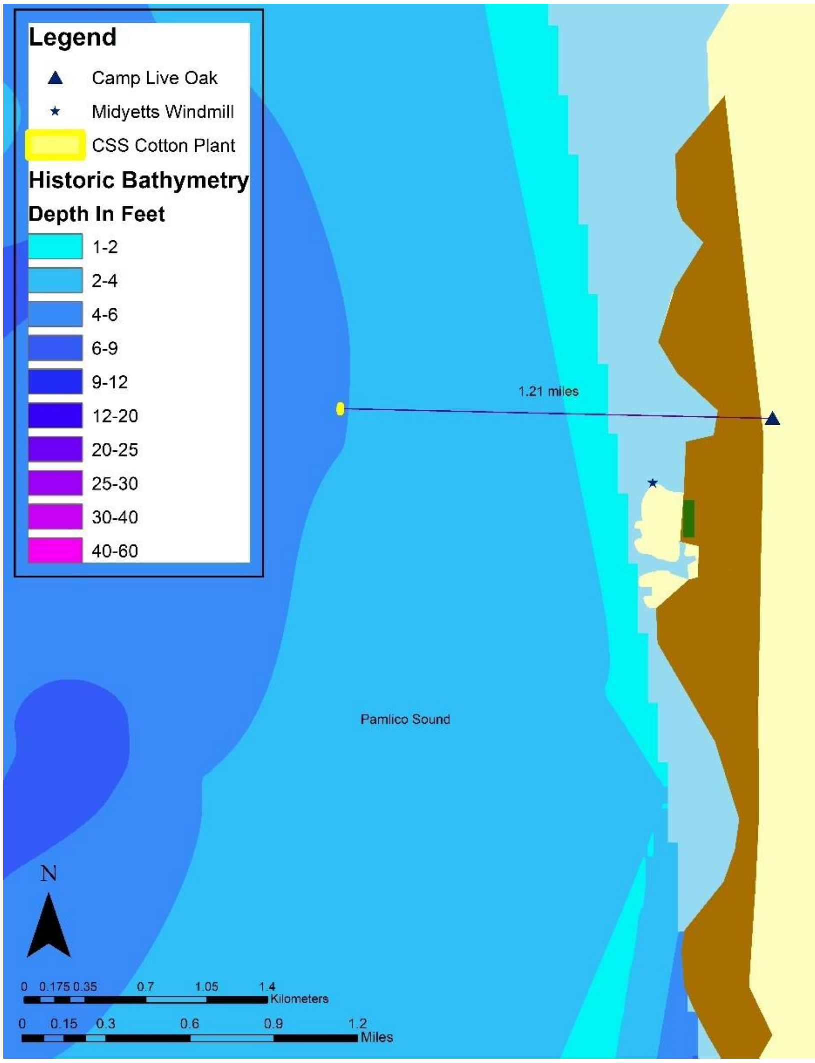

Figure 20. Image shows Cotton Plant's *placement in the GIS model. Ship placement is based on primary sources, Lee Oxford's proposed location of Camp Live Oak, and historic bathymetry data. Note,* Cotton Plant *is not drawn to scale, this was done so that it could be seen in the image. (By Jim Kinsella).*

An attempt was made to draw ships to scale. Data on ship dimensions was drawn from Oxford (2013), United States Naval History Division's, *Dictionary of American Naval Fighting Ships* (1959) and the NHHC (2015) online database. This data was organized and compiled into Tables 1 and 2. Adopting methodology from Parker's 2015 study, the ships were drawn to scale by creating a line feature for the ship's length, then creating a second line feature for the ship's beam (width). An ellipse was drawn around the two-line features and then converting it to a polygon (Parker 2015:75).

Confederate Warship							
Vessel	**Type**	**Artillery**	**Length (feet)**	**Width (feet)**	**Draft (feet)**	**Tonnage**	**Speed (knots)**
CSS *Cotton Plant*	Side Wheel Steamer	2, 12-pdr. brass field howitzers	107	18.9	4.6	85	n/a
CSS *Curlew*	Side Wheel Steamer	1, 12-pdr. smoothbore 1, 32-pdr. rifled	150	n/a	4.6	260	12
CSS *Empire*	Iron Hulled Screw Steamer	1, 12-pdr. howitzer 1, 32-pdr. smoothbore	n/a	n/a	7.5	n/a	n/a
CSS *Fanny*	Iron Hulled Screw Steamer/Tug	1, 32-pdr. rifled 1, 9-pdr. Sawyer rifle	115	18	n/a	145	n/a
CSS *Junaluska*	Iron Hulled Screw Steamer	1, 6-pdr. field cannon	n/a	n/a	n/a	79	n/a
CSS *Raleigh*	Iron Hulled Screw Steamer	2, 6-pdr. naval howitzers	n/a	n/a	n/a	65	n/a

Table 1.Table showing Confederate ship dimensions and individual armaments for 1861-1862 (NHHC 2015a-i).

Union Warships							
Vessel	**Type**	**Artillery**	**Length (feet)**	**Width (feet)**	**Draft (feet)**	**Tonnage**	**Speed (knots)**
USS *Ceres*	Side Wheel Steamer	1, 30-pdr. rifled; 1, 32-pdr. smoothbore	108.4	22.4	6.3	150	9
USS *Fanny*	Iron Hulled Screw Steamer/Tug	1, 9-pdr. Sawyer rifle; 1, 6-pdr. Rifled James gun	115	18	n/a	145	n/a
USS *General Putnam*	Side Wheel Steamer	1, 32-pdr.; 1, 20-pdr. Parrot rifle	103.6	22	7.2	149	7
USS *Monticello*	Wooden Screw Steamer	2, 32-pdr. smoothbores; 1, 9-inch Dahlgren	180	29	12.1	665	11.5
USS *Susquehanna*	Side Wheel Steamer	2, 150-pdr. Parrot rifles; 12, 9-inch Dahlgren smoothbore; 1, 12-pdr. rifle	257	45	20.6	2450	n/a

Table 2.Table showing Union ship dimensions and individual armaments for 1861-1862 (Braine 1861:291-292; Daily National Intelligencer 1861a:3; Moore 1861:155; US Navy History Division 1959:429; Barrett 1963:50; NHHC 2015a-i)

Fields of Fire

The final step with the GIS model was to model the fields of fire so areas to be archaeologically surveyed could be defined. Range capabilities of each cannon type were determined. Because there were multiple ships, gun positioning, as a ship's location, was considered when creating the fields of fire. If precise information was available, it was used to site the guns; if it was not, an assumption was made that the more accurate long-range gun was mounted on the bow (Parker 2015:76).

Research to create fields of fire for the events of 1-5 October 1861 focused on only ships involved in the firing. These included Confederates: CSS *Cotton Plant*, CSS *Curlew*, CSS *Empire*, as well as the Union's USS *Monticello*. The collated data was organized and put into a table that included a gun's capability for each ship. Using data from Table 3, both the maximum and effective ranges were created in the GIS representations of each ship's fields of fire.

Fields of Fire Ranges			
Note, this table only includes data from ships that actively shot in survey zones.			
Vessel	**Artillery**	**Maximum Range (yards)**	**Effective Range (yards)**
CSS *Cotton Plant*	2X 12-pounder brass field howitzers	2000	1770
CSS *Curlew*	1X 12-pounder smoothbore	1600	1300
	1X 32-pounder rifled	8460	3500
CSS *Empire*	1X 12-pounder howitzer	2000	1770
	1X 32-pounder smoothbore	2731	1300
USS *Monticello*	2X 32-pounder smoothbore	2731	1300+
	1X 9-inch Dahlgren	3450	1300+

Table 3.Table showing ship armament and capabilities of both fleets. Note only the ships that are in the fields of fire model are being studied further with range information (Braine 1861:291-292; Moore 1861:155; Barrett 1863; Holley 1865:477-482; Scharf 1887:378; US Navy History Division 1959:429; Barrett 1963:50; Canfield 1969:20; Silverstone 2006:58; NHHC 2015a-i; Parker 2015:138)

There were a few discrepancies in the data collected for *Monticello*. As evidenced by the table above, *Monticello* carried two 32-pounder (these had a bore of 6.4 inches) smoothbore guns (Braine 1861:291-292; US Navy History Division 1959:429; Silverstone 2006:58; NHHC 2015h). In addition to the 32-pounders, *Monticello* also carried a smaller gun, although there seem to be conflicting reports on whether it carried a 9-inch Dahlgren, 10-inch Dahlgren, or a 30-pounder Parrott. Lieutenant Braine refers to shooting a 30-pounder Parrott and striking CSS *Fanny* (Braine 1861:291-292). Other sources show Monticello carried one Dahlgren type which was typical aboard Union gunboats during this time. *Monticello*'s 32 pounders were capable of firing rounds at distances close to a mile, while the one 9-inch gun was capable of shooting to a distance close to two miles (Silverstone 2006:xx-xxi). For this study, the 9-inch Dahlgren gun was used for the fields of fire model, since this was the common broadside gun used and a standard for the US Navy (Bell 1941:61; Schneller n.d.:5).

This data was then entered into the GIS model to create fields of fire, adopting methodology from previous studies (Simonds 2014; Parker 2015). Simonds (2014:47) stated that creating fields of fire for vessels is spatially ambiguous due to the episodic nature of naval engagements. Therefore, special consideration must be made when creating the fields of fire for vessels. Creating a field of fire relies on primary accounts, geography, and bathymetry. Like Simonds' study, the first step involved identifying approximate vessel locations. Starting on 1 October 1861, *Fanny* was reported to be anchored in six feet of water approximately three miles west south west of Camp Live Oak (*Harpers Weekly* 1861c:668; Mansfield 1861:595; Morrison 1861:276; *The New York Herald* 1861; Ridgely 1861). This position was plotted using the distance tool from the reported location of Camp Live Oak. Its location was then used as the target for which the Confederates would have fired towards. Primary sources state that the Southern flotilla approached *Fanny* from the northwest. It is hard to say how far they were from *Fanny* when they started firing, so it was deemed appropriate to use both effective and maximum ranges for each gun while creating the fields of fire. It should be noted here that although *Junaluska* was present during *Fanny's* capture, it was unable to get into firing range, so the *Junaluska* fields of fire were not created.

Creating the fields of fire for *Fanny*, *Raleigh*, and *Curlew* was done using a single line to show the direction of fire from each cannon. From there, a line was offset by 22.5 degrees on each side to create a 45-degree arc of fire (see Simonds 2014 and Parker 2015). Creating fields of fire for CSS *Cotton Plant* and CSS *Empire's* bombardment of Camp Live Oak on 4 October 1861 as well as the USS *Monticello* firing on the 3rd Georgia on 5 October 1861 were done the same way, (Figure 21). A 45-degree angle was implemented based off precedent set by previous maritime studies (see Simonds 2014 and Parker 2015). Guns were not mounted on traditional naval carriages as they were before the war. In an effort to reduce recoil generated from large guns, the US Navy shifted from traditional 4-truck carriages to either pivot carriages or the 2-wheeled Marsilly carriage prior to the war. This allowed the guns to be easily rotated from side to side while giving the guns a wider angle if directly facing their target (Veit and Kuchera 2011:186). The 45-degree angle was deemed appropriate since *Monticello* was likely parallel to the shore as it was stalking the Georgians, therefore the angle would be closer to 45 degrees. The same assumptions were made for the other ships involved in the affair. Additionally, since steamers are not beholden to the whims of the wind, a 45-degree angle was deemed an appropriate interpretative tool. The arc of the 9-inch was wider since the gun was on a pivot.

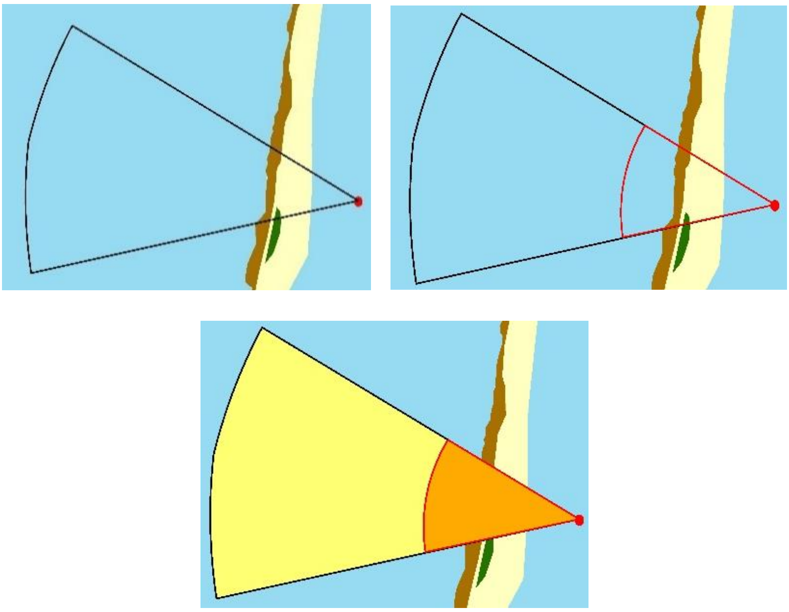

Figure 21. Creation of Fields of Fire (By Jim Kinsella).

Planning Fieldwork

Archaeological investigation for this project was concerned with two separate areas in the sound, the first area was off Camp Live Oak where *Cotton Plant* and *Empire* fired at the 20th Indiana (Figure 22). The second area was where the 3rd Georgia was fired on by *Monticello* (Figure 23). Archaeological data concerning the Camp Live Oak engagement was obtained during the Rodanthe Ferry survey project (Richards and Parker 2017), therefore planning of archaeological activities centered on the area *Monticello* harassed the 3rd Georgia. Reports show the *Monticello* fired close to 400 shots in a span of about three hours (Braine 1861:291-292; *Daily National Intelligencer* 1861b:2). Additionally, there was a distorted report of *Monticello* hitting CSS *Fanny* as well as two Confederate sloops (Braine 1861:291-292). This comes from Lieutenant Daniel Braine's official navy report where he incorrectly reported a couple of Confederate boats carrying Confederate soldiers were hit and destroyed by *Monticello*'s shot. He based this on Private Warren O'Harver's (from the 20th Indiana's Company H) account regarding the skirmish. Additionally, Braine speculated in his report about striking CSS *Fanny* (Braine 1861:291-292). Although it was reported that two unknown sloops on the sound island received fire from *Monticello* (*New York Times* 1861d). There is no concrete evidence, however, that supports the *New York Times* that this happened. From the GIS fields of fire representation, it is reasonable to assume that sloops in the sound could have received fire from *Monticello,* despite being three-quarters of a mile off the Atlantic coast. Two areas were identified for the archaeological survey using the fields of fire model in conjunction with the historical narrative. The first location was the shoreline just off Little Kinnakeet Life Saving Station. This shoreline zone would later be searched using visual shoreline techniques adopted from the Rodanthe Ferry channel survey. The second survey area was located west of the "Drain," a site near the visual shoreline inspection area. The next phase of the project involved pBlock modeling.

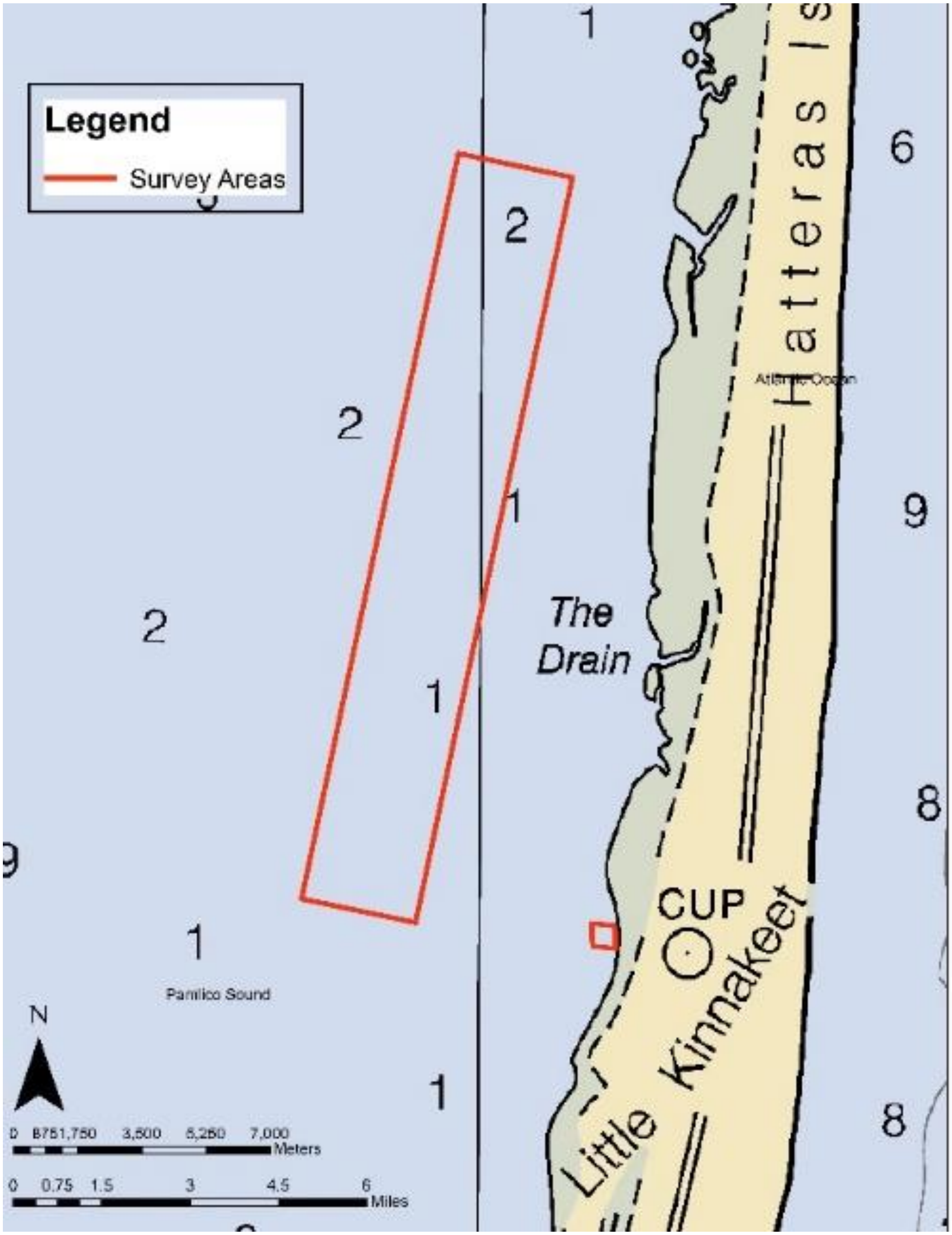

Figure 22. Kinnakeet survey areas. (By Jim Kinsella).

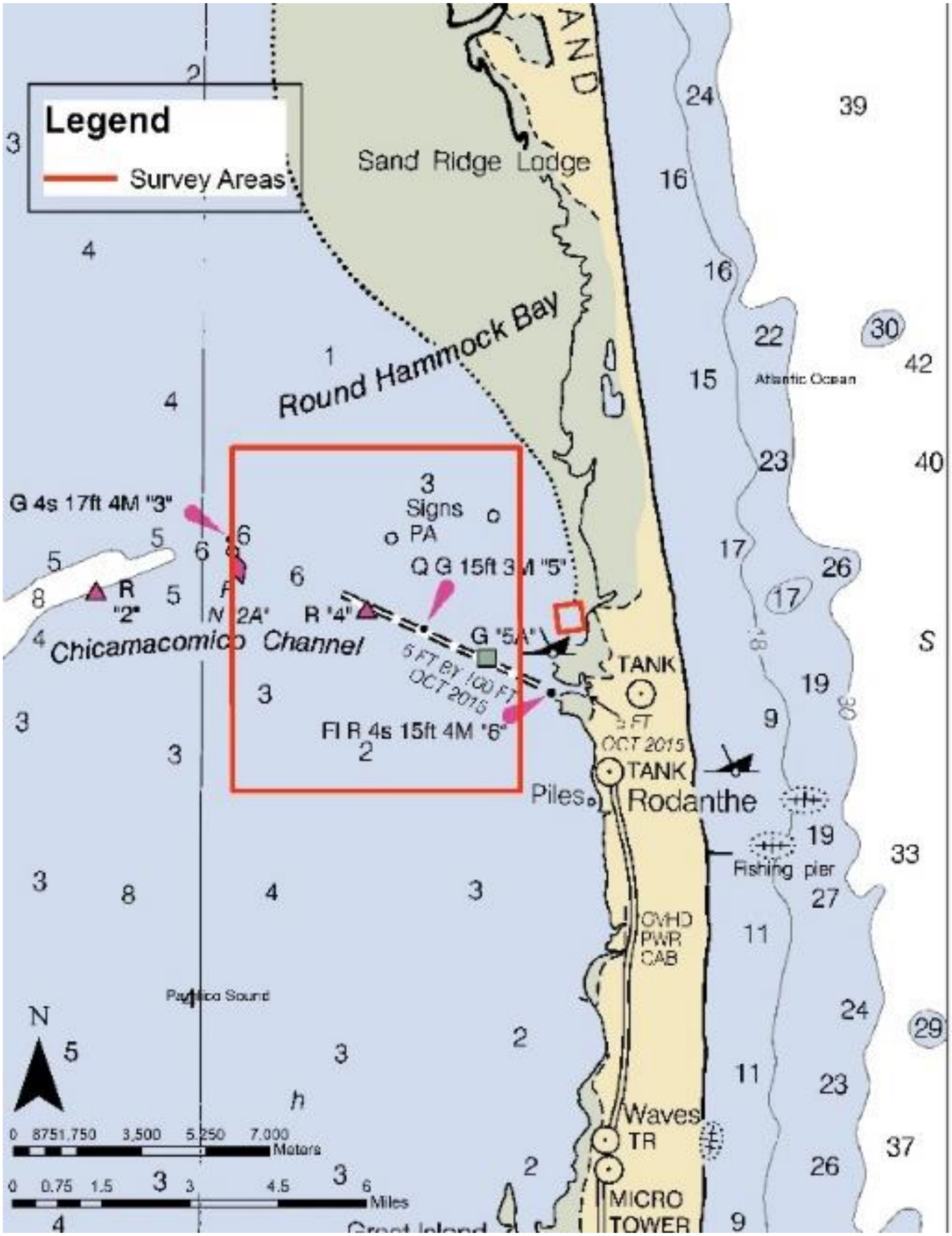

Figure 23. Rodanthe survey areas. (By Jim Kinsella).

pBlock Model

Previous remote sensing studies suggested that *pBlock* modeling may be a useful tool for predicting magnetic signatures of subsurface ordnance (Richards 2011; Parker 2015). pBlock modeling is a software utilized by Richards and Parker in their respective studies to deduce an object's magnetic strength. Parker and Richards acknowledge that this software is primarily used for geological studies rather than archaeological surveys, therefore particular attention had to be made, specifically, as to what traverse lengths to use. Here, traverse length refers the distance of which an anomaly is passed. Moreover, traverse length is the span of calculations used to represent the area of regularly spaced observation points (Smekalova and Bevan 2011:13; Richard Almond 2018 pers. comm.). Nonetheless, these studies set out a practice for utilizing pBlock modeling as a tool in remote sensing studies that incorporate a magnetometer. A series of pBlock models showing the potential magnetic signatures of Civil War ordnance that can be compared against any magnetic anomalies detected during a survey was designed. By providing a basic estimate or approximation for determining a potential anomaly's magnetic strength, comparisons could be made (Parker 2015:80). Parker (2015:80-81) elaborated further on the same issues that Richards (2011:4) faced in his study, in addition to errors concerned with figuring out and using the correct traverse lengths, estimating the susceptibility of iron was also an issue.

Concerning the ships involved in the affair (*Monticello*, *Empire*, and *Cotton Plant*), ordnance from a 32-pounder gun, 12-pound howitzer, and 9-inch Dahlgren gun were determined to be representative of battle, therefore, they were used for the pBlock modeling. The diameter of a 32-pound cannonball is .1524m (6 inches) and a shell from a 9-inch Dahlgren gun is .226m (8.90 inches) (Bell 1941:61; Parker 2015:81). These numbers were rounded to .2 meters since the program requires the measurement be within one decimal point, the same was done in Parker's (2015) study. The dimensions of these were similar, therefore, they produced similar results in the pBlock model. For both types of artillery, it was expected to see a gamma range of 30nT to 2600nT that would represent potential ordnance. A quick item of note, ordnance from a 9-inch Dahlgren gun would have been hollowed out, as they were designed to break apart upon contact with a target (Eldridge 1996:19). This was considered when creating the pBlock model for this type of ordnance. For maximum effect, these shells were hollowed out in a way that the density or real weight was equal to 2/8 that of its solid diameter (Gibbon 1860:163).

The diameter of the bore of a 12-pound howitzer is .1173m (4.62 inches). The windage (the difference between the diameter of projectile and weapons bore) of a 12-pound howitzer is ten one-hundredths which means the diameter of the projectile is .1056m (4.158 inches) (Bell 1941:360-68; Barrett 1863). This was rounded to .1m for the pBlock model. Based on the pBlock model, it was expected to see a gamma range of 8nT to 887nT that would represent potential ordnance. An item of note, the *Cotton Plant* only utilized a 12-pound Howitzer along with *Empire's* 32-pounder, therefore the minimum gamma reading of 8nT representing potential ordnance was only expected at Rodanthe, while 30nT was the minimum for the Kinnakeet survey.

With the earlier precedents set in the Richards (2011) and Parker (2015) studies, many of the same pBlock parameters were utilized for this study. The only variable difference for this study was water depth. Based on this survey area, the water depth variables used were 0.5 meters, 1 meter, and 1.5 meters. An additional variable was created at 2 meters on the assumption that any ordnance might be buried and not resting at the bottom. The latent magnetism of the earth in North Carolina is around 45,000 gammas (Breiner 1973:6; Parker 2015:81). During the survey, however, latent earth magnetism seemed to fluctuate around 48,000 gammas. Entering both numbers into the pBlock model showed a variance of 4 gammas, therefore the decision was made to use the 45,000-gamma figure as the latent magnetism of North Carolina (Tables 4-7).

As seen from the tables below, there are some differences in the gamma range returns of an anomaly with the same dimensions as shot used during the Chicamacomico Races. The stronger magnetic returns were at the shallower depths, while the weaker gamma returns were at deeper depths, but they are all theoretically detectable based on a +/- 0.1nT sensitivity.

pBlock Modeling				
	pBlock Model 1	**pBlock Model 2**	**pBlock Model 3**	**pBlock Model 4**
Depth (m)	0.5	0.5	0.5	1
Width (m)	0.2	0.2	0.2	0.2
Height (m)	0.2	0.2	0.2	0.2
Strike Length (m)	0.2	0.2	0.2	0.2
Iron Susceptibility (SI = 12.5*cgs)	12.5	12.5	12.5	12.5
Density (gm/c)	7.6	7.6	7.6	7.6
Gammas (nT)	45000	45000	45000	45000
Degree of Inclination	-65	-65	-65	-65
Degree of Declination	0	0	0	0
Degree of Traverse Bearing	0	0	0	0
Traverse Length (m)	50	100	200	50
nT +	2421	2421	2421	405.9
nT -	343.2	218.5	36.9	60.2
Total Field nT	2764.2	2639.5	2457.9	466.1

Table 4.pBlock Model 1-4

pBlock Modeling				
	pBlock Model 5	**pBlock Model 6**	**pBlock Model 7**	**pBlock Model 8**
Depth (m)	1	1	1.5	1.5
Width (m)	0.2	0.2	0.2	0.2
Height (m)	0.2	0.2	0.2	0.2
Strike Length (m)	0.2	0.2	0.2	0.2
Iron Susceptibility (SI = 12.5*cgs)	12.5	12.5	12.5	12.5
Density (gm/c)	7.6	7.6	7.6	7.6
Gammas (nT)	45000	45000	45000	45000
Degree of Inclination	-65	-65	-65	-65
Degree of Declination	0	0	0	0
Degree of Traverse Bearing	0	0	0	0
Traverse Length (m)	100	200	50	100
nT +	393.8	393.8	148	128
nT -	60.2	29.7	19.8	17.7
Total Field nT	454	423.5	167.8	145.7

Table 5. pBlock Models 5-8

pBlock Modeling				
	pBlock Model 9	**pBlock Model 10**	**pBlock Model 11**	**pBlock Model 12**
Depth (m)	1.5	2	2	2
Width (m)	0.2	0.2	0.2	0.2
Height (m)	0.2	0.2	0.2	0.2
Strike Length (m)	0.2	0.2	0.2	0.2
Iron Susceptibility (SI = 12.5*cgs)	12.5	12.5	12.5	12.5
Density (gm/c)	7.6	7.6	7.6	7.6
Gammas (nT)	45000	45000	45000	45000
Degree of Inclination	-65	-65	-65	-65
Degree of Declination	0	0	0	0
Degree of Traverse Bearing	0	0	0	0
Traverse Length (m)	200	50	100	200
nT +	128	66.9	56.9	56.6
nT -	17.7	8.8	8.8	8.8
Total Field nT	145.7	75.7	65.7	65.4

Table 6. pBlock Models 9-12.

pBlock Modeling			
	pBlock Model 13	**pBlock Model 14**	**pBlock Model 15**
Depth (m)	2.5	2.5	2.5
Width (m)	0.2	0.2	0.2
Height (m)	0.2	0.2	0.2
Strike Length (m)	0.2	0.2	0.2
Iron Susceptibility (SI = 12.5*cgs)	12.5	12.5	12.5
Density (gm/c)	7.6	7.6	7.6
Gammas (nT)	45000	45000	45000
Degree of Inclination	-65	-65	-65
Degree of Declination	0	0	0
Degree of Traverse Bearing	0	0	0
Traverse Length (m)	50	100	200
nT +	35.1	32.9	29.8
nT -	4.7	4.4	3.7
Total Field nT	39.8	37.3	33.5

Table 7. pBlock Models 13-15

Archaeological Fieldwork

Once potential battle areas were defined and identified by integrating historical research into the GIS model, a two-stage, four-method methodology was applied to the Pamlico Sound's waters off Little Kinnakeet, the beaten zone for ordnance *Monticello* fired at the 3rd Georgia on 5 October 1861. The first stage involved a visual shoreline inspection of inundated land via transects (visually inspected on snorkel) paired with an underwater metal detector. The second stage consisted of a remote sensing survey (side-scan sonar and magnetometry) of the sound's floor in slightly deeper water.

Visual Shoreline Inspection and Handheld Metal Detection Survey

The objective for the visual shoreline inspection was to record geological and biological features such as sediment changes and sub-aquatic vegetation (SAV). Additionally, this survey sought to observe any cultural anomalies that may lie within the survey area. During the three-day visual shoreline inspection, the survey area was mapped onto mylar proforma templates (Figure 24).

Figure 24. (Left) Scott Rose canvasing the survey area with the handheld CTX3030 unit. (Right) Jim Kinsella sketching the sound floor during the visual shoreline survey.

Originally it was proposed that the visual shoreline inspection would consist of two or three parallel 300-meter north to south transects. Due to time constraints, funding, and lack of volunteer support, this plan was reduced to a smaller scale. During the period of 26-28 July

2016, a three-person team conducted a 300-foot north to south baseline survey with 300 foot transects running west into the sound (Figure 25). Reconnaissance activities took place the previous summer to locate suitable sampling points within the suspected *Monticello* activity area. The reconnaissance activities dictated potential areas to survey in and around an area known as "the Drain" in Little Kinnakeet. In the end, however, only one area was selected. The actual survey area was adjacent to the Little Kinnakeet Life Saving Station. In addition to the restrictions mentioned above, this area was selected because it was the easiest point within the *Monticello* fields of fire to access. There was an off-road trail from Route 12 that led directly to the shoreline inspection area.

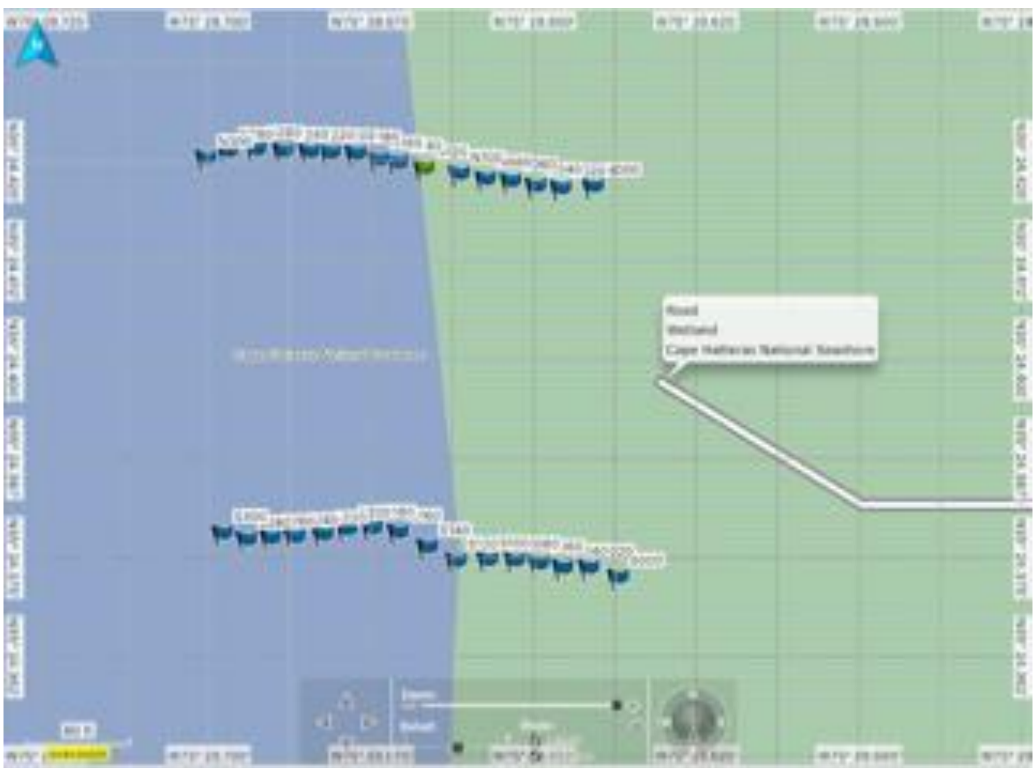

Figure 25. Illustrates where the visual shoreline inspection activities took place. (By Jim Kinsella).

This methodology was chosen because of the shallow depths along the coastline, which are at times only one to two feet deep and would not allow a research vessel to effectively deploy remote sensing equipment and obtain quality data. Therefore, this portion of the survey relied on a pedestrian/snorkel survey. The area surveyed was 300 feet by 300 feet with transects spaced 20 feet apart. A GPS point was taken at each transects end. A compass was used to make the transect lines as straight as possible. Once the survey area was set up, two team members meticulously combed the bottom looking for cultural anomalies and mapping the seafloor. During the transect survey, a third team member utilized a metal detector on loan from, the UNC Coastal Studies Institute (submersible Minelab CTX3030 with integrated GPS capabilities) for detecting metallic anomalies under the seafloor. It was hoped that any ordnance fired from *Monticello* would be picked up with this unit. Any potential anomaly detected by the CTX3030 unit was tagged with the integrated GPS unit and reviewed during data processing.

The mapping activities were recorded on sheets of mylar which were scaled at 20 feet by 300 feet, which was essentially one survey lane (Figure 26). In total, there were fifteen sheets of mylar with recorded data on them. These sheets were then scanned onto the computer to create a final map in Adobe Illustrator. This process involved pulling up each sheet of mylar and using the “snip it” tool in Microsoft Office to cut out each data element and place it in the Adobe Illustrator program (Figure 27). Once each portion was input into the Adobe Illustrator program, they were lined up with each other to create a map template in which to trace. The next steps in this process involved tracing in the seagrass and filling in the sandy areas (Figure 28). Once the map was completed, it was imported into the GIS model. The final step in this process involved overlaying the targets detected by the metal detector on atop the completed shoreline map so that data analysis and interpretation could occur.

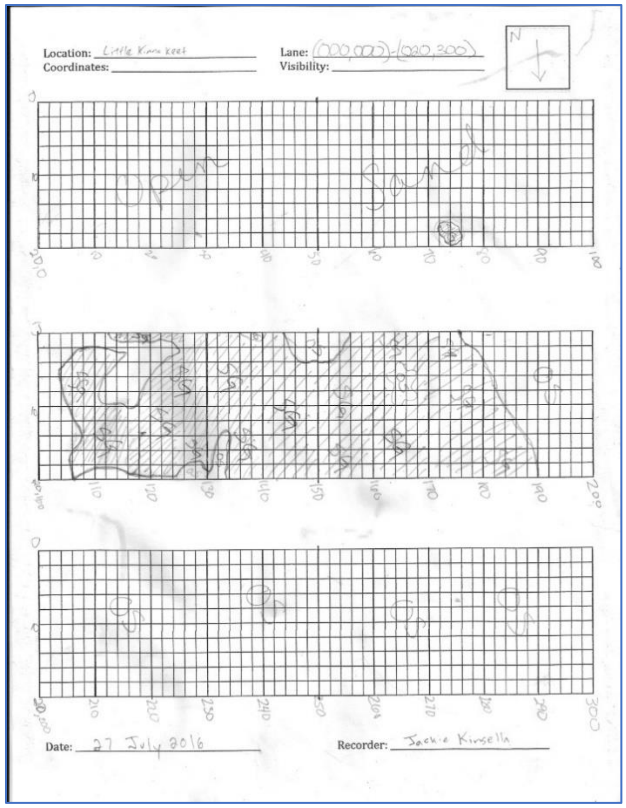

Figure 26. Mylar worksheet used to sketch the shoreline during the visual shoreline inspection (By Jim Kinsella).

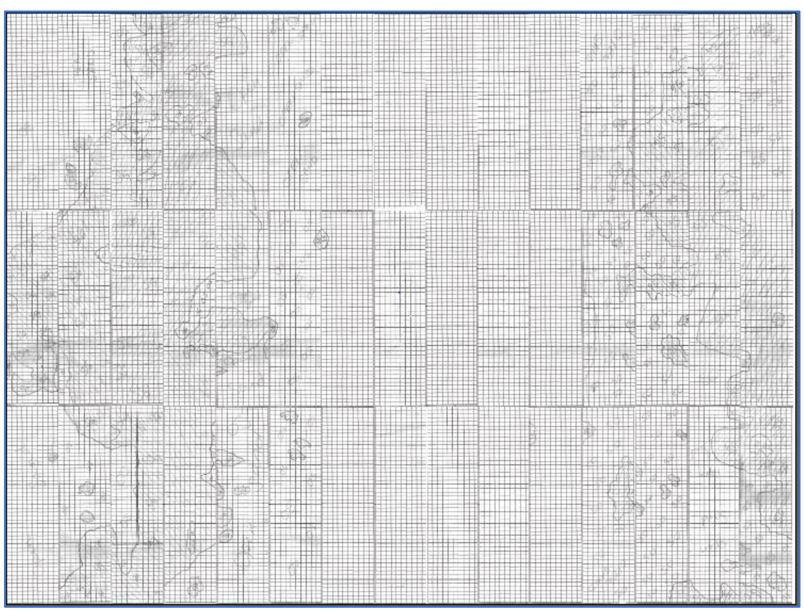

Figure 27. Mylar template showing sketched shoreline off Kinnakeet before digitizing in Adobe Illustrator (By Jim Kinsella).

