Abstract
A DETERMINATION WORTHY OF A BETTER CAUSE:
NAVAL ACTION AT THE BATTLE OF ROANOKE ISLAND 7 FEBRUARY 1862

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The Battle of Roanoke Island, during the American Civil War, was one of the first major amphibious landing operations in U.S. military history. As the Union Army landed troops on the island, an accompanying Union Naval squadron engaged a squadron of Confederate gunboats and some small forts on the island. This was the first in a series of battles known as the Burnside Expedition, which established a Union presence in eastern North Carolina that would last until the end of the Civil War.

While the battle is historically important in its own right, here it serves as a case study for the application of a revised theory of battlefield archaeology that has been developed expressly for the purpose of studying human behavior during conflict. Drawing from a number of established theories of battlefield archaeology, this study incorporates a theory of military forces as complex systems, which redirects the focus of those established theories more closely on the study of human behavior. Using historical, geospatial, and archaeological data, this study explores the motivations behind the decisions made by the Union and Confederate naval commanders during the battle. Additionally, a limited side-scan sonar survey was conducted in order to assess the current state of submerged cultural resources related to the battle.

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The Department of History
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Master of Arts in Maritime Studies

By
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# Chapter 1: Introduction

On 7 February 1862, Brigadier General Ambrose Burnside and Flag Officer Louis Goldsborough led a joint Army-Navy assault on Roanoke Island, North Carolina (Figure 1). In what has been called "the first major amphibious operation in United States history" (Carbone 2001:23), gunboats under Goldsborough's command bombarded Confederate forts and gunboats defending the island while Burnside landed some 10,000 troops onshore. By the end of 8 February, the majority of the Confederate defenders had either surrendered or been captured, and the island was firmly under Union control. From this base of operations, Burnside would move forward to capture New Bern, Morehead City, Beaufort, and Washington before being called away to reinforce General-in-Chief George B. McClellan in Virginia (Barrett 1975: 128)

Although McClellan's disastrous Peninsular Campaign often overshadows Burnside's successes in historic accounts of the Civil War, the Battle of Roanoke Island is nevertheless an important event in the history of both North Carolina and the United States. The capture of the island opened the door to a Union occupation of the majority of eastern North Carolina, which would prove a constant pressure on Lee's later operations in Virginia, sometimes causing him to divert much needed troops away from key engagements (Barrett 1975:129).

Moreover, the Battle of Roanoke Island took place during a unique period of the history of the U.S. Navy. At this early point in the war, no new warships had been constructed, and the Navy relied largely on purchased or chartered vessels to make up its numbers. In addition, Navy arsenals were not yet fully equipped to outfit this influx of new vessels with the large shell guns and rifled cannon that became the hallmark of naval battles later in the war.

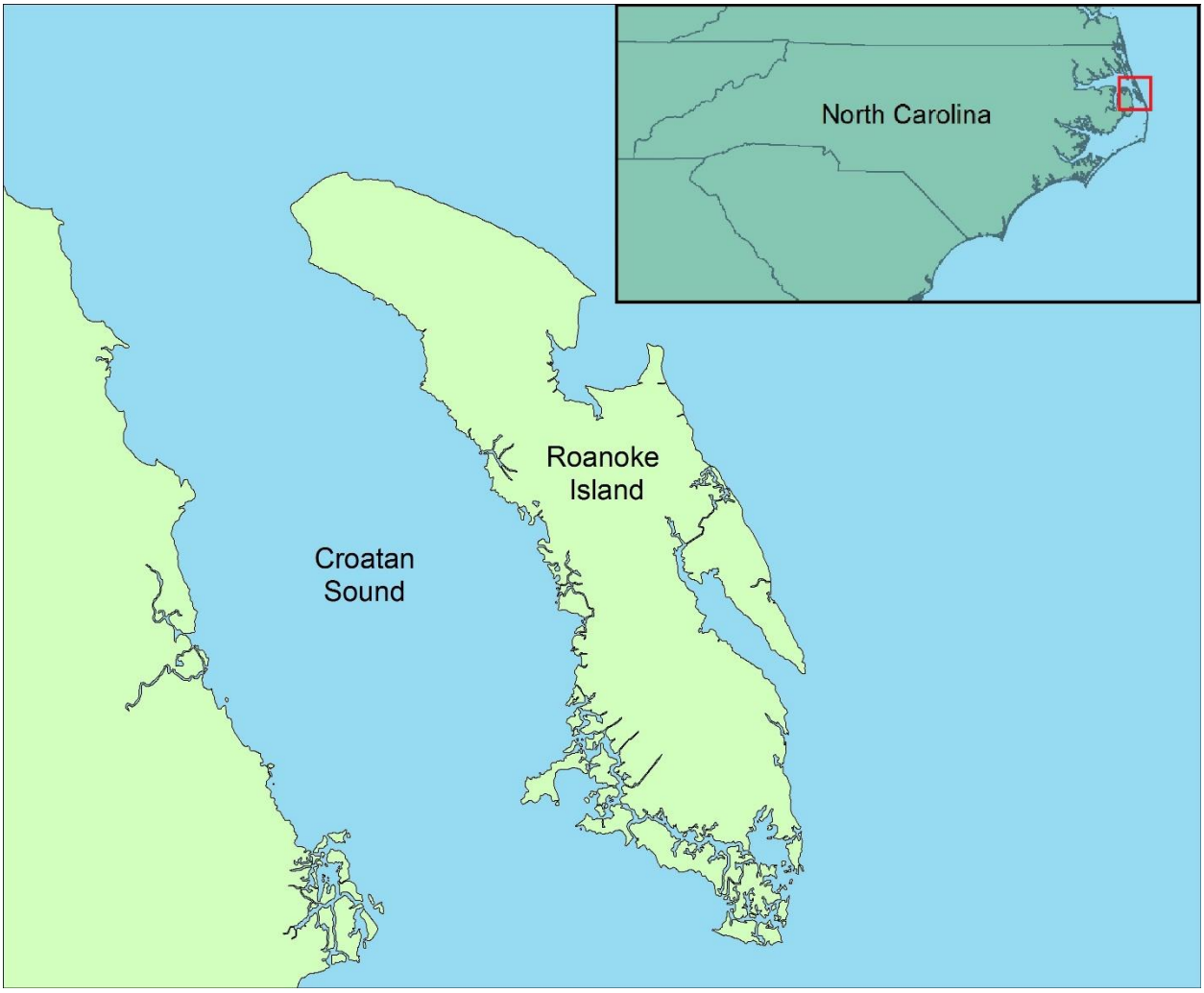


Figure 1: Location of Roanoke Island in North Carolina (Lucas Simonds)

The vessels that fought at Roanoke Island were an ad-hoc mixture of ferries, tugs, and other small merchant craft armed with cannon ranging from 32 pounders designed in the 1840s to Parrott Rifles cast shortly before the expedition set out. Although the rise of ironclads and heavy shell guns are often the only aspects of the Civil War at sea which generally receive attention, battles such as Roanoke Island are illustrative of the Navy early in the war, and the tactics that were developed to make the best use of available resources (Silverstone 2001).

Because the Battle of Roanoke Island is so often overlooked despite its importance to the history of North Carolina, the United States, and the U.S. Navy, the present study is intended to carry out a more thorough investigation of the actions of the Union and Confederate Navies in

this battle than has heretofore been attempted. Previous studies of the battle have been largely descriptive in nature, drawing exclusively from primary accounts to create a narrative of the battle, and focused primarily on the actions of the Army. Building on the foundation of prior studies of maritime battlefields, the present study will employ anthropological analyses of historical, geospatial, and archaeological data in order to construct an explanatory account of the actions of the naval forces during the battle. In this way, factors of human behavior which fall outside the scope of a traditional descriptive narrative can be explored, and the decision making processes that led to the outcome of the battle can be better understood. Furthermore, it is hoped that, through the creative application of established theoretical approaches to the study of the Battle of Roanoke Island, a new theoretical approach will be created which more fully addresses the myriad influences on human behavior during conflict.

## Previous Research

Although the present study is intended to be the most in-depth study of the battle to date, the Battle of Roanoke Island has by no means been entirely neglected in historical scholarship to date. Beginning with one of the earliest histories of the navies of the Civil War, that by John Scharf (1887), the battle has held an important place in the story of the war. In this account as in most, however, the primary focus is on the battle's place in the overarching narrative of the war, and nothing more than the key facts of the engagement are presented. More commonly, accounts of the battle appear in histories of the war in North Carolina (Barrett 1975; Mallison 1998; Carbone 2001; Morrill 2002; Campbell 2005). Although these accounts of the battle are often lengthy and detailed, they are still primarily descriptive narratives, with little attempt made at an explanation of the events of the battle. Additionally, most accounts focus almost exclusively on the role of the Army in the battle rather than that of the Navy. Recently, studies of joint Army-

Navy operations in the war have also touched on the battle (Reed 1978; Gibson and Gibson 1995; Symonds 2010). These studies, though, have focused either on the organization and logistics behind such operations or only briefly skimmed over the battle before moving on to engagements that have traditionally been considered more notable. In fact, to date, no explanatory account of the battle as a whole or of its naval aspect has been produced, and no historical work has been dedicated solely to the Battle of Roanoke Island.

In addition to the historical studies discussed above, a number of archaeological studies are also of some importance to the study of the battle. The first archaeological survey of the battlefield was carried out by the North Carolina Underwater Archaeology Branch (UAB) in 1988 under the direction of Wilson Angley. This magnetometer survey was intended to locate the wreck of CSS *Curlew*, the only vessel lost during the battle, and a number of schooners that the Confederate defenders sank to form a barricade across the main channel near the island. Although this survey was unsuccessful in locating any of the vessels from the barricade, it was successful in locating the wreck of CSS *Curlew* (Henry 2003a). The first follow-up to this initial survey took place in 1994. In that year, the UAB and the East Carolina University Program in Maritime Studies carried out an investigation of the wreck of CSS *Curlew*. The results of that project were a detailed site map, multiple detailed records of the features of the vessel, and a thesis on the history of the vessel by Christopher Olson (1997). In 2003, the UAB returned to the battlefield to conduct a further magnetometer survey in search of the Confederate barricade. This survey was successful in locating two wrecks filled with stones that were most likely part of that barricade (Henry 2003b). The final and most recent survey of the battlefield took place in 2005. During the summer of that year, Barry Cullens undertook a side-scan sonar survey in search of further wrecks from the barricade. This survey was followed up in November when divers from

the UAB investigated targets from Cullens' survey. These divers were able to carry out further investigations of the two wrecks located during the 2003 survey and identified two new wrecks which were likely also related to the barricade (Henry 2005). Although these surveys provide valuable archaeological data pertaining to the battle, no attempt has yet been made to incorporate this data into an explanatory account of the events of the battle.

Apart from those archaeological studies relating directly to the Battle of Roanoke Island, another body of research is particularly relevant to the present study. The theory and methodology employed in the present study are built upon a foundation established by previous archaeological studies of terrestrial and maritime battlefields. Military terrain study, which is the core theory on which the present study is based, has been developed and popularized through battlefield studies sponsored by the American Battlefield Protection Program (ABPP), an effort by the National Park Service to investigate and document historic battlefields in the United States for the purposes of inventory and preservation. While the sheer number of surveys carried out under this program makes a full accounting of those studies impractical here, the survey manual of the program (Lowe 2000) and Charles Mabeltini's work on the Confederate defenses along the Apalachicola River (2012) have served as guides for understanding the theory and practice of ABPP terrain studies. The primary theoretical focus of the ABPP studies has been to examine the landscape of the battlefield through frameworks developed in the military in order to assess the military significance of the features of the terrain. These studies, however, have still been generally, although not exclusively, descriptive in nature despite the fact that they examine aspects of the battle which fall outside traditional historical narratives.

The first ABPP funded study of a maritime battlefield was carried out by Panamerican Consultants in 2005. This study examined naval operations on the Ogeechee River in Georgia

during the Civil War (Lydecker and James 2005). Although this study is important as the earliest to apply the ABPP theory and methodology to a maritime battlefield, it has little bearing on the present study, as it was focused purely on creating an inventory of the submerged cultural resources in the area and did not advance the theory of the study of maritime battlefields.

The inspiration behind the theory employed in the current study is found rather in the second ABPP funded study of a maritime battlefield. Larry Babits' 2010 study focused on six separate engagements in and around Chesapeake Bay that took place during the American Revolution and the War of 1812. Babits' key contribution was to recognize the potential of terrain study to move beyond the description of militarily significant terrain features. Rather, he sought to examine how those features affected the actions taken during the battle in order to work towards an explanation of the course that the events of the battle took. Babits also introduced conceptual frameworks from wider military scientific theory, namely METT-T (Mission, Enemy, Terrain, Troops Available, Time Available) and the Principles of War (Objective, Offensive, Maneuver, Mass, Economy of Force, Unity of Command, Security, Surprise, Simplicity). These frameworks, which will be explained further in Chapter Two, were used to examine important elements of the battle, such as the nature of the troops available to each side, and to compare the actions of the combatants with long-standing tactical principles. Through the introduction of these theoretical concepts to archaeological study, Babits established a true explanatory approach (the METT-T/Principles of War approach) to the study of historic battles and battlefields. In the case of his 2010 study, however, the thrust of the approach was still to inform archaeological investigation by better delineating the terrain on which the battle took place. Although there was some explanatory analysis of the events of the battle, it centered

on determining how the conformity or non-conformity of the combatants to tactical principles led to the outcome of the battle (Babits 2010:5-12, 76-86).

The third ABPP study of a maritime battlefield was carried out in 2012 by John Bright, and it was this study that finally established the essential theoretical framework on which the present study is based. The battle in question in Bright's study was the attack of Convoy KS-520 by *U-576* during World War Two. Although the study of this particular battle was the focus of Bright's thesis research, it was undertaken as a part of NOAA's Battle of the Atlantic Expedition (BoA) (Richards et al. 2011). The theory and research design for Bright's study were based on those of the BoA and were created through a collaboration between Bright and the leaders of that expedition. In his study, Bright sought to establish the relevance of the METT-T/Principles of War approach by comparing the results of a terrain study as outlined by the ABPP with a study carried out using the METT-T/Principles of War approach. In doing so, however, Bright also moved beyond the scope of Babits' study to confront questions about human behavior during conflict. Whereas Babits had focused on the actions taken by the combatants and how their conformity or non-conformity to tactical principals led to the outcome of the battle, Bright questioned why those actions were taken in the first place and how tactical principals may have influenced the decisions of the combatants. In doing so, he necessarily addressed some factors that lay outside the scope of the METT-T/Principles of War approach as established by Babits. (Bright 2012:38-39,117,303-320). The addition of these new factors, which will be discussed at length in Chapter Two, allowed for a better understanding of the motivations behind the behavior of the commanders during battle, and it is for this reason that the theory pioneered in Bright's work is considered the starting point for the present study.

## Objectives

The primary objective of the present study is to complete a detailed anthropological investigation of the naval action at the Battle of Roanoke Island using historical, geospatial, and archaeological data. A secondary objective is to formalize a revised form of the METT-T/Principals of War approach which better addresses questions of human behavior during conflict. The primary objective is achieved through the collection and compilation of geospatial, archaeological, and historical datasets into qualitative and quantitative assessments of various aspects of the battle and battlefield, and the creation of a Geographic Information System (GIS) to visualize relevant geospatial information. These datasets are then analyzed based on established theoretical approaches in order to produce interpretations concerning the decision making processes which led to the actions taken by the Union and Confederate squadrons during the battle. These interpretations are then synthesized with the historical narrative of the battle in order to produce an explanatory account of the battle. The secondary objective is achieved through the repurposing of established theoretical approaches as they are applied to the study of the Battle of Roanoke Island. In this way, the battle serves as a case-study for the efficacy of these approaches and as a demonstration of the ways in which these approaches can be used to answer questions concerning human behavior during conflict.