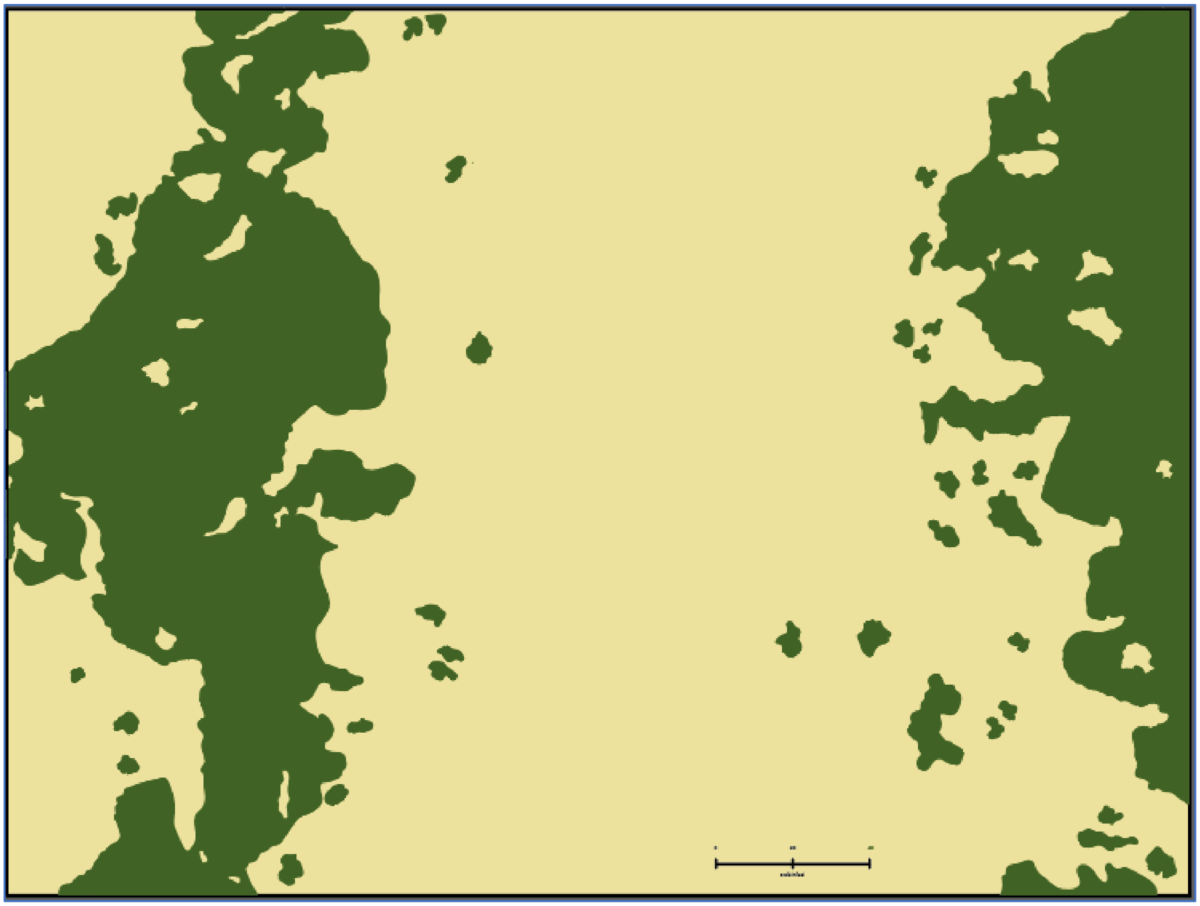

Figure 28. Visual shoreline inspection area off Kinnakeet digitized through Adobe Illustrator (By Jim Kinsella).

Off Shore Remote Sensing Survey

Phase Two of the archaeological fieldwork was a three-day, self-funded remote sensing survey during the week of 24-28 October 2016, off Little Kinnakeet. This methodology was selected for the following reasons: first, part of the goal was to look for cultural evidence representing the Chicamacomico Races by utilizing side-scan sonar and magnetometer to search for cultural material underneath the water. Secondly, the area was large and remote sensing was deemed the most appropriate and effective way to survey. Furthermore, remote sensing has proven useful in maritime archaeological studies and in the discovery and documentation of vessels by NOAA's Battle of the Atlantic Expedition Research (Bright et al. 2012).

Additionally, they have shown to be practical in studies like this one (Simonds 2013; Parker 2015).

The remote sensing conducted for this project required a permit (see Appendix A) be issued by the North Carolina Underwater Archaeology Branch (UAB). There was a slight delay but, when the permit was granted, the UAB spelled out parameters required by the state for remote sensing. The UAB stipulated that survey lane spacing was to be at 20 meters with a 100% overlap between the lanes, aiming for 200% coverage.

This survey was carried out aboard a shallow water vessel R/V *Flounder*, a (24' Carolina skiff on loan from East Carolina University) and utilized a Tritech Starfish side-scan sonar (455 kHz) which ran congruently with a Geometrics G882 Cesium Magnetometer for data acquisition (Tritech International 2016; Geometrics 2016). Both units, along with the research vessel and support equipment were on loan from East Carolina University. Navigation data was acquired via a Trimble AgGPS332 Differential GPS unit. All survey and GPS data were acquired through Hypack 2016 software.

Side-scan Sonar Operation

The side-scan sonar device uses sound waves to give an image of the sound floor (Fish and Carr 1990:7). Side-scan survey techniques have been utilized in the previous maritime battlefield studies and East Carolina graduate student thesis projects (Bright 2012; Bright et al. 2012; Simonds 2013; Parker 2015). In this case, the Tritech sonar device was pole-mounted to R/V *Flounder* (Figure 29). The sonar device was mounted just off the helm with a starboard offset of 1.1 meters and 0.65 meters towards the bow. These measurements were taken from the boat's center of gravity. The layback figures were entered into the Hypack system before beginning the survey.

Figure 29. Pole mounted Tritech Sonar device with Trimble GPS unit (Photographed by Jim Kinsella).

Magnetometer Operation

A magnetometer survey occurred concurrently with the side-scan sonar survey to detect ferrous anomalies on the sound floor (Figures 30 and 31). As the goal of this study was to reveal ferrous material related to the Chicamacomico Races, specifically ordnance, it was hoped the magnetometer would uncover any ordnance fired by *Monticello*. Data referring to *Monticello's* armament in the pBlock analysis tool helped determine the magnetic signature expected ordnance types and if they could be detected by the magnetometer. The magnetometer survey results will be discussed further in the analysis chapter.

Figure 30. Equipment set up during the first day of survey (Photographed by Jim Kinsella).

Figure 31. Adam Parker and Emily Schwalbe getting ready to deploy the Geometrics Magnetometer (Photographed by Jim Kinsella).

Survey Operation

Initially the survey sought to run the transect lanes North-South; however, the contour of the coastline dictated that the lanes be slightly offset southwest to northeast by 10.3865°. Originally, the total planned survey area was approximately 2.90 sq. km (1.119 sq. miles). This worked out to each lane being 3021 meters (9911.4 feet) long and 20 meters (65.6 feet) across.

After concessions were made to fit within the scope of budget and time, the survey area was amended to approximately 1.29 sq. km (.498 sq. miles). With new goals set, the objective was to survey 10 lanes per day. It was hoped to cover as many survey lanes as possible without rushing through the survey. A maximum speed that fell within the range of 2.5 and 3 knots was deemed adequate. Survey lanes were numbered 1 to 51, with 1 being inshore and 51 furthest out in the sound. Once on site, it was determined that lanes 1 through 11 were far too shallow to adequately survey. The decision was made to begin the survey with lane 12 and work westward.

Originally a longer survey period was desired, however, due to similar obstacles met during the shoreline survey (time constraints, funding, volunteer commitment and availability, and a booked-up research vessel) the survey was truncated into three days. Within those three days, the crew tried to cover as much ground as possible without acquiring poor data in the process. In the end, 20 lanes were covered without issue. The lanes that were completed were done successfully and provided good data.

Data Processing and analysis

During the sonar processing phase, each lane was carefully examined for visual anomalies. In this study, the sole purpose of the side-scan sonar was to capture glimpses of the sound floor to eliminate magnetometer targets from further consideration. Going into the survey, it was understood that the likelihood of observing any ordnance in the sonar images was highly unlikely. After over 150 years they would most certainly have sunk below the surface of the sound floor or buried by changing shoals. Even if they had not, they were far too small to capture with the sonar device (Parker 2015:109-110). Instead, as discussed, using the side-scan sonar assisted in weeding out false magnetic targets or other anomalies such as crab pots or anchors.

Data processing occurred every evening after fieldwork. The magnetometer data was edited in Hypack 2016 software, which helped eliminate any data acquisition errors from a variety of factors occurring during a survey. Magnetometers do not have swaths as do side-scan sonar devices, therefore, they record data for a specific point on earth at that specific point in time, but not outward. With that said, much time was spent interpreting and contouring the magnetometer data. Once the magnetometer data was edited for errors, the next step was to analyze each individual anomaly picked up by the towfish and compare it against the pBlock models discussed earlier. Further discussion of this data is in the following chapter. Once data were sorted and analyzed, the next step was to create a final data set to import into the GIS map using Hypack 2016 software.

The sonar files were originally intended to be processed using Chesapeake Technology's SonarWiz 5 software as was the case with previous ECU studies (Simonds 2013; Richards et al. 2015; Parker 2015). There were technical issues importing the sonar data into the SonarWiz software, therefore the decision was made to process the sonar data with the Hypack 2016 software. This process involved manually bottom tracking each individual survey lane and then analyzing each one for visual anomalies. The sonar images provided a check and balance for the magnetometer data. Like the 2015 Parker study, the sonar images assisted in eliminating magnetic anomalies such as crab pots, duck blinds, and pilings. Once this step was completed, a final mosaic of the sonar images was created and imported into the GIS map.

The magnetometer data set was then combined with the sonar images. To accomplish this task, both data sets were imported into the GIS model, by overlaying one on top of the other. Any target represented in the magnetometer data that matched up with a sonar target (not in the shape of Civil War ordnance; a shell or cannonball) was eliminated from further consideration as being ordnance. Additionally, any ordnance representative of battle would likely have sunk into the sediments and not produced a sonogram signature.

Additional Survey Areas and Further Data Acquisition

This project also analyzed and re-assessed data acquired off Rodanthe in late summer of 2015 for integration into this study. These data were acquired during a remote sensing operation conducted near the Rodanthe ferry channel during the UNC-Coastal Studies Institute's (CSI) interdisciplinary NC Department of Transportation (NCDOT) survey in off Rodanthe. While the interdisciplinary grant was geared more toward the geological and ecological consequences of dredging and subsequent deposition, it also included a marine debris survey led by Dr. Nathan Richards utilizing side-scan sonar and magnetometer, and visual and metal detection techniques off present-day Black Mar Gut (see Richards and Parker 2017), which is near Lee Oxford's location for Camp Live Oak. This same area is in proximity to the capture of *Fanny* by Confederate forces (Oxford 2013:195-196). Figure 32 below illustrates the area that was examined during the CSI DoT study over August of 2015 – and which essentially represents a "sampling" of the Chicamacomico Civil War battlescape.

Data for this survey were collected in the same manner and with the same equipment as the Little Kinnakeet survey. The data from the NCDOT survey were also incorporated into the GIS model. The results will be presented in the next chapter; analysis of the results will be presented in Chapter 6.

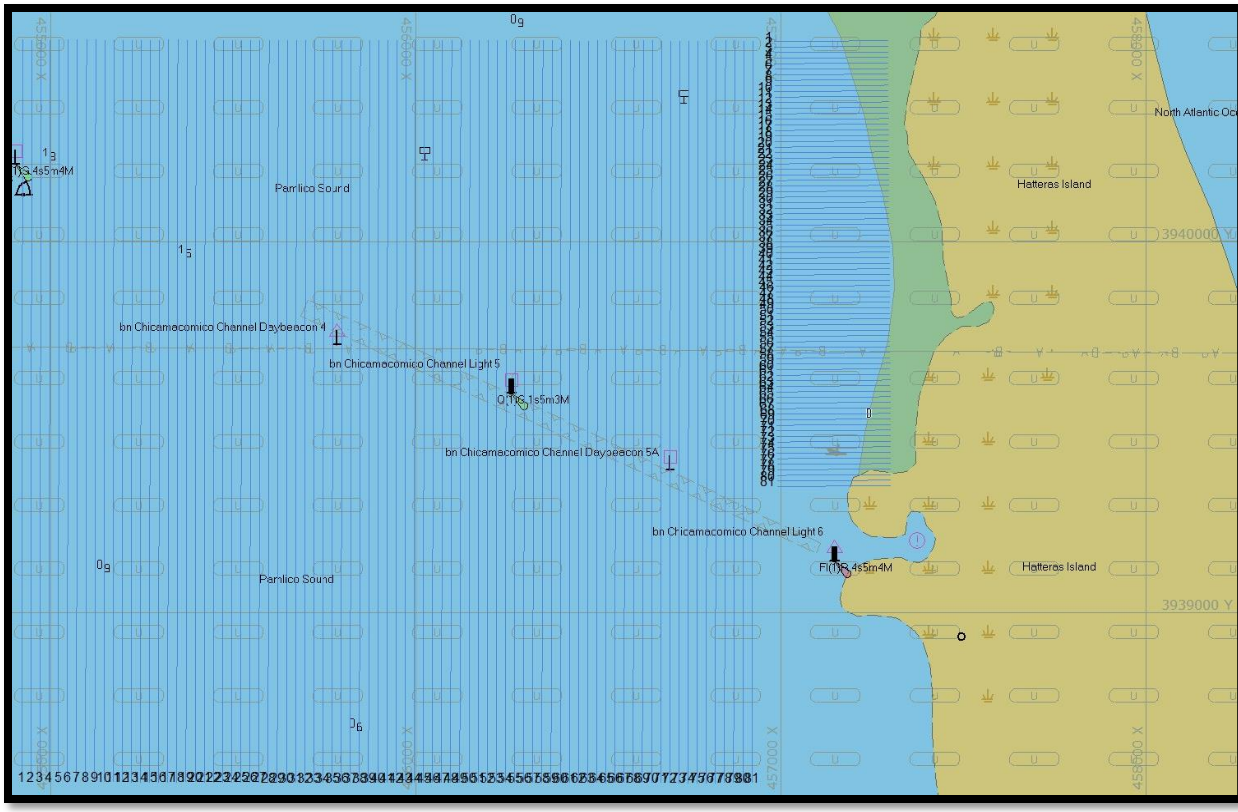

Figure 32. Survey area of UNC-CSI's August 2015 DoT survey (marine debris survey) (Image courtesy of Nathan Richards).

Chapter 5
Is there in situ Maritime Archaeological Evidence of the Chicamacomico Races?

Introduction

This chapter will examine both the historical and archaeological data gathered throughout this study. The discussion will begin with a historical narrative focusing only on the events from 4 and 5 October 1861, since the archaeological fieldwork was only concerned with activity on those dates. This focus will center upon the information that guided the GIS models' creation. From there, the focus will shift towards communicating the results from the archaeological surveys conducted along the shoreline and waters off shore of Little Kinnakeet. Additional data sets from the Richards and Parker (2017) survey are also presented in this chapter. The Little Kinnakeet survey results will precede the Rodanthe survey results.

Battle Narrative

The Chicamacomico Races was a confusing event that was the result of two opposing strategies to secure the Outer Banks. This event can be broken down into two parts: Confederate bombardment of Union forces at Camp Live Oak and Union bombardment of Confederate forces at Kinnakeet. The two events will be discussed in chronological order and will be viewed from both Union and Confederate perspectives.

4 October 1861

On the morning of 4 October 1861, the Union's 20th Indiana Regiment was encamped at Camp Live Oak near the Midyett Windmill about 40 miles north of Hatteras Inlet (*Harpers Weekly* 1861d:673; Scharf 1887:380). At least two companies were, or very shortly would be, posted further south to guard possible landing sites. That same morning, Colonel Wright and the 3rd Georgia arrived off Chicamacomico accompanied by the 8th North Carolina. They left Roanoke Island the previous evening and were aboard a small fleet of Confederate gunboats consisting of CSS *Curlew*, CSS *Raleigh*, CSS *Junaluska*, CSS *Empire*, CSS *Cotton Plant*, and the recently captured CSS *Fanny* (*New York Times* 1861c; *The Richmond Daily Dispatch* 1861e, 1861f).

At Camp Live Oak, Colonel Brown along with the 20th Indiana saw the fleet which appeared to be moving toward their position from Croatan Sound from the northwest. Initially, Brown suspected these were rebel steamers due to their movements, but he was unsure. A short time later, it was confirmed that these were rebel steamers as they changed course directly towards the camp (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; Whitney 1866:60).

Once Brown realized the approaching vessels were indeed the enemy, he knew it was time to act, so he immediately sent a message to Hawkins to inform him of the situation (*Harpers Weekly* 1861d:673). He then readied the 20th Indiana to prepare for an attempted landing as the Southern flotilla approached their position. In a strange turn of events, the Confederate fleet changed direction. Instead of approaching straight toward Brown and his men as he expected, they moved south, to a point roughly 5 miles below their position. The bulk of the flotilla moved towards the shore where they anchored about two miles offshore while another Confederate steamer moved north towards the camp. Several ships were towing large barges packed with men from the 3rd Georgia and 8th North Carolina Regiments. This was particularly alarming to Colonel Brown because the number of Confederate troops he witnessed that morning was much higher than he initially anticipated (Brown 1861a; *Logansport Journal* 1861: Whitney 1866:60-61).

At approximately 9:00 a.m. Confederate forces launched an attack against the Union encampment at Camp Live Oak (*New York Times* 1861c). The attack consisted of an artillery bombardment from gunboats positioned a short distance off shore. The steamer, CSS *Cotton Plant* was now directly west of Camp Live Oak and the windmill (Yellowley 1861). *Cotton Plant* had a shallow draft, so it could get closer in shore than other vessels like *Curlew* and *Empire* (NHHC 2015c; NHHC 2015d). Several men and officers from *Curlew*, boarded *Cotton Plant* so that they could disembark with the infantry once they were in position to land. *Cotton Plant*, now anchored (1 mile directly west of the camp), continuously bombarded the camp from the sound side to drive Union forces out, while *Empire* shelled them as they retreated towards the south (Figure 33). This assault lasted for close to an hour, and several tents at Camp Live Oak as well as a house being used as a hospital caught fire. The windmill adjacent to the camp was also destroyed (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; *New York Times* 1861b; Yellowley 1861; Merrill 1869:488; NHHC 2015b).

Due to many sick men, lack of supplies, and inferior armament, the 20th Indiana were unable to adequately defend the camp; however, they were still willing to put up a fight to hold the camp (Oxford 2013:127). Once Colonel Brown realized holding the camp was not feasible, he gave the order to retreat toward Hatteras. The men obeyed these orders leaving everything behind except for their muskets. Once the Georgians noticed the 20th's retreat they attempted a landing from *Cotton Plant* to intercept them (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; *New York Times* 1861c; *New York Tribune* 1861b; Yellowley 1861:55-60; Merrill 1869:488; see also Trotter 1989:46; Oxford 2013:128-130).

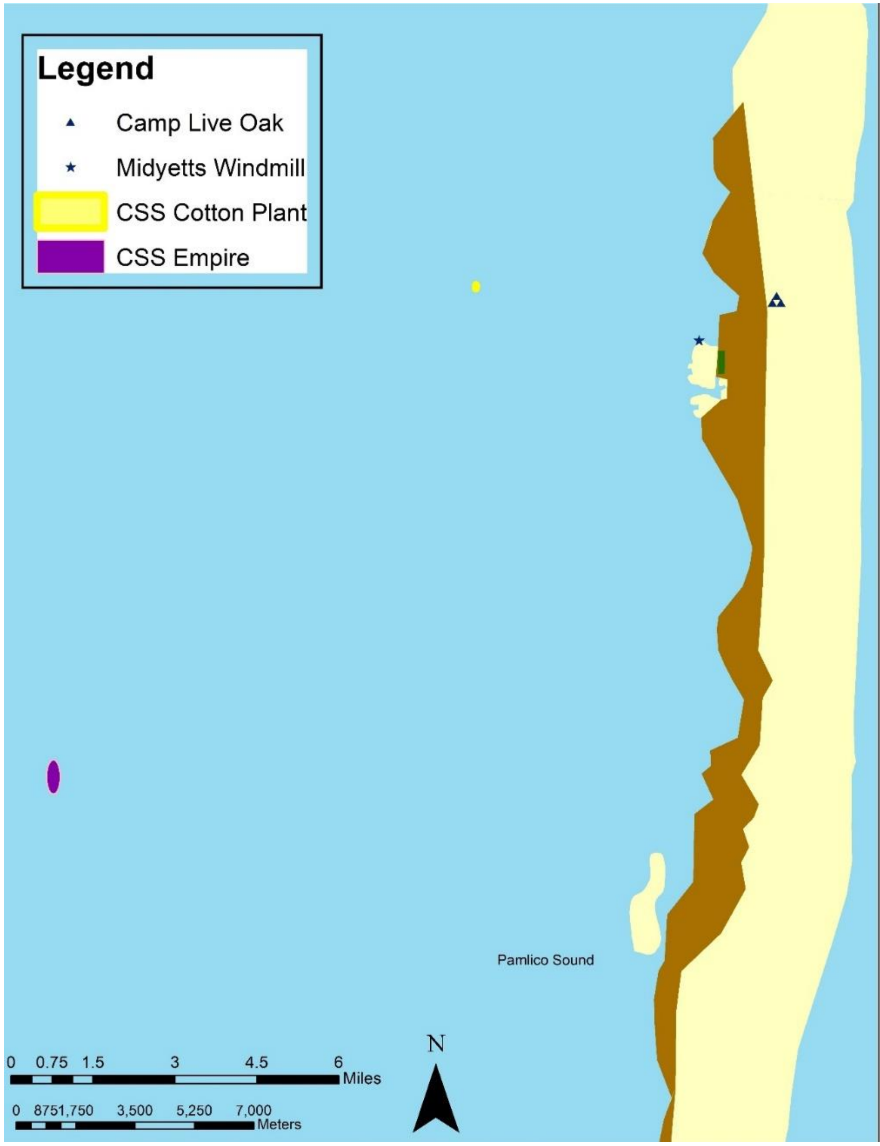

Figure 33. Cotton Plant *and* Empire's *positions during the assault on Camp Live Oak on 4 October 1861.* Cotton Plant's *position is based off primary sources as well as historic bathymetry. This researcher derived* Empire's *location from information in the historical record. Note, ships are not drawn to scale so that they could be seen in the image. (By Jim Kinsella).*

After the retreat was ordered, Captain Edward Jardine raced via horseback to deliver news of the enemy attack at Chicamacomico to Hawkins at Hatteras. In response, as a countermeasure, Hawkins ordered Jardine to return to Camp Live Oak with reinforcements to aid the 20th Indiana (Johnson 1861:56; Graham 1900:94). By now, a couple of hours had passed since the assault began at Chicamacomico. While continuing with their retreat towards Hatteras, the Indianans noticed the Confederate fleet was moving parallel to them along the sound. This prompted them to move their retreat at a quicker pace, as they feared another landing attempt further south was possible (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; see also Trotter 1989:46; Oxford 2013:135).

With the menacing presence of CSS *Empire* in the sound, the 20th Indiana's fears were justified, as the enemy planned to cut them off further south by landing the 8th North Carolina from the barges towed behind *Empire* at Big Kinnakeet (Scharf 1887:381). The 8th North Carolina arrived at Kinnakeet ahead of the 20th Indiana and anchored two miles offshore. Unfortunately, they were unable to land in time because *Empire* ran aground on an uncharted sandbar. Furthermore, the shoals prevented the smaller boats from reaching shore (*New York Times* 1861c; see also Oxford 2013:141-143). Undeterred, the 8th North Carolina wanted to attempt the landing, however, Colonel Wright was reluctant to issue the order and thus, they missed their opportunity (*The Richmond Daily Dispatch* 1861f; see also Trotter 1989:46).

The 8th North Carolina's failed landing attempt allowed Colonel Brown and his troops to continue their retreat towards the Hatteras Lighthouse (*Harpers Weekly* 1861d:673). During the retreat, Brown kept an eye on the Confederate fleet in the sound, stopping only a handful of times to rest. Several hours later, Colonel Brown and his men finally made it to the lighthouse. As soon as they arrived, they decided to make a stand, turning the lighthouse into a temporary fort. While Colonel Brown was busy with the retreat and evacuation of Camp Live Oak, Colonel Hawkins was at Fort Clark staying apprised of the situation. Hawkins prepared to send the 9th New York Zouaves to support the retreating 20th Indiana. Along with the Zouaves, he also issued orders for the USS *Monticello* and USS *Susquehanna* to render aid and provide support (Brown 1861a; *Harpers Weekly* 1861d:673; Lardner 1861:291; *Logansport Journal* 1861; see also Trotter 1989:46; Oxford 2013:140-42).

Several hours later *Monticello* was steaming parallel to the Zouaves on the Atlantic, with *Susquehanna* not far behind. Together, both ships hugged the shore as they made their way north towards the lighthouse where they anchored upon arrival. While at anchor, the two steamers sent provisions to the 20th Indiana who were camped at the lighthouse (*Harpers Weekly* 1861d:673; Johnson 1861:56; *Logansport Journal* 1861; *New York Times* 1861d; see also Oxford 2013:144).

5 October 1861

On the morning of 5 October 1861, Hawkins ordered Commander Lardner to remain off the lighthouse with *Susquehanna* to reinforce those on shore. At the same time, he ordered *Monticello* to patrol north and look for Confederate forces (*Harpers Weekly* 1861d:673). Meanwhile, Union forces camped at the lighthouse realized they were followed by the 3rd Georgia, who were advancing on their position after making a successful landing a few miles north from where they were now camped. That same morning, Colonel Brown marched the 20th Indiana further south to Fort Clark where they would remain while the Zouaves were posted near the lighthouse ready to engage the 3rd Georgia should the need arise (Oxford 2013:152-154).

The 3rd Georgia soon became aware that the 20th Indiana were now reinforced by the 9th New York Zouaves. This was reported by 3rd Georgia soldier, Asa Winn. Winn's statement indicates they came in sight of the lighthouse and noticed the Union numbers were too large to attack, so the 3rd Georgia moved back towards Chicamacomico (Winn 1861). The Zouaves they were relieved when the 3rd Georgia did not attack (Oxford 2013:152-154).

After falling back towards Chicamacomico, the 3rd Georgia camped and waited for the 8th North Carolina to join them after landing at Kinnakeet. Unfortunately, the 8th's landing was unsuccessful due to the shoals and shallow waters. These circumstances, coupled with the appearance of the Zouaves, an attack on the lighthouse by the 3rd Georgia, was not likely to be successful, prompting Colonel Wright to pull them back towards Chicamacomico (Trotter 1989:47; Oxford 2013:153-154). Around noon, as the 3rd Georgia was falling back along Bald Beach, they noticed a large vessel situated close to the shore. As they stared curiously at the ship, the situation grew tense. The unidentified vessel, (determined to be USS *Monticello*), opened fire, starting a relentless assault against the withdrawing Georgians (*Frank Leslie's Illustrated Newspaper* 1861; *Harpers Weekly* 1861d:673-677; see also Barrett 1963:55; Oxford 2013:154-155).

Monticello was steaming northward close to shore on the Atlantic side of the island when the lookout spotted the 3rd Georgia moving north along Bald Beach (Figure 34). *Monticello's* lookout also noticed several vessels flying enemy colors in the sound across the island. This prompted them to anchor and begin firing on the combined Confederate forces (Braine 1861:291-92; *Frank Leslie's Illustrated Newspaper* 1861; *Harpers Weekly* 1861d:673-677; Johnson 1861:58; *New York Times* 1861d; see also Trotter 1989:47; Oxford 2013:156-157). A report from one of Hawkins's Zouaves stated the following about the *Monticello* 's bombardment on the rebels;

> Steaming up the Atlantic to a position opposite the Rebel fleet, she shelled the camp and vicinity in a right lively manner. One of her shells, as I watched, either struck one of the gunboats or so near it as to perceptibly swing the vessel to and fro for a moment (Johnson 1861:58).

During the chaos of *Monticello's* gunfire, some Georgians took refuge in the woods while others ran towards the sound side as the Confederate fleet began sending small boats to recover soldiers who were trying to escape. Around this time, some Confederate steamers moved into position and returned fire over the island towards *Monticello*, however they were unable to get within appropriate firing range as they were miles from the shore. This prompted *Monticello* to respond, firing its thirty-pounder Parrott rifle over the island towards the Confederate fleet and the smaller boats, resulting in shells cascading over the island. Colonel Wright reported that *Monticello* hurled over 400 shells before they were able to get out of range (Figure 35 and 36) (Braine 1861:291-92; *Frank Leslie's Illustrated Newspaper* 1861; *Harpers Weekly* 1861d:673-677; Johnson 1861:58; *New York Times* 1861d; see also Barrett 1963:55; Trotter 1989:47; Oxford 2013:158-59).

During the firefight between both fleets, the Zouaves gave chase to the Georgians while the 8th North Carolina watched helplessly aboard CSS *Empire*. The long-range fighting lasted several hours before it finally ended later that evening. Once it was over, *Monticello* rejoined *Susquehanna* and the two made their way back towards Hatteras Inlet while the 3rd Georgia withdrew to Chicamacomico (Braine 1861:291-92; *New York Times* 1861d; see also Barrett 1963:55; Trotter 1989:47-48; Oxford 2013:159-61).

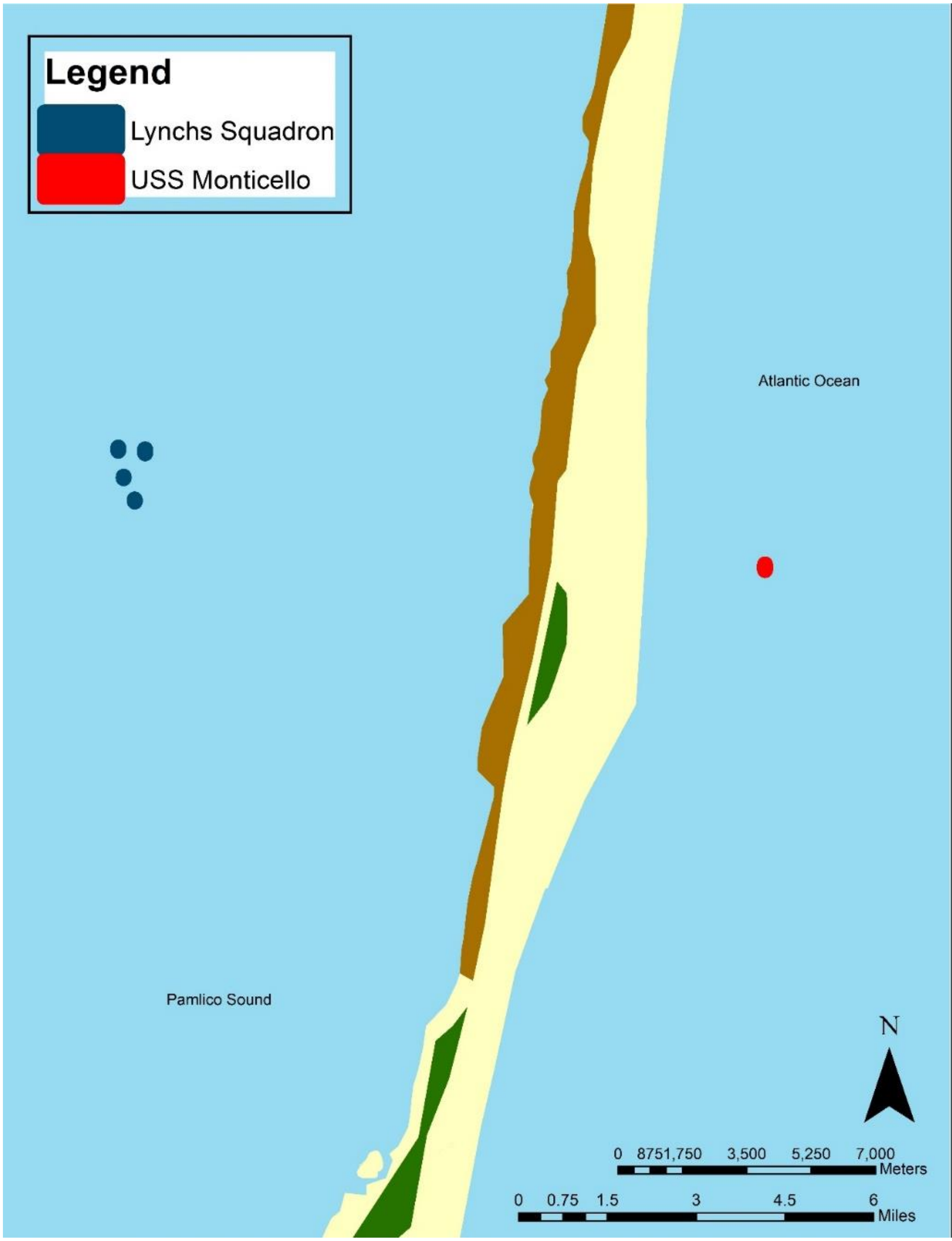

Figure 34. Monticello's *position as it shelled the 3rd Georgia as well as the Confederate fleet in the sound on 5 October 1861.* Monticello's *position is based on primary sources as well as historic bathymetry. This researcher placed Lynch's squadron based on historic bathymetry. Note, ships are not drawn to scale so that they could be seen in the image. (By Jim Kinsella).*

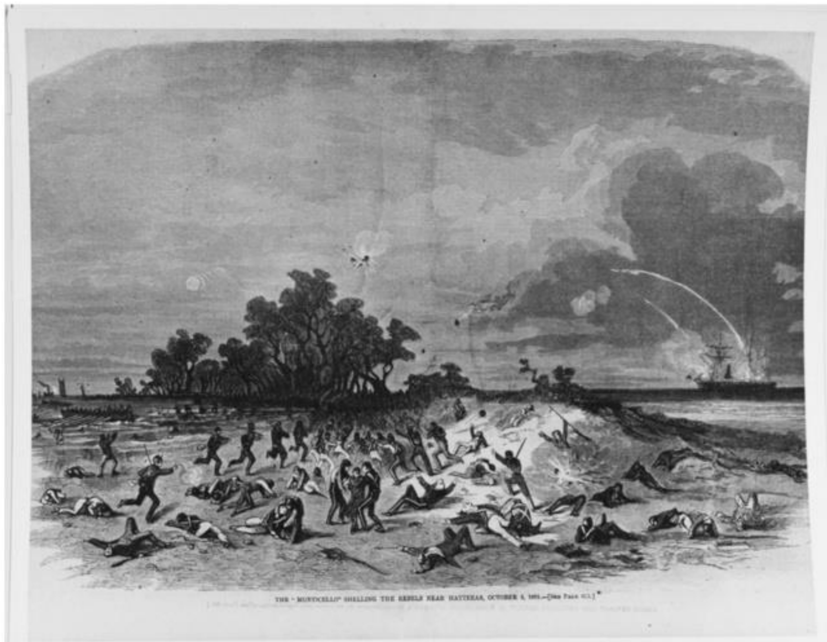

Figure 35. "The 'Monticello' Shelling the Rebels near Hatteras, October 5, 1861." (Harpers Weekly 1861d:677).

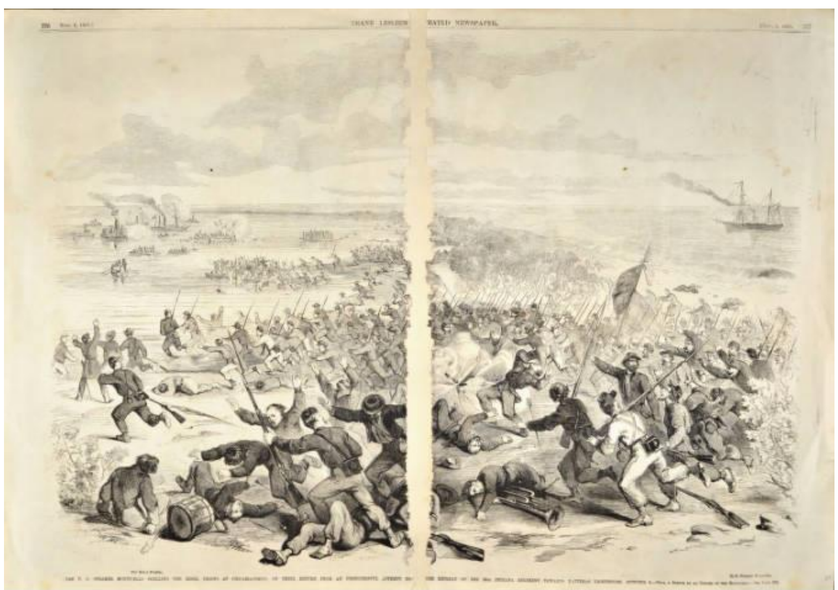

Figure 36. "Engraving of the Chicamacomico Races." (Frank Leslie's Illustrated Newspaper 1861).

Battle Conclusion

By the morning of 6 October 1861, the affair was over, and the entire Confederate expedition was back at Roanoke Island (*New York Times* 1861d). Union forces abandoned the outpost at Chicamacomico and decided to focus efforts on holding Hatteras Inlet. After four confusing days, little was accomplished by either side, except for the capture of *Fanny*. There were claims from Union forces that the bombardment from *Monticello* was lethal towards the 3rd Georgia as well as the Confederate steamers in the sound (Braine 1861:291-92; *Daily National Intelligencer* 1861b:2; *Harpers Weekly* 1861d:673; *Logansport Journal* 1861). This was inaccurate, there were no major casualties and no reports of successful hits on the Confederate fleet (*The Richmond Daily Dispatch* 1861f). Additionally, there was no shift in military power, neither side gained any significant edge. Furthermore, control over Pamlico Sound and the Outer Banks was not decided during this event. Both Union and Confederate forces convinced themselves that they successfully fought off enemy advances (Barrett 1963:55; Trotter 1989:47-48; Oxford 2013:166).