## Research Questions

As stated in the primary objective of this study, many questions concerning the naval action at the Battle of Roanoke Island will be answered as a result of the present study. The research questions, however, center on the development of a revised theoretical approach for the study of human behavior during conflict. Hence, the primary research question is:

*Is there an observable benefit to the use of this revised theoretical approach over the METT-T/Principals of War approach for the purpose of examining human behavior during conflict?*

Additionally, two secondary research questions are of some importance:

- *Does an anthropologically based battlefield study provide significant interpretive value over traditional narratives of a battle?*
- *What is the extent and state of preservation of the submerged cultural resources left by the naval action at the Battle of Roanoke Island in Croatan Sound?*

Thesis Structure

Chapter One is the introduction, which describes the importance of the present study, reviews previous work, and outlines the objectives and research questions. Chapter Two presents the details of the established theoretical approaches to battlefield study that form the basis of the approach utilized in the present study. Chapter Three outlines the methodology of the present study. This includes a review of the historical, archaeological, and geospatial sources that were used, details concerning the creation of the GIS, and the methodology of the associated archaeological survey. Chapter Four details the historical context of the battle and includes a detailed account of the events of the battle itself. Although a historical chapter such as this typically comes before the chapter on methodology, the integral nature of the historical context and narrative to the analysis performed in Chapter Five makes this position more logical. In Chapter Five, the revised theoretical approach is introduced as it is used to analyze the battle. This analysis forms a basis for interpretations of the battle in a revised explanatory account. Chapter Six is the synthesis of the historical narrative from Chapter Four, interpretations based on the analysis in Chapter Five, and archaeological data into a revised explanatory account of the

battle which clarifies the motivations behind the actions of the combatants and aligns the narrative of the battle with the extant archaeological evidence. Chapter Eight concludes the thesis by answering the research questions posed above, commenting on and critiquing the revised theoretical approach, and proposing avenues of future research.

# Chapter 2: Theory

## Introduction

This chapter will explore a number of established theoretical approaches to battlefield archaeology that form the core of the revised theoretical approach espoused in this study. The theoretical underpinnings of the present study, although drawing from the extensive tradition of battlefield or conflict archaeology (Snow 1981; Scott et al. 1989; Fox and Scott 1991; Drexler 2009; Heckman 2009), find their origin primarily in the work of Larry Babits (2010) and John Bright (2012), both of whom carried out ABPP funded studies of maritime battlefields. Taking those studies as a starting point, the functions of the theoretical frameworks from those established approaches will be tweaked as they are applied to the study of the Battle of Roanoke Island. Additionally, theories of military forces as complex systems (Bar-Yam 2003) will play a major role in the analysis of the battle.

In its infancy, battlefield archaeology often lacked expressed theoretical frameworks, and battlefield archaeological studies were largely descriptive in nature rather than explanatory. Phillip Freeman (2011:149) describes the common early approaches to battlefield archaeology as: embellishing accepted accounts of a battle, clarifying the details of battles for which no good accounts exist, and correcting the details of unreliable historical accounts. In recent years, however, battlefield archaeology has shifted in large part to theoretical approaches which "share a common goal of analyzing the decisions made by combatants in the preparation and operation of conflict" (Richards et al. 2011). By far the most common such theoretical approach is KOCOA (Key Terrain, Obstacles, Cover and Concealment, Observation and Fields of Fire, Avenues of Approach), which is designed to analyze the military significance of features of the battlefield terrain.

The prominence of KOCOA, due in large part to its promotion by the ABPP, has spurred further theoretical developments recently in the work of Larry Babits (2010) and John Bright (2012) both of whom sought to adapt the approach espoused by the ABPP to the study of maritime battlefields while simultaneously introducing new theoretical concepts which allowed for the production of explanatory accounts of the battles that they studied. In his work, Babits' interpretations were largely military-historical in nature, focusing on how the actions taken during the battle conformed to tactical principals and how this conformity or non-conformity led to the outcome of the battle (Babits 2010:82-84, 97-100). Bright, on the other hand, focused on human behavior and the motivations behind the actions taken during the battle (Bright 2012:189-190). Despite these differences in focus, Babits and Bright ostensibly utilized the same theoretical principles in their respective studies. Babits based his approach around two concepts from modern military science, METT-T and the Principles of War, which broadened the scope of his study beyond the elements of terrain entailed in KOCOA (Babits 2010:5-12). Bright, in turn, built his study around comparing Babits' METT-T/Principles of War approach with the established ABPP terrain study approach in order to demonstrate the superiority of Babits' approach for the study of human behavior (Bright 2012: 7-9). In his study, however, Bright introduced two key concepts that fall outside the scope of the METT-T/Principles of War approach, which proved to be integral to his interpretations of human behavior. These concepts were the command and control structures of the opposing forces, and tactical principles contemporary to the battle and specific to the type of engagement that was being studied (Bright 2012:117).

The theoretical approach used in the present study will be based firstly on formalizing Bright's additions to the METT-T/Principals of War approach. Secondly, however, the function

of the theoretical frameworks described above in the study of human behavior will be reconsidered in light of a theoretical approach to the study of warfare espoused by Yaneer Bar-Yam (2003). Bar-Yam argues that military forces should be viewed as complex systems whose actions and capabilities are dependent on their size, structure, and level of complexity (Bar-Yam 2003:1-3). This framework, based on complex systems theory, as well as KOCOA, METT-T, and the Principles of War will all be discussed in further detail in the following sections.

## KOCOA

KOCOA is an acronym created by the U.S. Army to facilitate the quick assessment of battlefield terrain. In the context of battlefield archaeology, it has found use as a means for researchers to identify features of the modern landscape of battlefield sites that would have been militarily significant during the battle. As outlined by the Department of the Army (1992:46-47), the elements of KOCOA are as follows:

> **K**ey Terrain - Key terrain is any locality or area whose seizure or retention affords a marked advantage to either combatant. The leader considers key terrain in his selection of objectives, support positions, and routes in the offense, and on the positioning of his unit in the defense.
>
> **O**bservation and Fields of Fire - The leader considers ground that allows him observation of the enemy throughout his area of operation. He considers fields of fire in terms of the characteristics of the weapons available to him; for example, maximum effective range, the requirement for grazing fire, and the arming range and time of flight for antiarmor weapons.
>
> **C**over and Concealment - The leader looks for terrain that will protect him from direct and indirect fires (cover) and from aerial and ground observation (concealment).

**O**bstacles - In the attack, the leader considers the effect of restrictive terrain on his ability to maneuver. In the defense, he considers how he will tie in his obstacles to the terrain to disrupt, turn, fix, or block an enemy force and protect his own forces from enemy assault.

**A**venues of Approach - An avenue of approach is an air or ground route of an attacking force of a given size leading to its objective or key terrain in its path. In the offense, the leader identifies the avenue of approach that affords him the greatest protection and places him at the enemy's most vulnerable spot. In the defense, the leader positions his key weapons along the avenue of approach most likely to be used by the enemy

KOCOA has become ubiquitous largely as a result of the ABPP, which requires a KOCOA analysis for inventory studies that it funds. The ABPP outlines a specific version of KOCOA in its survey manual that is geared towards simplifying the identification of militarily significant terrain features in the modern landscape for the purposes of battlefield preservation (Lowe 2000:7). Within ABPP studies, KOCOA analysis has generally been limited in its use to descriptive accounts of the features of the modern landscape that would have been significant at the time of the battle. As noted by Bright (2012:30), however, "the interaction of combatants with the landscape itself represents a distinct set of human decision making." In this, Bright was commenting on the possibility of using KOCOA analysis to explain the events of a battle as they relate to the terrain of the battlefield and the way in which decisions made during the battle can be understood as responses to the terrain. Babits (2010) also recognized the utility of KOCOA as a means of studying the influence of terrain on a battle, but argued that terrain was not the only influential factor that should be addressed in a battlefield study. In response to this, Babits introduced two further concepts from military science to widen the scope of his inquiry.

The Principles of War and METT-T

> Describing the theory behind his 2010 study, Babits wrote that,
>
> KOCOA analysis follows a set of other military terms that … are part of a standard set of military understanding related to battlefield activity … Together these analytical formats will allow a better junction of military practice with the historical and archaeological record (Babits 2010:5).

The "other military terms" to which he refers are The Principles of War and METT-T. Babits argued that incorporating these concepts would allow for a more complete explanation of the events of a given battle.

The Principles of War first appeared in Army Training Regulation 10-5 in 1921 as a condensation of principles found in the work of military theorists such as Napoleon Bonaparte and Antoine de Jomini (Glenn 1998). Although they are technically modern in origin, the principles are intended to represent the core of successful strategy and tactics from any period. As noted in current U.S. Army doctrine, "[a]pplied to the study of past campaigns, major operations, battles, and engagements, the principles of war are powerful analysis tools" (Department of War 2008:143). In Babits conception, "[a]nalysis using the Principles of War provides operational and tactical combat details that enhance our understanding of what happened in the engagement … if one side did something, why did they do it, and what was the enemy's response?" (Babits 2010:10). As listed in current U.S. Army doctrine (Department of the Army 2008:143-145), the Principles of War are as follows:

> **O**bjective – Direct every military operation toward a clearly defined, decisive, and attainable objective.
>
> **O**ffensive – Seize, retain, and exploit the initiative.

**M**ass – Concentrate the effects of combat power at the decisive place and time.

**E**conomy of Force – Allocate minimum essential combat power to secondary efforts.

**M**aneuver – Place the enemy in a disadvantageous position through the flexible application of combat power.

**U**nity of Command – For every objective, ensure unity of effort under one responsible commander.

**S**ecurity – Never permit the enemy to acquire an unexpected advantage.

**S**urprise – Strike the enemy at a time or place or in a manner for which he is unprepared.

**S**implicity – Prepare clear, uncomplicated plans and clear, concise orders to ensure thorough understanding.

Following from the Principles of War, METT-T is a translation of those somewhat abstract principles into an acronym which is designed to "[organize] a leader's thoughts prior to engagement" and "ensure that a commander considered especially relevant impacts on the planning process" (Babits 2010:6). Whereas the Principles of War "represent the most important nonphysical factors that affect the conduct of operations" (Department of the Army 2008:143), METT-T represents the numerous physical factors which must also be taken into consideration. As defined by the Department of the Army (1992:46-47), the elements of METT-T are as follows:

**M**ission - The leader considers his mission as given to him by his commander. He analyzes it in light of the commander's intent two command levels higher, and derives the essential tasks his unit must perform in order to accomplish the mission.

**E**nemy - The leader considers the type, size, organization, tactics, and equipment of the enemy he expects to encounter. He identifies their greatest threat to his mission find their greatest vulnerability.

**T**errain - The leader considers the effect of terrain and weather on enemy and friendly forces using the guidelines below [KOCOA]…

**T**roops available - The leader considers the strength of subordinate units, the characteristics of his weapon systems, and the capabilities of attached elements as he assigns tasks to subordinate units.

**T**ime available - The leader refines his allocation of time based on the tentative plan and any changes to the situation.

Through the introduction of these additional theoretical frameworks, Babits significantly expanded the scope of his inquiry and created the potential to take a serious look at questions of human behavior during conflict. His study, however, remained primarily focused on interpretations of a military-historical nature. Most of his METT-T analysis consisted of detailed descriptions of the forces and the battlefields on which they fought whereas the Principles of War served as a means of critiquing the actions of the combatants rather than a means of discussing the motivations behind those actions (Babits 2010:76-84).When Bright set out to expressly focus on questions of human behavior then, his approach differed in a number of significant ways.

## Differences in Approach between Babits and Bright

Despite Babits' assertion that the METT-T/Principles of War approach could answer questions of why certain actions were taken during a battle, in practice, his study was focused far more on military history than aspects of human behavior during conflict (Babits 2010:10). In

Babits' study (Babits 2010:76-81), METT-T served primarily as a framework for presenting details about the opposing forces and the terrain with little interpretation regarding the influences of these factors on the behavior of the combatants. Similarly, the Principles of War served as a means of assessing how the actions of the combatants measured up to accepted tactical principles without interpreting how those tactical principles may have influenced the actions that were taken (Babits 2010:82-84). While there is certainly merit in such military-historical studies, there is also much to be gained through the study of human behavior. As demonstrated by Bright, however, the METT-T/Principles of War approach is not necessarily predisposed to military-historical analysis, and it is also well suited, with minor modification, to answering questions concerning human behavior (Bright 2012:303-320).

Bright's use of the METT-T/Principles of War approach differed from Babits' in three key ways. First, Bright expanded his discussion within METT-T to include not only details of the opposing forces and the terrain, but also interpretations of the influence that the factors discussed within METT-T had on the decisions made during the battle. Second, Bright used the Principles of War as a means of explaining the motivations behind the behavior of the opposing forces rather than a means of judging the merits of that behavior. Finally, Bright introduced details concerning the command and control structure of the opposing forces and tactical principles which were both contemporary to the battle and which pertained to the specific type of engagement that occurred at the battle. In his study, these additional details were only discussed in a chapter on the "Elements of the Battlefield" (Bright 2012:117-190) and were not included in the formal analysis chapters. When reading Bright's "Revised Analysis of the KS-520 Attack," however, it is clear that an understanding of the command and control structures of the opposing forces and contemporary submarine and anti-submarine tactics played a significant role in his

analysis (Bright 2012:303-320). The inclusion of these factors was due in large part to the work of Michael Palmer (2007) in his historical studies on naval command and control, and this added layer of influential factors greatly increased the interpretive potential of Bright's analysis.

Bright's amendments to the METT-T/Principles of War approach form the core of the theory behind the analysis in the present study. One final theoretical approach, however, serves as a mechanism through which these function of those theoretical frameworks discussed above will be tweaked. Multiscale complex systems analysis provides a new outlook on the structure of military forces, and will allow for a better understanding of the command and control structures in play.

## Multiscale Complex Systems Analysis

In a 2003 report on Littoral Warfare to the Naval Operations Strategic Studies Group, Yaneer Bar-Yam argued that multiscale complex systems analysis (MSCA) will allow the Navy and the Marines to develop more effective fighting forces for littoral operations (Bar-Yam 2003:iii). In his words, "MSCA provides a formal framework for understanding the interplay of scale and complexity in complex systems and their capabilities in the face of challenges" (Bar-Yam 2003:2). Complex systems are systems composed of multiple elements whose coordinated actions produce a result that could not be inferred by viewing the action of any element of the system individually. Scale refers to the number of elements within the system that can act in a coordinated manner, and a single system can often operate at multiple scales. For instance, an engagement between two individual vessels would be considered small scale, whereas a squadron engagement would be a larger scale, and a fleet engagement would be larger yet. Complexity, on the other hand, refers to the number of possible actions that a system could possibly perform at a given time. The complexity of a force is dependent on the scale at which it

is acting, however, and MSCA is a means of analyzing complexity at each possible scale level (Bar-Yam 2003:1-4).

In the context of military forces, the complexity of the force at its various scale levels is determined by the command and control structure of that force. The structure of complex systems, military forces included, can be placed typologically within the continuum in Figure 2.

Figure 2: Continuum of Structures of Complex Systems (Bar-Yam 2003:9)

To the far left is an idealized hierarchy in which the actions of the elements in each level are coordinated directly by a single element in the level above, culminating in a single element which coordinates the actions of the system as a whole. To the far right is a network, or distributed, structure in which the elements of the system are connected in such a way as to allow numerous forms of coordination or independent action. Between these extremes fall an almost limitless range of structures labelled *hybrid*. In a hybrid structure, some stratification into levels may exist, as in an idealized hierarchy, but lateral connections within levels also exist, allowing for direct coordination without the intervention of a superior element. Describing the possible complexity of these various command and control structures, Bar-Yam (2003:8) writes that:

> In an idealized hierarchy . . . the coordination between these units cannot be of greater complexity than the leader. More generally, we can state that to the extent that any single human being is responsible for coordinating parts of an organization, the coordinated

> behaviors of the organization will be limited to the complexity of a single individual … a command hierarchy is effective at amplifying the scale of behavior, but not its complexity. By contrast, a network structure (like the human brain) can have a complexity greater than that of an individual element.

Because of the complex nature of military forces, an understanding of the command and control structure of a force is fundamental to interpreting the motivations behind the actions taken by that force. Whereas the large-scale actions of a relatively non-complex force may indeed be the result of a decision made by a single individual, the actions of more complex forces are often the cumulative result of multiple independent actions taken by the individual elements of that system, and therefore represent multiple decisions made by multiple individuals or groups of individuals. In the present study, the multiscale complex systems analysis of the opposing forces will form the basis of the analysis of their actions during the battle.

## Conclusion

In the preceding sections, established theoretical approaches to the study of battles, battlefields, and military forces have been discussed. These approaches form the basis of the analysis performed in the present study; however, they will be revisited in Chapter Five as they are repurposed and applied to the study of the Battle of Roanoke Island. Having established the importance of these approaches to the present work, the following chapter will focus on the methodology through which the tenets of these theoretical approaches are implemented in the present study.

# Chapter 3: Methodology

## Introduction

This chapter outlines the methodologies used to carry out the present study. Although a chapter concerning the historical context of the event in question would typically precede this chapter, the creation and analysis of the historical narrative of the events that took place in the lead up to and during the Battle of Roanoke Island formed an integral part of the methodology of this study. The historical context of the battle will therefore be discussed in Chapter Four.

The methodology of the present study can essentially be divided into four phases: historical research, archaeological survey, compilation, and analysis. Although these phases were not necessarily sequential, and were in fact concurrent at times, they describe the four basic types of activities which took place during the study. The research phase encompasses time spent collecting the data concerning the battle that would later be analyzed to interpret the decisions made during the battle. This included, but was not limited to, primary and secondary sources concerning the narrative of the events during and surrounding the battle, statistics on the vessels present at the battle, and geospatial sources related to the landscape of the battlefield in the mid-19th century. Data was also collected through a limited archaeological survey of the battlefield. The survey took place at multiple points throughout the study and was informed both by previous archaeological work on the battlefield and by analyses of the landscape of the battlefield which suggested where cultural material was likely to be found. The compilation phase refers to the methods by which the various historical, geospatial, and archaeological data were compiled into forms that facilitated their later analysis. This included the creation of the historical narrative of the battle and the events surrounding it, and the creation of a Geographic Information System (GIS) to organize and manipulate the geospatial data concerning the

landscape of the battlefield. Finally, the analysis phase refers to the analysis and interpretation of the compiled data concerning the battle through the lens of the theoretical approaches described in Chapter Two. The methodologies employed in these phases will be described in further detail in the sections below.

## Historical Research

This initial phase comprises the collection of a number of different types of data related to the study of the battle. The following section is an overview of the sources discovered during this phase and the ways in which they were used in the present study. Information concerning the events leading to and surrounding the battle was drawn primarily from secondary sources. Histories of the Civil War in North Carolina (Barrett 1975; Mallison 1998; Carbone 2001; Morrill 2002; Campbell 2005) and the Civil War at sea (Scharf 1887) provided the bulk of the detail about earlier operations in North Carolina and the activities of the Union and Confederate forces in the months leading to the battle, with some details coming from primary sources (U.S. War Department 1883; U.S. Navy Department 1897a, 1897b; Fox 1920). Studies of joint operations in the Civil War (Reed 1978; Gibson and Gibson 1995; Symonds 2010) and general naval policy at the time (Symonds 2008; Taafe 2009; Dougherty 2010) were also useful, serving primarily as references for the wider trends in the war that led to the battle.

Information on events during the battle itself was drawn wholly from primary accounts. The bulk of the data came from the *Official Records* of the Navy and Army (U.S. War Department 1883; U.S. Navy Department 1897a, 1897b). Some details, however, were also drawn from William Parker's *Recollections of a Naval Officer* (1883) and Lorenzo Traver's *Burnside Expedition in North Carolina* (1880).

The technical details of the vessels came from a number of sources. General statistics were drawn from Thomas Moeb's *Confederate States Navy Research Guide* (1991) and Paul Silverstone's *Civil War Navies* (2001). Qualitative assessments concerning the vessels were derived largely from James Spirek's study of USS *Southfield* (1993) and Christopher Olson's study of CSS *Curlew* (1997).

The technical details of the armament were drawn from a wide range of primary and secondary sources. Warren Ripley's *Artillery and Ammunition of the Civil War* (1970) was by far the most comprehensive secondary source, providing extensive detail on the history and capabilities of various cannon. Eugene Canfield's *Notes on Naval Ordnance* (1969) was particularly useful for information pertaining specifically to naval cannon. Further details and statistics were found in John Dahlgren's *Shells and Shell Guns* (1856), Alexander Holley's *Treatise on Ordnance and Armor* (1865), and the *Official Records* of the Army and Navy (U.S. War Department 1883; U.S. Navy Department 1897b).

Modern geospatial data was obtained through ArcGIS Online (ESRI 2013b) and the National Elevation Dataset (United States Geological Survey 2013). Historic data was obtained from the NC Maps Project (State Library of North Carolina 2010), and the Office of Coast Survey's Historical Map & Chart Collection (National Oceanic and Atmospheric Administration 2012). Further information on the geologic history and other details of the area were drawn from Walter Gwynn's report on the "Opening of an Inlet at or near Nag's Head, on the Coast of North Carolina" (1840), Taylor et al.'s *Survey of the Marine Fisheries of North Carolina* (1951), Gary Dunbar's *Historical Geography of the North Carolina Outer Banks* (1958), and Riggs and O'Connor's *Relict Sediment Deposits in a Major Transgressive Coastal System* (1974).

Information on relevant tactical principles contemporary to the battle were found in Howard Douglas' *A Treatise on Naval Gunnery* (1855) and *On Naval Warfare With Steam* (1860), Antoine de Jomini's *Art of War* (1862), and John Dahlgren's *Shells and Shell Guns* (1856). Finally, information on the results of previous archaeological surveys of the battlefield was taken from reports provided by Nathan Henry of the North Carolina Underwater Archaeology Branch (Henry 2003a, 2003b, 2005).

Archaeological Survey

In addition to historical research, two limited remote sensing surveys were carried out in Croatan Sound to better assess the extent of the submerged cultural resources related to the Battle of Roanoke Island. The first survey was carried out in conjunction with the Program in Maritime Studies' 2013 Fall Field School. The schedule of this field school dictated the dates available for the survey, which took place on 17 and 19 September 2013. The survey was conducted using a Klein 3000h high resolution digital dual frequency 445/900 kHz sonar system and a Trimble AgGPS542 global positioning system (GPS) both of which were on loan from the UNC-Coastal Studies Institute. The sonar was towed alongside the boat, and the data were recorded using Klein's *SonarPro* software suite. This survey was intended to cover an area of the sound in which the Confederate Navy had sunk a number of vessels as blockships. Due to complications in planning, however, the survey took place in an area that was primarily to the south of the actual location of those blockships (Figure 3).

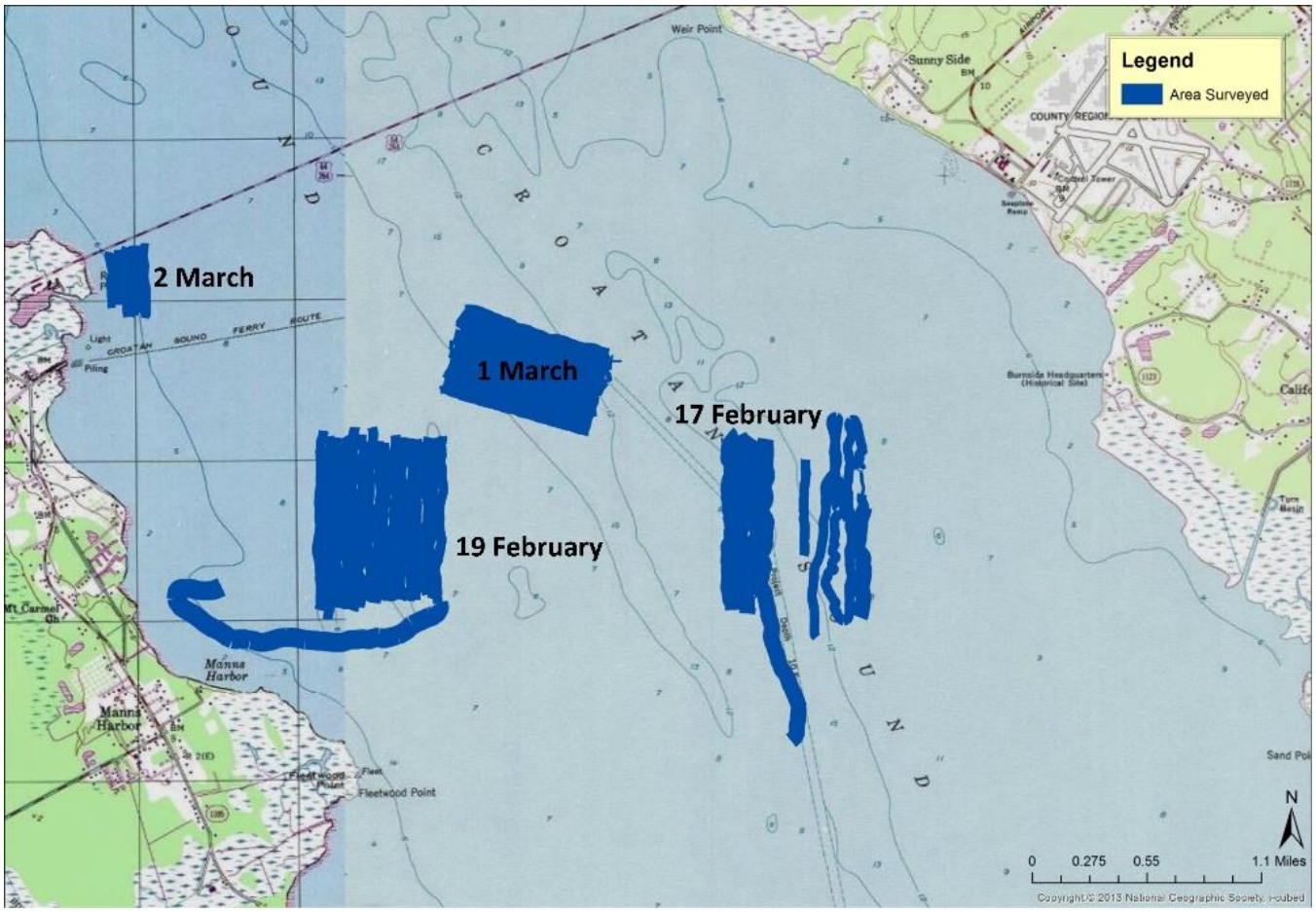



Figure 3: Areas Surveyed with Side-Scan Sonar (Lucas Simonds)

The second survey was carried out on 1 and 2 March 2014. The survey was conducted using a Tritech Starfish 450F digital 450 kHz sonar belonging to the Program in Maritime Studies and a Trimble AgGPS542 on loan from the UNC-Coastal Studies Institute. The sonar was mounted on a pole off the bow of the boat, and the data were recorded using Hypack Incorporated's *Hypack 2014* software. This survey consisted of two areas. The first area was comprised of 21 lines running east to west with the center line oriented on the location of two sunken schooners located by the North Carolina UAB. The second area consisted of ten lines running north to south centered on the location of the wreck of CSS *Curlew* (Figure 3).

The data from these surveys were processed using Chesapeake Technology's *SonarWiz 5* software. The individual sonar images were first manually bottom tracked. They were then processed using the Automatic Gain Control function within *SonarWiz*. Finally, the individual images were scanned visually and potential targets were marked using the contact marking functionality within the software. The full list sonar targets can be found in Appendix A, and the more prominent targets are discussed further in Chapter Six.

## Compilation

In this phase of the study the data collected during the research and survey phases was compiled into datasets that facilitated the later analysis of that data. The processes of compilation were different in methodology and product depending on the type of data that was being compiled. Here, a distinction will be made between the compilation of geospatial data into a GIS and the compilation of historical and statistical data into various other forms.

### *Historical and Statistical Data*

Relevant information regarding the historical context of the battle was compiled as a narrative of the key events between April 1861 and February 1862 which led to the Battle of

Roanoke Island. This narrative focuses on the Union Blockade, earlier operations in North Carolina, and the creation and preparation of the Union and Confederate forces which participated in the battle. Multiple primary accounts of the battle were then cross-referenced to create a coherent timeline of the events of the battle. This timeline was then expanded to create a detailed narrative of the actions of the Union and Confederate forces on 7 and 8 February. These two narrative accounts are found in Chapter Four. Statistics concerning the vessels of the opposing forces, the number and type of ordnance fired during the battle, and the ranges of the cannon in use were tabulated and can be found in appendices B, C, and D respectively.

*Creation of GIS*

Geospatial data pertaining to the historic landscape of the battlefield and submerged cultural resources were compiled into a Geographic Information System (GIS). This GIS allows for a better understanding of the positions and movements of the vessels during the battle and the relationship between the combatants and the terrain of the battlefield. Additionally, it provides a reference between the current location of submerged cultural resources and the historic landscape of the battlefield. The GIS for this study was created using ESRI's *ArcGIS* 10.1 licensed by East Carolina University.

Before continuing with a description of the methodology employed during this phase, the limitations of this methodology, and the data produced through it, must be acknowledged. First and foremost, the purpose of compiling data into a GIS was to produce an approximate digital model of the landscape of the battlefield circa 1862. 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. This 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. When the battlefield is viewed as a whole, however, the relationship between the elements of the landscape is never distorted beyond the point of being useful to the interpretation of human behavior. By far the greatest inaccuracy in the GIS comes in the relation of this historic model to the modern landscape. In order to align the approximated historic elements of the battlefield with modern archaeological data, historic geospatial sources were georeferenced to a modern basemap. Because the projection of the historic sources was either unknown or unclear, they were georeferenced using a process known as rubber sheeting. A large number of points on the historic sources were referenced to points on a modern basemap. Because the exact shape of the landforms in the historic and modern sources was different due to differences in projection, the historic sources were warped in order to better align with the modern sources. Additionally, as Croatan Sound was the focus of this study, a large number of reference points were used in that area. This increased the accuracy of the georeferencing there, but the accuracy decreases in areas further away, as can be seen in Figure 4. The resulting inaccuracy is of little significance in the majority of the present study, as the digital model of the historic landscape is generally depicted without reference to the modern landscape. It must nevertheless be considered when historic and modern data, such as archaeological targets and historic shorelines, are presented together.

That being said, the first step in the creation of the GIS was the addition of modern geospatial data. First, basemaps of the modern landscape were imported. For the purposes of this study, the *USA Topo Maps* map service (ESRI 2013) was used. This map service is provided by ESRI, the creators of ArcGIS, and is available through the ArcGIS Online repository.

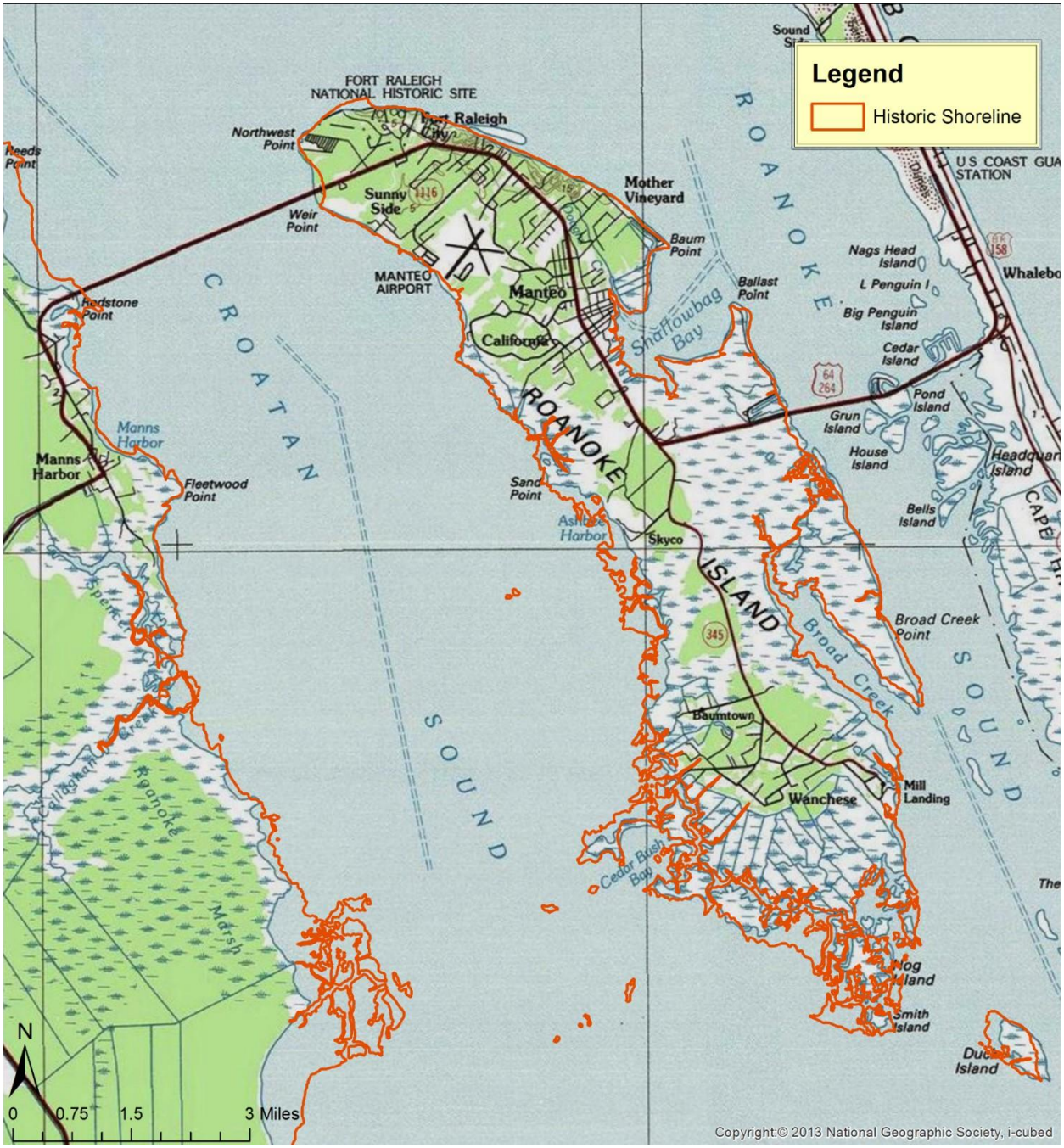



Figure 4: Comparison of Historic and Modern Shorelines after Georeferencing (By Lucas Simonds; ESRI 2013)

When viewed in ArcGIS, the map service overlays multiple scanned topographic maps of an area selected by the user which vary depending on the scale at which it is viewed. During the process of recreating the historic landscape, which is detailed below, maps at two scales were used. The overall landscape of the battlefield, including Roanoke Island and Croatan Sound, was viewed at

scales ranging from 1:100,000 to 1:80,000; at this range the map service displayed a scanned USGS 1$^{o}$ sheet of the area. Some finer details of the shorelines and other features of the landscape were viewed at a scale of 1:25,000; at this scale, the map service displayed multiple scanned USGS 7.5' quadrangles which covered the area. Next, 1/9 arc second digital orthographic images of the area (Figure 5) from the National Elevation Database were added. These images contain data concerning the elevation above sea level across the landscape and allow for analyses to be performed which take elevation into account. Finally, data from previous archaeological surveys of the area was added. Images in reports provided by Nathan Henry of the UAB contained points representing the positions of schooners from the Confederate barricade and the wreck of CSS *Curlew* overlaid on the USGS 7.5' quadrangle of the area (Henry 2003a; 2005). One such image (Figure 6) was georeferenced to the basemap using common points between the two and the points representing archaeological targets were digitized as point features.