Archaeological Data

This section presents data collated during the archaeological fieldwork conducted on 26-30 July 2016 and 24-28 October 2016. As discussed, only the Chicamacomico Race events from 4-5 October 1861 were examined archaeologically. Fieldwork at Little Kinnakeet focused on the 5 October 1861 battle events, while data extracted from the Rodanthe survey focused on 4 October 1861, including the initial assault on Camp Live Oak. As discussed, fieldwork activities for this project occurred in two stages; the first consisted of a visual shoreline inspection coupled with handheld metal detection along the shoreline adjacent to the Little Kinnakeet Life Saving Station, the second was a remote sensing survey (side-scan sonar and magnetometer) in the waters off Little Kinnakeet. The visual shoreline inspection and metal detection data will be discussed first, followed by the off shore remote sensing data. During the latter discussion, the magnetometer data will be presented first, followed by the side-scan sonar data. The two data sets will then be combined to discuss any relationships that may exist between the two. For each methodology, the Little Kinnakeet data will precede the Rodanthe survey data results.

Little Kinnakeet Visual Shoreline Inspection and Metal Detection Data

There were no expectations of seeing any ordnance on the sound floor; any potential ordnance would most likely be buried under sediment. There was not much to note visually during this survey aside from seagrass and various debris, such as small pieces of timber and discarded rope. Future archaeologists who survey this area may discover some of this project's lost tent stakes which were used to set up the lanes. These were lost in a deep portion of the survey area, possibly the result of an old dredging project. This area was observed as primarily consisting of a sandy bottom with sparse sub aquatic vegetation (SAV) (Figure 37).

Several anomalies were detected by the CTX 3030 unit during the handheld metal detector investigation. The detector logged spatial information for each anomaly as well as burial depth information, which was recorded in centimeters and converted to meters during post-processing. The device also captured the ferrous and conductivity levels of each anomaly. Ferrous levels were measured on a scale of 1 to 35, the higher the number, the higher the ferrous content. Conductivity levels were measured on a scale of 1 to 50, with 50 representing the highest conductivity.

Once the entire survey area was recorded on mylar proformas, and each lane had been canvassed with the metal detector, the decision was made to do some additional reconnaissance further out in the sound to see how far out anomalies were found. Additionally, this assisted with filling a small gap between the visual shoreline inspection area and the proposed remote sensing survey area. This was possible because the area beyond the potential dredge channel was shallower and accessible as the water was only waist deep. If more time and funding were available, the entire shoreline and metal detector survey would have been much larger to encompass the entire gap between the shoreline inspection area and the side-scan and magnetometer survey area.

As evidenced by Figure 38, most anomalies are situated closer to the shoreline, then get rarer further offshore. The depths of anomalies detected, ranged from .04m to .3m beneath the sound floor (see raw data in Appendix B). An assumption can be made about these targets; there is frequent foot traffic as well as off-road vehicles onshore in the area closest to the survey zone, therefore, several targets could be trash, fishing lures, or other debris.

Since this study was concerned with detecting archaeological signatures of a Civil War battlescape, the raw data was analyzed to see if they fit within the parameters of being ordnance. While analyzing the data, the following was kept in mind: high ferrous targets could be ordnance or iron nails whereas nonferrous targets could be certain coins, aluminum cans, or trash. Metals such as copper and silver would most likely have higher conductivity values (Minelab 2017:64; see also Richards and Parker 2017:83). Additionally, Civil War cannonballs and shells are known to be cast iron, as opposed to other types of metal (Gibbon 1880:163; Bell 1941:37). Iron has high ferrous levels as well as high levels of conductivity, therefore, certain criteria determined if these anomalies could be ordnance representative of battle: the anomaly's ferrous level, conductivity content, and spatial location along the shoreline. Figures 39 through 42 show the spatial location, ferrous content, and conductivity levels of each anomaly. During data processing the data were filtered using an SQL statement (i.e. Ferrous > 20 AND Conductivity > 40 = Potential Ordnance) in the GIS model. Any anomaly detected that fit within these parameters was considered as being potential ordnance (Figure 43). As evidenced by Figure 43 and Table 8, 28 of the 137 targets detected have the potential to be ordnance. These findings will be used to create a final battle map that will be compared against the operational frameworks outlined earlier and will be discussed in the following chapter.

Figure 37. Visual shoreline inspection area off Kinnakeet digitized through Adobe Illustrator and imported to GIS (By Jim Kinsella).

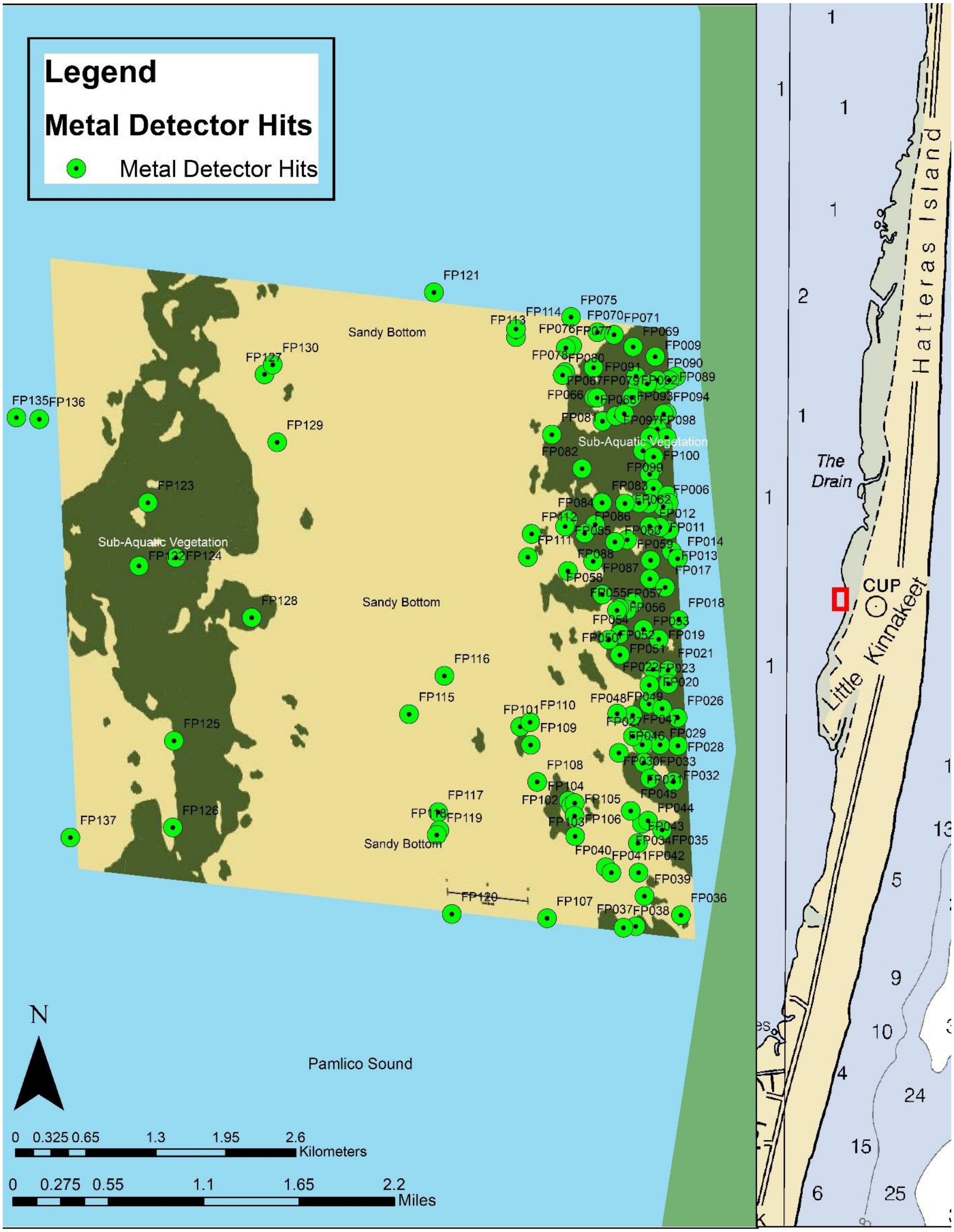

Figure 38. Map depicting visual shoreline survey area. Green points are individual metal detector targets. (By: Jim Kinsella).

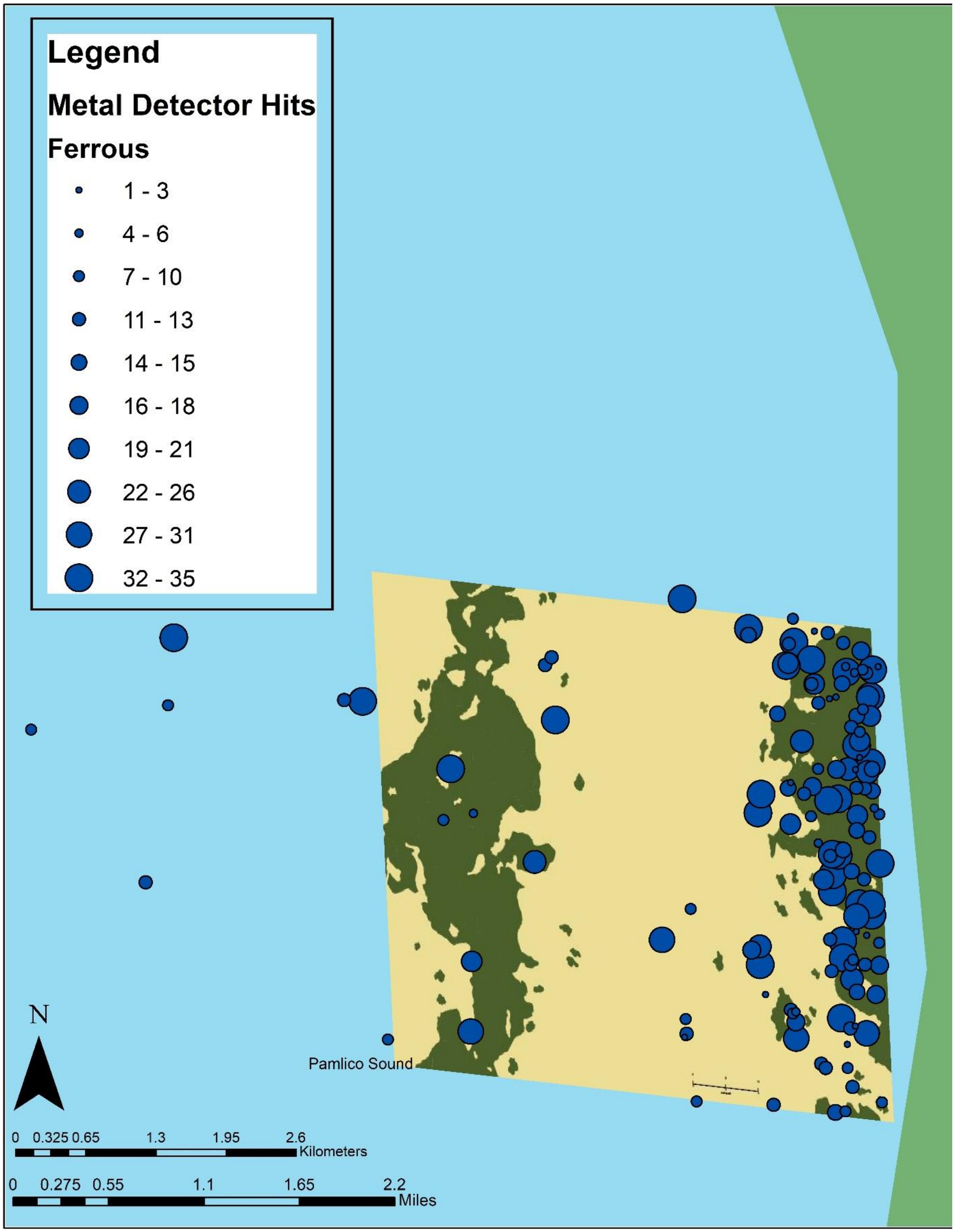

Figure 39. Map depicting ferrous levels of each anomaly detected with the metal detector. (By: Jim Kinsella).

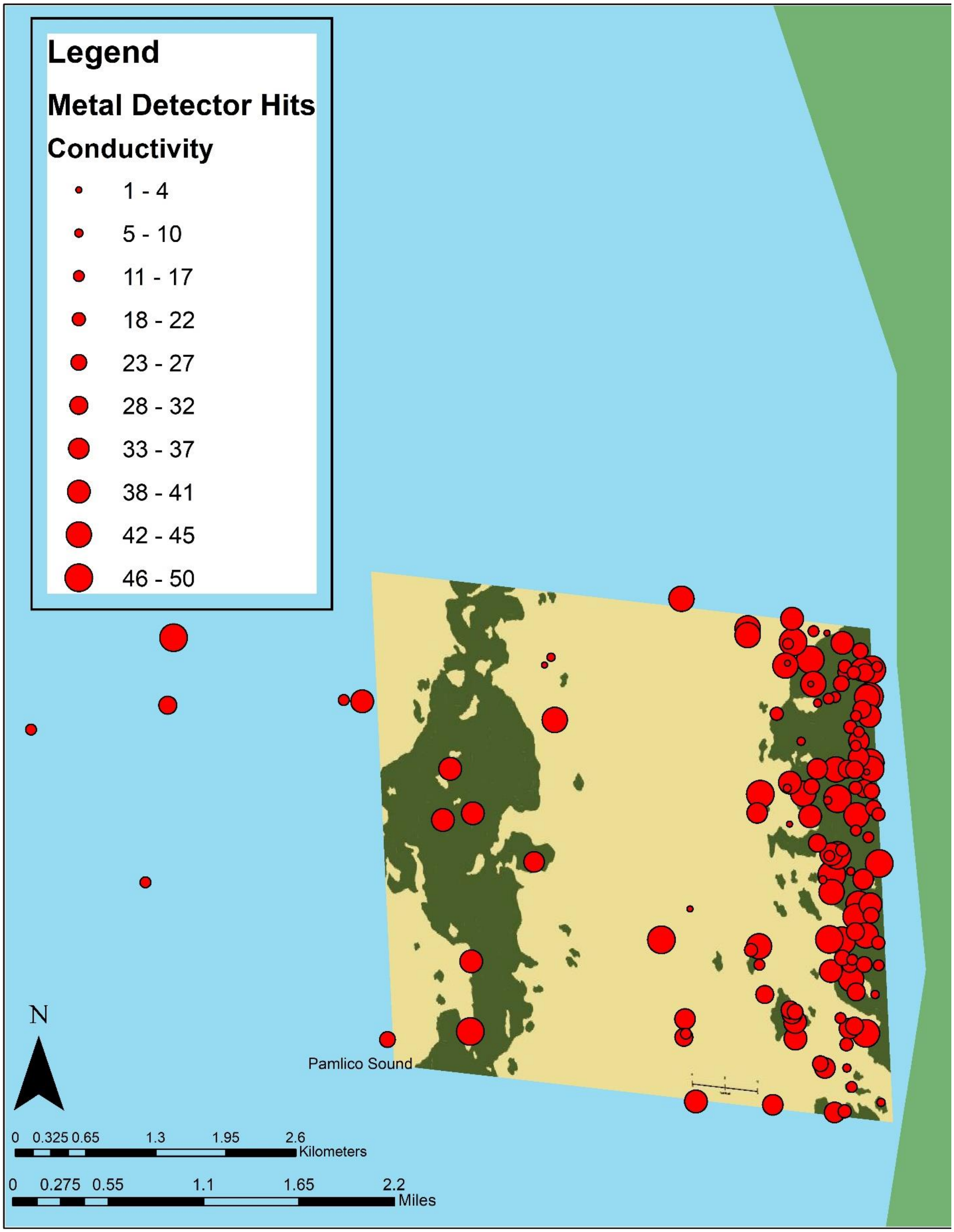

Figure 40. Map depicting conductivity levels of each anomaly detected with the metal detector. (By: Jim Kinsella).

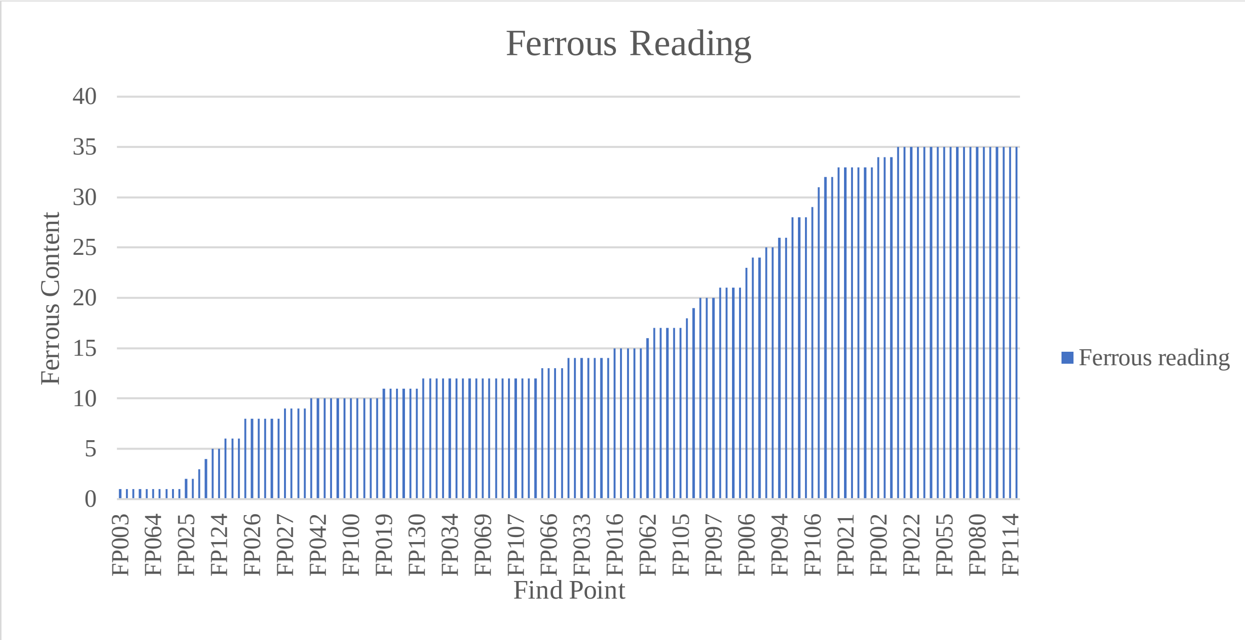

Figure 41. Chart depicting the ferrous content of each magnetic anomaly detected during the metal detection survey (By: Jim Kinsella).

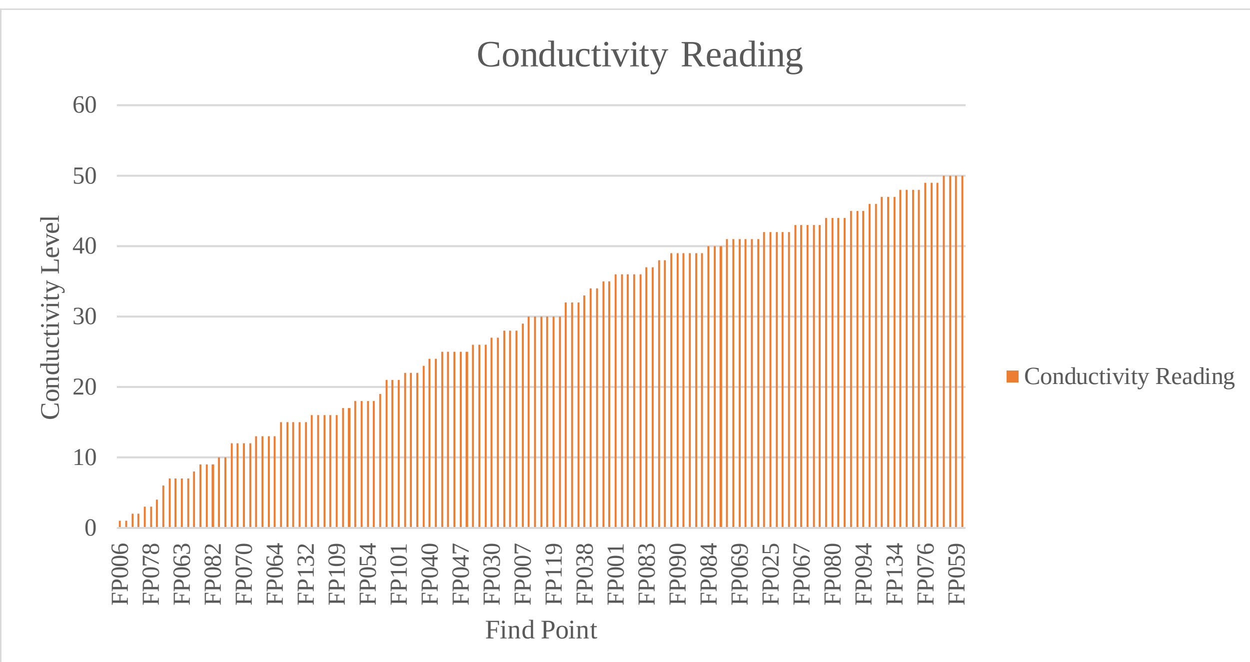

Figure 42. Chart depicting the conductivity level of each magnetic anomaly detected during the metal detection survey (By: Jim Kinsella).

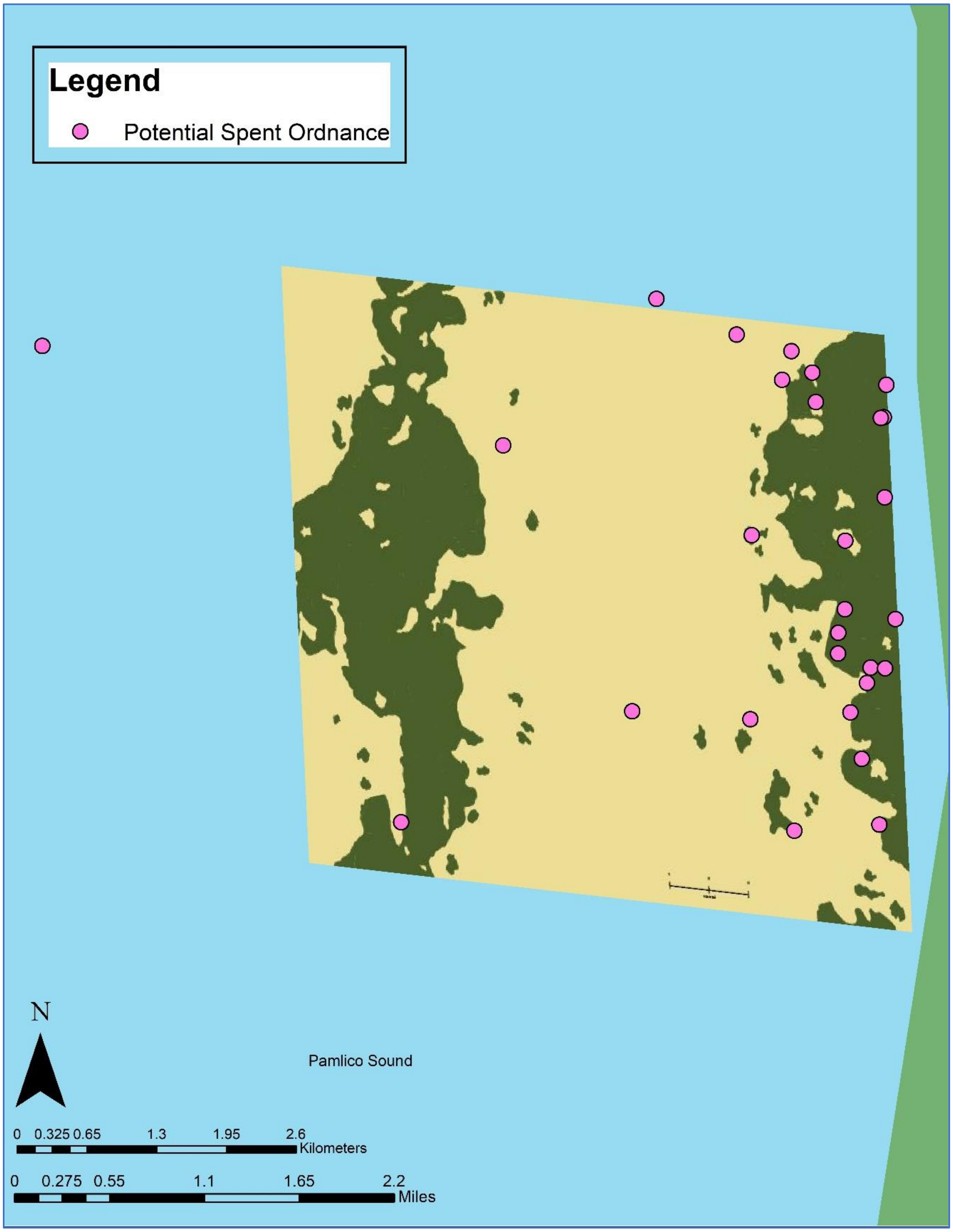

Figure 43. Map of Little Kinnakeet depicting potential ordnance based on high ferrous and conductivity levels. Data was filtered according to an SQL statement. (By: Jim Kinsella).

Findpoint	Ferrous	Conductivity	Depth (cm)	Latitude	Longitude
FP004	35	50	9	35.40679	-75.494
FP018	33	46	7	35.40663	-75.49398
FP020	35	45	14	35.40656	-75.49403
FP021	33	41	10	35.40656	-75.494
FP023	31	43	5	35.40654	-75.49403
FP031	24	45	5	35.40644	-75.49404
FP035	28	48	8	35.40635	-75.49401
FP048	35	47	15	35.4065	-75.49406
FP050	35	42	5	35.40658	-75.49408
FP051	35	50	8	35.40661	-75.49408
FP055	35	46	24	35.40664	-75.49407
FP059	35	50	12	35.40673	-75.49407
FP067	21	43	7	35.40692	-75.49412
FP076	35	49	7	35.40699	-75.49416
FP079	35	50	7	35.40696	-75.49412
FP080	35	44	9	35.40695	-75.49417
FP089	33	49	6	35.40695	-75.494
FP093	35	48	24	35.4069	-75.49401
FP094	26	45	14	35.4069	-75.49401
FP106	29	41	19	35.40634	-75.49415
FP110	24	42	11	35.40649	-75.49422
FP112	35	49	9	35.40674	-75.49422
FP114	35	44	10	35.40701	-75.49425
FP115	28	48	21	35.4065	-75.49442
FP121	34	43	8	35.40706	-75.49438
FP126	28	48	5	35.40635	-75.4948
FP129	32	44	14	35.40686	-75.49464
FP134	32	47	5	35.40699	-75.4954

Table 8. Targets from Kinnakeet shoreline survey area that possess the potential to be ordnance.

Rodanthe Visual Shoreline Inspection and Metal Detection Data

Additional data sets from the Richards and Parker 2017 survey were incorporated into this study as well. The Richards and Parker survey focused on an area located adjacent and slightly north of Black Mar Gut off Rodanthe. Based on evidence contained within the historical record and Oxford's secondary account of events (Oxford 2013), there is a strong likelihood that the initial assault on Camp Live Oak lies within proximity to the survey area.

The methodologies employed during the Rodanthe survey by Richards and Parker (2017) were like the Little Kinnakeet survey; however, the Rodanthe survey area was much larger. Richards and Parker (2017) surveyed a 600 by 600-foot area off Rodanthe's shoreline. They also had different research objectives where the goals were to search for anomalies with any cultural significance. Although the size of their survey area and research objectives differed, their study provided a similar data set to that gathered during the Little Kinnakeet survey. Richards and Parker recorded the sound floor in a similar fashion. The primary difference from this project, however, was the degree of metal detector coverage. The Little Kinnakeet survey had many more targets than the Richards and Parker study because the metal detector was utilized to canvas the entire area. During the Richards and Parker survey, half of the area was systematically covered with the metal detector to detect targets at random points between the search area and the point of access. This methodology proved sufficient as it provided a decent data set for further analysis.

The Rodanthe survey area was comparable to Little Kinnakeet as there was not much to note visually other than a large amount of seagrass and a sandy bottom (Figure 44). There were, however, various articles of marine debris such as a paddle, rope, timber, and a concrete block (Richards and Parker 2017:84-85). Although the methodologies were slightly different, there were still several anomalies detected with the metal detector (see raw data Appendix C). Figures 45 through 49 show the spatial location, ferrous content, and conductivity levels of each anomaly. Keeping the same considerations in mind, these data were reassessed and filtered in the same manner as the Little Kinnakeet shoreline data sets to produce a final data set of anomalies thought to be representative of battle (Figure 50). As evidenced by Figure 50 and Table 9, 15 of the 30 targets detected have the potential to be ordnance. These findings will be used to create a final battle map for the Rodanthe area, which will be compared against the operational frameworks outlined earlier which will be discussed in the following chapter.

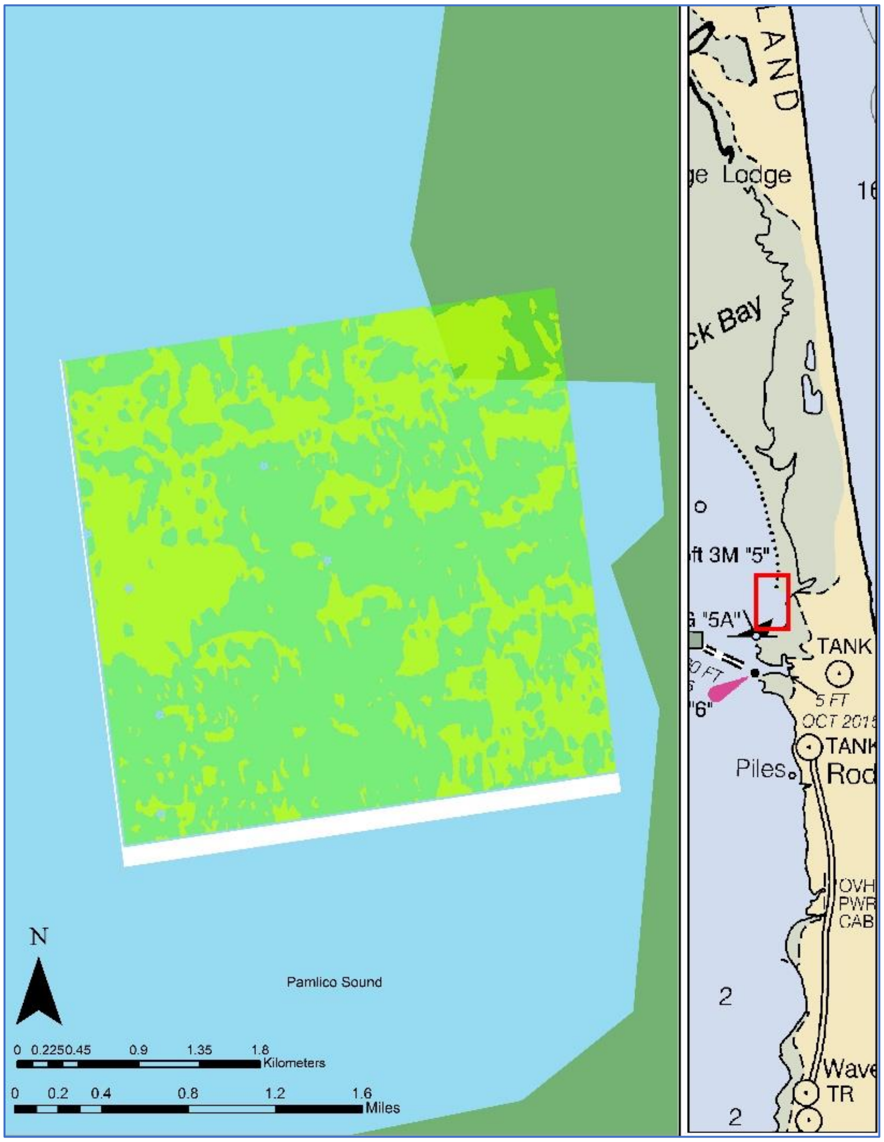

Figure 44. Visual shoreline inspection area off Rodanthe, from Richards and Parker 2017 Survey, digitized through Adobe Illustrator (By: Richards and Parker) and imported to GIS (By Jim Kinsella).

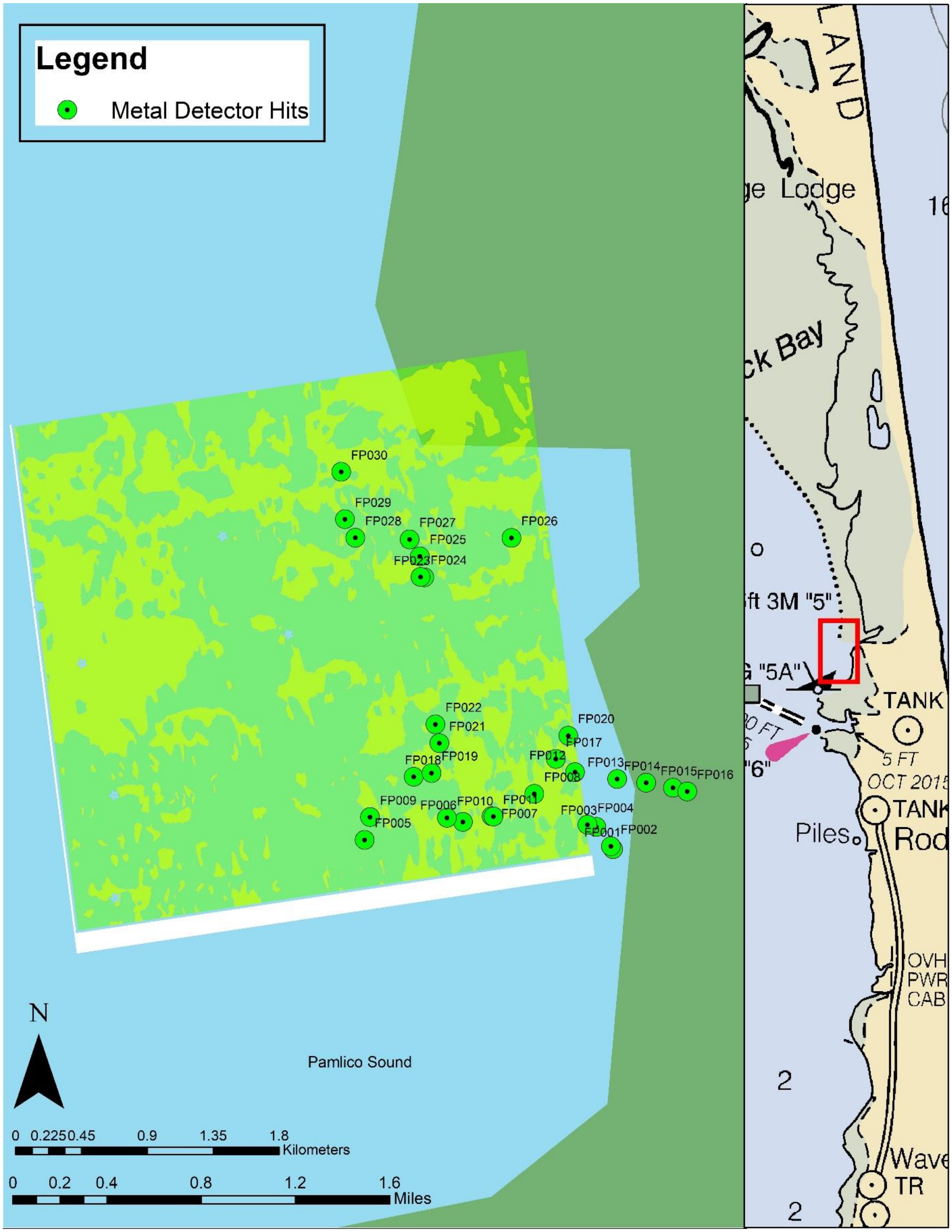

Figure 45. Map of Rodanthe depicting metal detector targets. (By: Jim Kinsella)

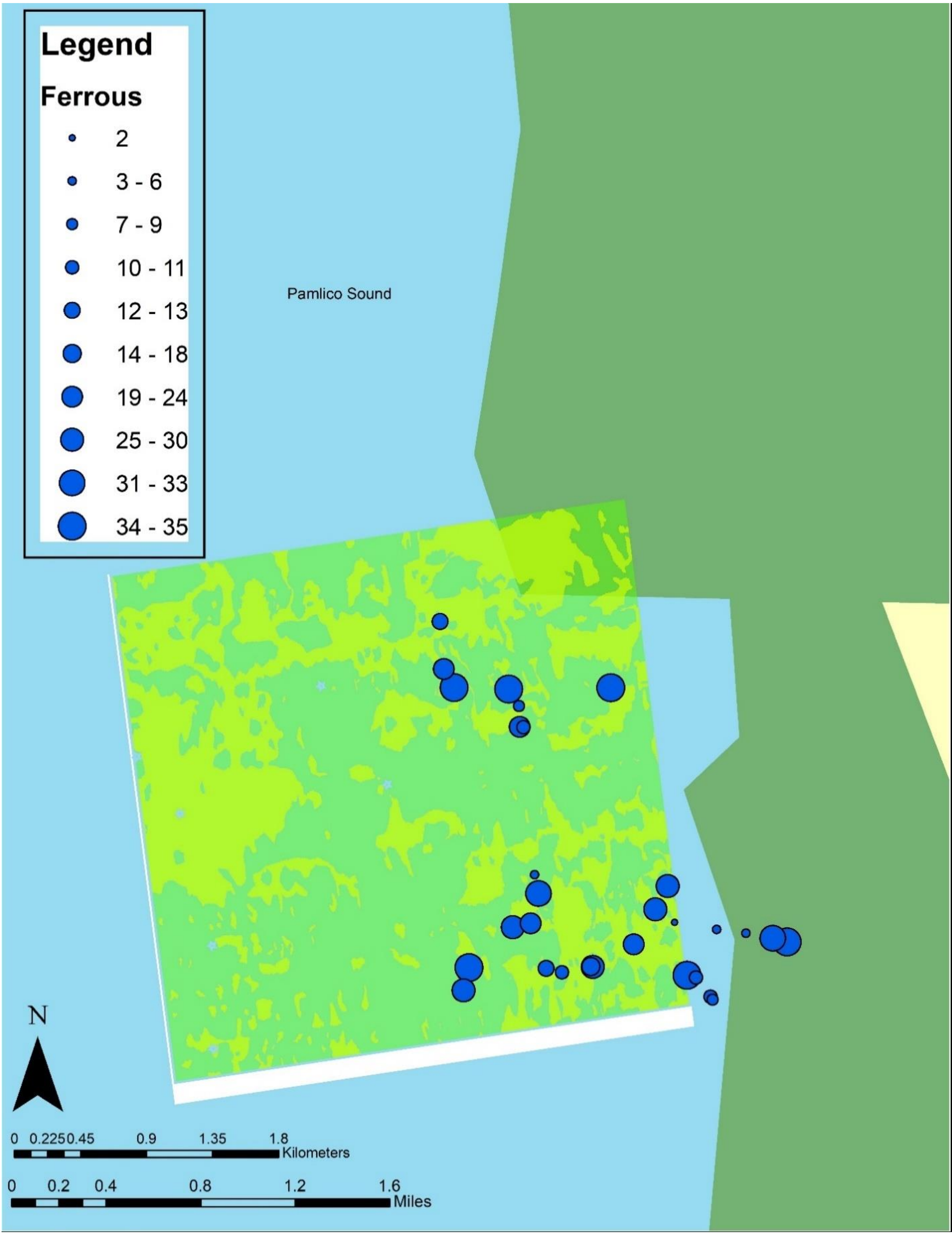

Figure 46. Map of Rodanthe, depicting ferrous content of each anomaly detected with the metal detector. (By: Jim Kinsella).