Next, historic geospatial data sources were added. In this study, three historic sources were used: *Coast Chart No.40* (Figure 7), a US Coast Survey Chart of Albemarle, Currituck, and Croatan Sounds published in 1876 (United States Coast and Geodetic Survey 1876); *T-Sheet No.933* (Figure 8), a US Coast Survey preliminary sketch of Croatan Sound published in 1864 (USCGS 1864); and *Coast Chart D No.2* (Figure 9), a US Coast Survey Preliminary Chart of Albemarle Sound which includes the northern portion of Croatan Sound (USCGS 1855). Each of these sources served a specific role in the digital reconstruction of the historic landscape of the area. *Coast Chart No.40* served as the primary reference source for the historical topography and bathymetry of the area. Although the version used here was published in 1876, the original edition of the map was published in 1860, and was based primarily on data collected in the late

1840s and into the 1850s, with some adjustments having been made based on surveys in the 1860s and 1870s (USCGS 1876). This chart is the most detailed source available, including the topography of the island and associated landforms, the bathymetry of the sound, delineations of marshland and solid ground on the island, and roads and settlements. *T-Sheet No.933,* because it was published in 1864 and therefore represents a possibly more accurate depiction of the island at the time of the battle, was used to check for major topographical discrepancies in *Coast Chart No.40*. The T-Sheet also included some wreck markings in the sound which were not found on *Coast Chart No.40*. *Coast Chart D No.2* is one of the few extant historical sources that marks the exact location of Fulker's Shoals, a key feature for determining the location of some other historic features of the battlefield landscape, and was used to mark the location of this feature.

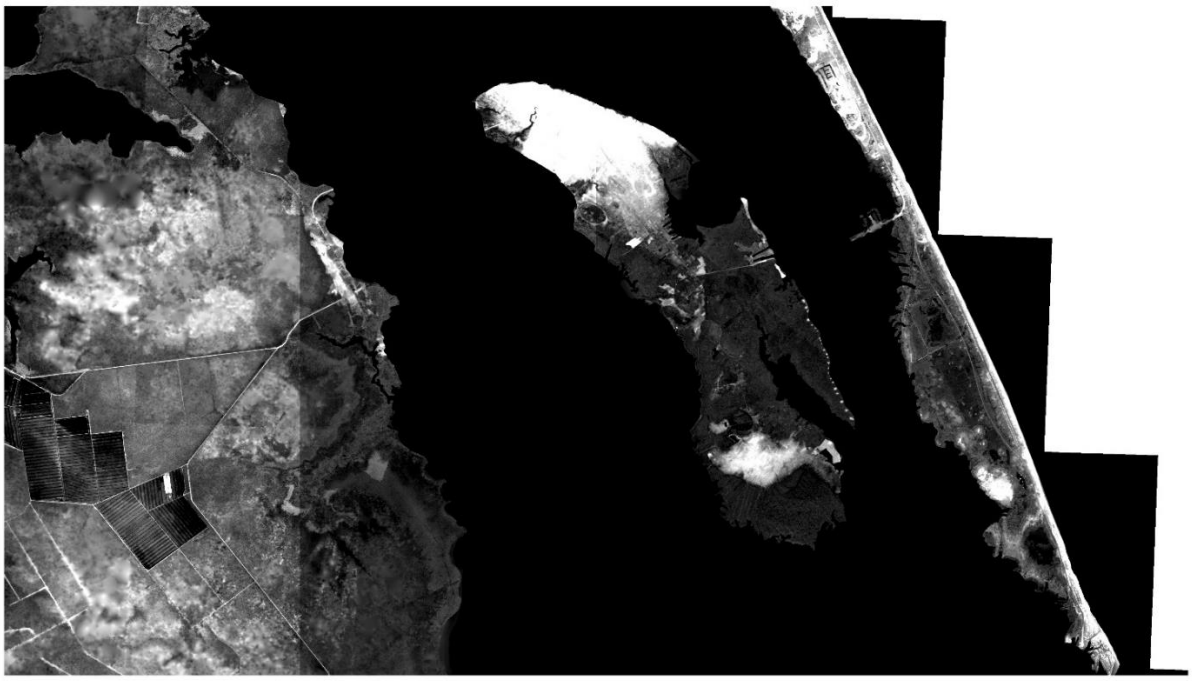


Figure 5: Digital Orthographic Mosaic (USGS 2013)

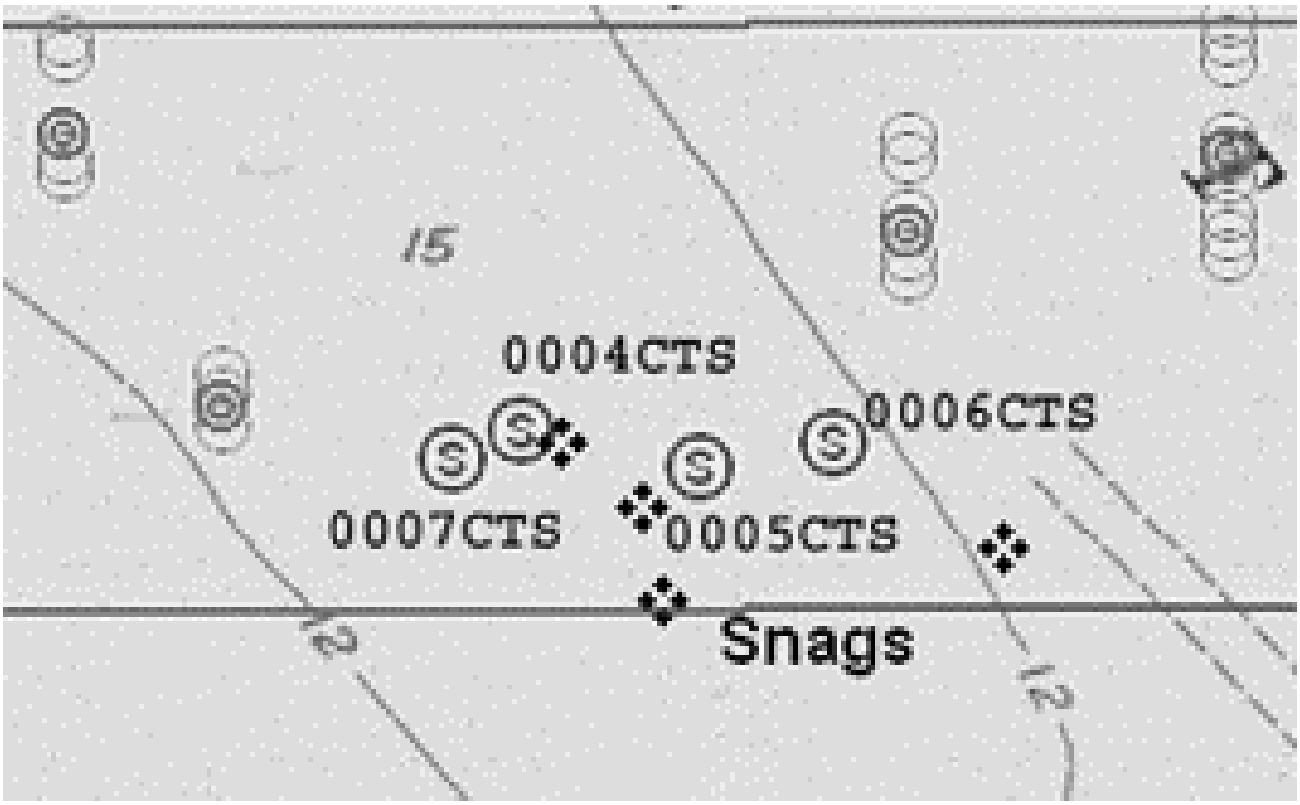


Figure 6: Sunken Schooner Targets (Henry 2003b)


Figure 7: Coast Chart No.40 (USCGS 1876)


Figure 8: *T-Sheet No.933* (USCGS 1864)

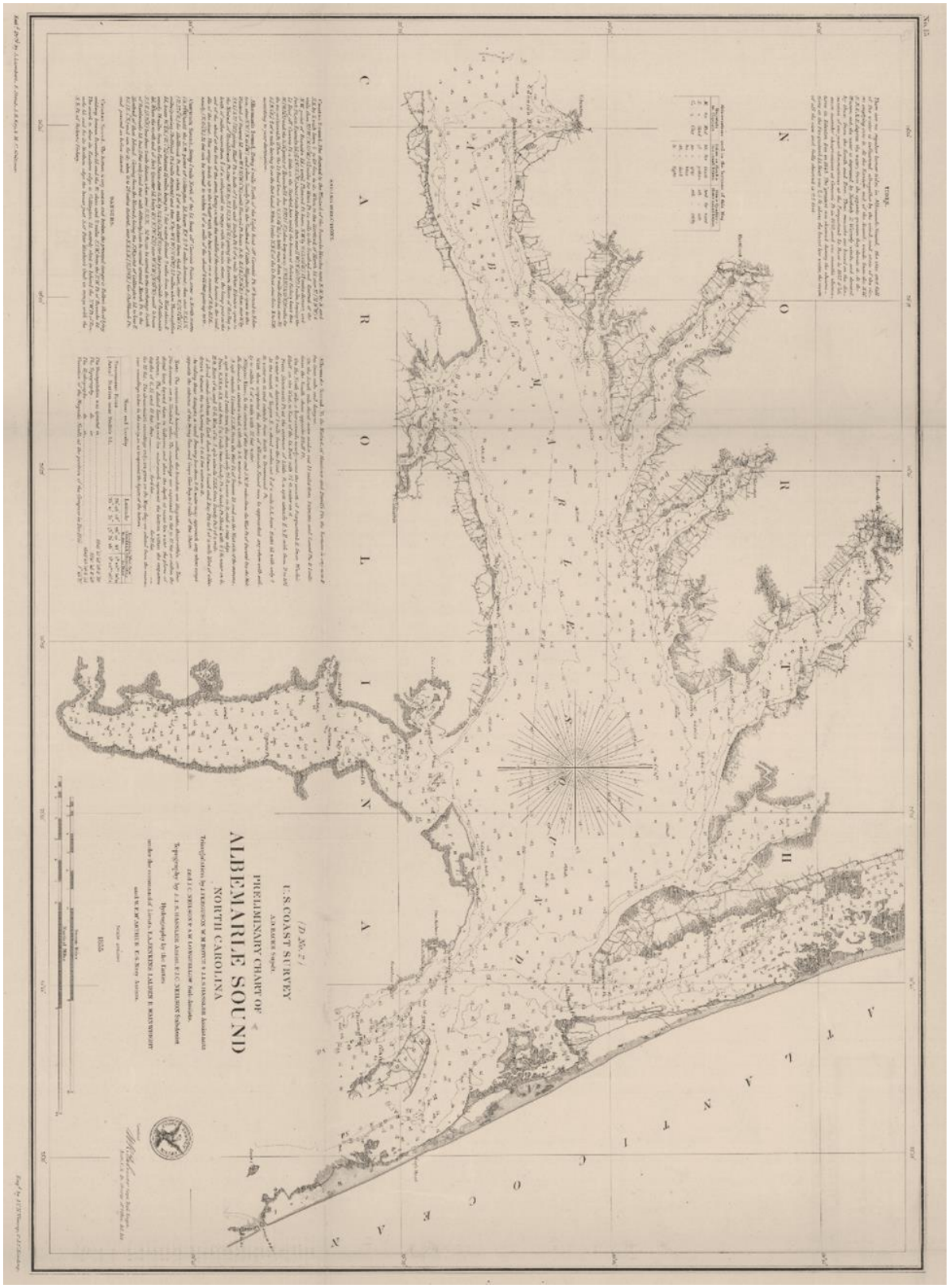



Figure 9: *Coast Chart D No.2* (USCGS 1855)

The sources described above were first cropped to show only the relevant areas (Roanoke Island and Croatan Sound) and were then imported to the GIS. Following this they were georeferenced so that the model of the historic landscape could be related to modern archaeological data. *Coast Chart No.40* was georeferenced first. A spline transformation was used, and control points on the chart were referenced to points on maps from the *USA Topo* map service. The Roanoke Marshes Lighthouse and the Bodie Island Lighthouse were used as primary control points. Although the Roanoke Marshes Lighthouse no longer exists, its location is still marked on modern USGS topo maps. Bodie Island Lighthouse, on the other hand, was destroyed in 1861 and was not reconstructed in its current location until 1872 (National Park Service 2013b). While Bodie Island Lighthouse did not exist at the time of the battle, *Coast Chart No.40* was published in 1876, and therefore includes the 1872 lighthouse which still stands today. In addition to these relatively accurate points, eight other control points were created on presumably relatively stable terrain features to further refine the alignment of the historic chart with the modern basemap. These additional points were as follows: three points along Sand Beach Creek, Ballast Point, Baum Point, Weir Point, Fleetwood Point, and the mouth of an unnamed creek approximately one mile north of Sand Point. The RMS Error for this chart was 0 ft.

*T-Sheet No.933* was georeferenced next, however, it was georeferenced to points on *Coast Chart No.40* rather than points on the modern basemap. This was done for two reasons. Firstly, Bodie Island lighthouse is not marked on the T-Sheet, leaving only one known stable point. Secondly, the primary purpose of including the T-Sheet was for comparison with the Coast Chart, and it was easier to ensure that the two were properly aligned if the T-Sheet was georeferenced to the Coast Chart rather than the basemap. *T-Sheet No.933* was georeferenced

using a spline transformation and ten control points: Roanoke Marshes Lighthouse, a small promontory slightly north of Broad Creek Point, the western mouth of Sand Beach Creek, Baum Point, two small promontories around Scarboro Creek, Weir Point, Pork Point, an unnamed point approximately two miles south of Sand Point, and the mouth of an unnamed creek 0.2 miles north of the Roanoke Sound Bridge. The RMS Error for this chart was 0 ft.

*Coast Chart D No.2* was georeferenced last. Like the T-Sheet, it was georeferenced to points on *Coast Chart No.40* rather than the basemap. As the primary purpose of including this chart was to properly place Fulker's Shoal in the historic topography of the island it was once again easier to ensure proper alignment by using *Coast Chart No.40* as a reference. *Coast Chart D No.2* was georeferenced using a spline transformation and 10 control points: Pork Point, Weir's Point, Northwest Point, Fleetwood Point, Redstone Point, and five unnamed points along the shore of Roanoke Island. The RMS Error for this chart was 0 ft.