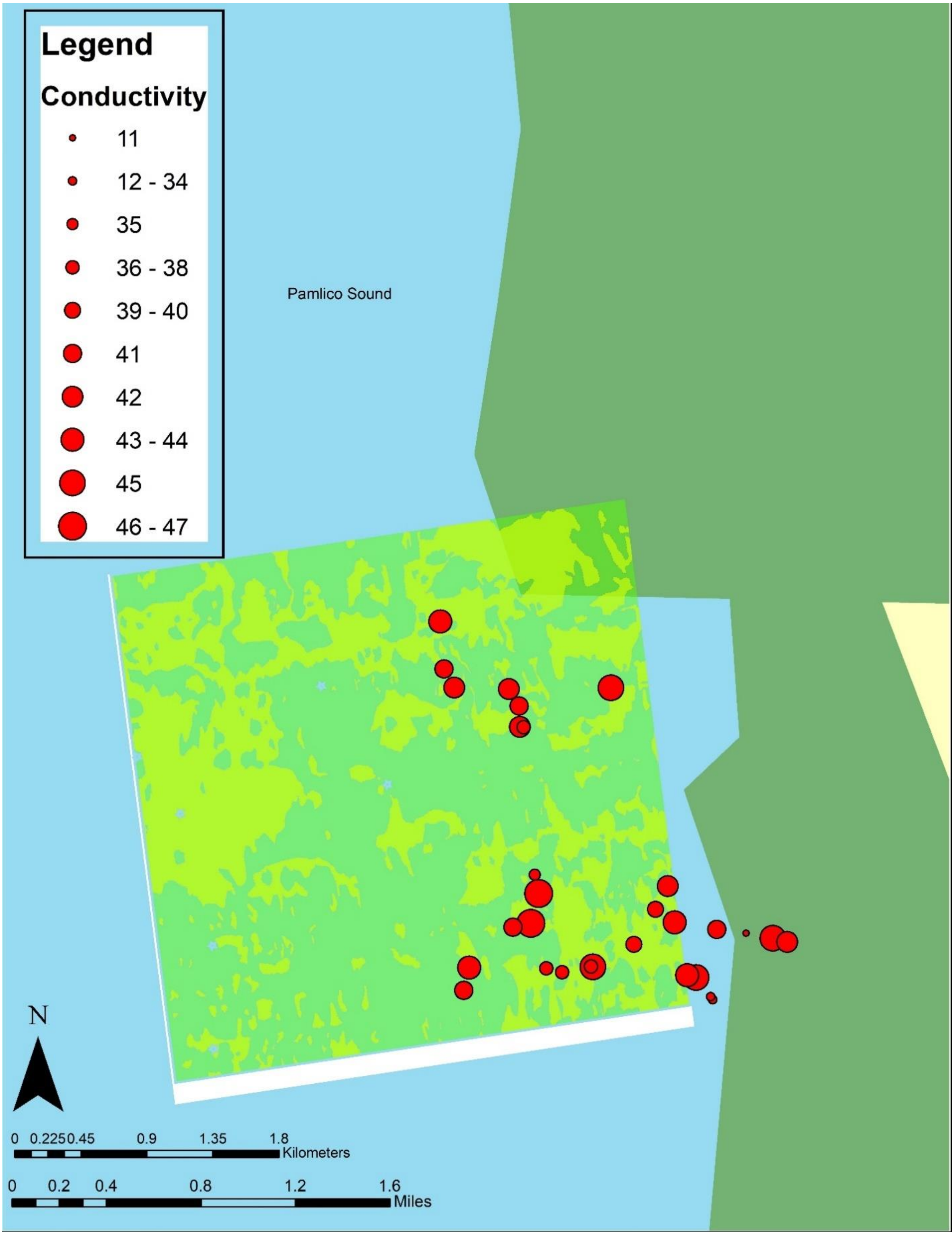

Figure 47. Map of Rodanthe depicting conductivity levels of each anomaly detected with the metal detector. (By: Jim Kinsella).

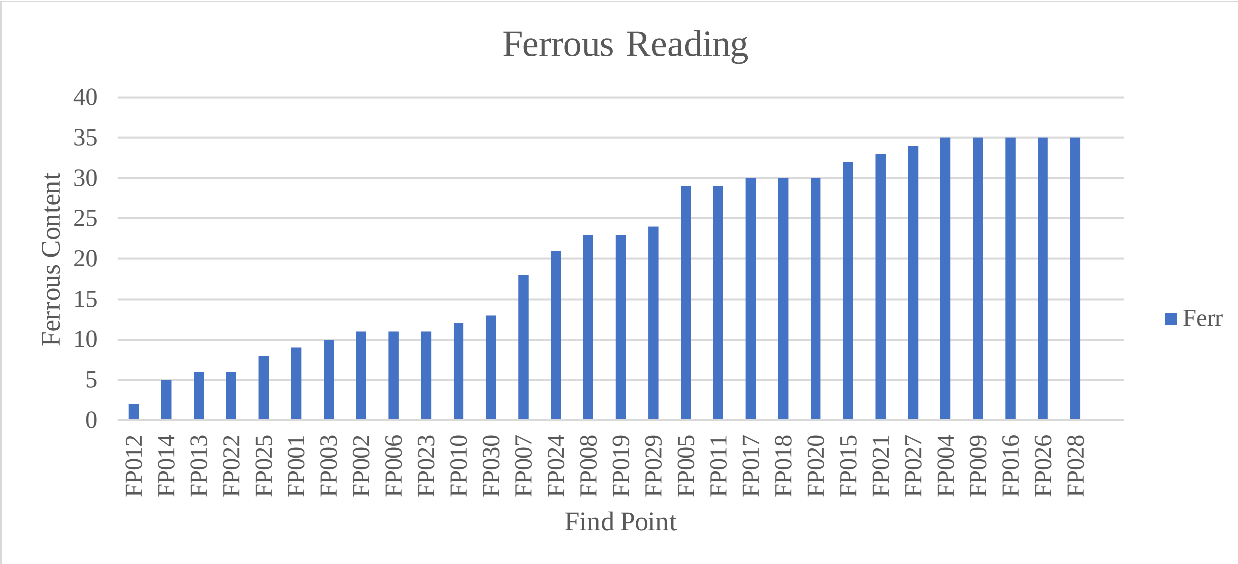

Figure 48. Chart depicting the ferrous content of each magnetic anomaly detected during the Richards and Parker 2017 metal detection survey (By: Jim Kinsella).

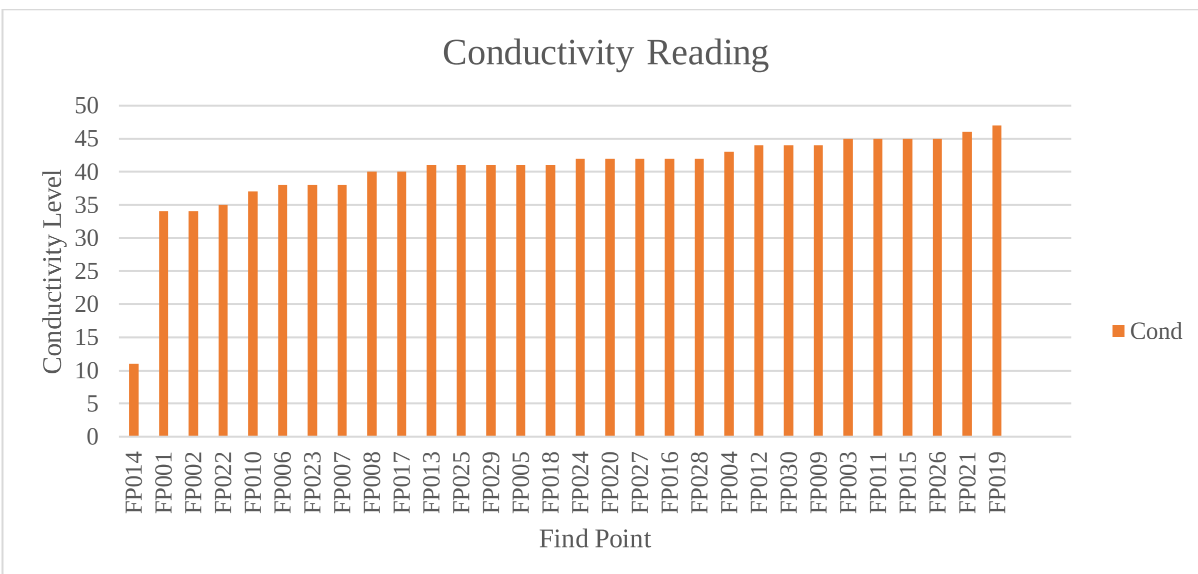

Figure 49. Chart depicting the conductivity level of each magnetic anomaly detected during the Richards and Parker 2017 metal detection survey (By: Jim Kinsella).

Figure 50. Map of Rodanthe depicting potential ordnance based off high ferrous and conductivity levels. Data was filtered according to a SQL statement. (By: Jim Kinsella).

Findpoint	Ferrous	Conductivity	Depth (cm)	Latitude	Longitude
FP004	35	43	0.12	35.59939	-75.47062
FP005	29	41	0.07	35.59934	-75.47146
FP009	35	44	0.1	35.59941	-75.47144
FP011	29	45	0.12	35.59941	-75.470975
FP015	32	45	0.11	35.5995	-75.470298
FP016	35	42	0.16	35.59949	-75.470244
FP018	30	41	0.09	35.59953	-75.471276
FP019	23	47	0.17	35.59954	-75.471209
FP020	30	42	0.07	35.59966	-75.470694
FP021	33	46	0.05	35.59964	-75.47118
FP024	21	42	0.11	35.60015	-75.471254
FP026	35	45	0.11	35.60027	-75.470912
FP027	34	42	0.17	35.60026	-75.471296
FP028	35	42	0.17	35.60027	-75.471501
FP029	24	41	0.17	35.60032	-75.47154

Table 9. Targets from Rodanthe shoreline survey area that possess the potential to be ordnance.

Little Kinnakeet Magnetometer Data

The magnetometer and side-scan sonar surveys were run concurrently. This proved the most optimal use of time and worked well in covering a lot of ground with the allotted time. The baseline magnetic range in North Carolina is around 45,000nT (Breiner 1973:6). During this survey, the baseline gamma range was 48,960 gammas/nanoteslas (nT) which changed over time due to diurnal variation.

Like Parker's (2015) study, certain criteria were set to determine whether an anomaly had the potential to be ordnance representative of the Chicamacomico Races: strength and duration of each magnetic anomaly. An additional criterion was established, that involved each anomaly's location that will be compared against the fields of fire models. It should be noted here, that a portion of this survey extended slightly past the fields of fire range of *Monticello's* 32-pounder; however, it was within the 9-Dahlgren range. While shelling the 3rd Georgia, firing would have been level coming from a 32-pounder smoothbore as they were direct fire weapons with low trajectories (Eldridge 1996:15). Firing upon the flotilla in the sound would require the gun to be elevated so that the effective range could reach the targets. Even if fired at a level range, the smoothbore guns were capable of clearing obstacles (Eldridge 1996:15). Furthermore, the decision was made to survey the area because it seems fully plausible that round shot ordnance from a 32-pounder smoothbore could still be found in this area through a "ricochet" effect. Water is considered a stable surface so there is the potential for artillery fire to have ricocheted enough off the water if the projectile's velocity slowed down enough. Certain types of ordnance have the tendency to lose velocity once it enters the water. Furthermore, smoothbore guns were utilized as direct fire artillery with low trajectories. They could be angled in such a way that the projectile would ricochet off the water in instances where water was calm (Holley 1865:216; Bell 1941:4-5; Eldridge 1996:15).

As discussed in the previous chapter, shot from the following guns were deemed representative of the types of ordnance this survey expected to come across; 9-inch Dahlgren gun and 32-pound smoothbore. Based off the parameters entered into the pBlock analysis it was expected that potential ordnance would have a gamma reading of 30nT or more. It was expected that the duration of each anomaly would vary, presumably even at shallow depths, if the target is likely buried, therefore objects closer to the surface would have a longer duration than deeper objects. Objects at 1-2 meters would likely have a duration of one to two seconds, while those closer to the surface would have a longer duration.

Several false targets were deleted from the data set record during the data post-processing phase. The criteria for a false target were any large spike in a magnetic reading with a short duration (usually under one second). There were several instances of false or "glitchy" data, caused by sharp turns during lane changes, over-corrections in steering, tow cable snag, or the magnetometer bottoming out on the sound floor. A final table of targets to be analyzed further was produced once the false targets were removed (see Appendix D). This final table includes target number, target coordinates, target intensity, and target duration.

Interpreting the magnetometer data required reviewing several factors to determine whether the target was an object lying on the sound floor. Each magnetic anomaly exists as a dipole (a pair of equally charged magnetic poles). The magnetic strength of an anomaly, as well as depth, plays a role in how dipoles are expressed in the data (Breiner 1999:17-18). Having set the lane spacing to 20 meters, it was expected to see dipoles (distinct positive and negative values) associated with each anomaly (Figure 51). There were certain cases where only a monopole, half the dipole, was visible; possible explanations for this occurrence offered by Parker (2015:104), were that the towfish passed over only one side of the magnetic field (positive or negative) of a given target, that may have had a strong gamma reading but was farther from the towfish. Figure 52 shows anomalies and their magnetic intensities. As shown in this figure, intensity ranged from 5.83nT to 1450.79nT. Table 14 in Appendix D shows the duration of each magnetic anomaly detected during the survey.

Figure 51. Example of a dipole from this study's magnetometer data set. This dipole has a reading of roughly 70nT (25 negative and 45 positive).

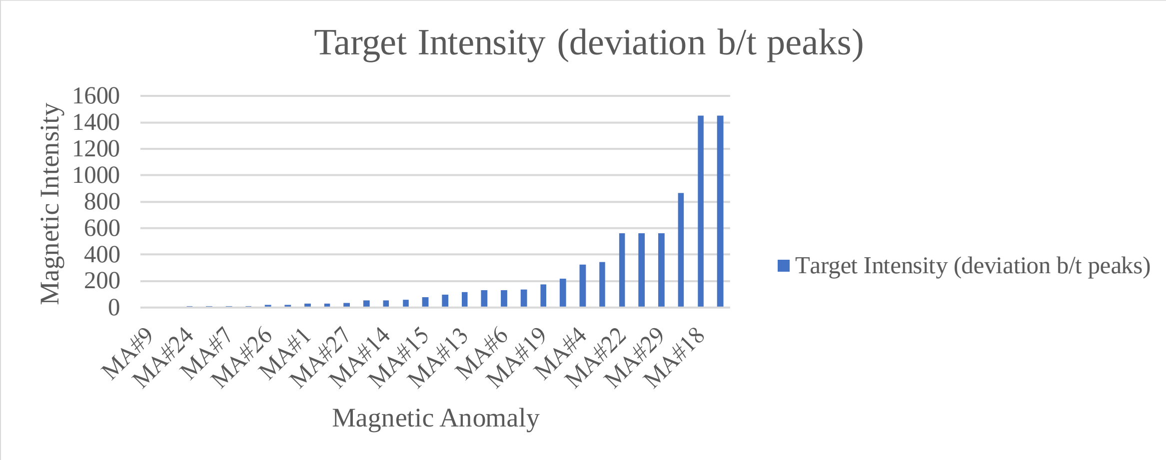

Figure 52. Chart depicting magnetic intensities of each magnetic anomaly. Magnetic intensity was measured by finding the deviation between the high peak vs. the low peak (By: Jim Kinsella).

While compiling the magnetometer data in the GIS model, there were some noticeable gaps and shelving in the data. To overcome this issue, lane spacing was set to 5m and 10m in Hypack for data processing to eliminate the gaps. There was not a significant difference in the 5m vs. 10m; therefore, the decision was made to use the 10m lane spacing to analyze the data. During this analysis in the GIS model, the gamma intervals were set to 1, 5, and 10 nanoteslas. It was determined that setting the parameters to 10nT in the GIS model offered the clearest representation of the data. Figures 53 and 54 below show the difference between the 10m and 20m lane spacing with the gamma range set at an interval of 10nT. In these images, the black line represents the baseline of 48,960nT while the blue line represents values above the baseline and the red represents values under the baseline value.

The next set of figures shows the epicenter and intensity for each magnetic anomaly. The intensity of each anomaly was determined by finding the deviation between each magnetic dipole's positive peak and negative peak. Figure 55 below shows the GIS representation of each magnetic anomaly. In this figure, the epicenter of each magnetic anomaly is represented by a yellow asterisk. Additionally, each anomaly is identified with a label in this figure. These labels were not generated in any strategic fashion by the author, they were simply generated by ArcMap as an Object ID Number assigned by the program. Figure 56 shows the GIS representation of each anomaly's magnetic intensity.

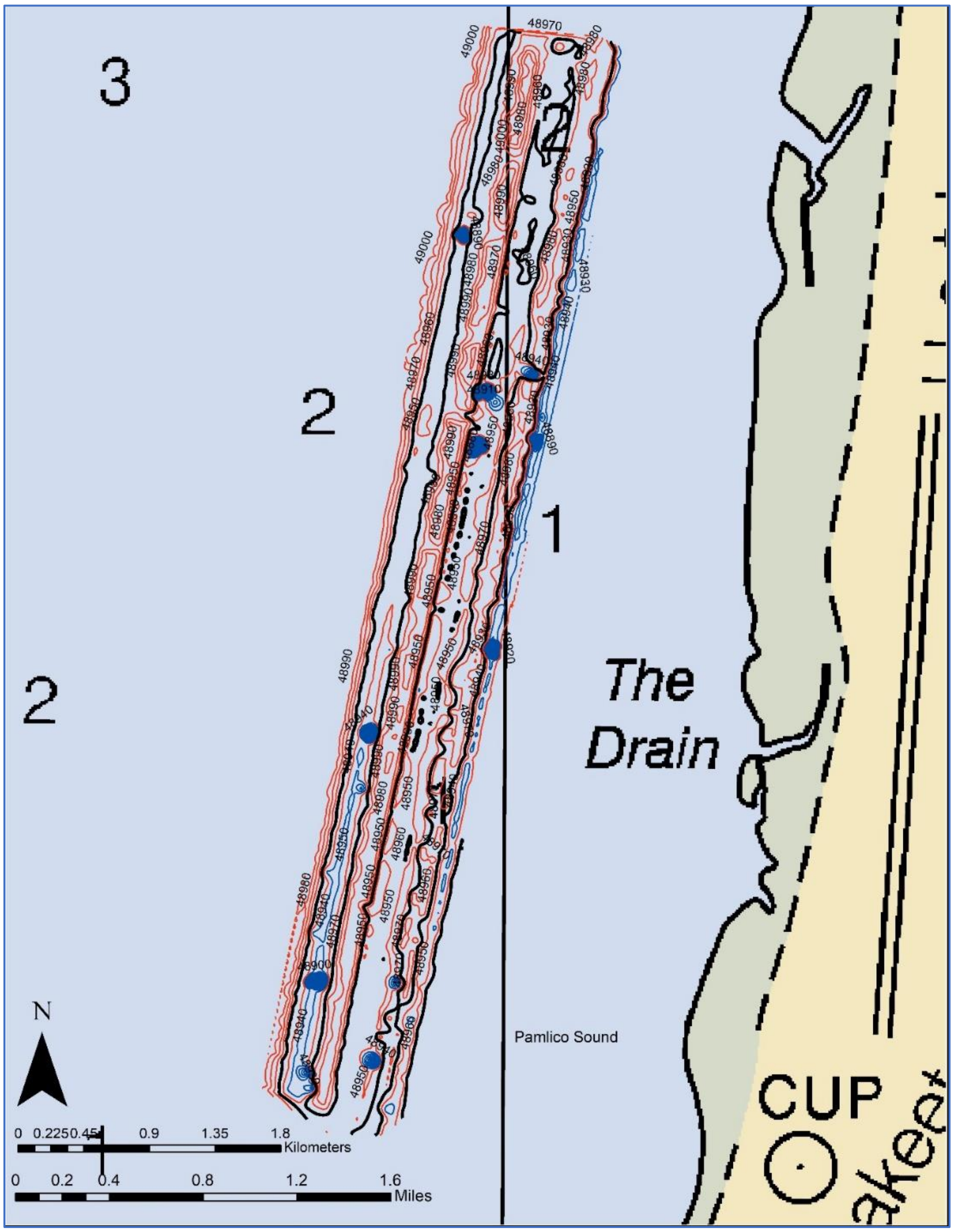

Figure 53. Magnetometer data from Hypack depicted in the GIS model for analysis. Image above shows results with 20m lane spacing with 10nT intervals. The baseline 48960nT is represented by the black line. (By: Jim Kinsella).

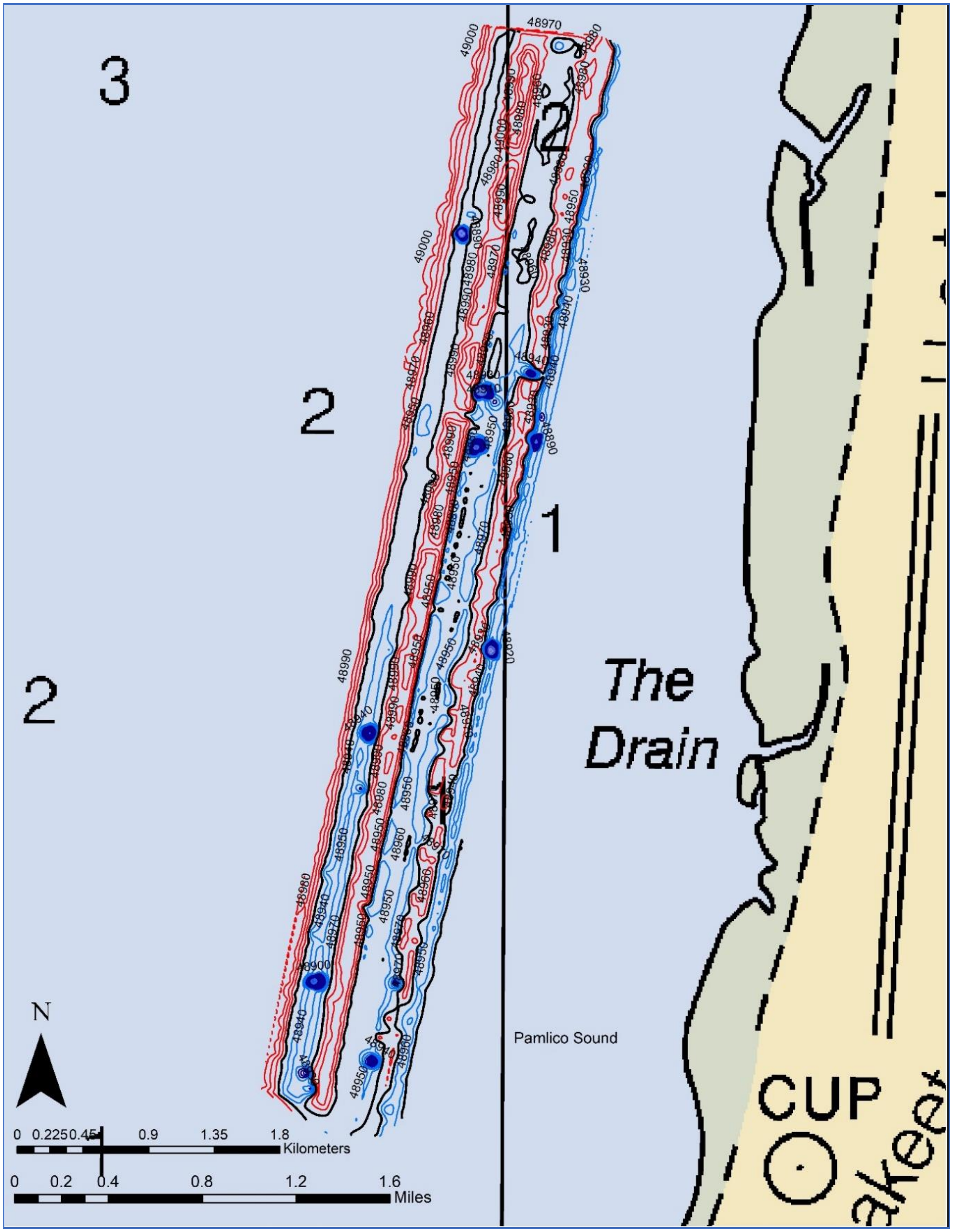

Figure 54. Magnetometer data from Hypack depicted in the GIS model for analysis. Image above shows results with 10m lane spacing with 10nT intervals. The baseline 48960nT is represented by the black line. (By: Jim Kinsella).

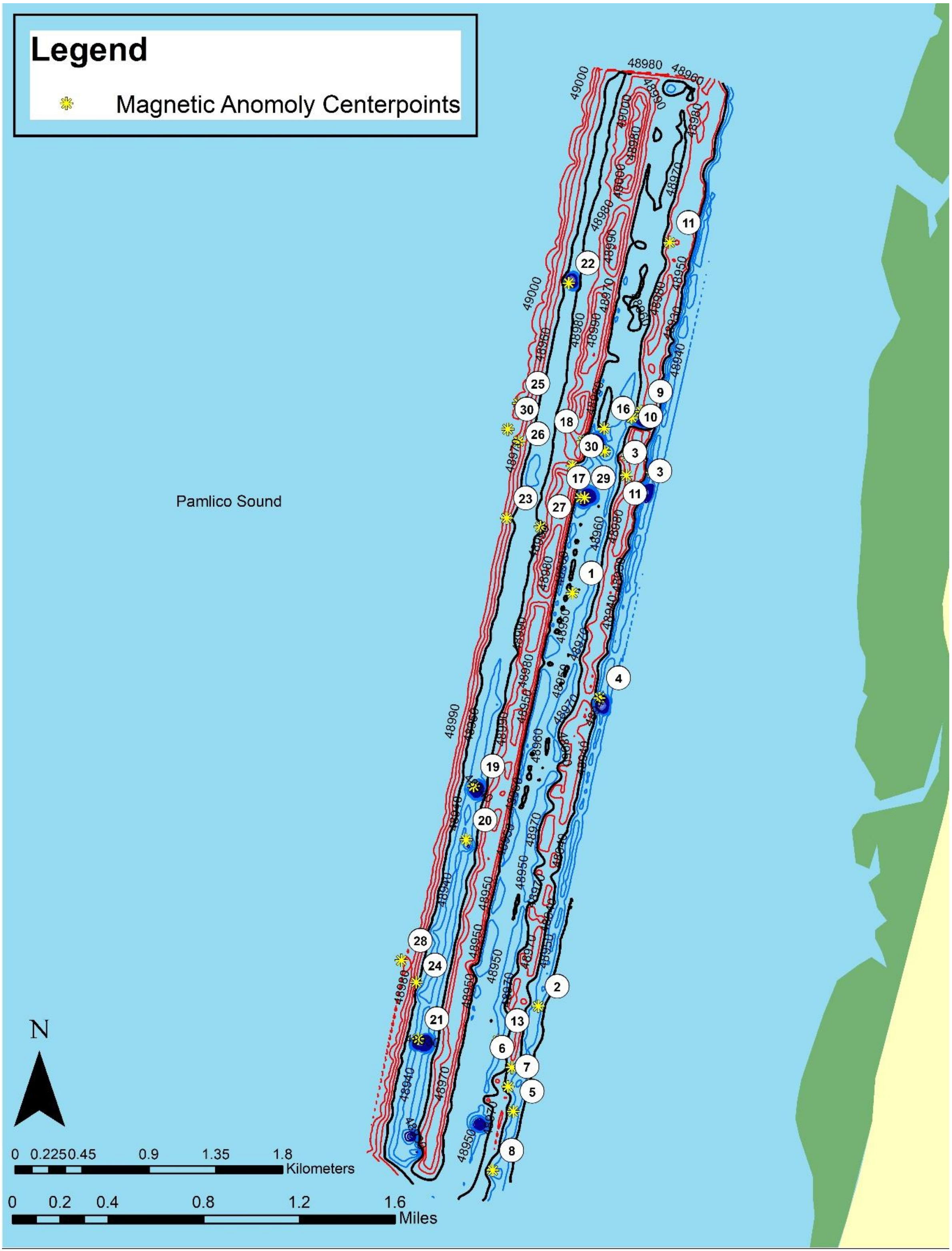

Figure 55. Magnetometer data from Hypack represented in the GIS model. Image includes 10m lane spacing with contour lines spaced at 10nT, as well as the epicenter for each magnetic anomaly. The epicenter of each anomaly is depicted by a yellow asterisk. (By Jim Kinsella)

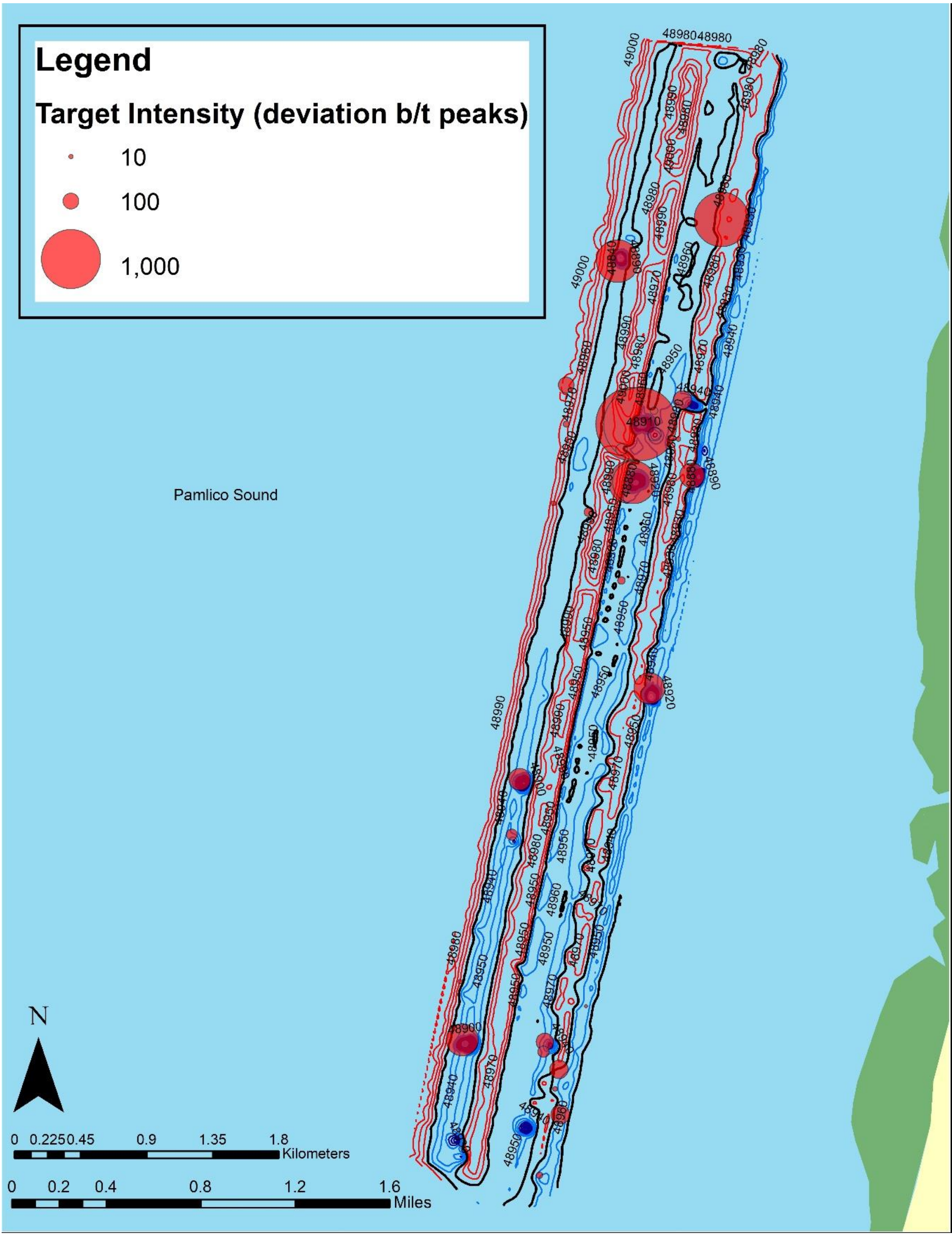

Figure 56. Magnetometer data from Hypack represented in the GIS model. Image includes 10m lane spacing with contour lines spaced at 10nT, as well as the magnetic intensity of each magnetic anomaly. The value is represented in nT. (By: Jim Kinsella).

Little Kinnakeet Side-scan Sonar Data

Like Parker's (2015) study, the purpose the side-scan sonar survey's purpose was not specifically to find targets representative of ordnance as the likelihood of doing so was extremely low. Instead, the purpose was to eliminate the causes of magnetic anomalies such as buoys, crab pots, and pilings. During the Little Kinnakeet remote sensing survey, a total of 175 targets were recorded and cataloged into an Excel spreadsheet. Information captured on each target included the date target was acquired, fish altitude, range to target, target dimensions, target coordinates, and target description. Each target was captured as an image (jpg format) and cataloged. Each target was also categorized into the following categories; SAV, marine debris, limbs, pilings, crab-pots, duck-blind, and unknown. Like the 2015 Parker study, the final phase of data processing involved capturing all lanes as GeoTIFF images to be incorporated into ArcGIS (see raw data in Appendix E).

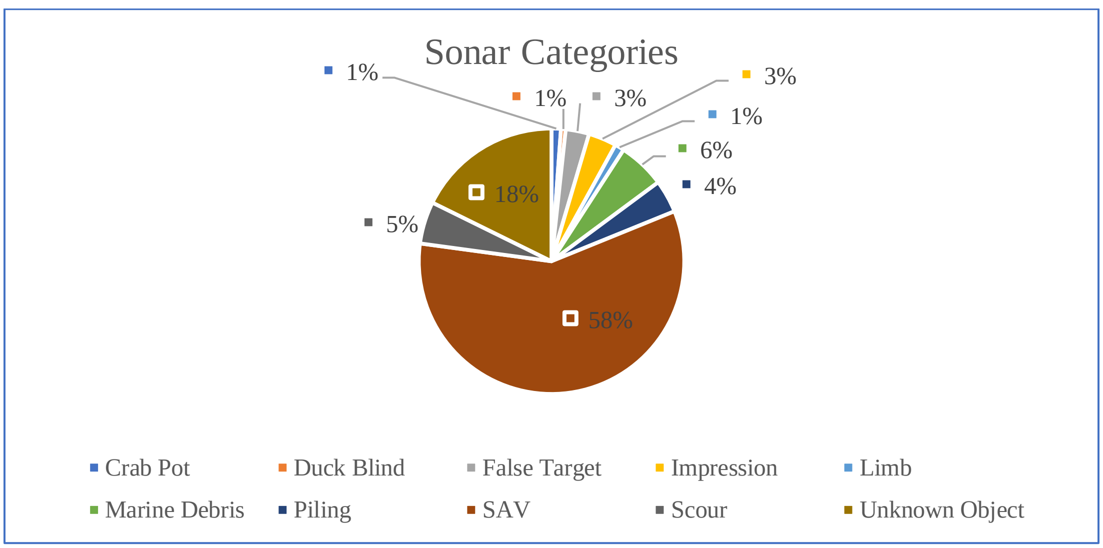

Figure 57. Chart illustrating the percentage of sonar categories (By: Jim Kinsella).

Due to the nature and economy within the Outer Banks, it was expected to see several abandoned crab pots in the sonar images during data processing, this was not the case, however, as evidenced by the data in Appendix E and chart in Figure 57. In fact, there were only two targets that may be crab pots. The remaining targets were an assortment of various kinds of SAV, tree limbs, marine debris, downed pilings, and pilings from a duck blind in the survey area. One thing to note, while processing the side-scan sonar data, an undetermined flaw in the data was detected. This may have occurred during data acquisition. As a result, data could not be processed in SonarWiz as originally planned. Nevertheless, once it was accepted that there were flaws in the data, analysis proceeded through the Hypack and GIS software (Figures 58 and 59).

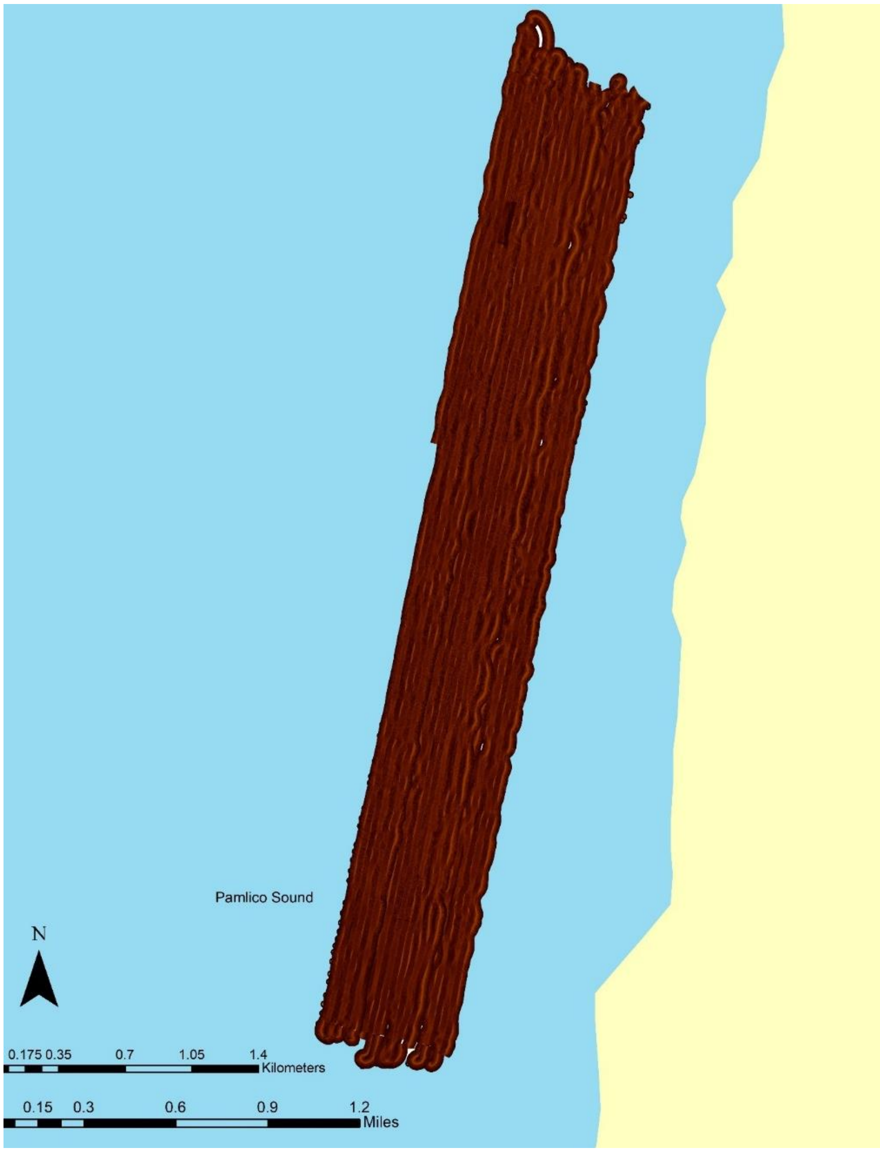

Figure 58. Sonar mosaic from Little Kinnakeet, as imported into the GIS model. (By Jim Kinsella).