Having referenced these charts to the modern landscape, features from them were digitized in order to produce the digital model of the historic landscape. First, the topographies of Roanoke Island, the mainland to the west, and various small islands were traced as polygon features. The shorelines of these features were traced from *Coast Chart No.40*. In order to delineate between marshland and solid ground on Roanoke Island, the polygon of the entire island was given a marsh texture. The areas of solid ground depicted on *Coast Chart No.40* were then traced as polygons in a separate feature and layered on top of the feature depicting marshland. The roads on the island were traced as line features from *Coast Chart No.40* while areas of cleared land and the structures on the island were digitized as polygons and points respectively. The end product of this digitization can be seen in Figure 10 below.

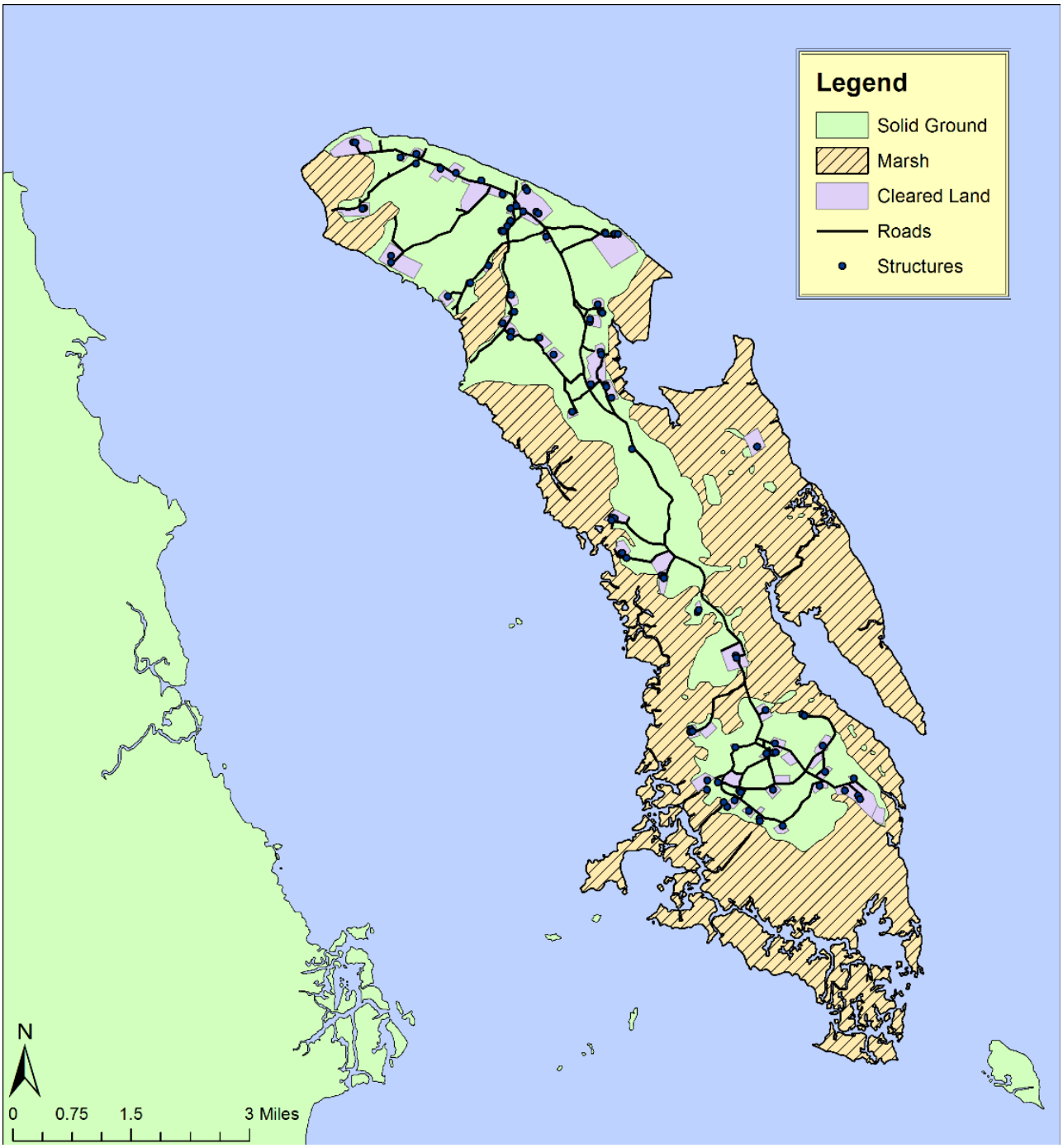


Figure 10: Features Digitized from Historic Sources (By Lucas Simonds)

Next, the historic bathymetry of Croatan Sound was modeled using soundings from *Coast Chart No.40*. First, each sounding marked on that chart was digitized as a point. Each point was assigned an attribute representing its depth. In order to delineate the edges of the sound, the eastern shoreline of Roanoke Island and the western shoreline of the mainland were then converted from lines to a series of points along those lines. Additionally, in order to improve the accuracy of the model, some further points were added. A number of points were added within the area of Fulker's Shoals and assigned a depth of three and a half feet so that those shoals would be represented. A series of points was also added along the channel through which the Union squadron passed at the southern end of Croatan Sound and assigned a depth of nine and a half feet so that that channel would be represented. The resulting set of points can be seen in Figure 11 below. A continuous raster image was then created from these points in which each pixel represents a specific depth. This was achieved using the natural neighbor interpolation function which filled in the gaps between the individual sounding points. Natural neighbor interpolation was chosen after testing the Krig, IDW, spline, and natural neighbor interpolation functions with the sounding points. The Krig, IDW, and spline interpolation functions produced a very regular bathymetry sloping from shallow depths at the edge of the sound to deeper depths in the center. Natural neighbor interpolation, on the other hand, produced and irregular and uneven bathymetry that more closely followed the contours evident in the sound points. Such a bathymetry better reflects the nature of the sound-floor as described in historic sources, and it was for this reason that natural neighbor interpolation was used to create the bathymetry model used in this study. Additionally, Fulker's Shoals, as depicted on *Coast Chart D No.2* were traced as dashed lines. The resulting model of the historic bathymetry of the sound can be seen in Figure 12 below.

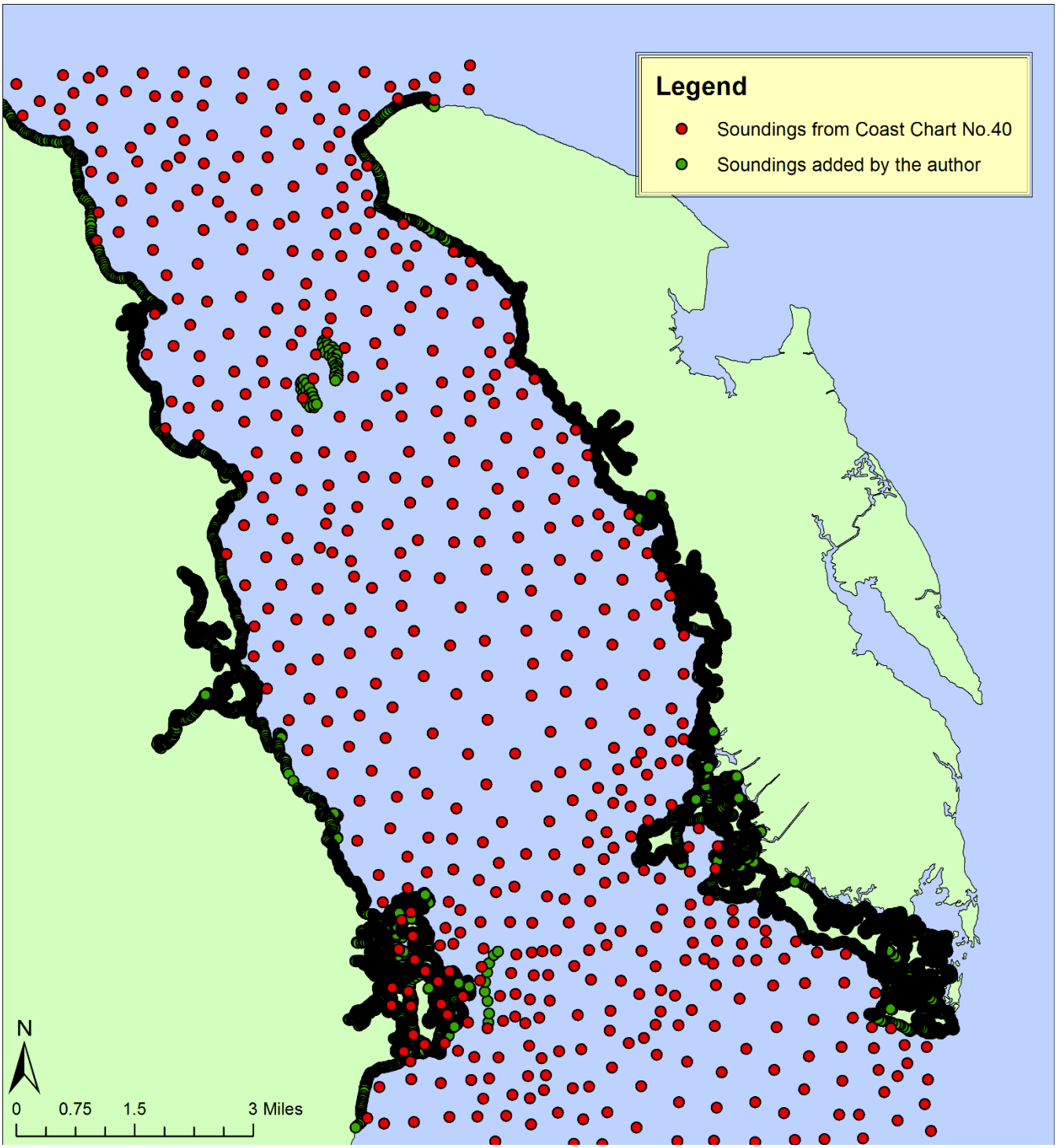


Figure 11: Digitized Soundings in Croatan Sound (By Lucas Simonds)

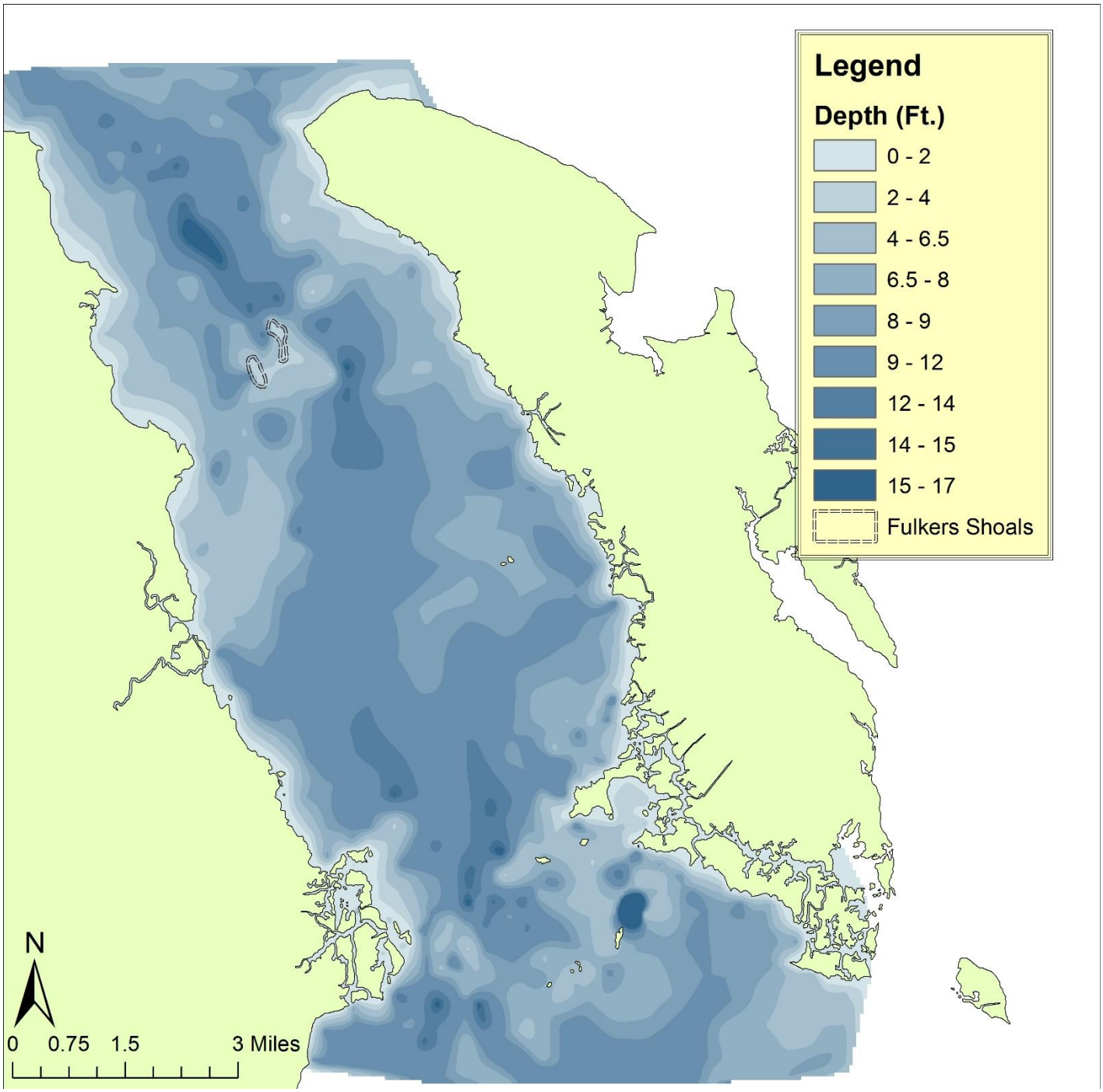



Figure 12: Bathymetery Raster Interpolated from Digitized Soundings (Nearest Neighbor Interpolation) (By Lucas Simonds)

Following this, some information regarding the Confederate defenses of the area was added. The general shape and location of the Confederate Forts was taken from *A Sketch of Roanoke Island N.C.* (Figure 13), a sketch of the island included in Major General J.G. Foster's report on the battle (Foster 1866). Because this sketch was not made to scale, only the general outline and location of the forts were taken, and the details were modified to better fit within the topography as depicted in *Coast Chart No.40*. The outlines of the forts as depicted in the sketch were recreated as line features in the approximate locations in which they are shown in the sketch. The cannon within the forts were represented as point features (Figure 14). These points were derived partly from points representing cannon in the sketch, partly from descriptions of the forts found in the *Official Records* of the Navy and Army, and partly from a historic newspaper illustration of the interior of Fort Bartow (Figures 15) from the collections of the New York State Library (New York State Library 2012). Information concerning a Confederate barricade of pilings and blockships in Croatan Sound was also added. A series of points on *T-Sheet No.933* marked as "Cross Part of Blockade" was digitized as a line to indicate one possible location of the barricade.

At this point the compilation of the collected geospatial data into a GIS was complete. The GIS included maps and elevation data concerning the modern landscape, as well as digitized representations of the historic topography and bathymetry of the area and the Confederate defensive structures. Data within the GIS was later manipulated during the analysis phase to create new features related to the elements of KOCOA and the relative positions of the vessels during the battle in order to better understand the relationship of the combatants with the terrain.

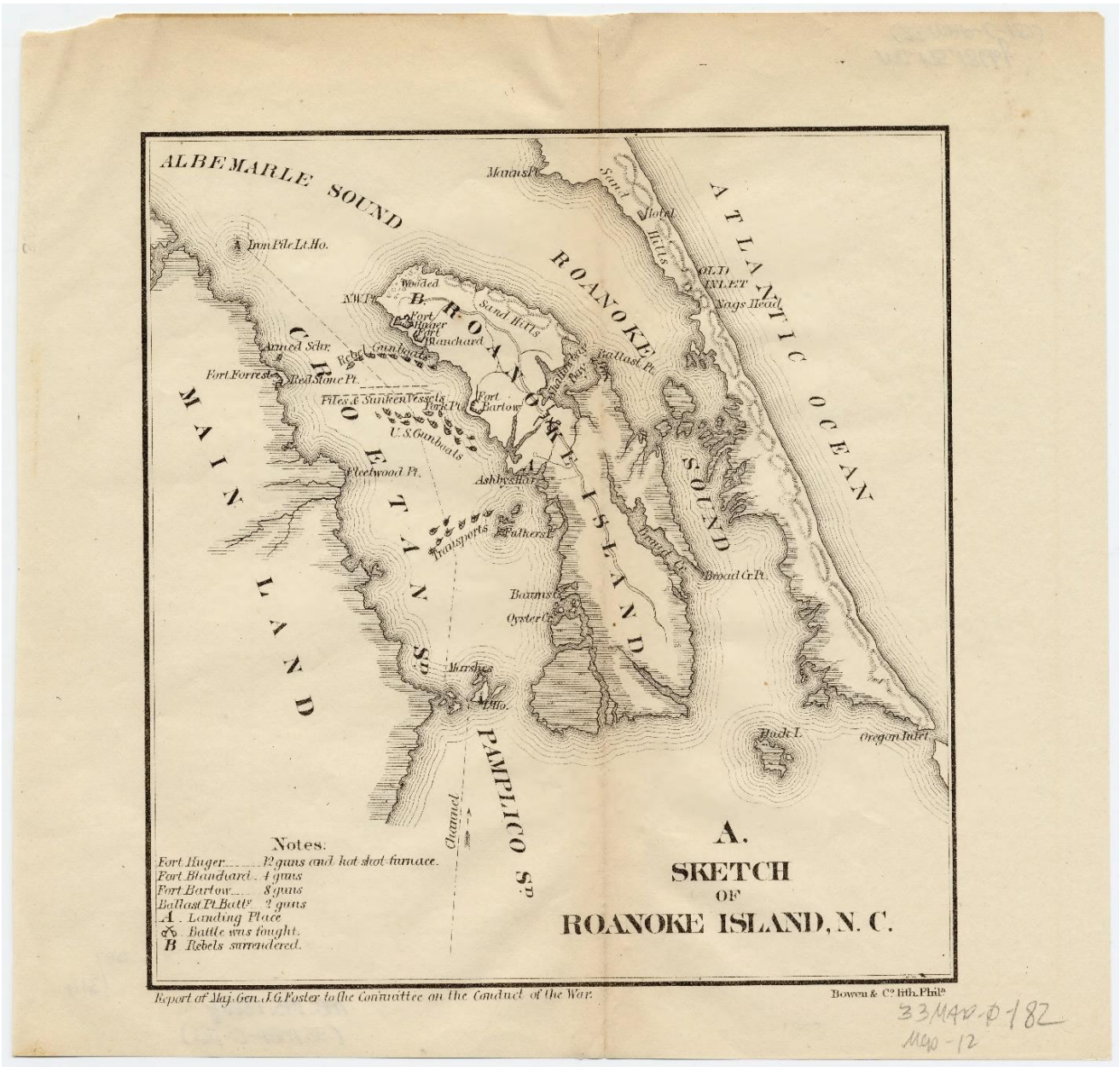



Figure 13: A Sketch of Roanoke Island North Carolina (Foster 1866)

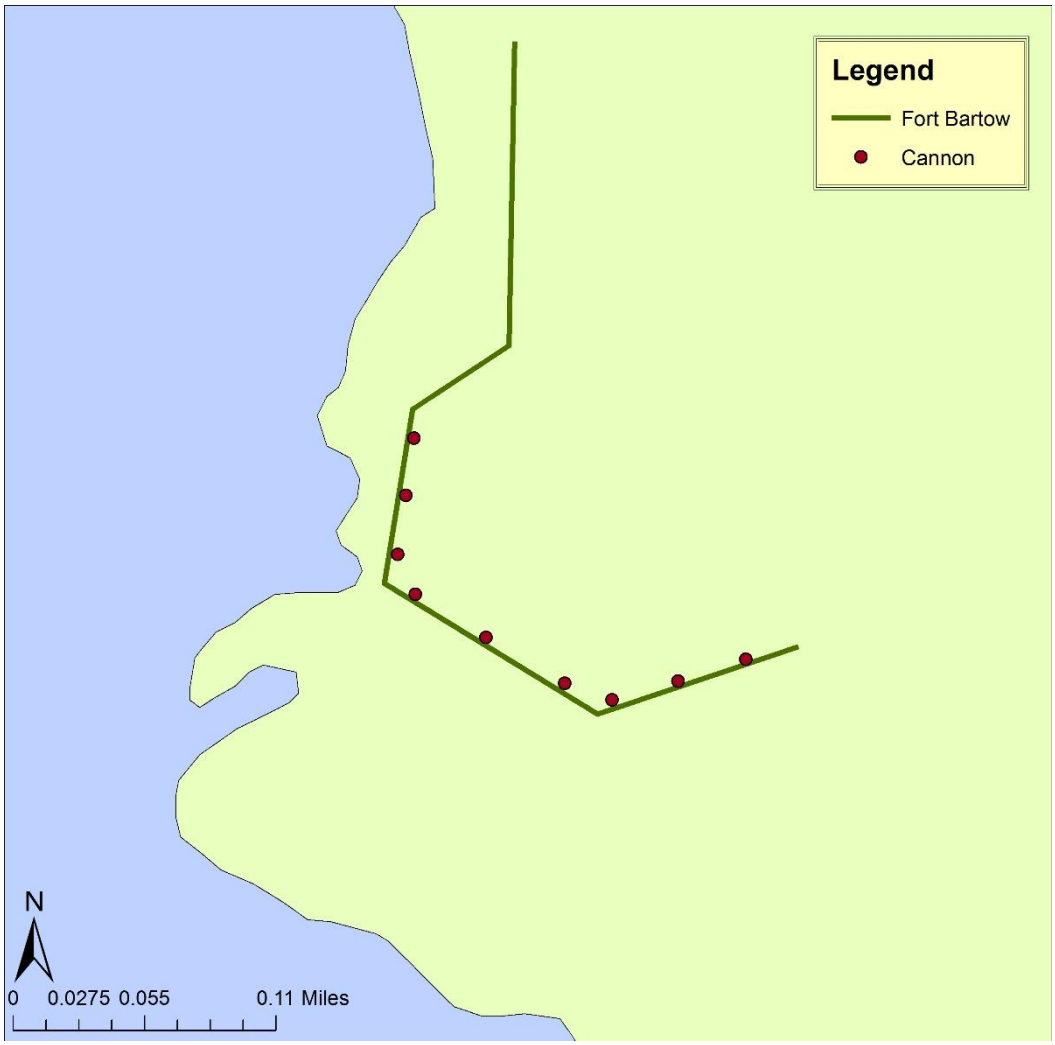


Figure 14: Digitized Fort and Cannon Placement (Shoreline ca. 1862) (By Lucas Simonds)

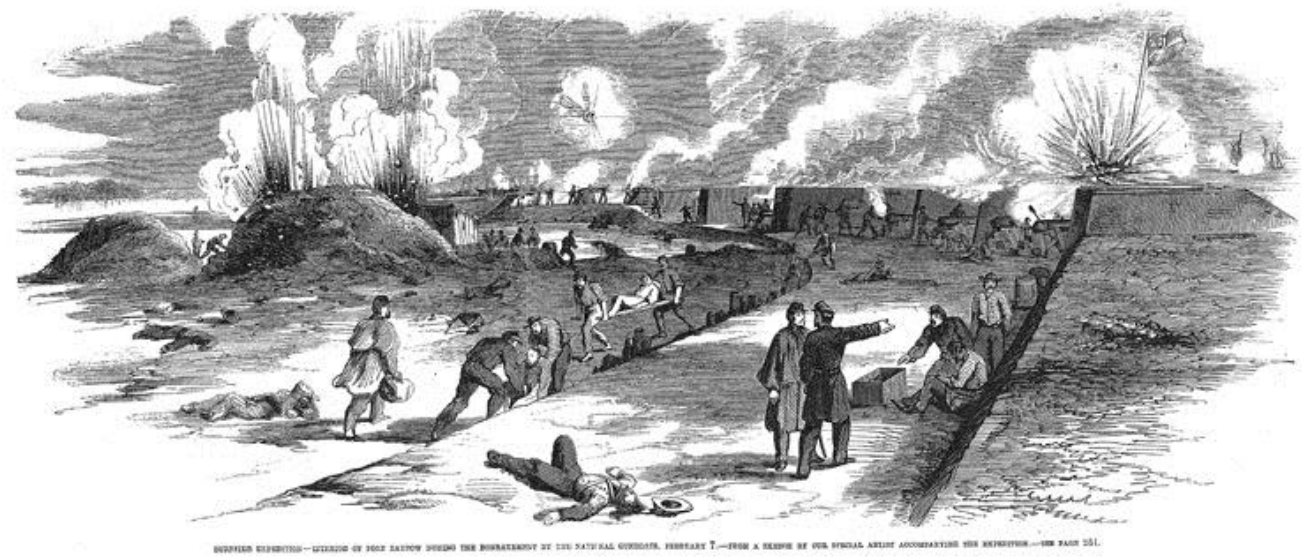


Figure 15: Interior of Fort Bartow (NYSL 2012)

## Analysis

After the collected data was compiled as described above it was analyzed in accordance with the theoretical approaches described in Chapter Two. This analysis is presented in Chapter Five, and its methodology is largely straightforward enough as to require no detailed description. The only exception to this is the methodology by which the representations of the fields of fire of the various cannon were created within ArcGIS. This methodology will be described below.

The creation of the fields of fire can be divided between those fields of fire for cannon within the Confederate forts and those for the Union and Confederate vessels. In the case of the cannon within the forts, points representing these cannon had been created previously as described in the preceding section. The fields of fire were created based on these points. For cannon mounted *en barbette*, on a mount which allowed 180º - 360º of rotation, their points were buffered using the buffer function in ArcToolkit with a radius equal to the range of the particular cannon. This buffer created a circular shape with the point at its center which represents that cannon's field of fire. For cannon mounted *en embrasure*, through a narrow opening in the fort's earthworks, their points were also buffered with a radius equal to the range of the cannon, this

circular buffer was then reduced to a 45$^{o}$ section, a typical field of fire through an embrasure (National Park Service 2013). This was done in the following way: a new line feature was created, in this feature a line around the circumference of the buffer was created using the replace sketch function and the buffer layer was turned off (Figure 16). Then a line was drawn from the point of the cannon to the edge of this circle in the direction the cannon would have fired. Two additional lines drawn from the point of the cannon to the edge of the circle and offset from this first line by 22.5$^{o}$ and 337.5$^{o}$ respectively in order to create a 45$^{o}$ angle. The original straight line was deleted and the circular line was clipped at the endpoints of the two angled lines. The remaining arc of the circle and the two angular lines were merged and this shape was converted to a polygon using the line to polygon function. For guns within the same fort facing in the same direction, the resulting polygon was copied and pasted to each point, but the process was repeated for each direction within each fort.

The process by which representative fields of fire for the vessels were created was slightly more spatially ambiguous due to the transitory and episodic nature of those fields of fire throughout the course of the battle. Whereas the location of the cannon within the forts did not change and can be determined with relative accuracy, the location of the vessels changed constantly and can only be approximated based on primary accounts of the battle. The first step in the process then, was to determine the approximate locations of the vessels over the course of the battle. For the Confederate vessels, this was assumed to be a general area north of their barricade excluding areas of extreme shoal water in which their vessels could not travel. A polygon was created to represent this area (Figure 17). For the Union vessels, three areas were created in relation to Fort Bartow.

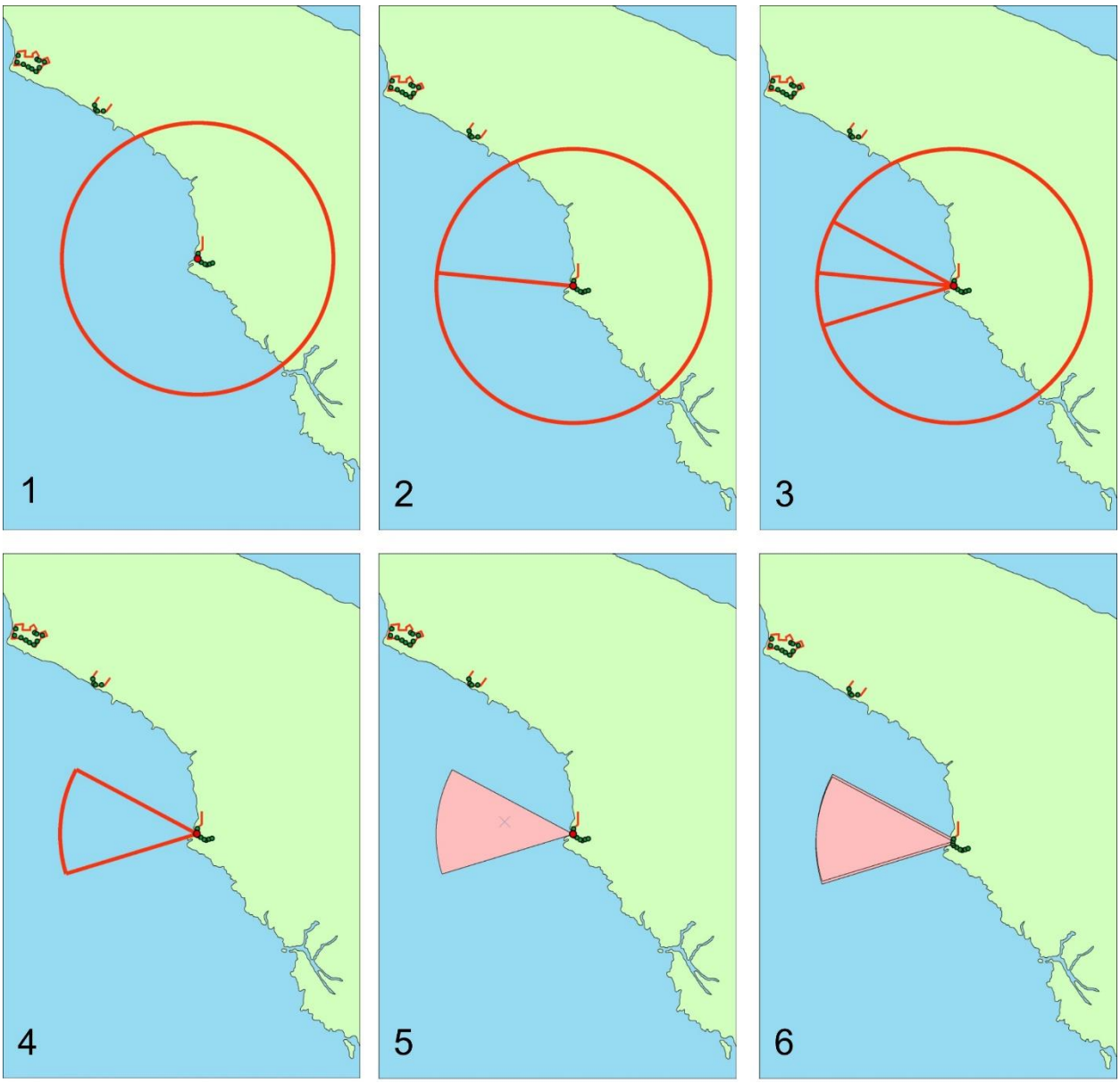



Figure 16: Process of Creating Field of Fire (1. Cannon point is buffered; 2. Line is drawn between point and edge of buffer; 3. Additional lines are drawn at offsets to create 45$^{o}$ angle; 4. Excess lines are removed; 5. Lines are converted to polygon; 6. Polygon is copied for all guns facing the same direction) (By Lucas Simonds)

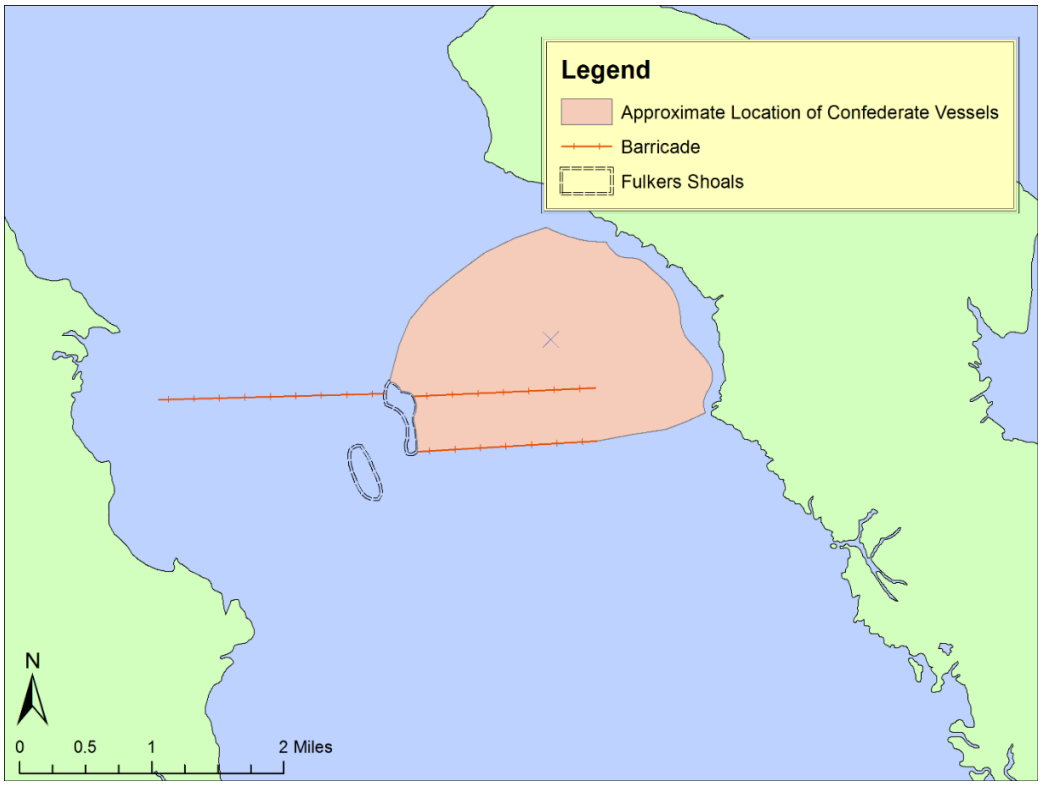



Figure 17: Approximate Location of Confederate Vessels during the Battle (By Lucas Simonds)

A point was created in the middle of the fort to represent a hypothetical area of the fort which the Union vessels targeted; this point was then buffered three times with radii based on ranges at which particular Union vessels reportedly fired on the fort. For two of these vessels, only a maximum range was reported, which resulted in a simple circle (Figure 18). For one vessel, both maximum and minimum ranges were reported. In the case of this vessel, two buffers were created representing the maximum and minimum ranges. The larger of the two buffers was then clipped based on the smaller to create a wide arc. All three areas are displayed overlapping in Figure 18.