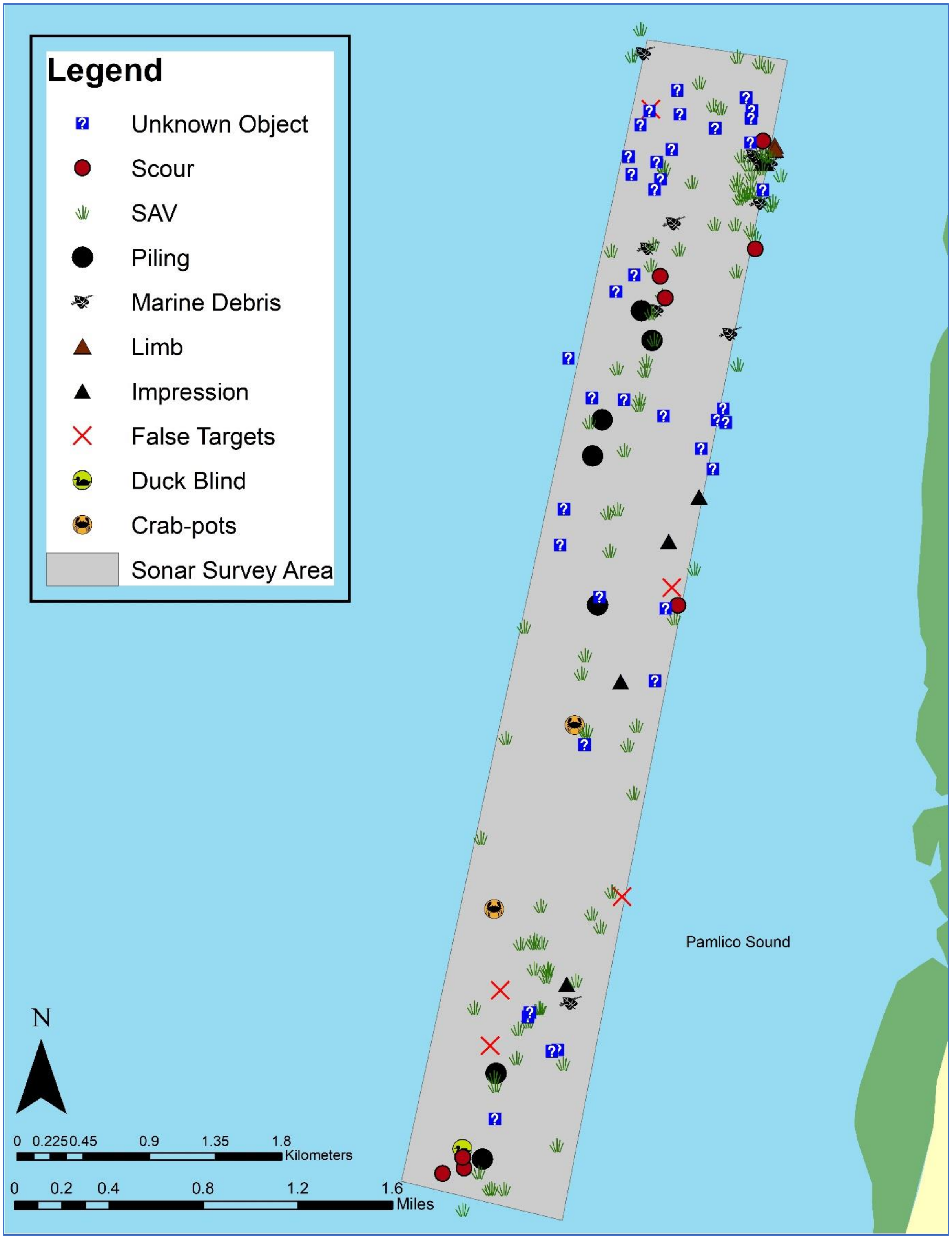

Figure 59. Sonar survey area with sonar targets imported into the GIS model. Note mosaic layer is turned off so that the target symbols could be seen. (By Jim Kinsella).

During the side-scan sonar investigation and processing activities, acoustic targets were used to eliminate magnetometer targets from consideration of potentially being ordnance. This included targets such as crab-pots, pilings, scour marks, and a duck blind. They are presented here as examples of the types of sonar anomalies discovered during the survey. By the conclusion of fieldwork, no sonar targets could be definitively connected to Civil War-era conflict.

TARGETS 107 and 151

Figure 60 includes images of sonar targets noticed during data processing. These were detected near the middle of the survey area. They appear to be abandoned crab-pots, based on the absence of a marker buoy. There is a small possibility that they could be cinder blocks due to the lack of magnetic signature noticed during data processing. Both objects are similar in size and shape. They are approximately 0.8 meters long and 0.8 meters wide.

Figure 60. Images of TARGETS 107 and 151 (left to right) which appear to be discarded crab-pots lying on the sound floor in Pamlico Sound.

TARGET 135

TARGET 135 appears to be a cluster of pilings associated with a duck blind (Figure 61). The duck blind was observed prior to the survey, so it was expected to show up during post-processing. This was the only duck blind in the survey area and it was located right in the middle of the survey area.

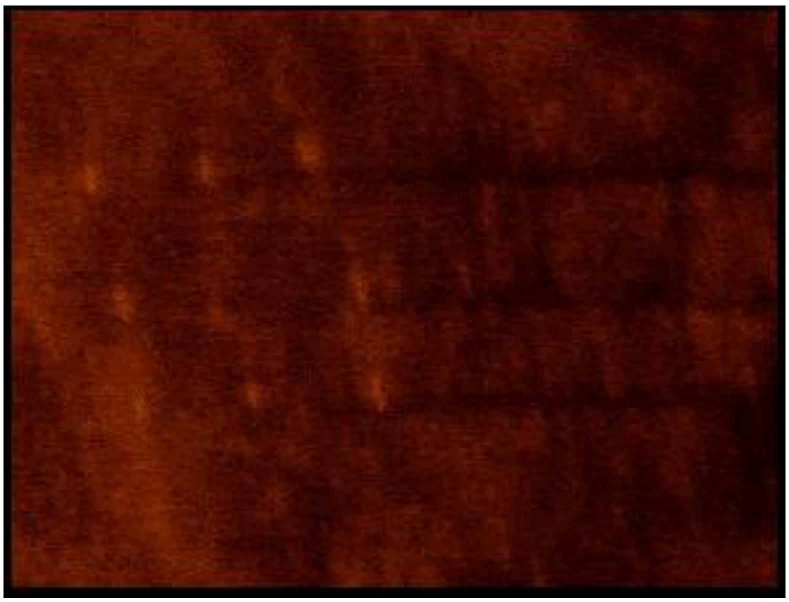

Figure 61. Image of TARGET 135, revealed to be a duck blind in the middle of the survey area.

TARGET 134

TARGET 134 shows scour marks on the sound floor (Figure 51). There were several instances of this observed during the survey and post-processing. The cause for such marks on the sound floor could be the result of an anchor being dragged through sediment. A more likely answer is that this scour mark was left behind by a boat motor. Due to the shallow depths, it is very likely that boat motors contact the sound floor producing these types of scour marks.

Figure 62. Image of TARGET 134, example of scour markings on the sound floor.

Combined Magnetometer and Side-scan Sonar Data

The final steps in processing the remote sensing data involved combining the two data sets and integrating them into the GIS model (Figure 63). The purpose was to see if there was any correlation or relationship between sonar targets and magnetic anomalies. From the onset, it was discussed that it was unlikely to see any ordnance in the sonar images but combining both sets of data was important as it gave a clearer picture of what is on or underneath the sound floor. Like previous studies conducted at ECU, combining both data sets in the GIS model helped define primary battle areas for further analysis (Parker 2015).

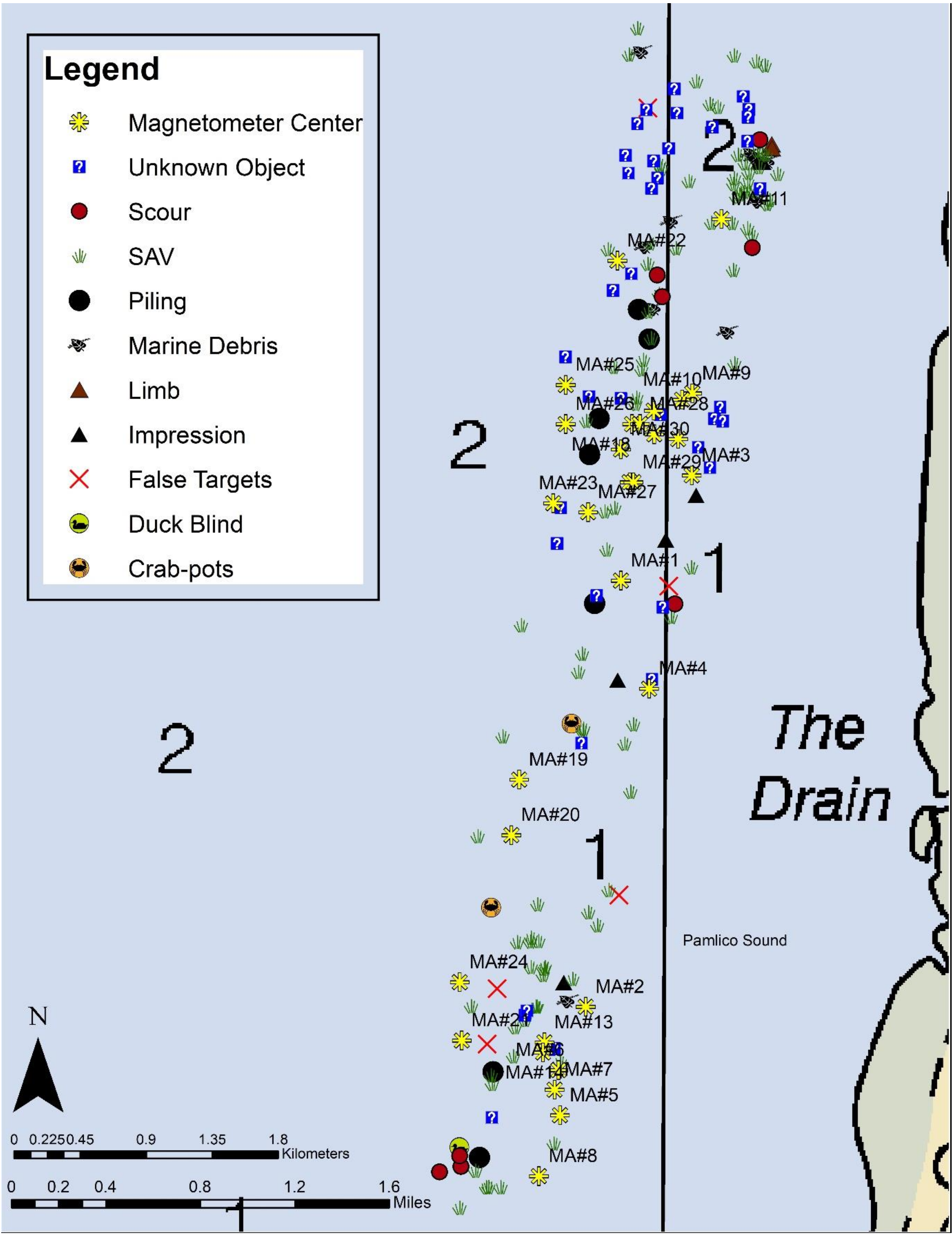

Figure 63. All Sonar Targets overlaid on top of the magnetometer data in the GIS model. Note: due to potential layback issues as well as the sonar device being pole mounted while magnetometer was towed, targets may not line up. This is further exacerbated by wind, current, and sharp turns. (By: Jim Kinsella).

Combining both data sets assisted in eliminating several targets from consideration; any magnetometer image with an associated sonar target was not considered ordnance. Such was the case with crab pots identified earlier in the side-scan sonar images, as well as the duck blind. A total of 30 magnetic anomalies were further examined (see Figure 63 above). Among these 30 magnetic anomalies, 16 were eliminated from further consideration of being ordnance as they appeared to share a relationship with a side-scan sonar image (see Table 10 below).

Target	**Related Sonar Image**
MA#1	Piling Unknown Object
MA#2	Marine Debris
MA#3	Unknown Object
MA#4	Unknown Object
MA#9	Unknown Object
MA#10	Unknown Object
MA#12	Unknown Object
MA#13	Unknown Object
MA#14	Unknown Object
MA#15	Unknown Object
MA#16	Unknown Object
MA#21	Piling
MA#22	Unknown Object
MA#24	Crab Pot
MA#23	Unknown Object
MA#27	Unknown Object

Table 10. This table depicts the magnetic targets that were eliminated from consideration based off a correlation with a side-scan sonar image.

These remaining targets fell within the range of 12.44nT to 1450.79nT. Based on the pBlock parameters mentioned earlier, for a target to be considered ordnance, it needed to have a gamma reading of 30nT or higher. With that said, 3 targets from the remaining 14 were eliminated. This left only 11 targets that fit within the pBlock parameters of being ordnance and that do not have a correlation with a sonar image. Additionally, there were two sets of targets that appeared to have been duplicates of one another. This brought the list of targets to 9 considered as being potential ordnance (see Table 11 below). Figure 64 below shows the magnetic intensities of the remaining targets under consideration.

Target	Magnetic Intensity	Within pBlock	Comments
MA#5	136.3	Yes	n/a
MA#6	129.39	Yes	n/a
MA#7	12.44	No	Eliminate
MA#8	21.07	No	Eliminate
MA#11	864.96	Yes	n/a
MA#17	563.8	Yes	Likely same target as MA#29
MA#18	1450.79	Yes	Likely same target as MA#28
MA#19	173.81	Yes	n/a
MA#20	52.04	Yes	n/a
MA#25	98.48	Yes	n/a
MA#26	20.51	No	Eliminate
MA#28	1450.79	Yes	Likely same target as MA#18
MA#29	563.8	Yes	Likely same target as MA#17
MA#30	58.69	Yes	n/a

Table 11. The table above depicts the 14-remaining magnetic targets that does not have a correlation with a sonar image. The table also shows if they fall within the pBlock parameters.

Being unable to physically investigate the remaining magnetic anomalies, coupled with the assumption that potential ordnance was buried within the sediment; magnetic anomalies detected by the magnetometer fitting within pBlock parameters were said to be potential ordnance. Parker (2015) made a similar assumption in his study. As a result, the nine magnetic anomalies fitting pBlock parameters and not correlated with a sonar image were revealed in a final map, along with the shoreline targets, for further analysis (Figure 65).

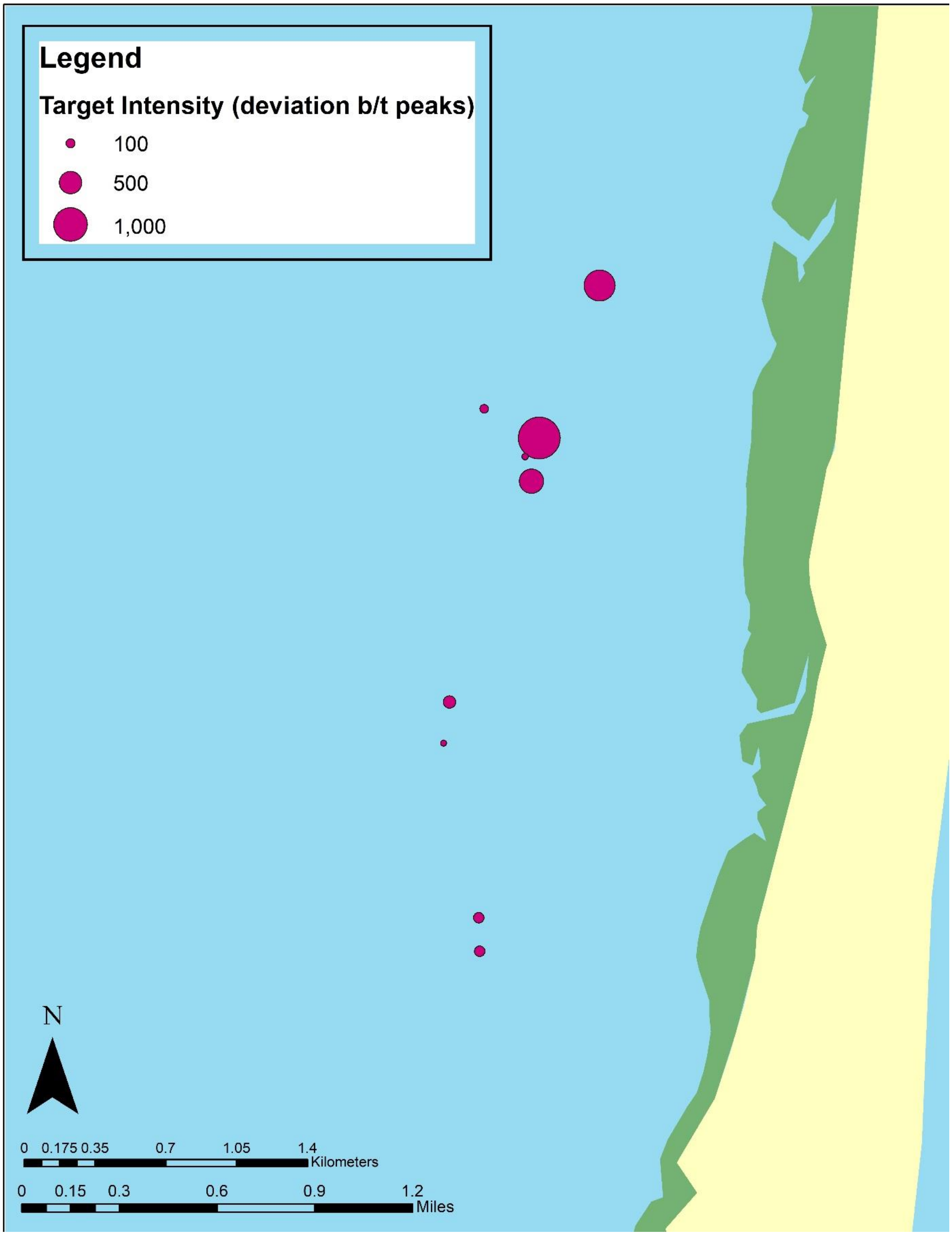

Figure 64. This figure represents the magnetic intensity of the remaining targets under consideration for ordnance. (By Jim Kinsella).

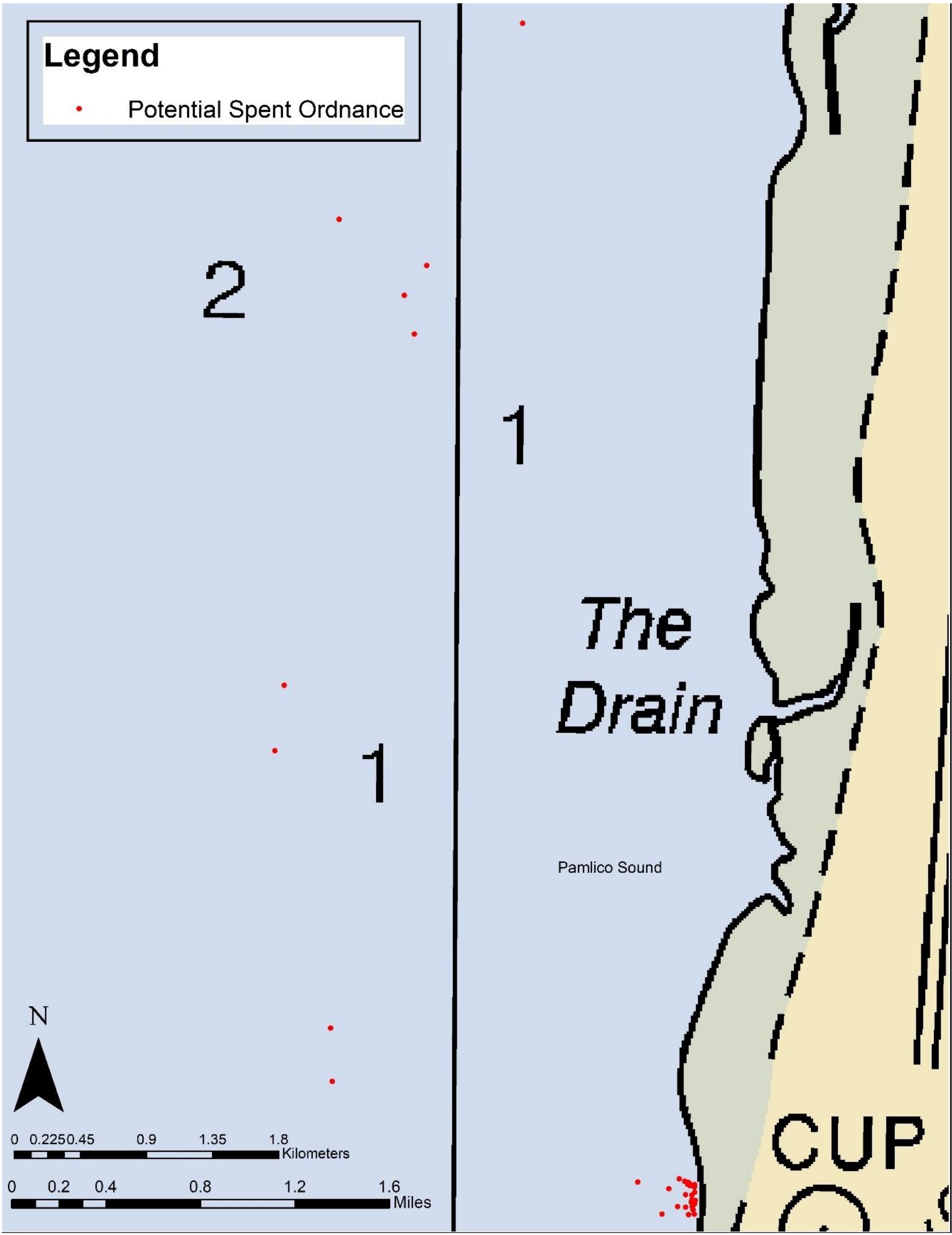

Figure 65. This figure represents the location of targets in off Little Kinnakeet that are potentially associated with the Chicamacomico Races. (By: Jim Kinsella).

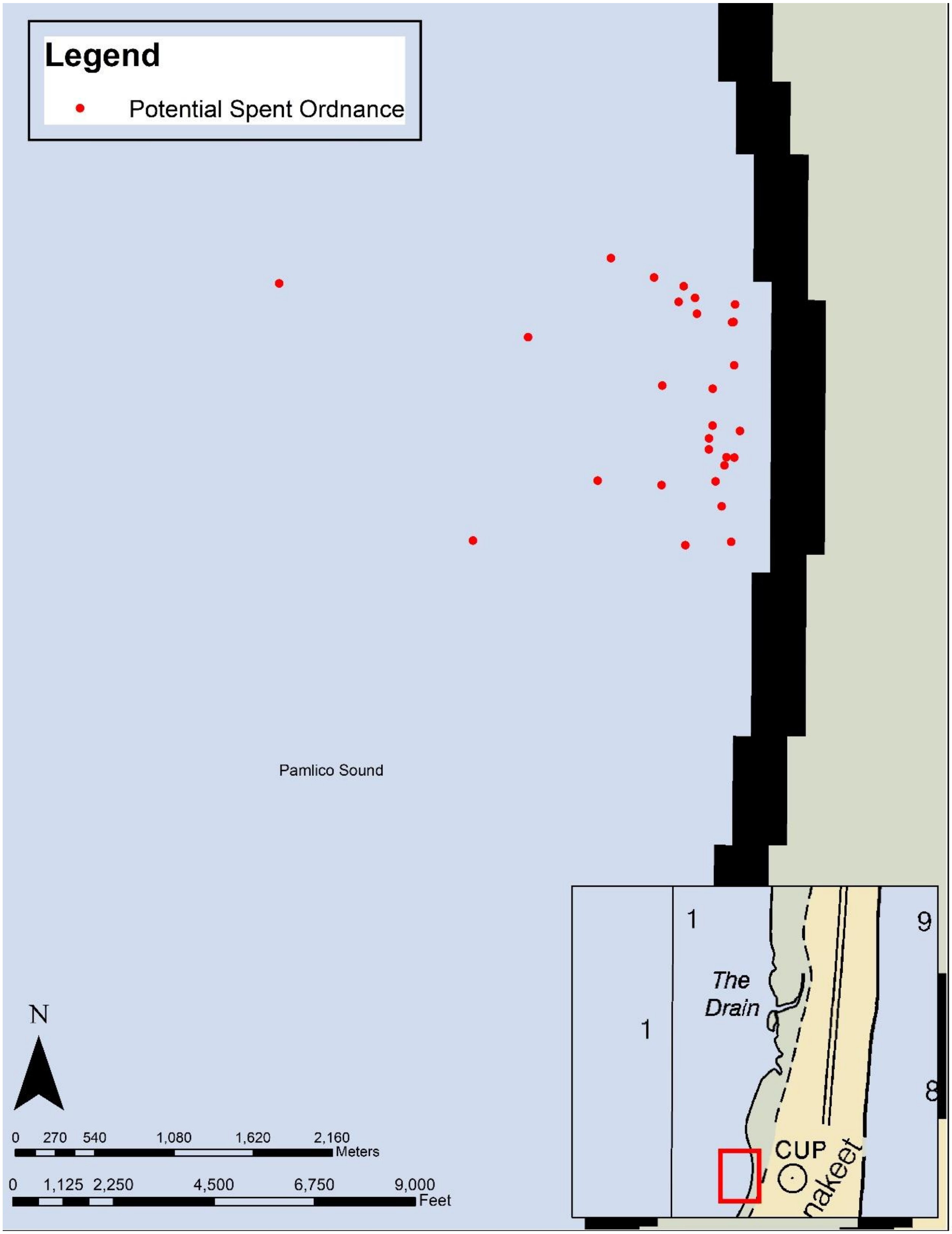

Figure 66. This figure represents a close-up of targets along the Little Kinnakeet shoreline that are potentially associated with the Chicamacomico Races. (By: Jim Kinsella).

Rodanthe Remote Sensing Data Set

Richards and Parker's project also involved a remote sensing survey in the waters off Rodanthe in addition to the shoreline survey (Figure 67). Their survey covered approximately 4.195717 square kilometers (1.61997539 square miles) to assess any cultural resources and/or marine debris in the area (Richards and Parker 2017:1,76). The methodologies to carry out the survey were like this study; however, their research was not focused on searching for ordnance, therefore the data sets were reanalyzed when integrated into this study.

Richards and Parker identified 75 sonar targets at Rodanthe, many of which fell into the following categories; pilings, crab pots, and channel marker buoys. Seventeen of the 75 targets had correlating magnetic signatures; therefore, they were removed from being considered ordnance. The Richards and Parker survey area was littered with both active and abandoned crab pots, which was much different than the Little Kinnakeet project, however, the water is much deeper than at Little Kinnakeet, so that factor alone could account for the abundance of crab pots. Additionally, the Black Mar Gut area is much more active in terms of recreation due to its proximity to public roads and residential areas, and therefore easier to access for noncommercial crabbing activities.

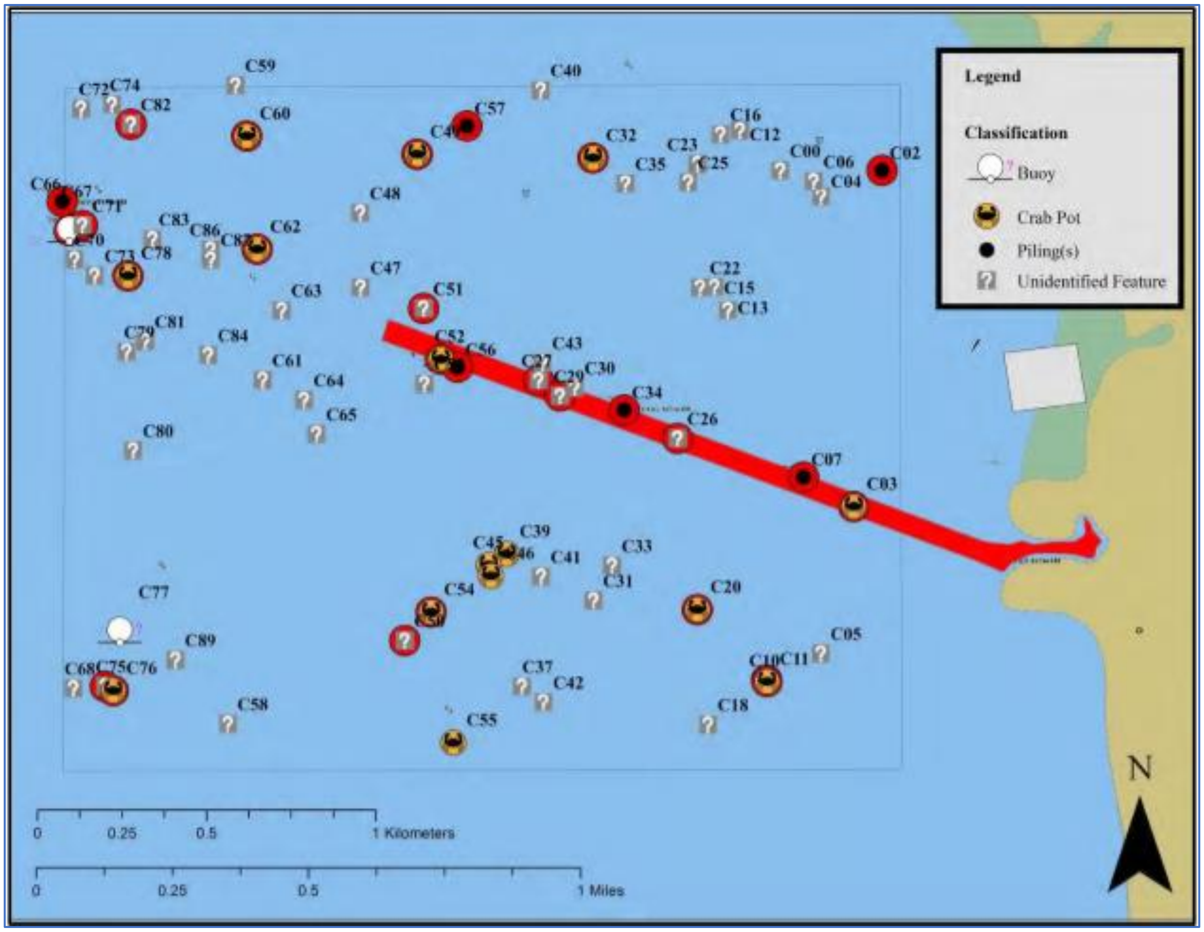

Figure 67. GIS Image of sonar targets collected during the Richards and Parker 2017 survey. Red line indicates the Rodanthe Ferry channel, while the gray box indicates the shoreline inspection area (Image provided courtesy of N. Richards).

Richards and Parker also utilized a magnetometer concurrently with the sonar device. The baseline gamma range fluctuated between 48,125.6 nT – 49,320.2 nT during their survey (Richards and Parker 2017:80). Figure 68 below shows results of their magnetometer survey. Note the target cluster along the dredged ferry channel. This is possibly indicative of discarded debris from boat or ferry traffic. Several magnetic anomalies correlated with crab pots and buoys identified during the survey as well as during post-processing. There were several unidentified targets from the magnetometer data set, for which they offer the following explanation: the unidentified targets could possibly be discarded submerged crab pots or ferrous line weights (Richards and Parker 2017:76-80). The same explanation could be made for the Little Kinnakeet survey. However, with the research goals in mind, this study looked at the Richards and Parker data differently. Since this area falls within the proximity of the initial assault on Camp Live Oak, one would expect that these small unidentified magnetic targets could potentially be ordnance from Confederate forces in the sound but as will be discussed later, this is not the case. Figures 69 and 70 below show sonar data overlaid atop the magnetometer data.

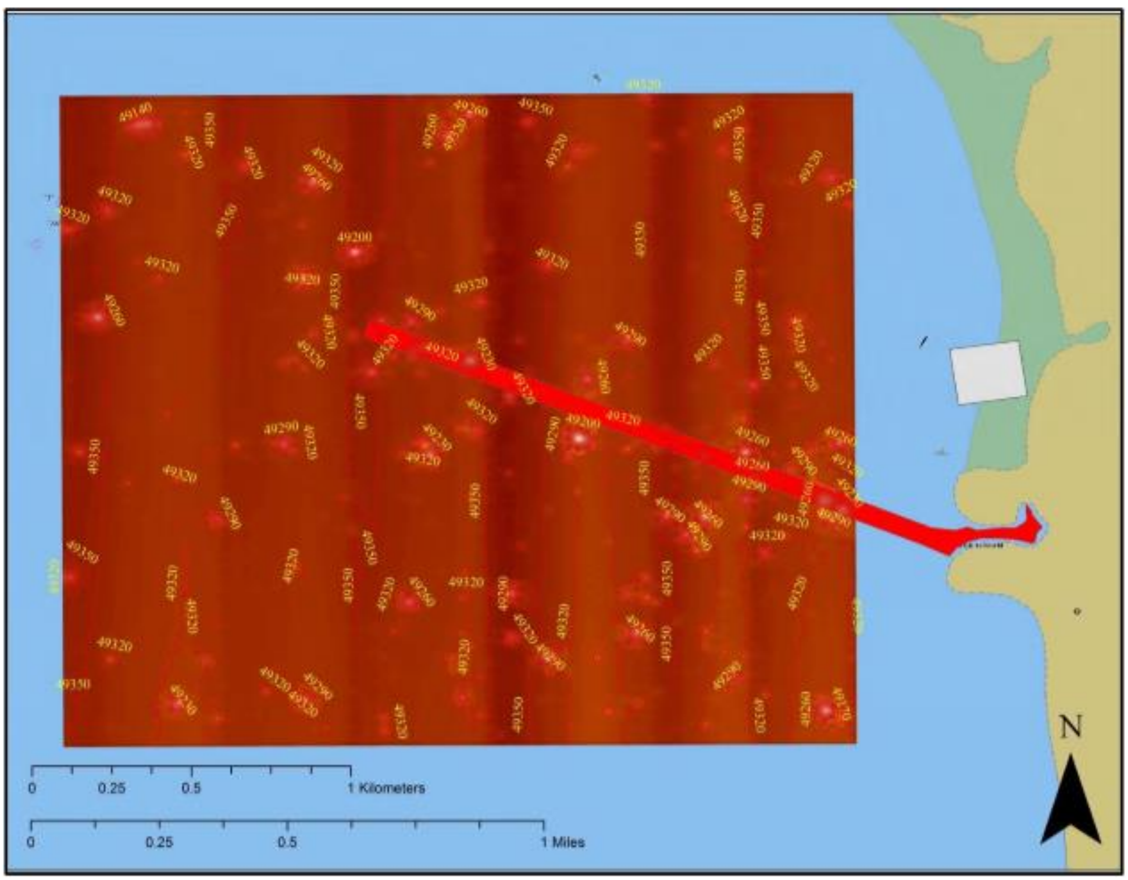

Figure 68. GIS Image of magnetometer targets with gamma readings for each target collected during the Richards and Parker 2017 survey. Red line indicates the Rodanthe Ferry channel, while the gray box indicates the shoreline inspection area (Image provided courtesy of N. Richards).

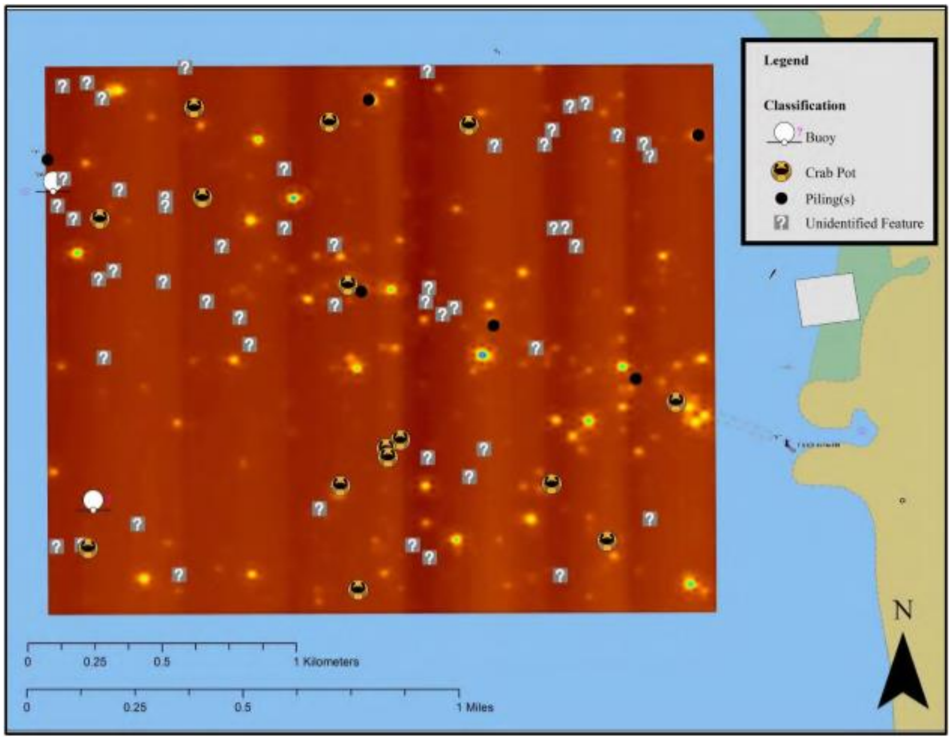

Figure 69. GIS Image of magnetometer data overlaid with side-scan sonar targets collected during the Richards and Parker 2017 survey. Gray box indicates shoreline inspection area (Image provided courtesy of N. Richards).

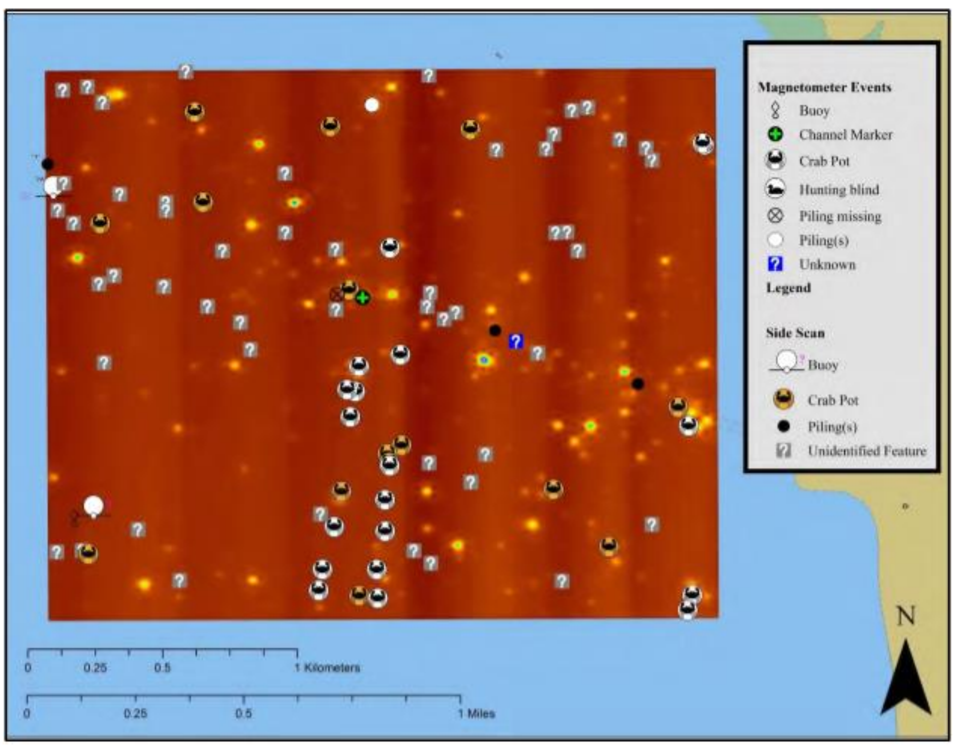

Figure 70. GIS Image of magnetometer overlaid with side-scan sonar targets collected during the Richards and Parker 2017 survey. Special note, this image contains surface events. (Image provided courtesy of N. Richards).

During data processing and analysis, it was discovered that targets detected during remote sensing in the off-shore survey area at Rodanthe were likely not representative of battle. These conclusions were drawn after further review of primary source material, historic bathymetry, and fields of fire models. There were a few targets that fell within 1000 yards of *Cotton Plant*; however, they appeared to have sonar targets associated with them. Therefore, only targets from the Rodanthe shoreline survey were considered for final battle analysis. These have been put into a final GIS map for further analysis (Figure 71). It could be argued that the approximated position of *Cotton Plant* could be incorrect. However, in this case, the ship's position was estimated based on its proximity from one of the best-known landmarks in the area at the time – the windmill, and historical testimony that *Cotton Plant* was anchored 1 mile directly west of Camp Live Oak (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; *New York Times* 1861b; Yellowley 1861; Turner 1864; Merrill 1869:488; Oxford 2013:130). As discussed, the GIS tool is an interpretation of the historical data from the author, therefore a degree of inaccuracy in the actual location could exist.

Conclusion

This chapter focused on data sets produced from historical research as well as archaeological fieldwork (shoreline and remote sensing surveys) outlined in the previous chapter. The battle narrative informed the GIS model creation which outlined the proposed battle areas that assisted in planning archaeological fieldwork. Which in turn assisted in setting up the desired survey areas for the visual shoreline inspection and remote sensing operations. Although there are several other areas that would be ideal candidates for survey as they fall within the fields of fire models, the decision was made to focus on the areas identified above. This decision allowed the project to stay within budget and time constraints. Each archaeological data set was examined individually before they were combined and examined together. The end results of this combined analysis were put into a final GIS map that showcased all targets from each survey that are considered potential ordnance representative of battle. This final map will be utilized in the next chapter to examine the Chicamacomico Races within the KOCOA framework.

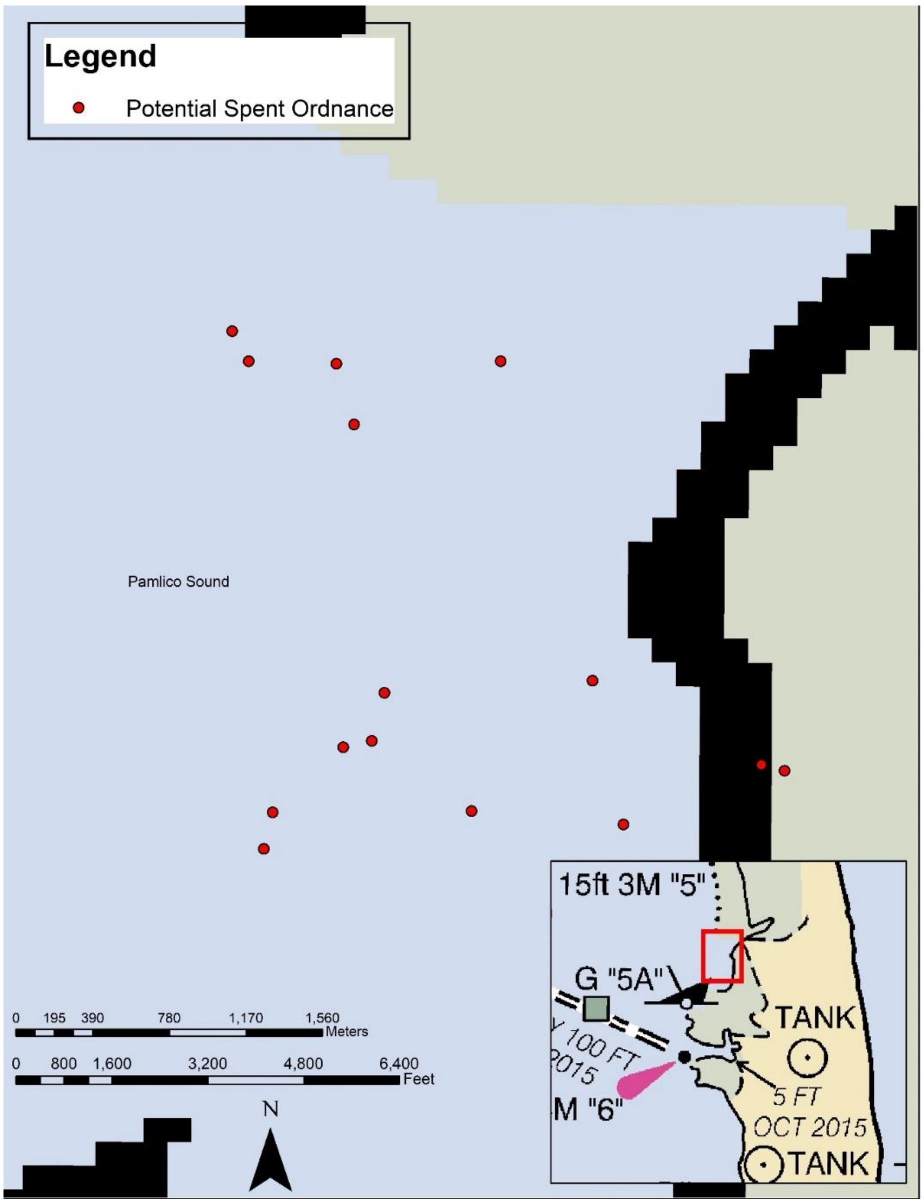

Figure 71. This figure represents a close-up of targets along the Rodanthe shoreline that are potentially associated with the Chicamacomico Races. (By: Jim Kinsella).

Chapter 6
Ordnance or Crab Pot? An Analysis of the Sound Floor in Pamlico Sound

Introduction

This chapter will focus on bringing together all the collated data sets to analyze them according to the theoretical framework presented in Chapter 2. This includes data gathered through historical research as well as the archaeological surveys. Data sets from the archaeological surveys were filtered according to the ordnance characteristics and cross-referential data sets to identify characteristics with the potential to be in situ ordnance. The final data set produced was imported into the GIS model to create a composite battle map where the targets (potential ordnance) were compared against the fields of fire models. The objective was to determine if the targets met the criteria of potential ordnance from the Chicamacomico Races. The chapter will follow precedent set in Parker's (2015) study, where he outlined a naval battlefield's boundaries by utilizing archaeological data. Determining battlefield boundaries was done before commencing the theoretical analysis of the battle. For the theoretical analysis, the battlefield pattern framework is influenced by the historical and archaeological records while the KOCOA analysis is influenced by the historical record as well as the GIS model.

Chicamacomico Races Battle Boundaries

The battle areas were determined using the two final survey data maps from the Little Kinnakeet and Rodanthe surveys (Figures 65 and 71). Most targets (potentially representative of battle) at Little Kinnakeet were situated closer to the shore adjacent to the access area near the Little Kinnakeet lifesaving station. These anomalies fit the ferrous and conductivity characteristics (detected by the metal detector) that could represent potential ordnance. Furthermore, it was reported that the 3rd Georgia withdrew into the sound in this area as they were harassed by shells from *Monticello* (Braine 1861:291-292).

An additional small group of magnetic anomalies is located further (.38 miles) out into the sound. Collectively, these targets are consistent with the historical record reporting Civil War activity in this area. If these magnetic anomalies are ordnance, then they are indicative of Union artillery fire from *Monticello* as these anomalies lie within the fields of fire represented in the GIS model (Figures 72 & 73). This would have been the point *Monticello* fired upon their enemy from ¾ of a mile off Bald Beach in the Atlantic. The Georgians were attempting to withdraw back towards Chicamacomico when they came under fire after being spotted. As a result, the Georgians scurried northward on the beach as well as towards the Confederate flotilla in the sound while seeking cover from Union artillery fire (Braine 1861:291-292; Johnson 1861:58; *New York Times* 1861d).

For the Rodanthe area, there was a small cluster of anomalies (potentially representing the battle) situated along the shoreline adjacent to Black Mar Gut. This zone is adjacent to Oxford's purported location of Camp Live Oak (Oxford 2013:195-196). The historical record indicates this area was heavily bombarded by both *Cotton Plant* and *Empire* (2, 12-pdr howitzer, 1,32-pdr smoothbore) during the initial assault on Camp Live Oak. Furthermore, there are reports the windmill, tents, and hospital caught fire (*New York Times* 1861c; Yellowley 1861). The hospital appeared to be a major target of the Confederate attack (*Logansport Journal* 1861). This area also falls within the fields of fire of Cotton Plant (Figure 74)

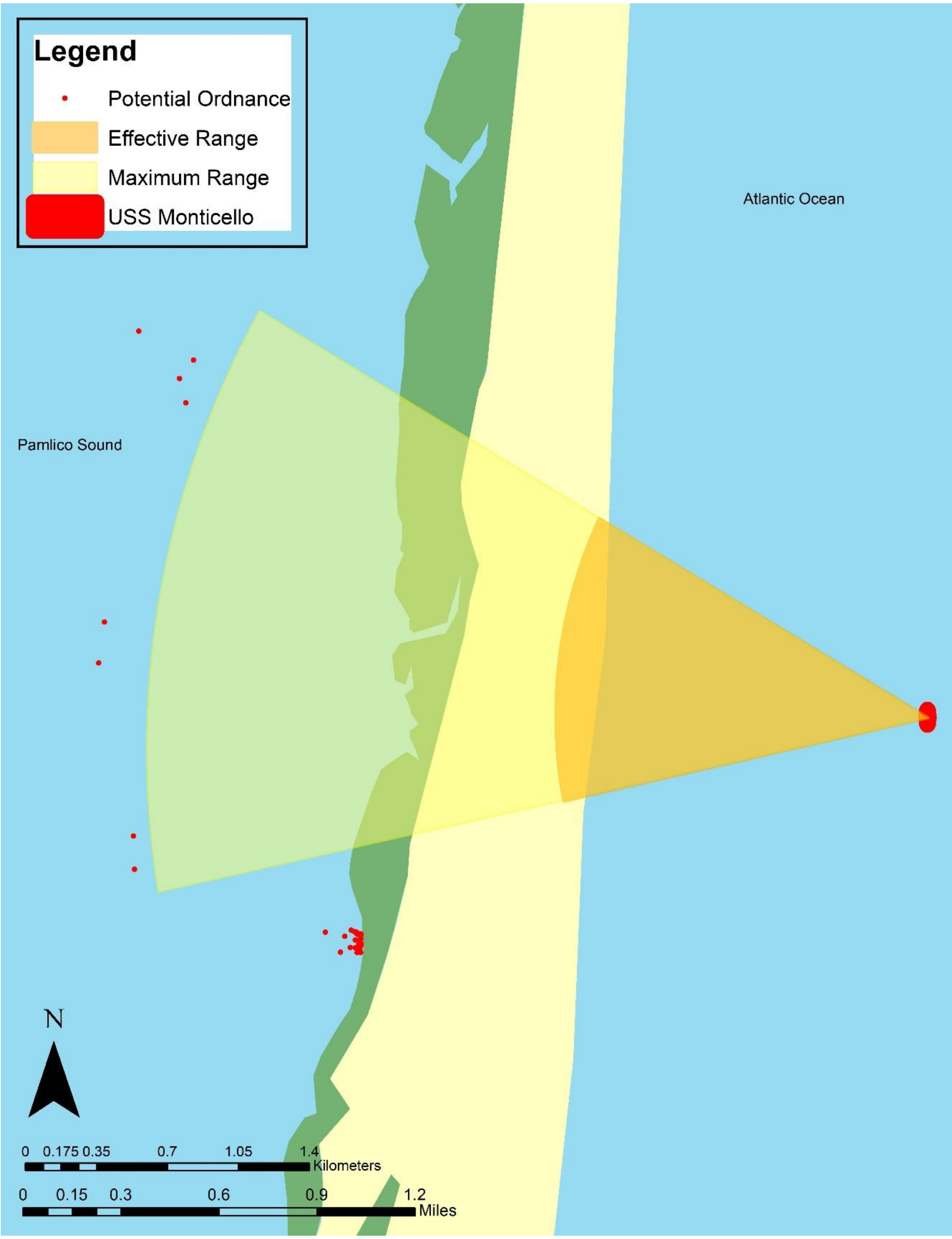

Figure 72. This figure represents the fields of fire range for Monticello's 32-pound smoothbore as well as anomalies that fit the criteria of potential ordnance. (By: Jim Kinsella).

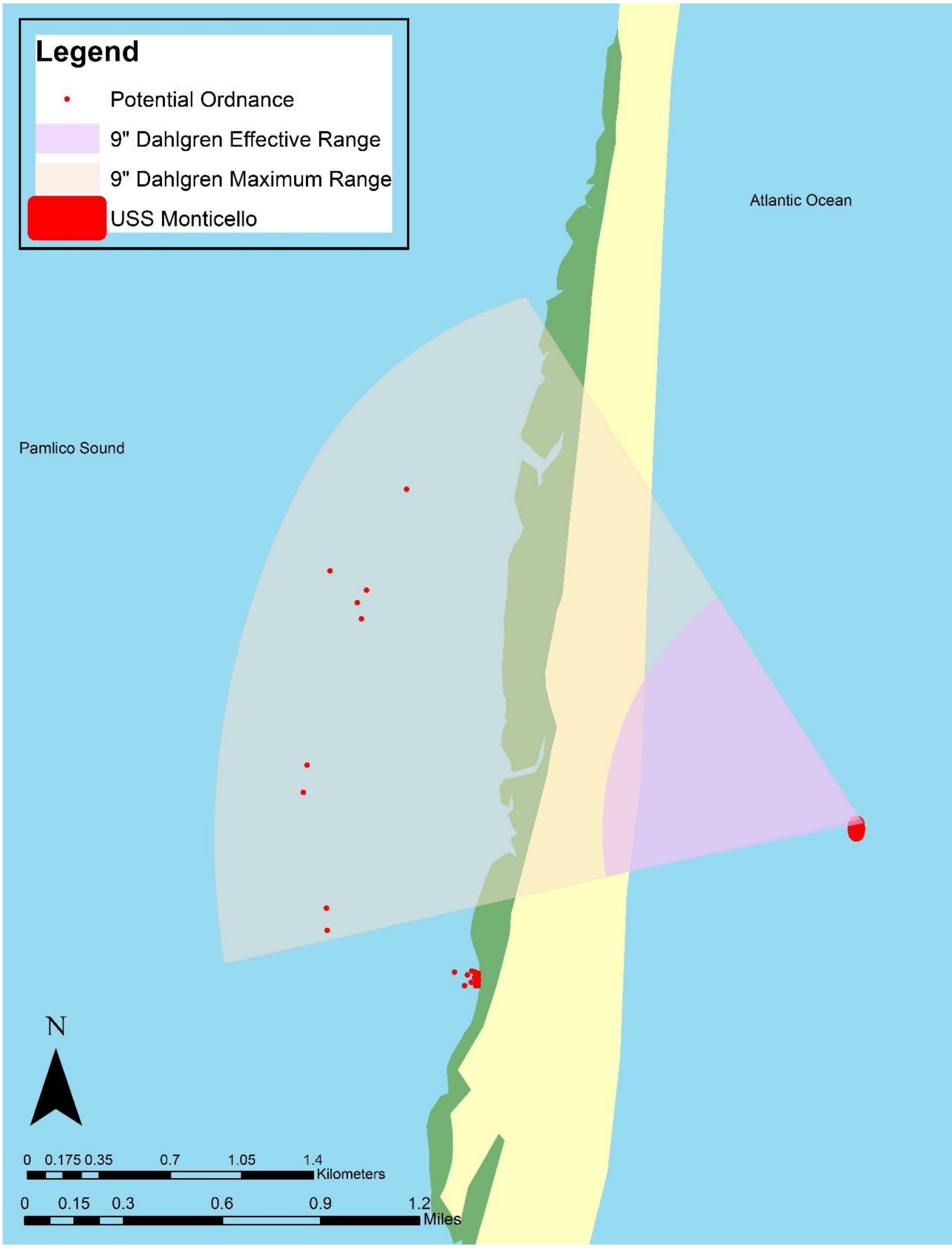

Figure 73. This figure represents the fields of fire range for Monticello's 9-inch Dahlgren gun as well as anomalies that fit the criteria of potential ordnance. (By: Jim Kinsella)

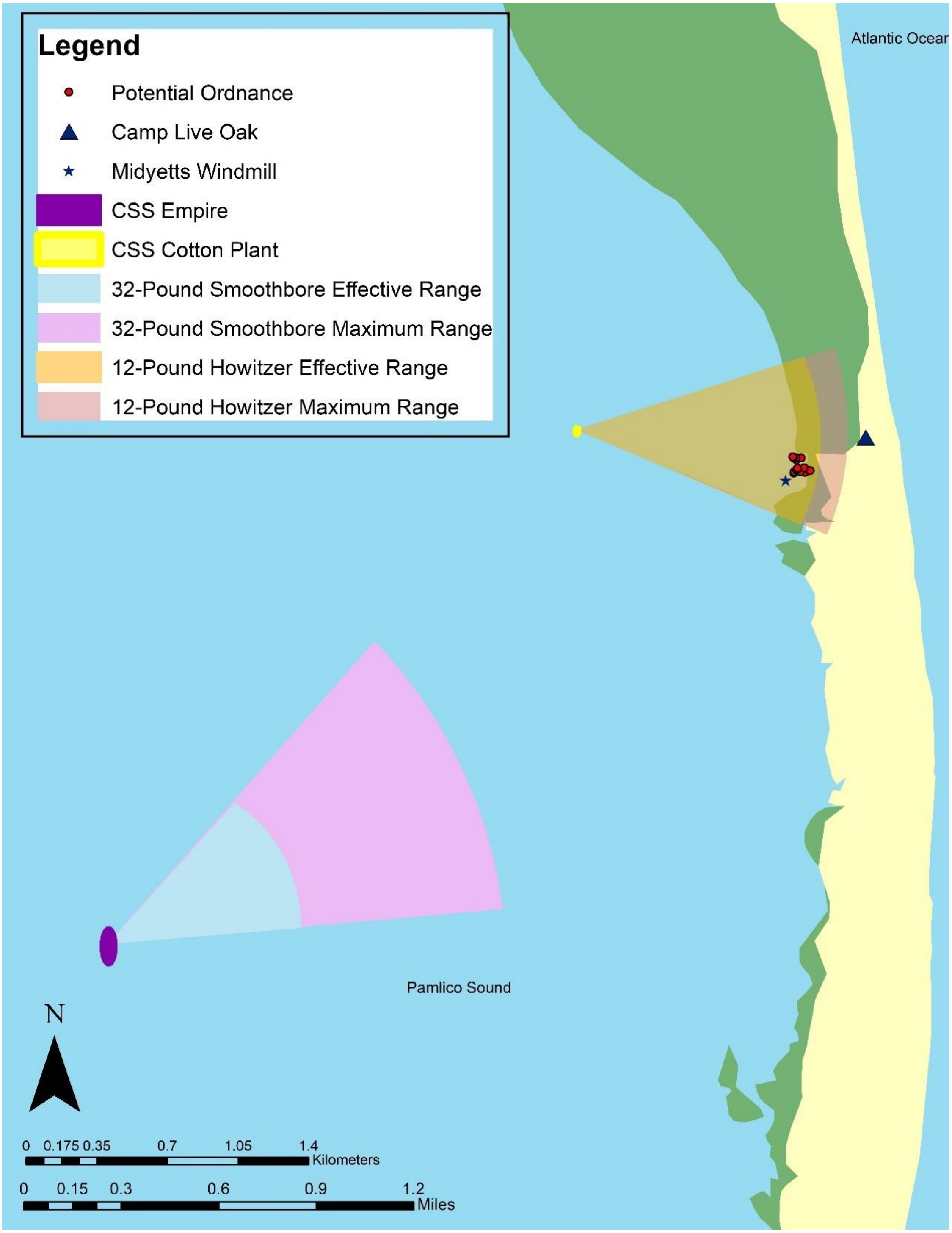

Figure 74. This figure represents the fields of fire range for Cotton Plant's 12-pound Howitzers and Empire's 32-pounder smoothbore as well as anomalies that fit the criteria of potential ordnance. (By: Jim Kinsella)

Like the Little Kinnakeet area, several anomalies were detected further out into the sound in the Rodanthe area. Eighteen of the 75 targets detected by the Richards and Parker (2017) magnetometer survey did not have a corresponding sonar image. They were thought to be abandoned crab pots but for purposes of this study, the data was reassessed to see if they fit within the ordnance range (Figures 54 & 68). While the magnetic signatures shared similar characteristics (relative strength and duration) to those found at Kinnakeet, the likelihood of these being representative of battle is low. This is because the area surveyed by Richards and Parker did not fit within the fields of fire model (discussed further below). There are also no reports of Union forces, in this case 20th Indiana, firing any artillery toward *Cotton Plant* or *Empire*. Therefore, it is unlikely that these anomalies represent Union artillery fire.

Like Parker's (2015) study, defining the battle boundary areas produced two areas to focus the analysis on; the core area and the study area. As stated by Parker (2015:122), the study area concerns those places that related to or contributed to the battle, while the core area is where actual battle activity occurred (see also Lowe 2000:23-24). While both events examined here were somewhat one-sided day to day, (conditions of 4 October favored Confederate forces, while conditions of 5 October favored Union forces), the battle areas can still be analyzed using KOCOA. The study area includes both the sound and ocean off Hatteras Island where Union forces established Camp Live Oak adjacent to Midyett's Windmill near Black Mar Gut (Yellowley 1861; Oxford 2013:195-196). This also includes the point where *Fanny* was captured on 1 October 1861. Unfortunately, the *Fanny* capture zone was not surveyed archaeologically by this survey or Richards and Parker (2017). Therefore, there is no archaeological evidence to verify this event, so the Rodanthe analysis will focus solely on activity within areas surveyed archaeologically. The study area also includes the area where Confederate forces attempted a landing during the initial stages of the Races and where the 3rd Georgia observed *Monticello* stalking their position from the Atlantic. The core areas include the area where *Cotton Plant* and *Empire* engaged the 20th Indiana at Camp Live Oak on 4 October 1861, then from the northern end of the island moving southward to Kinnakeet (more specifically Bald Beach) where *Monticello* opened fire on the 3rd Georgia (Figure 75). Following the definition of the core areas involved with the Chicamacomico Races, the Battlefield Pattern analysis and KOCOA analysis were completed.

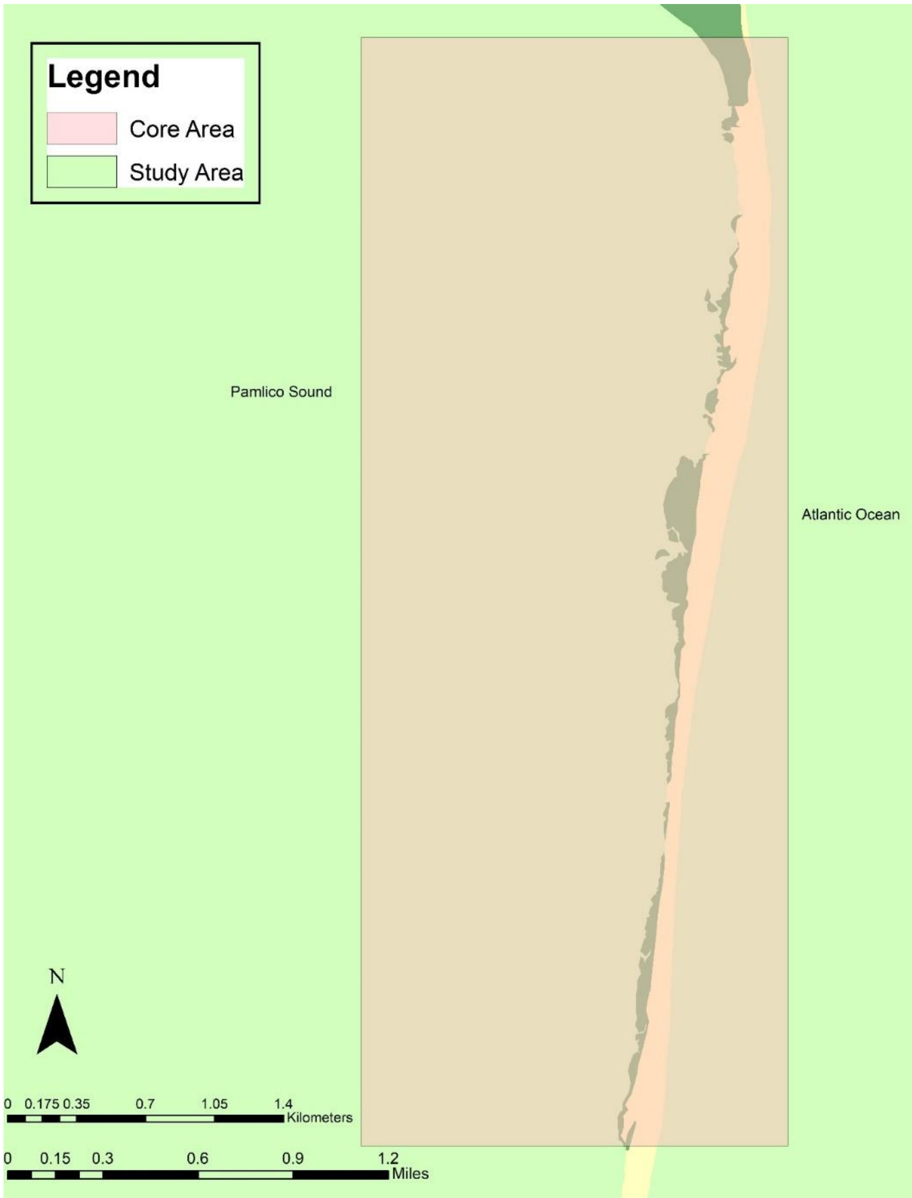

Figure 75. This figure represents both the core and study areas of the Chicamacomico Races. (By: Jim Kinsella).

Battlefield Pattern Analysis

As discussed in Chapter 2, the battlefield pattern analysis is focused on addressing the spatial and temporal aspects of a battlescape (Fox and Scott 1991:92). While the Chicamacomico Races were far from a traditional military encounter, prescribed tactics used in military encounters such as this are evidenced in the archaeological record. Therefore, material evidence left behind in the wake of battle offers insight into the progression of a battle (Fox and Scott 1991:92-93). In the case of the Chicamacomico Races, material evidence detected during archaeological investigation and thought to be representative of a battle offered several clues about the military action that occurred. Much of this has already been discussed above while outlining the Chicamacomico battle boundaries.

The battlefield pattern analysis looked at each vessel (*Monticello, Cotton Plant,* and *Empire*) as a single unit and did not focus on individual sailors within the ships. For instance, the distribution of material evidence (with a potential to be ordnance) detected off shore as well as along the shoreline at Kinnakeet reveals much about the behavior of those aboard *Monticello*. These findings suggest that, as the Union ship stalked the 3rd Georgia as well as the small Confederate fleet in the sound, they were in a tactical position to do so. As a result, they made the decision to engage them by opening fire. Evidence of artillery fire was potentially recorded throughout the sound and along the shoreline in the survey areas. The evidence, magnetic anomalies, were found in clusters along the shoreline as well as offshore in the sound. The distribution could reveal that *Monticello* was stationary (anchored) along the inner shoals off Hatteras Island as it harassed the enemy. Similar conclusions can be made upon the material evidence detected at the Rodanthe sites. *Cotton Plant* and *Empire* situated themselves in stationary positions off Rodanthe (see Figure 33) where they shelled the 20th Indiana at Camp Live Oak (Yellowley 1861; Turner 1864; Oxford 2013:130).

Remote sensing methodologies allowed this study to observe the systemic location (gross patterning) of material evidence because the pBlock modeling tool examined signatures of anomalies (dynamic patterning) that were thought to be representative of battle. The pBlock analysis tool was useful for addressing this study's research goals, as it revealed characteristics representative of a 9-inch Dahlgren gun (one at Bald Beach), 12-pound Howitzer (3 at Rodanthe), and a 32-pounder (only one at Rodanthe, and only two at Bald Beach). As discussed earlier, shot from these guns were deemed representative of battle since they were aboard the vessels involved.

KOCOA Analysis

KOCOA is an analytical tool utilized by the ABPP for surveying and documenting battlefields (Lowe 2000:7). They use it to determine if and what areas of historic battlefields need to be protected (Parker 2015:133). Each element within the KOCOA analysis tool were discussed in detail in Chapter 2 as well as how each element has been amended to fit within a naval battlefield (see Babits 2010:3-4). For each element, the Kinnakeet area will be discussed first, followed by the Rodanthe area.

Key Terrain

The first element within the KOCOA analysis, Key Terrain, is described as the vantage point or "high ground." Whoever had this point during a battle had an advantage over the enemy (Fonzo 2008:2; Parker 2015:133). At Chicamacomico, this element is represented by both the sound and ocean. During the Chicamacomico Races at Kinnakeet, the Atlantic Ocean was the key terrain which was controlled by the USS *Monticello*. It was important to examine this area's bathymetry in much the same way as Parker did (2015). Parker (2015:133) pointed out that without enough water under a ship, it would not be able to effectively maneuver to engage the enemy. The Atlantic Ocean is much deeper than Pamlico Sound side as evidenced by the historic bathymetry (Figure 76). Therefore, *Monticello* could maneuver into position much easier than the Confederate fleet who were on the sound side of the island. Furthermore, this gave Union forces the vantage point to fire on the 3rd Georgia as they withdraw towards Chicamacomico. *Monticello* held this the vantage point for several hours constantly shelling the Confederate forces on the beach and in the sound. During this time, the Confederate tried to bring their fleet into a position to aid their infantry and return fire against *Monticello* (*New York Times* 1861d; Braine 1861:291-2; Oxford 2013:159). The archaeological evidence appears to verify this account as all targets potentially representing battle were found clustered together offshore at Little Kinnakeet (Figures 75 and 76).

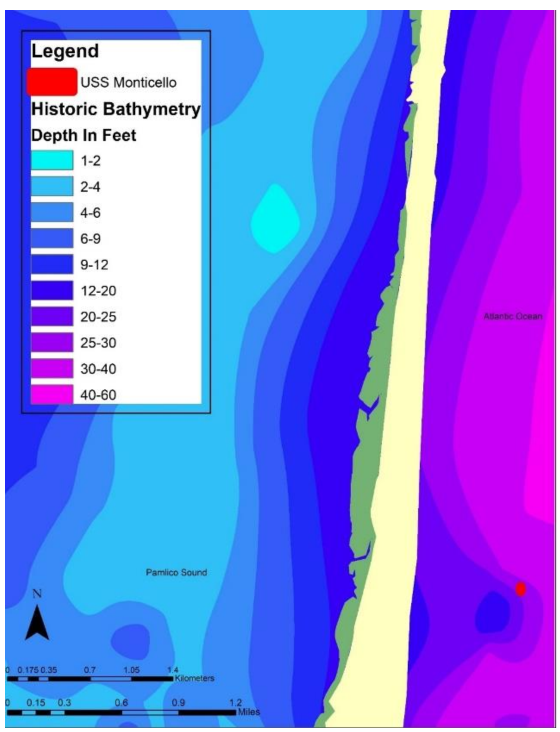

Figure 76. Historic bathymetry map including Monticello's *location. (By: Jim Kinsella).*

At Rodanthe, key terrain consisted mainly of Pamlico Sound which was occupied by Confederate forces during the initial assault on Camp Live Oak. Like the analysis at Kinnakeet and following precedents set by previous studies (Simonds 2013; Parker 2015), it was important to examine the bathymetry (Figure 77). Pamlico Sound is shallow as evidenced by the bathymetry model and as discussed, a certain amount of water must be under a ship for it to effectively engage the enemy. In this case, only *Cotton Plant* and *Empire* could effectively exploit the sound to fire on Camp Live Oak and the retreating 20th Indiana as well as assist in landing forces to take the camp. *Cotton Plant's* draft was only 4 feet 6 inches, allowing it to get within a mile of shore and engage the camp (NHHC 2015b). Other Confederate ships such as the expedition's flagship, *Curlew,* could not get as close to shore to fire effectively due to their deep drafts (Oxford 2013:127-128). While *Empire* had a draft of 7.5 feet, reports suggest it was still able to get within effective range and fire on the camp (Yellowley 1861; NHHC 2015d). A quick note, referring to *Empire,* the KOCOA analysis does not agree with the historical record. Due to bathymetry and fields of fire, *Empire* was not likely within effective range to fire on the camp or those amongst the 20th Indiana as they escaped towards the south (Figure 77 and 74). While *Empire* likely was not in the appropriate position, the position of *Cotton Plant* gave them the vantage point to fire on the 20th Indiana unhindered because the Federals did not have cannons. Additionally, reports reveal the 20th Indiana were unable to defend their position due to several sick soldiers and their reinforcements being captured a few days prior (Brown 1861b:68, see also Oxford 2013:127). In this instance, only Confederate forces could effectively utilize Pamlico Sound's key terrain. This is verified by Brown's report to Hawkins, where he stated, "the enemy was evidently at this time master of the upper end of the sound" (Brown 1861b:68, see also Oxford 2013:127). Referring to the data from the visual shoreline inspection and hand-held metal detection survey, the archaeological evidence was sparse along the shoreline suggesting that most ordnance fired from *Cotton Plant* likely landed on the island, in and around the location of Camp Live Oak.

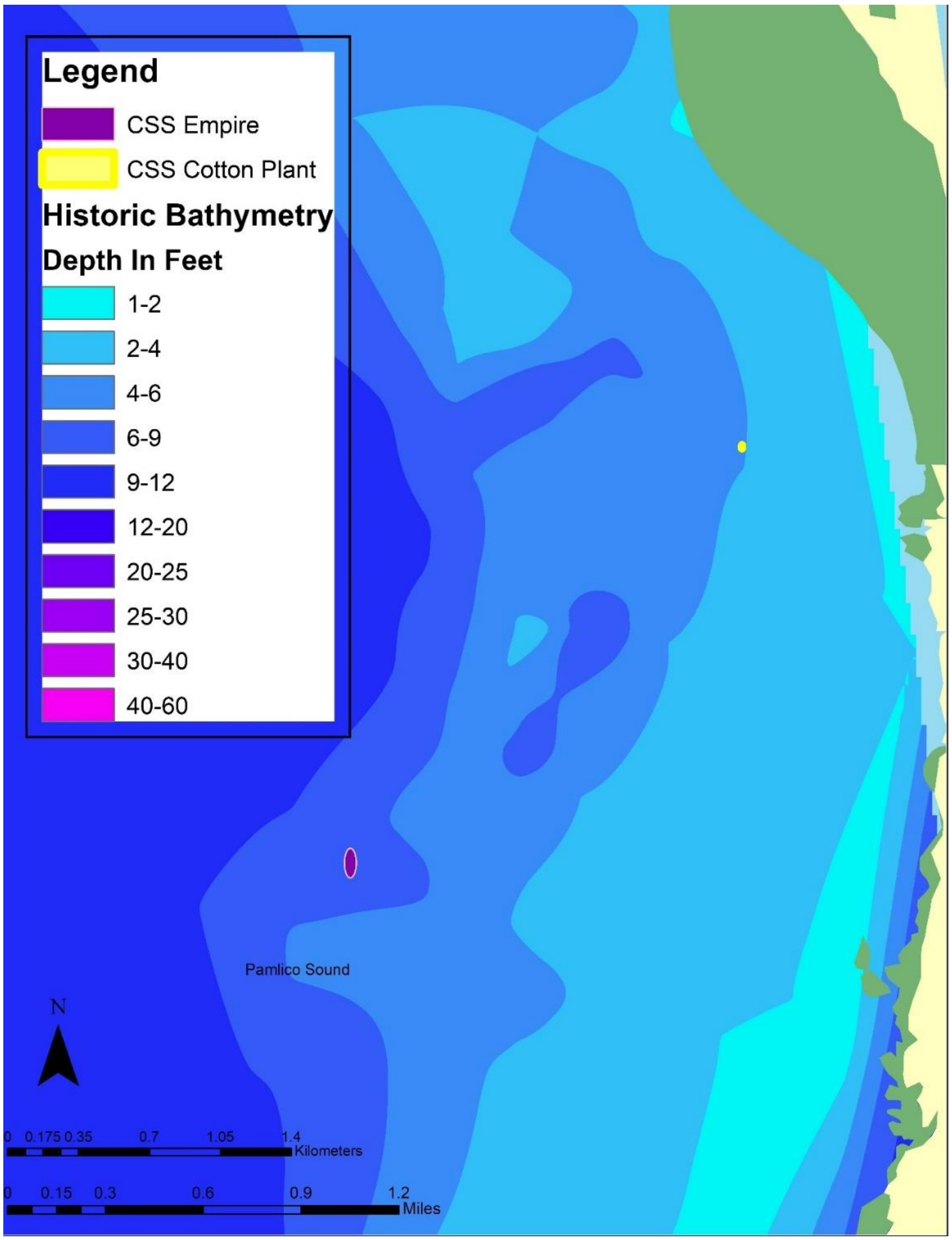

Figure 77. Historic bathymetry map including Cotton Plant *and* Empire's *location. (By: Jim Kinsella).*

Observation and Fields of Fire

The second element within the KOCOA analysis, Observation and Fields of Fire, can be broken into two subsets. Observation is considered any point on the landscape that allows observation of enemy movements. Furthermore, it is also considered as being seen by the enemy as well as allied in placements (an artillery component) that is not necessarily key terrain. Stephen Fonzo (2008:2) stated that observation offers the opportunity to see over an area and acquire targets and noted that high ground is one example. Babits (2011:3) stated that observation is not as important in a naval context as it would be for a terrestrial battle. In a naval battle, ships are highly visible to the enemy unless weather (fog, night) interferes, therefore, this analysis will focus mainly on fields of fire.