After the approximate locations of some vessels were determined, representative fields of fire for two individual vessels were created. CSS *Sea Bird* and USS *Commodore Perry* were chosen because they were well described and depicted in historic sources.

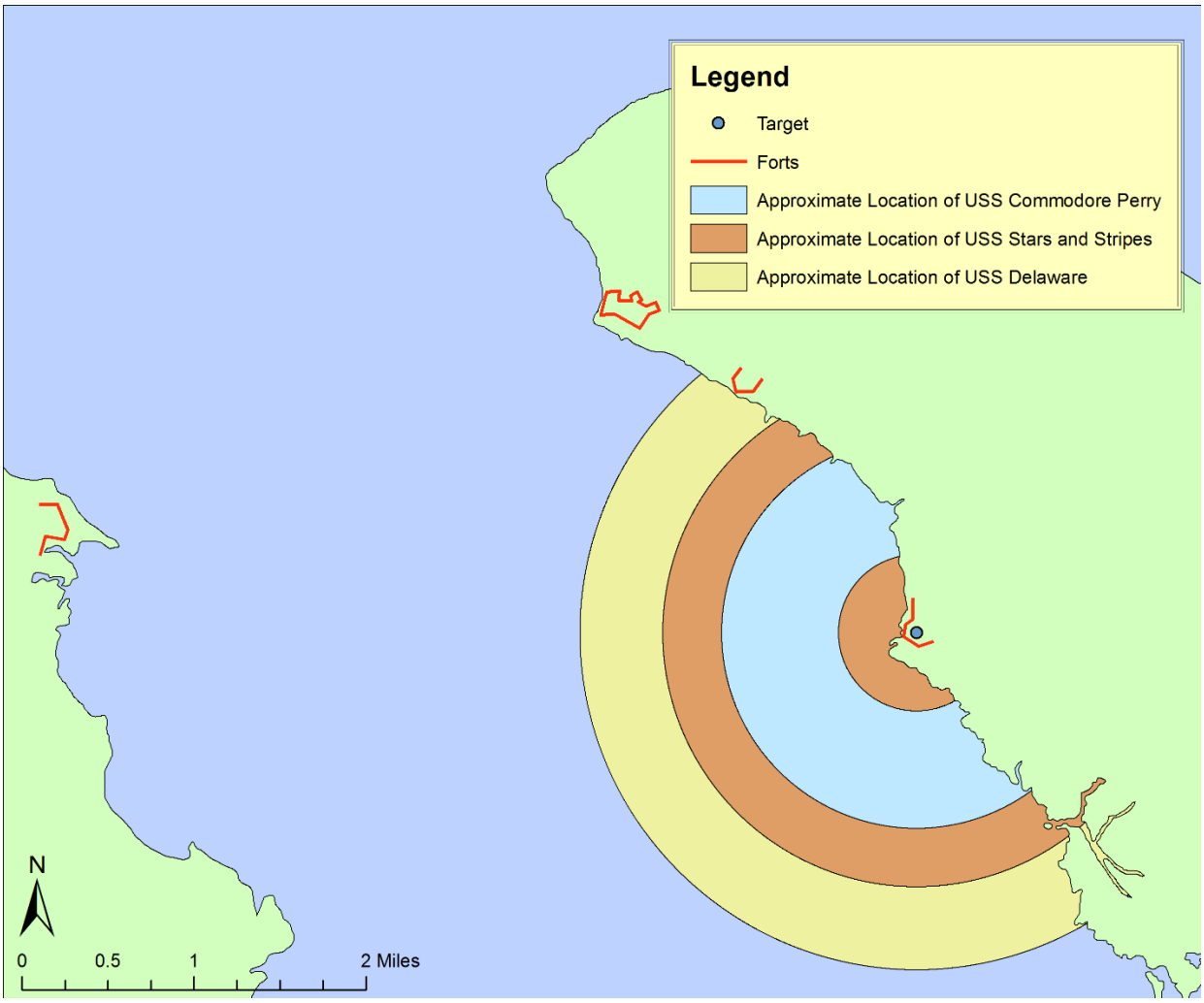



Figure 18: Approximate Locations of Union Vessels (By Lucas Simonds)

Models of each vessel were made by creating line features in the general shape of the vessels with the proper length and breadth and then converted to polygons. Cannon were represented as points within these polygons and their placement was based on historic depictions of the vessels (Figures 19, 20 and 21). The polygons and points were then moved to positions within the areas described above and oriented so as to fire in the proper direction. Fields of fire for their cannon were then created in the same manner as those for the cannon mounted in the forts. These fields of fire can be seen in in Figure 22 below.

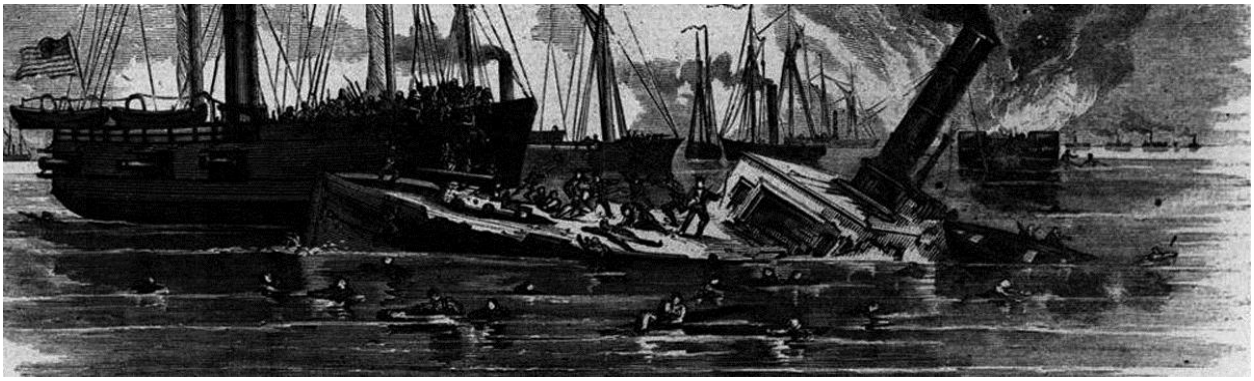


Figure 19: Historic Illustration of CSS *Seabird* (*Harper's Weekly* 1862)

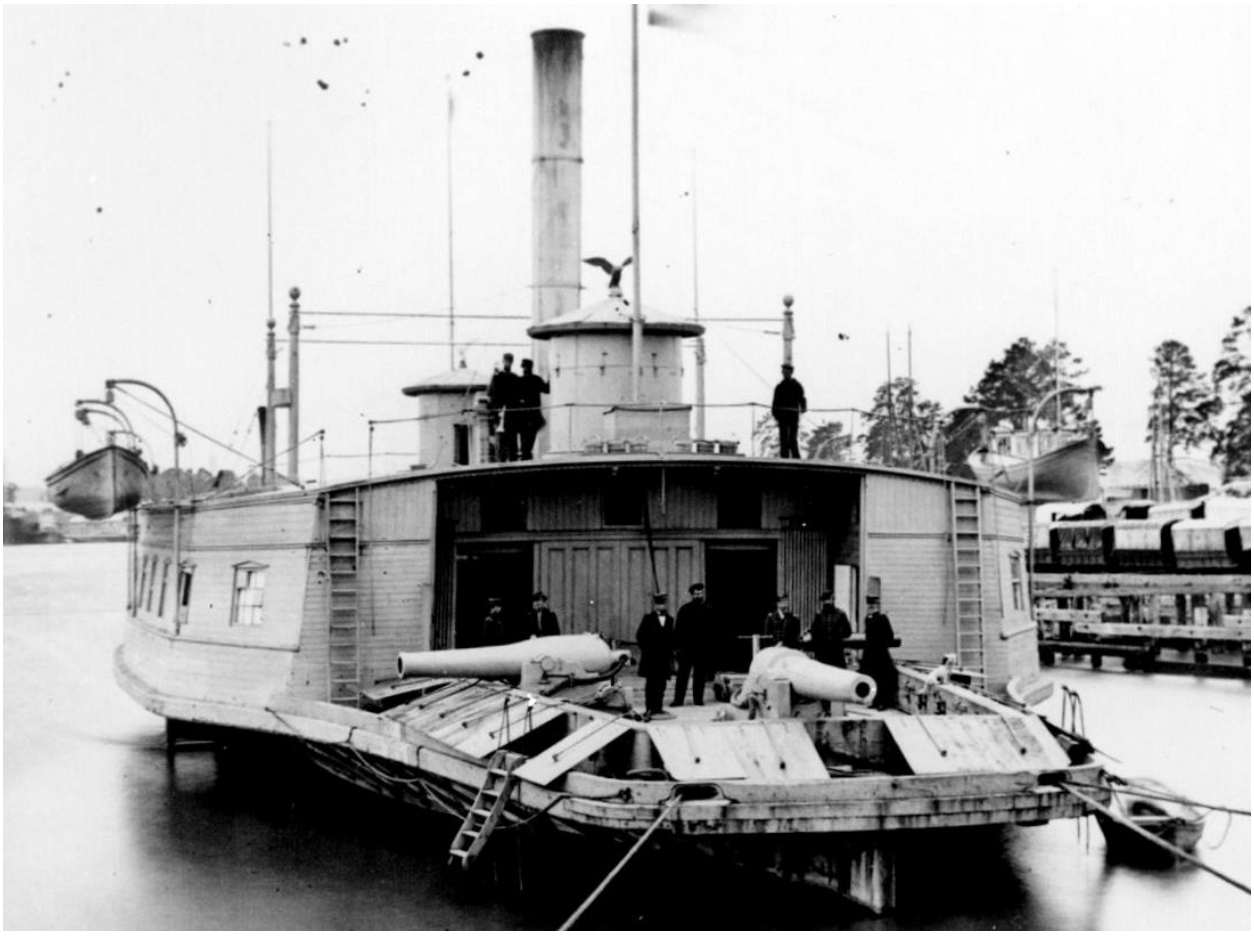


Figure 20: Historic Photo of USS *Commodore Perry* (National Archives 1864:111-B-411)

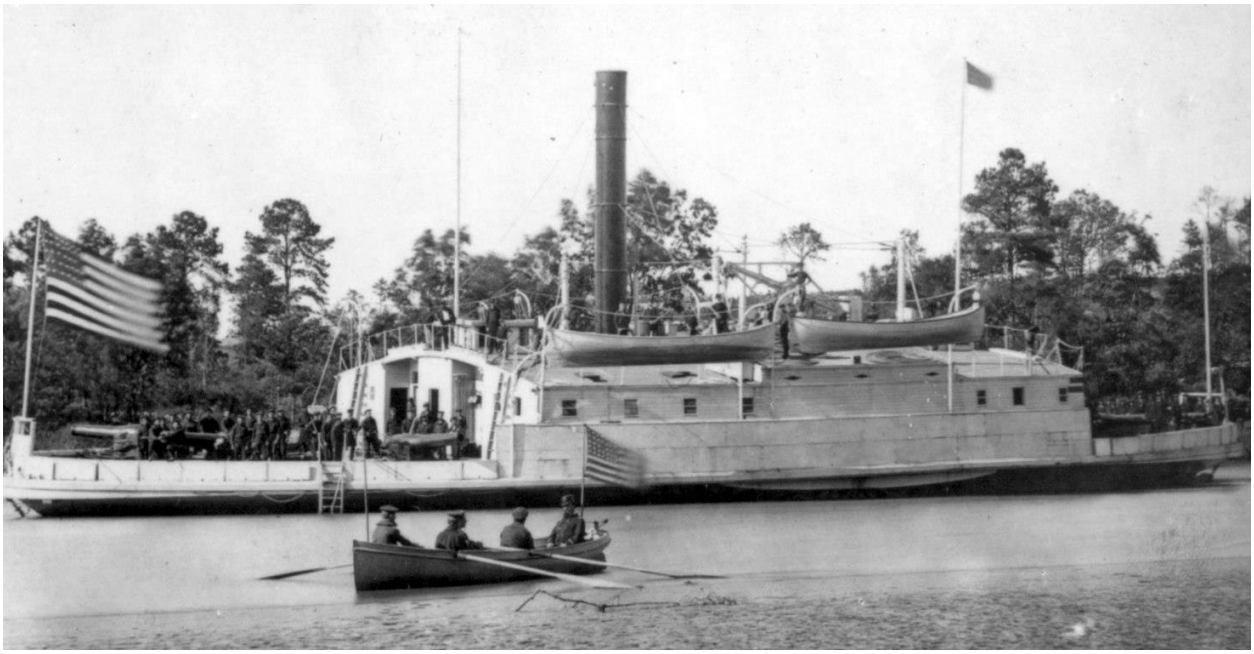


Figure 21: Historic Photo of USS *Commodore Perry* (National Archives 1860-1865:111-B-130)

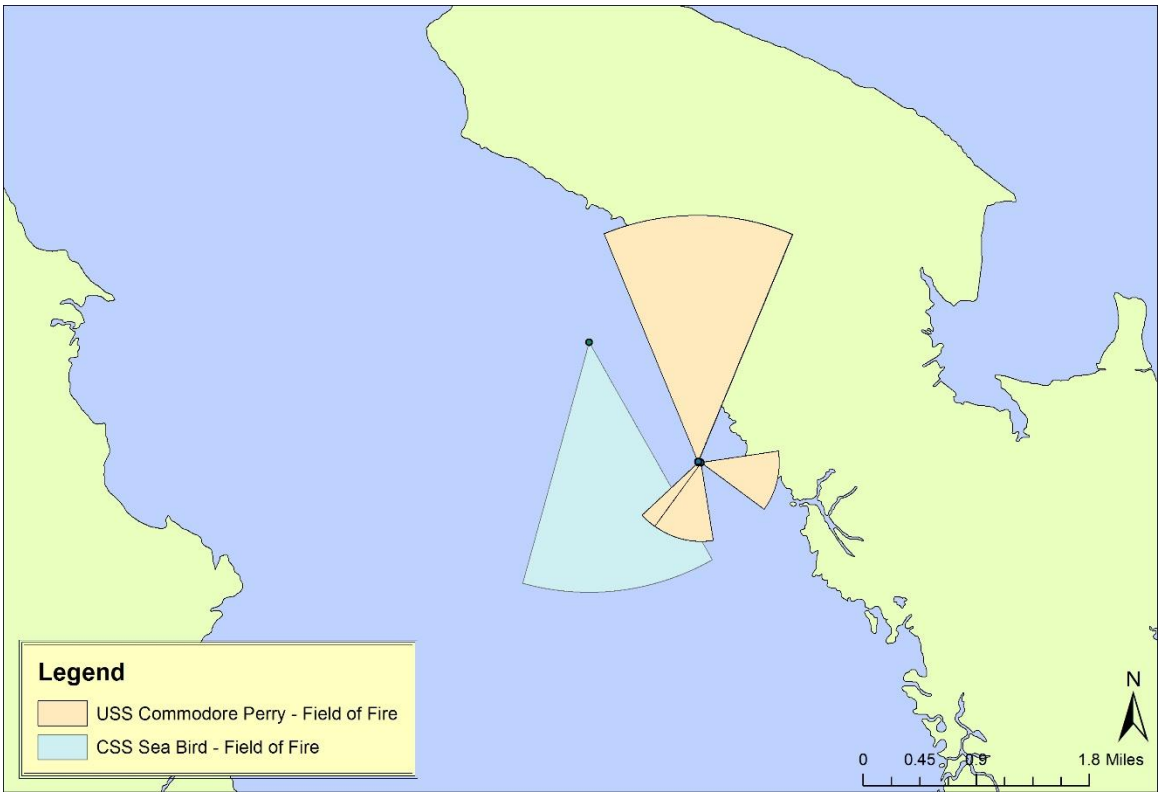



Figure 22: Representative Fields of Fire (By Lucas Simonds)

As with the digital model of the historic landscape, it is important to note that the locations of the forts, cannon, vessels, and fields of fire were based on historic sources and are only intended as approximations. They are intended to show the relationships between these elements and the influence of those relationships on the decisions made during the battle rather than providing an exact diagram of the battle.