In Chapter 2 it was discussed that fields of fire refers to a weapon's capability, more specifically, the maximum and effective ranges of weapons or a ship's armament (see Parker 2015:137). These capabilities have been visually presented in the GIS model representing the fields of fire for each ship involved in the Chicamacomico Races. It is important to note that within a nautical scope, this element can fluctuate during battle because fields of fire are temporary circumstances where it depends upon the ship's ability to move into the appropriate position to engage and fire at the enemy. This is heavily influenced by certain factors such as ships roll, currents, obstructions in the water, tidal behaviors, and winds (Babits 2010:3; Parker 2015:137).

Following precedent set by Parker (2015), data from Tables 1 and 2 representing ship weapon capabilities were used to examine both the maximum and effective ranges for each ship. Figure 78 shows the fields of fire representation of *Cotton Plant* as it fired upon the 20th Indiana as well as *Empire's* nonfiring position during the initial assault on Camp Live Oak on 4 October

1861. As discussed, the historical record shows *Empire* was within range to shell the 20th Indiana; however, as evidenced by the fields of fire model and historic bathymetry, reports of *Empire* being within range are likely untrue. Figure 79 shows the fields of fire for *Monticello* as it shelled the 3rd Georgia on 5 October 1861. Special consideration must be made when examining the fields of fire for vessels. These models are interpretive tools based on historical research, historic geography, as well as historic bathymetry. Therefore, ship locations in the models are only approximations due to the episodic nature of naval encounters (Simonds 2014:47; Parker 2015:138).

Research shows both ships were anchored while firing, however, the exact point cannot be pinpointed with exact precision. As per the historical record, *Cotton Plant* was allegedly anchored 1 mile west of the windmill (*Harpers Weekly* 1861d:673; *Logansport Journal* 1861; *New York Times* 1861b; Yellowley 1861; Merrill 1869:488; Oxford 2013:130). This project did not investigate the location of the windmill archaeologically, therefore, the location is based upon Oxford's (2013:195-196) theory. The same considerations must be made for *Monticello* as well. Historical evidence, suggests *Monticello* was ¾ of a mile off Bald Beach (Braine 1861:291-292; Barrett 1963:55; Oxford 2013:157, 171). Since Bald Beach is a broad area, the location was based off where it was pinpointed on maps available. The possibility exists that *Monticello* could have been located anywhere off Bald Beach, perhaps 100 yards north or south from the location used in the GIS representation. Therefore, ship locations in the GIS model are approximations.

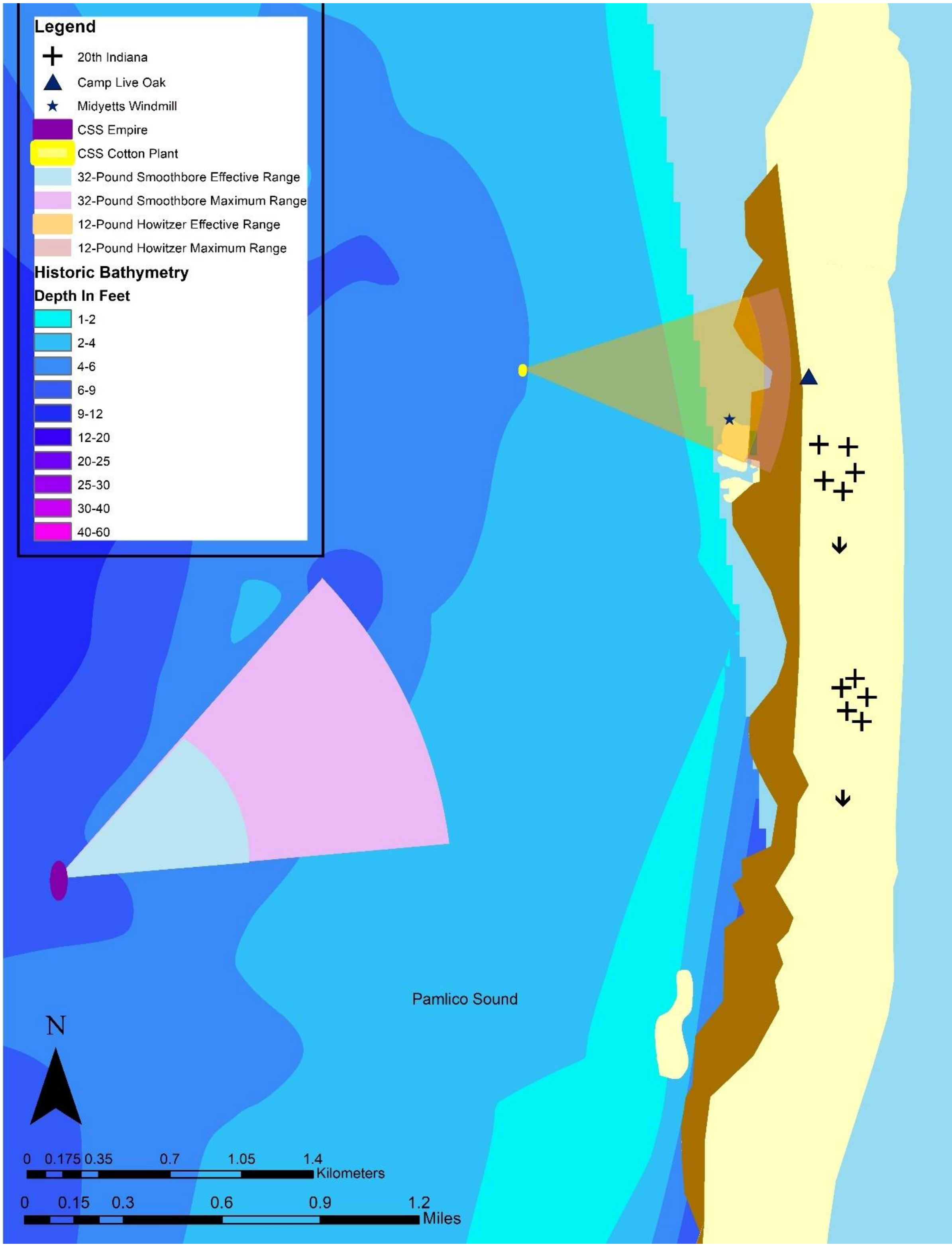

Figure 78. Fields of Fire model for Cotton Plant *and* Empire *during the events of 4 October 1861. This shows the 20th retreating south as they were fired upon.*
(By: Jim Kinsella).

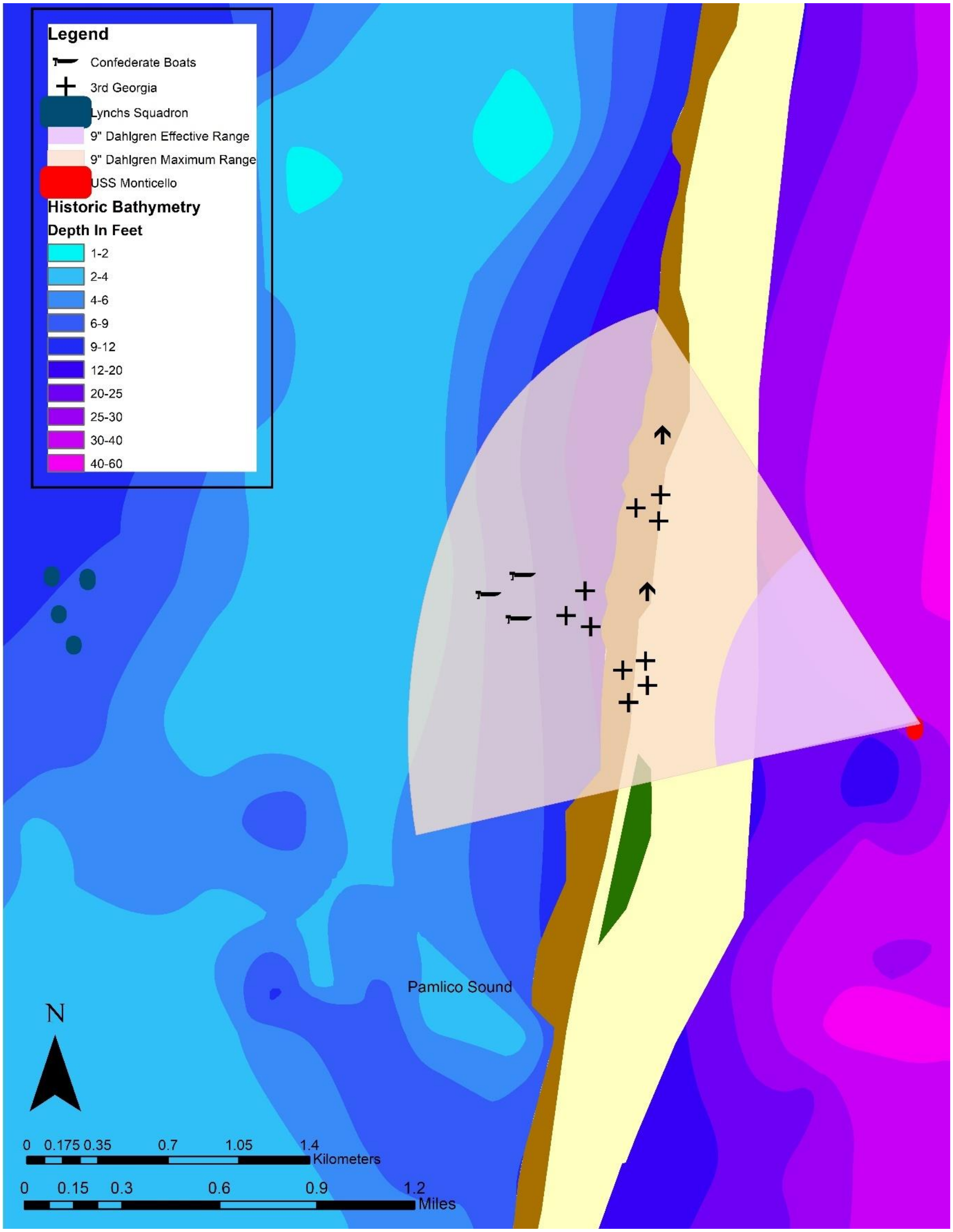

Figure 79. Fields of Fire model for Monticello *during the events of 5 October 1861, as it shelled the 3rd Georgia on Bald Beach and the rebel fleet in the sound. (By: Jim Kinsella).*

A few conclusions can be reached by examining the fields of fire models in conjunction with the historical record. Looking at the events of 4 October 1861, Union forces at Chicamacomico took the brunt of the enemy's attack for several hours, resulting in the destruction of nearby tents and the windmill, as well as the loss of the camp (*Logansport Journal* 1861; *New York Times* 1861c; Yellowley 1861; Merrill 1869:488). This ultimately led to the 20th Indiana's retreat towards Hatteras Inlet. The destruction caused by the attack and the 20th's retreat, reveals that Confederate forces were attempting to utilize the full range of artillery aboard *Cotton Plant*, as the goal was to drive Union forces out. While the Southerners attempted to effectively use the full range of *Cotton Plant's* artillery, the same cannot be conclusively said about *Empire's* effectiveness during this battle. While historical resources indicate *Empire* was within range to shell the 20th Indiana at Camp Live Oak, the ship's draft (7.5 feet), historic bathymetry maps, and the fields of fire models suggest *Empire* was likely unable to get within firing range of Camp Live Oak.

Examining the events of 5 October 1861, *Monticello* shelled the 3rd Georgia as well as the Confederate fleet in the sound for several hours. Material (with the potential to be ordnance) along the shoreline suggests that *Monticello* was within effective range of the temporary 3rd Georgia march route, as there are reports that shells landed among and passed over the Third (Braine 1861:291-92; *Daily National Intelligencer* 1861b:2; *Harpers Weekly* 1861d:673). During this event, there was no loss of life, suggesting *Monticello's* shots were not accurate, possibly resulting in wasted ordnance. The only effect it seemed to have was the 3rd Georgia withdrew from the area. None of the Confederate fleet on the sound were struck by *Monticello's* shells even though such was falsely reported in Braine's official report (Braine 1861:291-92; *Daily National Intelligencer* 1861b:2; *Harpers Weekly* 1861d:673; *Logansport Journal* 1861;

Mansfield 1861:626-27, see also Oxford 2013:168). While they may have been within effective range to engage the 3rd Georgia on the beach, this suggests they were not within effective range to strike the enemy fleet. The points in the sound where possible ordnance anomalies were found were likely unreachable by the Confederate flotilla due to the water depths. There is the possibility, however, that this area was reachable by smaller boats recovering 3rd Georgia troops seeking escape from Union fire. There were anomalies discovered in this area which supports the ricochet effect of ordnance from a 32-pounder smoothbore gun. As discussed earlier, water is stable surface, so the possibility of ordnance skipping along the surface is viable as the smoothbore guns could be angled to make the ricochet effect possible (Holley 1865:216; Bell 1941:4-5).

Cover and Concealment

The third element within the KOCOA analysis is cover and concealment. This element can also be broken down into two subsets: cover and concealment. Cover is considered protection from enemy fire whereas concealment is protection from enemy sight, which is a counter to observation. Parker (2015:136) further elaborates that while concealment offers protection from enemy sight, it does not always offer cover against enemy fire. Different types of landforms or landscapes can act as both cover and concealment, but at times may only work as one. Riverbanks, forests, and trenches are terrestrial examples of this element (Fonzo 2008:2). Within a nautical scope, dunes, ridges, and forts are considered cover and concealment. Babits (2011:3) states that in some instances, the vessel itself may act as cover and concealment, however, in most cases, they are poor sources of concealment due to their highly visible nature. This was until the advent of submarine warfare. Regarding cover, the vessel's armor may offer some protection for the sailors aboard.

Babits' thoughts on concealment being unlikely were validated while analyzing the events at Chicamacomico. During each engagement on 4-5 October 1861, there were no forts or ridges that offered concealment. At Bald Beach, the 3rd Georgia looked towards the sparse woodlands in the area for concealment. With limited options for cover, the 3rd Georgia sought cover on the small boats coming to shore to retrieve them and bring them to the Confederate fleet away from *Monticello's* assault (*New York Times* 1861d). In addition to the sparse woodlands in both areas, there are several sand dunes in the area (see Riggs and Ames 2011:2-3) that offered some cover and concealment during the Chicamacomico Races. While escaping the assault at Live Oak, the 20th Indiana used the dunes and woods to avoid being seen by the Confederate flotilla. At the northern end, just south of their camp, the 20th Indiana used the big dune there as concealment and partial cover (Braine 1861:291-92; *Harpers Weekly* 1861d:674-675; Oxford 2013:147-152).

Obstacles

The fourth element, Obstacles, is any feature on the landscape that affects the battle by hindering or restricting movement. In a terrestrial scenario, obstacles can be rivers, forts, mountains, and walls (Fonzo 2008:2; Parker 2015:135). Babits (2011:3) states that within a naval scenario, obstacles can range from sandbars, wind, and even the water itself. Tidal behavior can act as an obstacle for any ship (or men seeking to leave or get to the ship) in a naval situation if there is a significant change in draft underneath. Parker (2015:135) further adds that ships sunk within a harbor act as obstacles during naval warfare.

At Chicamacomico and the areas surrounding Hatteras Island, water, wind, sandbars, and even sandy ground are factors that both Union and Confederate forces would have contended with. The area is known for its shallow waters, sandbars, sand dunes, and shifting landscape.

Additionally, during the year at certain points, wind can also be a factor in the Outer Banks (Pilkey, et al. 1998:39; Carbone 2001:xv; Riggs and Ames 2003:23; Babits, et al. 2014:3).

At Chicamacomico, water depth was the main obstacle, such was the case, during the initial assault, as *Curlew* was unable to make it closer to shore to land troops at Camp Live Oak because the sound was too shallow in this area (Figure 80). As a result, *Curlew* had to unload men onto *Cotton Plant* which was a lighter draft vessel (NHHC 2015b; NHHC 2015c; Oxford 2013:128). Water depth was also an obstacle later during the affair; when *Empire* tried to unload men further south at Kinnakeet (Figure 81) to intercept the 20th Indiana who were retreating from Camp Live Oak (*New York Times* 1861c; *The Richmond Daily Dispatch* 1861f; Trotter 1989:46; Oxford 2013:143). Another obstacle was the sandy ground on Hatteras Island, which was a hindrance of troop movement. This would likely have been an issue during the Indianan's retreat towards the forts at Hatteras on 4 October as well as for the Georgians while they withdrew back towards Chicamacomico on 5 October (Merrill 1869:489; see also Oxford 2013:148).

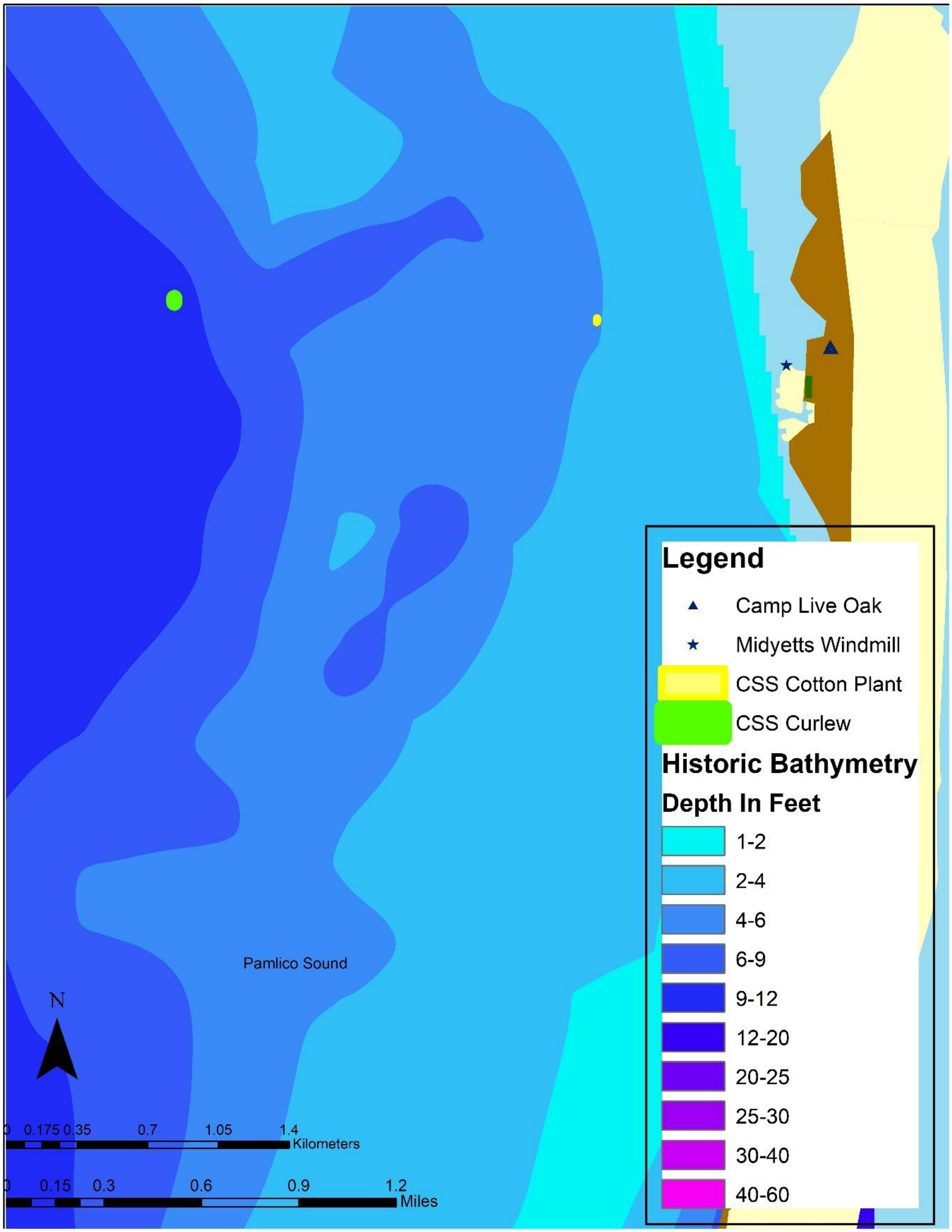

Figure 80. CSS Cotton Plant's position on 1 October 1861. CSS Cotton Plant managed to get closer to the shoreline to engage Camp Live Oak because of its shallow draft. CSS Curlew was unable to get within range. Please note, neither ship is drawn to scale in this figure, they have been enlarged so that they could be seen on map. (By: Jim Kinsella).

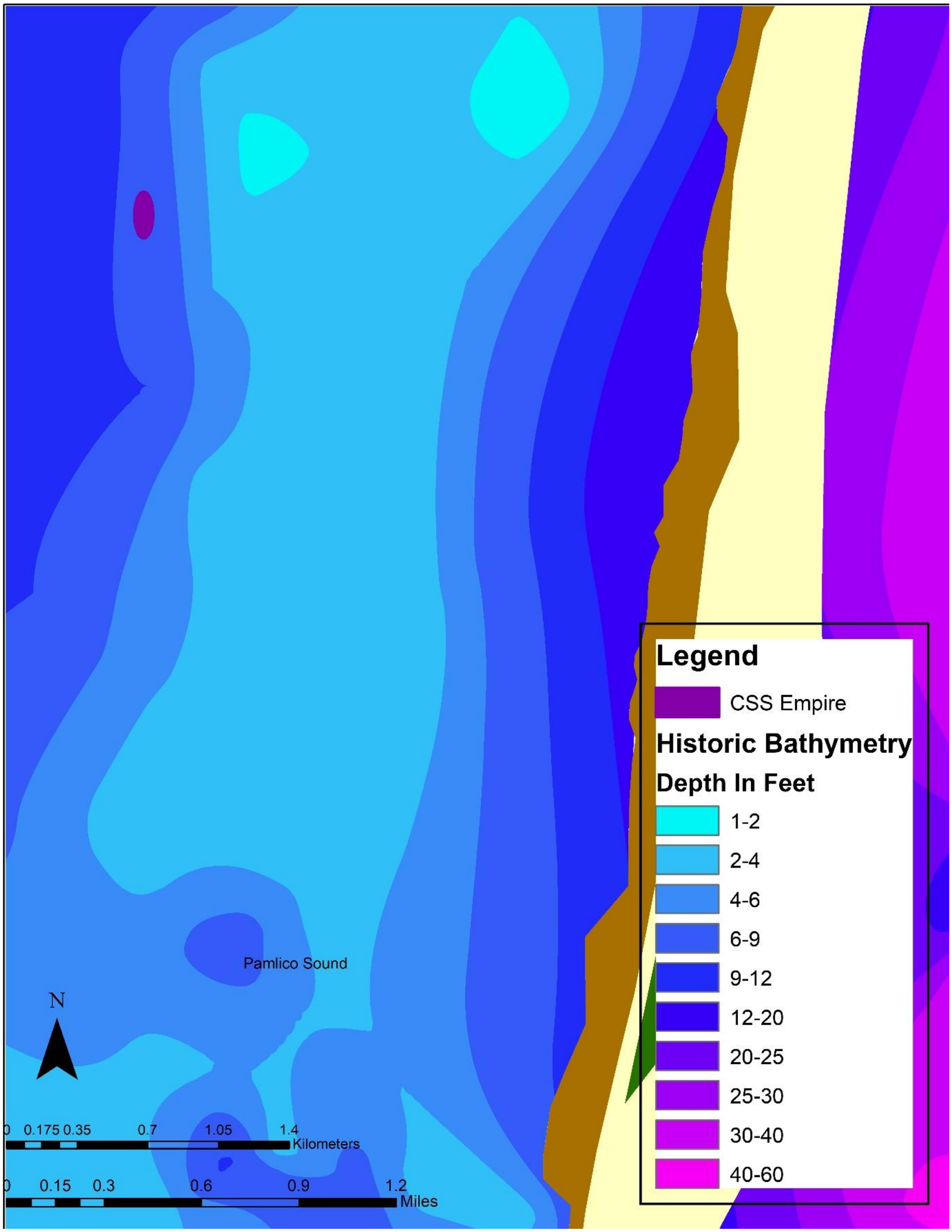

Figure 81.Bathymetry model with CSS Empire. Possible location where CSS Empire ran aground trying to offload the Eighth North Carolina to cut off the Twentieth Indiana. (By: Jim Kinsella).

Avenues of Approach

The fifth and final element within the KOCOA analysis model is Avenues of Approach. This element is described as any zone used for troop movement and/or transport. In terrestrial battlescape settings, this refers to any road, railroad, canal or river, dry open fields, that are used to allows troop movement (Fonzo 2008:2). Babits (2011:4) stated that in a naval scenario, this element is considered the channel or anywhere the tides and wind facilitate vessel movement. Parker (2015:143-144) elaborated, "this element refers to a route that offensively, will bring a unit safely to the enemy's most vulnerable position and will, defensively, offer the most protection from enemy fire during a withdrawal from action." He further added that in a naval battlescape, this element refers to any portion of the water that has sufficient depth to accommodate a ship's draft (see also Lowe 2000:7; Babits 2010:4).

On the morning of 4 October 1861, the avenue of approach and retreat for *Cotton Plant* and *Empire* is straightforward. That morning, *Cotton Plant* and *Empire* came from the west and situated themselves just offshore to begin their bombardment on Camp Live Oak (Brown 1861b:68; see also Oxford 2013:126-127). During this engagement, they maintained their vantage point; however, if circumstances were to change, the channel offered them a way to withdraw. While they could head in any direction they chose baring there were no shoals, the likely bet would be that they would head back in the direction they came. They knew that there was a heavy Union presence further south around Hatteras Inlet.

For Union forces, the 20th Indiana was already situated at Camp Live Oak, so only the avenue of retreat will be discussed. Since there were no nearby Union ships to send out surfboats to recover the 20th Indiana, they could not use the water as a viable retreat option. Therefore, the 20th Indiana's only viable option for retreat was south to the forts at Hatteras Inlet as they were surrounded by water on each side (Loggerhead Inlet to the north, Pamlico sound to the west, and the Atlantic Ocean to the east). The 20th Indiana made a successful retreat to Hatteras, resting and taking cover in the trees while on the way (Brown 1861b:68; Oxford 2013:140-142).

Examining the events of *Monticello's* assault on the following day, the avenue of approach for Union ship is quite clear. *Monticello* steamed close to shore in the inner channel of the Atlantic while it approached and engaged the enemy (Braine 1861:291-92). Therefore, the Atlantic served as the avenue of approach. Likewise, this could also serve as an avenue of retreat for *Monticello* if it was needed.

On land, the 3rd Georgia were already present. They were heading north towards Chicamacomico after ceasing their effort to attack the lighthouse (Oxford 2013:154). As soon as they were seen by *Monticello*, they came under fire. They only had two avenues of retreat available, north up the island to Chicamacomico on foot, or out into the sound to board the Confederate ships waiting.

Conclusion

Throughout this chapter, two analytical tools (Battlefield Pattern and KOCOA) were applied to the data collected during this study. Data consisted of historical research, archaeological findings, and GIS creation. KOCOA has historically been utilized to focus on terrestrial battlescapes; however, its elements were redefined into a nautical context for this study. The battlefield pattern analysis has been used in several studies to examine troop movements and is mostly influenced by the historical research and archaeological record.

These battlefield analytical tools were utilized to gain a better understanding of what occurred during the Chicamacomico Races. Furthermore, these tools assisted lending credence to the archaeological signatures being ordnance that is representative of battle. Having this in mind allows this study to draw conclusions on which archaeological methodology is best suited for determining archaeological signatures in a shallow water naval battlescape.

Chapter 7
Conclusion

Introduction

This chapter concludes the study by utilizing the results of the theoretical analyses to address research questions set forth at the project's beginning. This study was tasked with utilizing a multi-stage methodology to recreate an ephemeral shallow water battlescape geospatially, using the Chicamacomico Races as a case study.

To accomplish this, the historical record along with the archaeological data were analyzed utilizing military terrain analysis tools designed to analyze battlefields: KOCOA and battlefield pattern analysis. Similar efforts undertaken by other studies conducted at ECU have produced meaningful results, and precedent for the current study (see Bright 2012; Simonds 2014; Parker 2015). Additionally, the work throughout this study was influenced by other KOCOA naval battlefield studies (see Conlin and Russell 2006; Babits 2010; McKinnon and Carrell 2011). In addition to addressing the primary research objective, several secondary research objectives were addressed that sought to determine the potential for certain archaeological methodologies for identifying ordnance from a maritime battle area.

The Chicamacomico Races was hardly a decisive battle for either side, simply because, in the end, neither side gained significant advantages to further the war effort. The South merely gained equipment and clothing taken from the 20th Indiana (which kept the 3rd Georgia warm for the winter). Additionally, there were no reports of heavy losses on either side. It was a minor skirmish that appeared as nothing more than a blip in the history books. This study sought to change that by providing a thorough investigation into the battle activity in this area. To do so, several research questions were generated prior to data collection. The next part of this chapter will address these questions in detail.

Addressing Research Questions

As with other studies of this scope, the first step was to comb through the historical record to provide a detailed narrative of events leading up to, during, and after the Chicamacomico Races. Additional research conducted involved compiling data on ship armament and their capabilities as such was necessary for creating the fields of fire models. The next step in this study involved creating a GIS representation of battle areas. This assisted in designating areas suitable for archaeological survey. Archaeological survey results outlined the perimeters of each battle area of the Chicamacomico Races. From here, the data from the historical record, archaeological record, and GIS model were examined through the analytical tools mentioned above. The theoretical analysis sought to gain an understanding of military actions during battle to corroborate the historical record with the archaeological data.

Once the battlescape analysis was complete, the final step involved determining which archaeological methodology was best suited for detecting archaeological signatures to recreate a naval battlescape. Several secondary questions presented along with this studies' primary research question introduced earlier, will be addressed first, as they lend support to answering the primary research question. Once all research questions are addressed, the discussion will shift to focus on what could have been done differently within this study as there were deficiencies identified. Additionally, suggestions for future research opportunities will be discussed.

What is the potential of using visual search techniques (diver- or snorkel-based survey) for identifying the existence of ordnance and pattern of distribution associated with a submerged Civil War battlefield?

Through the course of this study, there was no evidence to conclude that visual shoreline survey techniques had a high potential to observe and identify ordnance from a historic battlescape within a shallow water site. The conclusion is that this methodology has limited potential due to both cultural (c-transforms) and non-cultural (n-transforms) site formation processes at work in the area. Looking at non-cultural site formation processes first, as mentioned, the Outer Banks is a dynamic environment that experiences a significant amount of coastal change. Areas that were once sandy beaches could now be marshy wetlands and vice versa. Tidal and sediment change also appear to be more influential in a shallow water zone such as the area surveyed, impacting the likelihood of observing ordnance lying on the sound floor. An object such as a piece of ordnance that once rested on the floor was likely buried deep beneath more than 150 years of sediment change and vegetation.

In addition to the effect environmental events had on the site formation process of survey areas, cultural processes have also occurred. Both the Rodanthe and Little Kinnakeet survey areas are relatively shallow, so human access is more likely than in a deep-water environment, therefore, site disturbance is highly likely. Looking closely at the Rodanthe survey areas, there are likely major impacts from c-transforms. The Rodanthe survey areas were noticeably active with recreational boating, kitesurfing, and commercial crabbing activities during each survey day. Furthermore, this area was designated as a dumping area for dredged material from the nearby Rodanthe Ferry channel. The Kinnakeet survey area was not much different, it also experiences human activity albeit at a smaller scale. Therefore, the potential for uncovering ordnance here is low. Perhaps in a less populated zone, one that is naturally more stable, this methodology would have a higher success rate in detecting ordnance in shallow waters.

Although the potential for detecting ordnance with this methodology was low there were, however, some benefits to the visual shoreline technique. It was predicted that this methodology would serve as checks and balances against the hand-held metal detector survey. In the event the hand-held metal detector indicated a ferrous target, the visual shoreline inspection was useful in eliminating targets from consideration of being representative of battle.

What is the potential of acoustic remote sensing techniques (side-scan sonar) for identifying the existence of ordnance and pattern of distribution associated with a submerged Civil War battlefield?

Like the visual shoreline methodology, the ability for acoustic remote sensing had low potential for identifying ordnance lying within a shallow water area. For similar reasons, site formation processes within the area account for some of the limitations of this methodology. Further limitations involve water depth as the area surveyed was anywhere from 1 to 5 feet deep. Since the sonar device was affixed to a pole mounted on the starboard side of the research vessel, it was often in danger of grounding in the shallow environment of the survey zone. This effectively limited what the device could "see," rendering it ineffective in certain areas.

Once again, looking closely at the Rodanthe survey area, the zone investigated during the side-scan sonar survey includes a portion of the Rodanthe Emergency Ferry Channel. It is likely that any material evidence that may have been representative of battle is no longer in situ. Any evidence would likely have been disturbed during initial channel dredging and any follow-up maintenance dredging activities that have occurred in the area.

Like the visual shoreline technique, this methodology had its benefits. With the same predictions in mind, this methodology served as useful checks and balances against the magnetometer data. It was useful in eliminating several targets such as crab pots, pilings, and a nearby duck blind from consideration of being ordnance.

What is the potential of magnetic remote sensing techniques (magnetometry and metal detection) for identifying the existence of ordnance and pattern of distribution associated with a submerged Civil War battlefield?

Research carried out during this study determined that magnetic remote sensing techniques (magnetometry and metal detection) had a mid to high potential for identifying the existence of ordnance derived from the Chicamacomico Races. While the potential was mid to high, there were some disadvantages associated with each device. These disadvantages, however, were outweighed by the advantages offered from both units.

A CTX 3030 metal detector was used during the shoreline survey. It was determined that within the scope of this study, this device had some limitations in its ability. In comparison with the magnetometer, the 3030 unit cannot detect objects as deep as the magnetometer (which was known when selecting this tool). While the maximum depth is not disclosed by Minelab in any of their literature, a technician from their tech support team stated that it can penetrate deeper than other units on the market. He stated it would likely not detect anomalies as deep as a magnetometer. Based on the objects sought during this study, the magnetometer can detect them as deep as 6m at .5 to 1nT (Geometrics 2018). Therefore, the CTX 3030 unit cannot search an area as intensely as the magnetometer. Additionally, the Minelab manual (2017:40-41) suggested using a fast swing speed while using it with the seawater function switched on. This is problematic in areas that are thought to be littered with trash and other refuse articles. Areas such as those require a slower swing speed to mitigate false signals. Lastly, this device is unable to cover a large area in a short window of time, as the magnetometer.

Although there are disadvantages with the CTX 3030 unit, it does have many advantages for surveying in a shallow water environment. First, the costs associated with conducting a metal detection survey are low. The unit is a handheld lightweight device that can be easily employed in small survey areas such as the shoreline at Rodanthe and Kinnakeet. Therefore, there is no need for additional costs such as there would be utilizing a boat: rental fee, fuel, and other major logistical factors such as food, per diem for the crew and lodging. Additionally, the shoreline survey areas at Rodanthe and Kinnakeet were similar in topography to a typical beach. Most beaches are non-mineralized which allows this unit to achieve greater depths (Minelab 2017:21).

Another advantage to this methodology is that the data/results were simple to analyze as it produced the results in an Excel format. Data captured by the device were easily uploaded onto the computer and integrated into the GIS model for analysis. While the unit itself could sort out certain types of anomalies so that focus can be on what is sought, this study found that this type of data was also easy to sort within GIS. If the properties of ordnance types being sought are known ahead of time, then the GIS allows the researcher to set certain parameters in the model (SQL statement) to eliminate targets that do not have the potential to be representative of battle. This made data post-processing much quicker and simpler.

The magnetometer device had reasonable success during this survey, therefore it was determined to have a mid-to-high potential for identifying materials with the chance of their being ordnance. In comparison with the hand-held metal detector, it was predicted that it could survey a much larger area in a shorter amount of time. This was confirmed after the archaeological survey concluded.

The magnetometer methodology worked well due to a working precedence using pBlock modeling set by past studies (see Richards 2011 and Parker 2015). These studies somewhat acted as a "how to guide" for this methodology. This study followed suit and created a pBlock model which was helpful in determining which magnetic anomalies fit the criteria of being ordnance. While data processing is a much more cumbersome process with this unit as opposed to the CTX 3030 unit, utilizing the pBlock model made it easier, as there were set parameters to look for. Additionally, there are many more accessible post-processing and analytical resources for examining the magnetometer data set such as GIS and Hypack. Although not used for this study, Magpick was another resource that was available for data processing and analysis.

Although the magnetometer methodology has several advantages, there are a few disadvantages worth mentioning. Conducting a survey in a shallow water or deep-water environment with this methodology can be very costly as boat usage and fuel costs need to be factored into the budget. Additionally, unlike the handheld metal detection survey that can be handled by one person, this type of methodology requires more support and staff. Conducting a survey with a magnetometer device should be at least a 2-3-person operation. Finally, careful consideration must be taken when working with the computer software for this device as well as the side-scan sonar. It was found that inadvertently inputting the wrong survey search parameters can be a costly and time-consuming mistake.

What is the benefit of utilizing a combination of remote sensing technologies to identify the existence of ordnance distribution with a submerged Civil War battlefield?

Throughout the course of this study, it was deemed that there is a noticeable benefit of employing different remote sensing methodologies in concert with one another. During fieldwork and post-processing, the visual and acoustic sonar methodologies proved to be reliable checks and balances against the magnetic remote sensing methodologies. This was apparent when several magnetic anomalies were eliminated from consideration of being ordnance when the anomaly had a correlating sonar target. Instances such as this were noticed during the survey when surface-level events (such as moving past a duck blind or buoy) occurred. Similar conclusions were drawn during the post-processing phase, when anomalies (detected with magnetic remote sensing methodologies) such as crab pots, were revealed in the sonar data.

Addressing the Primary Research Question

Using the military actions from the "Chicamacomico Affair" as an example, what are the best approaches for reconstructing ephemeral maritime battlefield events from the Civil War?

Using the Chicamacomico Races as a case study, this study looked beyond just determining which archaeological methodology was best suited for this task. It looked at the overall process the study undertook to accomplish its research goals. This included historical research, theoretical applications, archaeological methodologies, and post-processing methodologies. In addition, if not directly stated, the importance of the GIS model was showcased throughout this study.

The final conclusions of this study determined that the best approach for reconstructing a shallow water battlescape from the Civil War was to analyze all collated data from the project through the analytical tools chosen for this study. By using the KOCOA and battlefield pattern analyses, coupled with an understanding of site formation theories allowed for an efficient documentation of the "Chicamacomico Races" battlefield.

KOCOA sought to understand the battle through an examination of physical factors such as historic bathymetry and fields of fire. By tailoring the elements of KOCOA to a nautical context, interpretations of how each belligerent in the Chicamacomico Races tactically reacted and engaged environmental elements within the area were ascertained. This allowed for an efficient recreation of the battle as well as a thorough documentation of the Chicamacomico Races. Additionally, the KOCOA analysis provided an understanding of how Hatteras Island's terrestrial features interacted with the naval scope of the Chicamacomico Races more specifically, how the belligerent forces in the water engaged those on land.

There are, however, some limitations within the KOCOA model for naval studies, that were evident while trying to tailor terrain elements to a nautical context. For instance, cover and concealment are not usually present in an open water engagement since vessels are typically visible to one another. For this study, the Chicamacomico Races was a blended mix of naval and terrestrial elements, therefore the KOCOA model worked well. If this study were strictly analyzing an open water engagement, the KOCOA model may not work well as a standalone framework. Other naval tactical theories would likely need to be utilized to efficiently recreate an open water naval battlescape.

Examining the data through the battlefield pattern analysis was also concluded to be an effective approach for understanding the battle. The battlefield pattern analysis focused on the progression of the battle by analyzing both material evidence potentially representative of battle as well as the historical record. Since battlefield patterning is influenced through historical and archaeological data, it not only helped understand certain aspects of battle, it also helped with understanding the site formation processes. More specifically, how material evidence (with the potential to be ordnance) went from its systemic context to the archaeological record, i.e. decisions in battle to fire ordnance to specific locations.

Study Problems

During the post-processing phase of this study, it was revealed that there were a few errors that occurred during data capture. The files from days 2 and 3 were somehow corrupted as it seems the files were inadvertently captured in the wrong format. While the sonar images were in the appropriate location, this researcher was unable to produce an adequate sonar mosaic in the Hypack software. Multiple calls were made to the Hypack support team for assistance with this issue. In the end, however, they were unable to assist. Therefore, this study had to rely further on the GIS model to analyze the sonar data. Luckily, the spatial data was not compromised, nor were the individual lane tracts. The main issue was related to being unable to stitch all the files together for a sonar mosaic for illustration purposes. It is unclear exactly what caused this issue.

Study Deficiencies and Shortcomings

Through an understanding of the historical record, coupled with the fields of fire representations in the GIS model, there were much higher expectations of material evidence representative of battle being revealed during the archaeological surveys. The results, however, were much lower than expectations. Several possibilities could account for these results, such as site disturbance. This is a heavily trafficked and active area; therefore, it has likely seen a lot of site disturbance. Furthermore, the Rodanthe Emergency Ferry Channel is within the area surveyed, so the initial dredging for the channel as well as maintenance dredging activities could have disturbed any ordnance and redeposited them into other areas designated for dredge spoil.

Conversely, the sparse amount of data discovered could be the result of simply surveying the wrong areas. This would indicate possible inaccuracies in the historical record or simply the author's misinterpretations historical data. Moreover, this might also be due to misinterpreting the GIS model. As discussed, the GIS model was merely used as an interpretive tool. Ship locations and fields of fire were approximations based on historical data. The belligerent ships possibly were not where they were reported to be in the historical record. In the case of *Monticello*, it could have been further north or south of zones that were surveyed. Additionally, it is possible that *Monticello* was further out into the Atlantic than reported. If either scenario were true, then this would result in inaccurate fields of fire representations. The same could be true for *Cotton Plant* and *Empire*'s battle positions. The only way to know for sure is to conduct follow-up surveys in other areas designated as suitable locations. This study, however, tried to account for this by surveying a few areas outside the fields of fire models. This is evident while looking at the results as some data sets were not within the fields of fire cone (see Figure 72).

Another factor that could account for the sparse amount of material evidence detected could be as simple as the survey zones being too small. Although the area involved in the Chicamacomico Races is quite large, this study opted for small survey zones to stay within budgetary and time constraints. This study would likely have benefited from a more expansive survey zone. Perhaps future researchers can obtain funding to encompass a much larger area with archaeological survey.

In addition to improvements on survey locations, there are also things that could be done differently as it pertains to the utilization of survey equipment, for instance, the CTX 3030 device. This study concludes that the CTX 3030 was not used to its full potential. Among the many features this device offers, there is a "pinpoint" feature to differentiate between different types of objects. This study would have benefited from sampling several different ferrous objects that were expected to be discovered in the area with the CTX device. Taking this step would allow the researcher to differentiate between an iron nail vs. iron ordnance as both are listed as high ferrous targets in the CTX 3030 manual (see Minelab 2017:64). Additionally, this researcher should have gathered a collection of different types of metal such as cans, nails, coins, and jewelry to create a small database to compare ferrous content and conductivity levels.

Similarly, there are improvements that could be made for the off shore remote sensing survey of Pamlico Sound at Kinnakeet and Rodanthe. This study concluded that while it remained within the lane spacing parameters set forth by the UAB, the survey would likely have benefited from tighter lane spacing, however, doing so, would result in covering less space, which would affect the overall interpretation of the battle. This mainly applies to utilizing magnetometer lane spacing. While the raw data collected shows that state regulations concerning lane spacing have the potential of working in a shallow water environment, this may not be the best option for an in-depth, research-driven battlefield study. Tighter lane spacing may have provided a more dynamic contour map and possibly detected more anomalies.

As with Richards' (2011) and Parker's (2015) studies, there were shortcomings utilizing the pBlock model. The shortcomings arise from this program not being geared or designed for use in an archaeological capacity. This program merely produces and represents a proposed gamma range that may be representative of ordnance in the survey areas. This model is also dependent upon what is plugged into it, so if any misinformation is plugged into the pBlock modeling program, results and interpolations could be skewed.

The final shortcomings within this project concern the analytical tools utilized to analyze the data collated from this project. As discussed earlier, the analytical tools utilized were found to offer satisfactory conclusions for this study; however, there is the chance this study could have benefited from other analytical approaches such as Principles of War, METT-T or MNTT (see Babits 2010; McKinnon and Carrel 2011; Bright 2012; Simonds 2013; Parker 2015). These alternate analytical tools may have provided deeper insight into the battle events at Chicamacomico that KOCOA and Battlefield Pattern were unable to adequately address. Additionally, utilizing the battlefield pattern analytical tool would likely have benefited from a forensic investigation of each anomaly to provide a better understanding of ordnance distribution. However, to accomplish a forensic investigation would have required divers to be in the water examining each individual anomaly. Unfortunately deploying divers to investigate each anomaly was not within the scope, time, and budget for this project.

Recommendations for Further or Future Research

This study concluded that there are several opportunities for further study in this area. For instance, the core area (where the battle activity occurred) is 226.905 sq. km (87.6085 sq. miles) whereas only a total of 5.527 sq. km (2.13410 sq. miles) was surveyed. This means only 2.44 percent of the core area was surveyed which included both the Kinnakeet and Rodanthe zones. Furthermore, the entire Chicamacomico Races took place in present-day Rodanthe, Avon, and Salvo, however, as mentioned in the historical narrative, the activity began with the capture of *Fanny*. The area where *Fanny* was reportedly captured was not surveyed archaeologically during this study. Surveying the zone Fanny was captured would provide the opportunity to add new data to the existing data set for a more comprehensive examination into the Chicamacomico Races. Furthermore, as evidenced by the historical narrative, the Chicamacomico Races was not solely a naval affair. There were some terrestrial components to the engagement, therefore some signatures representative of battle, are likely buried in the terrestrial environment. Future researchers may find it beneficial to use a combined maritime-terrestrial survey, specifically within the fields of fire models, to expand the Chicamacomico study area and enhance the battle recreations and interpretations. Perhaps in doing such a survey, the methodologies utilized during this study can be improved.

While adding to the existing Chicamacomico Races knowledge base, the data sets produced during the archaeological fieldwork may be valuable for incorporation into a larger analysis that encompasses the entire Outer Banks theatre. This could be accomplished by using similar methodologies to create battlefield studies of each Civil War battle in the area. This would include the Battle of Hatteras Inlet and the Battle of Roanoke Island in addition to the present study. While they are three distinct and separate events, including these would ultimately reveal a wealth of information on how the landscape elements within the Outer Banks interacted with and influenced battle events. Additionally, there is still the question concerning the definitive location of Camp Live Oak. Perhaps data compiled from this study could offer further areas to investigate.

Furthermore, data collated from this project can be reanalyzed and applied to different types of maritime studies, such as a site formation study or a maritime cultural landscape study. Conducting a maritime cultural landscape study, focusing on the lower Outer Banks barrier islands would likely produce a wealth of information pertaining to the local economic history. Data sets from this study as well as from the Richards and Parker (2017) study offer valuable data to contribute to such studies.

In conclusion, the Chicamacomico Races was a transitional event between two larger Civil War battles, the Battle at Hatteras Inlet and the Battle of Roanoke Island, where no ground or advantage was gained by either side. This study served as the first maritime archaeological investigation into the events of the Chicamacomico Races and hopefully future researchers find opportunities to expand on this research. It is hoped that future researchers can close any gaps left open by this study. It is also hoped that this event will no longer be overlooked by history books and that this study helped shed new light on the events that transpired during 1 October 1861 to 5 October 1861.

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Appendix A

Permit Number
16PAS652

STATE OF NORTH CAROLINA
Department of Natural and Cultural Resources

PERMIT

for

X Exploration

Recovery

Salvage

Issued to: James M. Kinsella IV
8866 Larwin Lane
Orlando, FL 32817

Authorizing activities affecting submerged cultural resources in Dare County in Pamlico Sound in locations requested in the Permittee's application dated March 20, 2016. This permit, issued on April 29, 2016, is subject to compliance with the application (where consistent with the permit), all applicable regulations, special conditions and notes set forth below. Any violation of these terms may cause the permit to be null and void.

SEE SPECIAL CONDITIONS A through P

Any project modifications not covered hereunder requires further Departmental approval.

All work must cease when the permit expires on April 29, 2017.

Signed by the authority of the Secretary of the Department of Cultural Resources

Stephen R Claggett

State Archeologist, Office of State Archaeology,

This permit and its conditions are hereby accepted.

Signature of Permittee

SPECIAL CONDITIONS FOR PERMIT

A. This permit is limited to survey and preliminary site assessment activities as defined in section III.B. of the Permittee's application

B. This permit authorizes the Permittee the right to conduct survey and assessment activities within the search area designated in the Permittee's original application. The Department shall not issue any additional permits to search within the permit holders area.

C. The period of this permit shall be one year. The permit may be renewed yearly, subject to any changes in the permit terms the Department of Natural and Cultural Resources (hereinafter DNCR) deems appropriate, providing the Permittee has satisfactorily met all the terms and conditions of this permit.

D. After issuance, this permit, or any part thereof, shall not be assigned or sublet by the Permittee.

E. The Permittee agrees to maintain close operational control of all survey and preliminary site assessment, laboratory, and report preparation activities performed under the Permit. "Operational control," at a minimum, includes direct, personal involvement and oversight of all: personnel management; fieldwork operations (boat operations, remote sensing, mapping, diving, excavations, artifact and data recovery); laboratory operations (artifact stabilization, documentation, analysis and conservation); and reporting. Failure by the Permittee to demonstrate operational control of permitted activities may result in revocation of the Permit.

F. Issuance or renewal of this permit shall not be construed to confer in the Permittee any right against claims of third parties. Nor shall this permit be construed to create in DNCR or the State any duty or obligation to defend or in any way support the Permittee against claims by third parties. DNCR and the State reserve the right to make determinations on whether to defend or support the Permittee based on the facts and circumstances of each claim.

G. Prior to commencing any recovery operations, the Permittee shall be responsible for obtaining all required permits and authorization from other state and federal regulatory agencies and, if necessary, adjacent landowners.

H. The Permit Holder agrees to notify the office of the Underwater Archaeology Branch, 1528 Fort Fisher Blvd. South, Kure Beach, North Carolina 28449, phone 910/458-9042, or email (nathan.henry@ncdcr.gov) at least 48 hours prior to initiating any field activities.

I. With regard to the matters authorized and regulated by terms of this Permit, the Underwater Archaeology Branch (UAB) and other DCR agency officials may perform inspections of any operations or facilities of the permit holder or its contractors, on reasonable (24 hour minimum) advance notification.

SPECIAL CONDITIONS FOR PERMIT

A. This permit is limited to survey and preliminary site assessment activities as defined in section III.B. of the Permittee's application

B. This permit authorizes the Permittee the right to conduct survey and assessment activities within the search area designated in the Permittee's original application. The Department shall not issue any additional permits to search within the permit holders area.

C. The period of this permit shall be one year. The permit may be renewed yearly, subject to any changes in the permit terms the Department of Natural and Cultural Resources (hereinafter DNCR) deems appropriate, providing the Permittee has satisfactorily met all the terms and conditions of this permit.

D. After issuance, this permit, or any part thereof, shall not be assigned or sublet by the Permittee.

E. The Permittee agrees to maintain close operational control of all survey and preliminary site assessment, laboratory, and report preparation activities performed under the Permit. "Operational control," at a minimum, includes direct, personal involvement and oversight of all: personnel management; fieldwork operations (boat operations, remote sensing, mapping, diving, excavations, artifact and data recovery); laboratory operations (artifact stabilization, documentation, analysis and conservation); and reporting. Failure by the Permittee to demonstrate operational control of permitted activities may result in revocation of the Permit.

F. Issuance or renewal of this permit shall not be construed to confer in the Permittee any right against claims of third parties. Nor shall this permit be construed to create in DNCR or the State any duty or obligation to defend or in any way support the Permittee against claims by third parties. DNCR and the State reserve the right to make determinations on whether to defend or support the Permittee based on the facts and circumstances of each claim.

G. Prior to commencing any recovery operations, the Permittee shall be responsible for obtaining all required permits and authorization from other state and federal regulatory agencies and, if necessary, adjacent landowners.

H. The Permit Holder agrees to notify the office of the Underwater Archaeology Branch, 1528 Fort Fisher Blvd. South, Kure Beach, North Carolina 28449, phone 910/458-9042, or email (nathan.henry@ncdcr.gov) at least 48 hours prior to initiating any field activities.

I. With regard to the matters authorized and regulated by terms of this Permit, the Underwater Archaeology Branch (UAB) and other DCR agency officials may perform inspections of any operations or facilities of the permit holder or its contractors, on reasonable (24 hour minimum) advance notification.

J. DNCR may require the Permit Holder to reimburse DNCR for reasonable costs incurred by UAB/DCR personnel when performing on-site or on-premises inspections. If required, reimbursement shall be consistent with State laws and regulations governing travel and subsistence allowances of State officers and employees. DNCR will coordinate with the Permit Holder prior to incurring expenses for which DNCR intends to request reimbursement.

K. This Permit prohibits the use of devices, including propwash deflectors, "blowers" or "mailboxes," which force water onto the ocean floor and displace sediment for the purpose of discovering, exposing, or excavating shipwrecks, or any portions thereof, or their associated cargoes, tackle, and materials. The use of handheld excavation devices, such as induction dredges or airlift systems, is permitted as long as the user maintains proper archaeological controls. All excavation methods must be approved in advance by the Deputy State Archaeologist, UAB.

L. Before undertaking recovery of any artifacts, the Permit Holder shall demonstrate to the satisfaction of DNCR that they have provided for facilities within the State of North Carolina, sufficient in size, security, equipment, staffing and supplies to perform stabilization, conservation, and analysis of all recovered artifacts

M. All artifacts and other materials recovered during this investigation remain property of the State of North Carolina.

N. If, for any reasons enumerated in the Permit, the Permit is revoked or future Permit renewal requests are denied, all materials recovered under terms of this Permit shall be returned to DNCR custody as soon as possible, at a time and place determined by DNCR and the Permit Holder. No materials may be removed from the territorial limits of North Carolina for any reason without the prior written authorization of the State Archaeologist or Deputy State Archaeologist, UAB.

O. The Permit Holder shall keep a daily log of activities conducted under this Permit including a list of recovered artifacts with assigned identification numbers, provenience, labeled digital images, and current disposition. The Permit Holder shall submit copies to UAB of this log on a monthly basis during field operations by mail or email (nathan.henry@ncdcr.gov). Daily logs shall include precise locational data (corrected GPS coordinates) for all actual or potential targets or finds, and more generally for all areas of exploration conducted during the reporting period. If no work is conducted during a given month, the Permittee shall notify DNCR of this fact in writing. Failure to submit copies of the daily logs or monthly progress reports in a timely manner may be grounds for permit revocation. All logs and reports shall be signed and dated by the Permittee.

P. At least 60 days prior to the expiration of the Permit, the Permittee shall provide DNCR with a draft project report as described in Section .1011 of DNCR's "Exploration and Salvage Rules and Regulations." DNCR shall have 30 days to review the draft report and provide the Permittee with comments. Upon receipt of DNCR's comments, the Permittee shall have 30 days to submit a final version of the report. Final reports shall be accompanied by scanned copies of all field records, daily logs, charts, maps, artifact inventories and images. After DNCR review and approval, a digital copy of the final report shall be submitted to UAB electronically.

Appendix B

Findpoint	Ferrous reading	Conductivity Reading	Depth (m)
FP001	21	36	0.26
FP002	34	13	0.14
FP003	1	34	0.11
FP004	35	50	0.09
FP005	14	44	0.11
FP006	23	1	0.27
FP007	1	29	0.12
FP008	25	32	0.25
FP009	17	25	0.26
FP010	14	25	0.06
FP011	12	28	0.08
FP012	12	22	0.16
FP013	6	26	0.1
FP014	8	18	0.15
FP015	20	42	0.17
FP016	15	12	0.09
FP017	12	15	0.12
FP018	33	46	0.07
FP019	11	35	0.06
FP020	35	45	0.14
FP021	33	41	0.1
FP022	35	25	0.22
FP023	31	43	0.05
FP024	1	28	0.1
FP025	2	42	0.13
FP026	8	19	0.13
FP027	9	13	0.18
FP028	17	13	0.18
FP029	11	26	0.17
FP030	12	27	0.08
FP031	24	45	0.05
FP032	17	8	0.17
FP033	14	30	0.15
FP034	12	34	0.08
FP035	28	48	0.08
FP036	9	7	0.18
FP037	10	18	0.1

FP038	14	33	0.12
FP039	12	12	0.1
FP040	12	24	0.05
FP041	11	36	0.1
FP042	10	10	0.18
FP043	1	21	0.17
FP044	1	32	0.26
FP045	35	16	0.06
FP046	12	41	0.22
FP047	33	25	0.3
FP048	35	47	0.15
FP049	12	47	0.05
FP050	35	42	0.05
FP051	35	50	0.08
FP052	21	9	0.17
FP053	15	7	0.24
FP054	14	18	0.21
FP055	35	46	0.24
FP056	35	39	0.23
FP057	11	15	0.1
FP058	6	30	0.08
FP059	35	50	0.12
FP060	33	9	0.29
FP061	17	25	0.11
FP062	16	42	0.1
FP063	13	7	0.1
FP064	1	13	0.12
FP065	1	16	0.3
FP066	13	2	0.19
FP067	21	43	0.07
FP068	34	27	0.12
FP069	12	41	0.09
FP070	3	12	0.26
FP071	12	3	0.13
FP072	1	16	0.07
FP073	5	21	0.11
FP074	11	32	0.26
FP075	10	41	0.06
FP076	35	49	0.07
FP077	13	15	0.21
FP078	20	3	0.2

FP079	35	50	0.07
FP080	35	44	0.09
FP081	14	22	0.04
FP082	25	9	0.1
FP083	9	37	0.1
FP084	1	40	0.11
FP085	15	10	0.16
FP086	12	43	0.08
FP087	8	38	0.09
FP088	21	1	0.24
FP089	33	49	0.06
FP090	10	39	0.12
FP091	6	18	0.17
FP092	15	24	0.14
FP093	35	48	0.24
FP094	26	45	0.14
FP095	10	30	0.18
FP096	10	7	0.12
FP097	20	40	0.28
FP098	15	12	0.11
FP099	12	22	0.16
FP100	10	16	0.1
FP101	18	21	0.08
FP102	12	28	0.17
FP103	8	37	0.1
FP104	4	26	0.09
FP105	17	39	0.11
FP106	29	41	0.19
FP107	12	36	0.14
FP108	2	30	0.11
FP109	35	16	0.19
FP110	24	42	0.11
FP111	35	36	0.1
FP112	35	49	0.09
FP113	14	43	0.19
FP114	35	44	0.1
FP115	28	48	0.21
FP116	8	2	0.22
FP117	10	36	0.14
FP118	13	15	0.12
FP119	1	30	0.18

FP120	10	41	0.12
FP121	34	43	0.08
FP122	10	38	0.07
FP123	33	39	0.11
FP124	5	39	0.16
FP125	19	40	0.22
FP126	28	48	0.05
FP127	12	4	0.09
FP128	26	35	0.15
FP129	32	44	0.14
FP130	11	6	0.21
FP131	8	17	0.23
FP132	12	15	0.13
FP133	10	30	0.06
FP134	32	47	0.05
FP135	12	17	0.06
FP136	35	39	0.11
FP137	9	23	0.05

Table 12. Magnetic anomalies detected from CTX3030 metal detector during the shoreline inspection off Little Kinnakeet. Tables also show ferrous content, conductivity, and depth.

Appendix C

Findpoint	Ferrous reading	Conductivity reading	Depth (m)
FP001	9	34	0.18
FP002	11	34	0.08
FP003	10	45	0.06
FP004	35	43	0.12
FP005	29	41	0.07
FP006	11	38	0.18
FP007	18	38	0.19
FP008	23	40	0.19
FP009	35	44	0.1
FP010	12	37	0.19
FP011	29	45	0.12
FP012	2	44	0.19
FP013	6	41	0.16
FP014	5	11	0.1
FP015	32	45	0.11
FP016	35	42	0.16
FP017	30	40	0.12
FP018	30	41	0.09
FP019	23	47	0.17
FP020	30	42	0.07
FP021	33	46	0.05
FP022	6	35	0.17
FP023	11	38	0.02
FP024	21	42	0.11
FP025	8	41	0.05
FP026	35	45	0.11
FP027	34	42	0.17
FP028	35	42	0.17
FP029	24	41	0.17
FP030	13	44	0.18

Table 13. Magnetic anomalies detected from CTX3030 metal detector during the Richards and Parker 2017 study. Tables also show ferrous content, conductivity, and depth. Table provided courtesy of N. Richards.

Appendix D

Target	Longitude	Latitude	Max Swing (+)	Max Swing (-)	Start of Dipole	End of Dipole	Target Base Value	Target Intensity (deviation b/t peaks)
MA#1	13919923	454497.7	48934.06	48961.73	12:58:03 PM	12:58:01 PM	48955	27.67
MA#2	13918800.9	454404.8	48960.77	48966.82	12:38:24 PM	12:38:23 PM	48942	6.05
MA#3	13920200.1	454684	48720.41	48938.62	1:35:28 PM	1:35:32 PM	48923	218.21
MA#4	13919638.6	454571.7	48594.8	48919.98	1:42:12 PM	1:42:14 PM	48870	325.18
MA#5	13918515.5	454336.9	48942.57	49078.87	1:55:17 PM	1:55:18 PM	48946	136.3
MA#6	13918634.4	454333.3	48944.61	49074	2:04:37 PM	2:04:36 PM	48959	129.39
MA#7	13918582.8	454322.9	48934.28	48946.72	2:04:17 PM	2:04:16 PM	48955	12.44
MA#8	13918355.4	454281.6	48928.02	48949.09	2:00:15 PM	2:00:11 PM	48943	21.07
MA#9	13920415.9	454685.3	48975.71	48981.54	2:56:32 PM	2:56:34 PM	48961	5.83
MA#10	13920399.2	454658.5	48856.57	48985.88	3:51:31 PM	3:51:30 PM	48941	129.31
MA#11	13920875	454761.9	48979.89	48114.93	3:58:35 PM	12:15:58 AM	48973	864.96
MA#12	13920295.8	454648.1	48971.35	48983.88	3:50:11 PM	3:50:09 PM	48972	12.53
MA#13	13918707.3	454296.2	48898.01	49017.28	4:36:01 PM	4:36:02 PM	48939	119.27
MA#14	13918680.9	454292.6	48911.02	48967.07	10:21:48 AM	10:21:49 AM	48947	56.05
MA#15	13920308.1	454585.5	48911.09	48987.65	11:07:37 AM	11:07:40 AM	48915	76.56
MA#16	13920370.7	454583.9	48949.13	48976.82	12:01:32 PM	12:01:31 PM	48957	27.69
MA#17	13920181.9	454520.4	48712.62	49276.42	12:28:50 PM	12:28:51 PM	48875	563.8
MA#18	13920335	454526.9	48491.36	49942.15	1:23:59 PM	1:23:57 PM	48913	1450.79
MA#19	13919398.9	454229.7	48775.73	48949.54	11:14:14 AM	11:14:16 AM	48885	173.81
MA#20	13919253.1	454208.9	48914.21	48966.25	11:16:58 AM	11:17:05 AM	48936	52.04
MA#21	13918712.4	454078.3	48698.84	49042.85	11:37:44 AM	11:37:43 AM	48854	344.01

MA#22	13920765.2	454488.2	48465.77	49027.91	12:26:12 PM	12:26:17 PM	48771	562.14
MA#23	13920126.7	454319.1	48954.26	48966.16	1:38:28 PM	1:38:25 PM	48980	11.9
MA#24	13918866	454073.1	48961.57	48971.76	1:22:11 PM	1:22:10 PM	48969	10.19
MA#25	13920438.2	454352.4	48982.39	49080.87	3:02:13 PM	3:02:10 PM	48995	98.48
MA#26	13920335.2	454352.4	48996.61	49017.12	3:01:01 PM	3:01:00 PM	48984	20.51
MA#27	13920103.3	454411	48950.55	48986.54	10:22:48 AM	10:22:44 AM	48953	35.99
MA#28	13920335	454547.7	48491.36	49942.15	1:23:59 PM	1:23:57 PM	48522	1450.79
MA#29	13920181.9	454530.6	48712.62	49276.42	12:28:50 PM	12:28:51 PM	48773	563.8
MA#30	13920268.6	454497.7	48950.05	49006.74	1:50:04 PM	1:50:42 PM	48966	56.69

Table 14. Magnetometer Raw Data

Appendix E

Target Name	Fish Altitude	Range to Target	Length	Width	Category
TAR_01	0.3	11.8	5.9	0.6	Limb
TAR_02	0.6	8.2	7.8	2.6	Limb
TAR_03	0.4	6.8	0.5	0.5	Marine_Debris
TAR_04	0.4	18.1	6.8	1.2	SAV
TAR_05	0.4	11.3	3.1	9.7	SAV
TAR_06	0.4	10.1	3.5	1.8	SAV
TAR_07	0.4	14.2	5.8	0.7	Marine_Debris
TAR_08	0.3	8	2.6	0.3	SAV
TAR_09	0.2	5.8	10.3	0.6	SAV
TAR_10	0.1	9	1.1	1	SAV
TAR_11	0.3	14	5.2	0.8	SAV
TAR_12	0.5	6.7	n/a	n/a	SAV
TAR_13	0.3	12.1	4	1	SAV
TAR_14	0.3	16.1	6.7	0.9	Scour
TAR_15	0.2	4.2	0.7	0.5	False_Target
TAR_16	0.5	5.8	1.4	6.9	SAV
TAR_17	0.2	5.5	2.4	2.4	SAV
TAR_18	0.3	1.1	0.2	0.6	Unknown_Object
TAR_19	0.4	10.7	17	0.5	SAV
TAR_20	0.6	6.2	13.4	10.6	Impression
TAR_21	0.3	10.4	0.3	0.2	SAV
TAR_22	0.3	6	7.6	4	SAV
TAR_23	0.5	4.2	0.9	0.3	Marine_Debris
TAR_24	0.5	17.9	0.9	8.1	Scour
TAR_25	0.7	10.7	8.5	12.1	SAV
TAR_26	0.5	6.2	0.5	4.9	SAV
TAR_27	0.5	4.4	0.9	3.8	Unknown_Object
TAR_28	0.4	7.5	2.9	1.1	SAV
TAR_29	0.5	3.5	0.6	2	Scour
TAR_30	0.5	5.6	0.7	2.7	SAV
TAR_31	0.4	10.1	9	9.8	SAV
TAR_32	0.5	16.8	5.2	0.8	Marine_Debris
TAR_33	0.5	5.8	0.6	0.3	Marine_Debris
TAR_34	0.5	5.3	5.2	0.6	Impressions
TAR_35	0.5	16.6	5.4	0.5	Impressions

TAR_36	0.6	6.1	0.9	4.9	SAV
TAR_37	0.6	13.4	3.3	2.3	SAV
TAR_38	0.6	11.8	0	0	SAV
TAR_39	0.6	7.7	0.5	1.4	SAV
TAR_40	0.5	15.4	6.1	1.6	SAV
TAR_41	0.5	3.5	0	0	SAV
TAR_42	0.3	5.1	1.2	0.3	Unknown_Object
TAR_43	0.3	1.9	0.7	0.2	False_Target
TAR_44	0.3	1.2	0	0	Unknown_Object
TAR_45	0.4	12	5.6	0.6	SAV
TAR_46	0.4	1.9	0.3	0.3	SAV
TAR_47	0.5	6.5	0.5	0.2	SAV
TAR_48	0.3	2.2	0.7	0.5	SAV
TAR_49	0.4	12	0.8	0.9	SAV
TAR_50	0.3	4.2	0.5	0.4	SAV
TAR_51	0.3	7.4	8.3	0.5	Impression
TAR_52	0.5	8	1	0.5	SAV
TAR_53	0.5	2.2	1.2	0.4	SAV
TAR_54	0.6	7.2	0.5	1.2	Unknown_Object
TAR_55	0.4	2.2	0.3	0.1	Unknown_Object
TAR_56	0.4	6.9	0.6	0.3	Unknown_Object
TAR_57	0.4	8.4	0	0	SAV
TAR_58	0.5	16.2	5.4	1.3	SAV
TAR_59	0.3	9.4	4.6	0.3	SAV
TAR_60	0.5	11.4	0	0	SAV
TAR_61	0.7	13.7	7.8	0.9	SAV
TAR_62	0.6	10.9	0.7	0.8	SAV
TAR_63	0.7	6.7	9.9	0.7	SAV
TAR_64	0.7	5.2	0.8	0.4	SAV
TAR_65	0.4	4.7	0	0	SAV
TAR_66	0.4	2.9	0.3	0.2	Marine_Debris
TAR_67	0.4	1.8	0.3	0.1	SAV
TAR_68	0.3	2	0.7	0.3	SAV
TAR_69	0.7	3	0.9	0.3	Impression
TAR_70	0.4	10.8	4.7	0.6	Impression
TAR_71	0.6	13.7	3.8	0.5	SAV
TAR_72	0.5	13.2	6	0.6	Unknown_Object
TAR_73	0.6	2.3	0.3	0.3	SAV
TAR_74	0.4	9.8	1.7	0.9	SAV
TAR_75	0.4	3.9	0.1	0.3	SAV

TAR_76	0.5	7.8	0.4	0.3	SAV
TAR_77	0.6	6.4	1	0.3	Unknown_Object
TAR_78	0.3	2.5	0.4	0.1	Scour
TAR_79	0.4	2.4	2.2	1	SAV
TAR_80	0	1.3	-	-	SAV
TAR_81	0.2	3.5	2.1	2	SAV
TAR_82	0.2	5.7	-	-	SAV
TAR_83	0.5	4.3	0.4	0.6	SAV
TAR_84	0.2	4.7	0.2	0.1	SAV
TAR_85	0.3	1.4	0.4	0.2	SAV
TAR_86	0.4	2.5	0.6	0.4	Unknown_Object
TAR_87	0.3	2.7	0.4	0.3	Unknown_Object
TAR_88	0.4	1.3	-	-	SAV
TAR_89	0.6	4	0.6	0.4	SAV
TAR_90	0.3	5	0.6	0.4	Unknown_Object
TAR_91	0.3	3	0.2	0.1	SAV
TAR_92	0.4	2.8	0.2	0.2	SAV
TAR_93	0.5	9.4	1	1.5	SAV
TAR_94	0.5	4	0.3	0.1	SAV
TAR_95	0.7	2.2	0.6	0.4	SAV
TAR_96	0.5	2.3	-	-	SAV
TAR_97	0.4	3.2	0.8	0.5	SAV
TAR_98	0.5	3	0.5	0.2	SAV
TAR_99	0.5	2.9	1	1	SAV
TAR_100	0.2	6	0.3	0.4	SAV
TAR_101	0.2	6	0.8	0.7	Unknown_Object
TAR_102	0	13.8	2	1.6	SAV
TAR_103	0	8.1	-	-	SAV
TAR_104	0	1.2	0.4	0.1	SAV
TAR_105	0	2.6	0.7	0.3	Piling
TAR_106	0	6.8	-	-	Piling
TAR_107	0.2	8.1	0.8	0.9	Crab_Pot
TAR_108	0.2	2.6	0.5	0.6	SAV
TAR_109	0.3	2	0.3	0.2	SAV
TAR_110	0.2	0.5	-	-	Piling
TAR_111	0.2	2.5	0.7	0.2	Unknown_Object
TAR_112	0.2	2.7	0.6	0.4	SAV
TAR_113	0.2	2.7	0.3	0.2	SAV
TAR_114	0.2	1.4	-	-	SAV
TAR_115	0.2	1.3	-	-	SAV

TAR_116	0.3	1.6	0.6	0.5	SAV
TAR_117	0.3	2.3	2	1.4	SAV
TAR_118	0.3	1.7	-	-	Piling
TAR_119	0.4	3.1	0.3	0.2	SAV
TAR_120	0.6	6.5	0.6	0.6	Marine_Debris
TAR_121	0.4	7.1	2.9	0.3	Scour
TAR_122	0.5	2.2	0.9	0.6	SAV
TAR_123	0.8	3.8	0.9	0.4	SAV
TAR_124	0.6	13.1	1.2	0.7	Marine_Debris
TAR_125	0.5	3.2	2	0.4	Scour
TAR_126	0.5	1.6	-	-	SAV
TAR_127	0.3	5.5	-	-	SAV
TAR_128	0.3	2.7	0.6	0.4	SAV
TAR_129	0.5	2.9	1.3	0.3	SAV
TAR_130	0.5	9.7	-	-	SAV
TAR_131	0	14	-	-	SAV
TAR_132	0	2.1	0.3	0.6	SAV
TAR_133	0.2	3.4	3.7	0.2	Scour
TAR_134	0.2	5.6	-	-	Scour
TAR_135	0.2	11.7	-	-	Duck_Blind
TAR_136	0.2	2.6	-	-	False_Target
TAR_137	0.2	4.1	0.9	0.6	False_Target
TAR_138	0.6	3.1	2.1	1.3	Unknown_Object
TAR_139	0.3	1.2	-	-	Piling
TAR_140	0.5	2.6	0.7	0.4	SAV
TAR_141	0.5	4.5	1.3	0.9	SAV
TAR_142	0.6	7.8	0.9	0.6	Unknown_Object
TAR_143	0.8	9.1	1	0.6	Unknown_Object
TAR_144	0.7	8.7	0.4	0.3	Unknown_Object
TAR_145	0.8	4	0.8	0.4	SAV
TAR_146	0.8	3.2	0.6	0.4	SAV
TAR_147	0.8	3	1	1.3	Unknown_Object
TAR_148	0.7	3	0.3	0.2	Marine_Debris
TAR_149	0.3	8.9	8.9	0.4	Scour
TAR_150	0.5	1.5	0.6	0.4	SAV
TAR_151	0.3	4.5	0.8	0.8	Crab_Pot
TAR_152	0.4	6	0.8	0.6	Piling
TAR_153	0.6	2.1	-	-	False_Target
TAR_154	0.9	5.7	-	-	Unknown_Object
TAR_155	0.6	3.6	0.3	0.3	Unknown_Object

TAR_156	0.4	6.4	0.7	0.3	Unknown_Object
TAR_157	0.4	1.9	-	-	SAV
TAR_158	0.7	2.7	-	-	Unknown_Object
TAR_159	0.4	4.1	-	-	Unknown_Object
TAR_160	0.8	4	0.5	0.5	Unknown_Object
TAR_161	0.8	4.3	0.3	0.3	Unknown_Object
TAR_162	0.8	3.7	0.6	0.2	Unknown_Object
TAR_163	0.6	7.2	0.8	0.7	SAV
TAR_164	0.5	4	5.1	1	SAV
TAR_165	0.3	3	0.4	0.2	SAV
TAR_166	0.5	3.4	1.4	1.1	SAV
TAR_167	1	5.3	1.1	0.3	Marine_Debris
TAR_168	0.8	3.6	0.4	0.5	SAV
TAR_169	0.7	3.2	-	-	SAV
TAR_170	0.8	4.7	0.3	0.3	Unknown_Object
TAR_171	0.8	3.9	1.1	0.5	Unknown_Object
TAR_172	0.6	4.9	0.5	0.4	Unknown_Object
TAR_173	0.6	3.6	1	0.3	Unknown_Object
TAR_174	0.6	2.3	1.7	0.6	SAV
TAR_175	0.5	4.7	0.4	0.6	Piling

Table 15. Visual anomalies revealed during the side-scan sonar survey. Sonar targets were captured by the Tritech Starfish Sonar device during the remote sensing survey off Little Kinnakeet.