## Conclusion

In this chapter, the methodology of the collection, compilation, and analysis of data in the present study has been described. In the interest of transparency, the limitations and inaccuracies of these processes have also been acknowledged. Having laid out this methodology, the following chapters will present the results of the processes described here. Chapter Four contains the historical narratives of the events leading to and during the battle and Chapter Five contains the analysis of all of the compiled data in order to interpret the decisions made during the battle.

# Chapter 4: The Battle of Roanoke Island in its Historical Context

## Introduction

This chapter is a compilation of data from primary and secondary sources into narratives which set out the wider context of the battle and provide a detailed account of the events of the battle itself. This section is integral to the analysis in the chapter that follows for a number of reasons. An understanding of the wider geopolitical context of the battle highlights the motivations for the decisions which led to the battle taking place. Additionally, an account of the organization of the forces which participated in the battle and their actions in the months leading to the battle illuminates the processes that created the situation in which the battle took place. This is particularly important in regards to the preparation of the Confederate defensive structures and the composition of the Union force. Finally, an accurate account of the events of the battle is critical to determining causal relationships between events as well as the critical decisions during the battle which led to its outcome. In the following sections, the geopolitical situation in which the battle took place and the events of the war which preceded and led to the battle are described. This is followed by a detailed account of the events of 7 and 8 February 1862 based on primary accounts.

## The Blockade and Early Operations in North Carolina

The Battle of Roanoke Island is tied inextricably to the Union naval blockade of the Confederate coastline. In response to a proclamation by Jefferson Davis offering letters of marque to Confederate privateers on 17 April 1861, Abraham Lincoln declared a blockade of all Confederate ports on 19 April (Scharf 1887:53, 55). At that time, the blockade did not include the ports of North Carolina or Virginia, but it would be extended shortly thereafter (Scharf 1887:369). The formal declaration of this blockade put Secretary of the Navy Gideon Welles in

the unfortunate position of needing to organize enough vessels to physically enforce this blockade. Not only did Welles' Navy need to eliminate the coasting trade between the ports of the Confederacy, but the major European powers insisted that they would only honor a blockade that met the standards specified in the Treaty of Paris. This treaty, signed 16 April 1856 at the conclusion of the Crimean War, stipulated that, "[b]lockades in order to be binding must be effective-that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy" (As cited in: Scharf 1887:58). In order to truly isolate the Confederacy from outside trade, a large and effective blockade needed to be implemented quickly.

Welles set to work immediately, ordering the purchase of merchant vessels for conversion to military service and the construction of new warships, and sending out those vessels which were available immediately (Scharf 1887:41). The imposition of a truly effective blockade was not as simple as posting vessels off the major Confederate ports, however, and the coast of North Carolina presented a particular challenge. The majority of the Atlantic Coast of North Carolina consists of a chain of barrier islands known as the Outer Banks. This chain is unique in that some islands lay up to thirty miles away from the mainland, creating large sheltered bodies of water known as sounds. The two largest sounds are Albemarle and Pamlico, which today cover a combined area of approximately 2,200 square miles (Taylor et al. 1951:3). These sounds have an average depth between twelve and eighteen feet, and were a major thoroughfare of maritime trade before the war (Taylor et al. 1951:5; Dunbar 1958:1). At the time of the battle, Pamlico Sound was connected to the Atlantic Ocean via a number of inlets, and relatively prominent ports such as New Bern and Washington were only accessible through it. Perhaps more important than these ports, though, were the two canals that connected Albemarle Sound with the Chesapeake Bay, one of which opened out almost directly into Norfolk. Because

Albemarle Sound had no inlets to the ocean, the only route to reach these canals was to enter Pamlico Sound through one of its inlets, and then enter into Albemarle Sound. By passing through Pamlico Sound, Albemarle Sound, and either the Dismal Swamp or Albemarle-Chesapeake Canal, small coasting vessels could avoid the dangerous waters off Cape Hatteras on their way north. In 1839, nearly 1,450 vessels carrying approximately 100,000 tons of cargo passed by Roanoke Island on this route (Gwynn 1840:14). Henry Clark, Governor of North Carolina in 1861, recognized the importance of this route through the sounds and ordered the construction of earthwork forts to guard the inlets into Pamlico Sound shortly after the Union blockade was extended to include North Carolina on 27 April 1861. With the sounds closed to the vessels of the Blockading Squadron, they quickly became a safe haven for Confederate blockade-runners and privateers. *Winslow*, a privateering vessel outfitted by Clark himself, had captured no fewer than nine Union prizes by August 1861 while operating out of Hatteras Inlet (Scharf 1887:369).

The value of the sounds to the Confederacy was recognized by some among the Union as well. R.B. Lowry, a Lieutenant serving in the Blockading Squadron, wrote on 1 June 1861 that, "[s]o long as the canal is open and in the hands of the rebels Norfolk and Richmond in Virginia, Wilmington, New Berne, Beaufort, and many thriving towns in North Carolina, have a ready access to the sea or an easy and safe communication with each other" (U.S. Navy Department 1897a:689). Lowry was in favor of launching an assault into the sounds, urging that, "there is no part of the country in armed rebellion against the government which can be so easily and so terribly made to feel the power of the United States by its occupation by the Union forces as the inland coast of North Carolina" (U.S. Navy Department 1897a:689). This aggressive stance differed from the official position of the Navy. The Blockade Board, a four man taskforce

established in May 1861 to make recommendations concerning the blockade, recommended that the inlets should be obstructed with blockships in a report on 16 July 1861 (Reed 1978:7-9). The blockade board also expressly opposed significant military action on the North Carolina coast, arguing that "the region was poor and unhealthy for Northerners" (Reed 1978:8-9). This recommendation was a moot point, however, as Major General Benjamin F. Butler had proposed an amphibious assault against the forts at Hatteras Inlet to his friend Simon Cameron, Secretary of War, on 10 June (Reed 1978:11). On 28 August 1861, a naval force commanded by Flag-Officer Silas Stringham began bombarding Fort Hatteras and Fort Clark while General Butler landed his troops further north on the island. Captain Samuel Barron, commanding Fort Hatteras at the time, surrendered at 11:00 on the morning of 29 August (Hawkins 1887:632,633; Scharf 1887:371-373).

Although the official plan for this operation specified that the forts should be demolished and the inlet obstructed with blockships, General Butler and Flag-Officer Stringham decided that the forts should be occupied, and placed a small force there under the command of Colonel Rush C. Hawkins (Reed 1978:15, 17). On 29 September 1861, Hawkins received reports that Confederate forces stationed on Roanoke Island planned to destroy the Hatteras Lighthouse and he responded by sending a regiment north to Chicamacomico to block their path. Although this regiment was successful in preventing the destruction of the lighthouse, this action resulted in the capture of USS *Fanny* on 1 October, and the regiment was driven back on 4 October (Hawkins 1887:638). Colonel Hawkins was soon replaced by Brigadier General J.K.F. Mansfield, who determined that the forts were safe but "no base for operations into the interior" (Reed 1978:22). Mansfield was in turn replaced by Brigadier General Thomas Williams, who put Hawkins under arrest and sent him back to Virginia (Hawkins 1887:639).

The defeat at Chicamacomico marked a temporary cessation of offensive action in North Carolina. Hawkins left the state convinced, however, that further operations there were necessary. In a letter to John E. Wool, Head of the Department of Virginia, Hawkins urged that:

> Roanoke Island … should be occupied at once. …A small force should be stationed at Beacon Island … light-draught vessels should be stationed between the mouths of the Neuse and Pamlico rivers … There should be at least eight light-draught gun-boats in Pamlico sound. … Beaufort should be occupied as soon as possible. … Seven thousand men judiciously placed upon the soil of North Carolina would, within the next three weeks, draw 20,000 Confederate troops from the State of Virginia (Hawkins 1887:636).

Although this particular letter was written in September as Hawkins was still in command at Fort Hatteras, he continued to lobby for this cause after his return north. Hawkins was not alone in voicing this sentiment either, and a joint Army-Navy expedition to North Carolina was finally authorized late in 1861.

## The Formation of the Burnside Expedition

A new army division known as the Coastal Division formed the core of the joint expedition to North Carolina, commonly called the Burnside Expedition in honor of its commanding officer. This division consisted of troops trained in amphibious landings and operating from shallow draft steamers, which could both transport the troops and serve as gunboats when needed. The exact origin of the Coastal Division is muddled in competing accounts by the key parties involved in its formation. Originally, however, it was not intended for operations in North Carolina. In a paper presented to the Soldier's and Sailor's Historical Society of Rhode Island in 1880, Burnside claims that he presented the idea of the Coastal Division to his friend Major General George McClellan, Commander of the Army of the

Potomac, in October of 1861. According to Burnside, his plan was that the division would consist of New Englanders familiar with sailing and operate from light draft steamers along the coast, "penetrating into the interior, thereby threatening the lines of transportation in the rear of the main army . . . and holding possession of the inland waters on the Atlantic Coast (Burnside 1887:660,661). In Burnside's account, McClellan subsequently presented this idea to Secretary Cameron, who then authorized the creation of the division. In a report on his term as Commander of the Army of the Potomac, however, McClellan presents a letter he wrote to Secretary Cameron on 6 September 1861, which contradicts Burnside's claim. In this letter, McClellan requests permission to create a division which was "sufficiently conversant with boat service," "armed with Dahlgren boat-guns," and "launches and floating batteries," "for operations in the inlets of Chesapeake Bay and the Potomac: by enabling me thus to land troops at points where they are needed," and to carry out attacks on the coast "in conjunction with a naval force" (McClellan 1864:83, 84). It is unclear whether Burnside misremembered the date of his conversation with McClellan or if both generals were attempting to claim credit for the idea.

In either case, on 12 September 1861, Burnside received orders from McClellan to raise two brigades in New England which would form the basis of the Coastal Division and work in conjunction with McClellan's Army of the Potomac (Carbone 2001:24). The Coastal Division was not ready for action until January 1862, however, due to the "difficulty in procuring the requisite vessels and adapting them to the special purposes contemplated" (McClellan 1864:85). These difficulties were due in large part to the extensive purchases of merchant vessels authorized by Welles. At the opening of the conflict, the Union Navy had only 12 vessels on its rolls available for service immediately, with an additional 30 being available after being fitted out from ordinary or returned from foreign service (Soley 1887:614). In order to fill these ranks

for the blockade, Welles' initially authorized the purchase of 136 vessels, but the Union Navy purchased 418 by the end of the war (Scharf 1887:41; Soley 1887:616). Unfortunately for Burnside, the vessels being purchased by the Navy were the same sort of vessels he needed for the Coastal Division. As such, he faced a significant challenge finding any vessels which could be purchased rather than simply chartered (Gibson and Gibson 1995:25). Despite these setbacks, Burnside attested that he had succeeded in arranging a "sufficient amount of transportation and armament" by 12 December 1861 (Burnside 1887:661). Describing what he fondly referred to as his "motley fleet," Burnside wrote that:

> North River barges and propellers had been strengthened from deck to keelson by heavy oak planks, and water-tight compartments had been built in them: they were so arranged that parapets of sand-bags or bales of hay could be built upon their decks, and each one carried from four to six guns. Sailing vessels, formerly belonging to the coasting trade, had been fitted up in the same manner. Several large passenger steamers, which were guaranteed to draw less than eight feet of water, together with tug and ferry boats, served to make up the fleet, which gave a capacity to transport 15,000 troops, with baggage, camp-equipage, rations etc. (Burnside 1887:661).

All together, the army vessels which would accompany the Coastal Division amounted to thirteen troop transports, nine shallow draft gunboats, seven supply transports, and six floating batteries (Gibson and Gibson 1995:27-28).

Between the conception of the Coastal Division in September and the purchase of the final vessel in December, significant changes had been wrought in the scope of its purpose. Although initially formed to carry out minor operations in the Chesapeake Bay area along with the Army of the Potomac, McClellan's appointment to General-in-Chief on 1 November 1861

brought about a shift in both the Union grand strategy and in the purpose of the Coastal Division. Colonel Hawkins, an outspoken supporter of further operations in North Carolina, caught McClellan's ear after a cabinet meeting on 5 November (Hawkins 1887:639). Hawkins' sentiments were echoed by other officers including Flag-Officer Louis M. Goldsborough, commander of the North Atlantic Blockading Squadron, who argued that a base of operations other than Fort Hatteras was necessary (Morrill 2002:246). The lobbying of these officers and others was apparently effective, as an expedition into North Carolina was included in McClellan's grand strategy for 1862. This new strategy called for aggressive joint Army-Navy operations in North Carolina, South Carolina, Florida, Georgia, and Louisiana, which were intended to disrupt Confederate lines of communication, draw attention away from Virginia, and speed the end of the war (Merrill 1957:86).

With this joint operation authorized, Goldsborough was engaged from November onwards in securing proper vessels to operate in the shallow North Carolina sounds. Although he did not face the same challenges as Burnside in finding vessels, correspondence between Goldsborough and Gustavus V. Fox, Assistant Secretary of the Navy, does indicate some difficulty in finding vessels which could effectively operate in the sounds from among those already on the Navy lists; eventually, ten new vessels would be purchased specifically for the expedition to North Carolina. Moreover, the vessels which were purchased new required modification to be ready for combat service. Writing on 29 December 1861, Goldsborough complained that "[v]essels, necessarily, are sent to me from New York without the slightest preparation of any sort or find for service—no guns, no men, no place for powder, none for shells, &c, &c, &c" (Fox 1920:226).

One such vessel was *Southfield*, a former Staten Island ferryboat. A number of New York ferryboats were purchased for the blockade. They were valued for their sturdy icebreaking hulls (*Southfield* had thirty feet of solid wood at both ends) and their maneuverable "double ended" design (Spirek 1993:46). *Southfield* is representative of the sort of modifications which were made to prepare the merchant vessels for combat roles. According to James Spirek, who led an investigation of the wreck of *Southfield* in 1993, "the alteration process consisted of deciding which features were to be retained, which were to be removed, and of those aspects remaining, how best they could be adapted to support a combatant role" (Spirek 1993:157). A sheath of planks perpendicular to the original deck planks was added to form a reinforced gun deck which could support the guns and allow their carriages to recoil along the grain of the wood (Spirek 1993:157). Around this new gundeck, breechworks between 2'1" and 2'2" high were constructed with breeches and equipment for the mounting of three 9 in. shell guns and one 100 pdr Parrott Rifle (Spirek 1993:137-139, 57). Inside the former cabin space, alterations were made to create a shell locker, magazine, and other spaces required for the military service of the vessel (Spirek 1993:54). In addition to these changes, davits were added for the deployment of a launch (Spirek 1993:142). Such was the nature of the vessels of the Navy which participated in the Burnside expedition, merchant vessels with the minimum modifications necessary to mount and operate cannon.

On 7 January 1862 as the Army and Navy divisions of the expedition finalized their preparations, McClellan issued the following orders:

> Your first point of attack will be Roanoke Island . . . Having completed your arrangements in regard to Roanoke Island, and the waters north of it; you will please at once make a descent on New Bern; having gained possession of which, and the railroad

> passing through it you will at once throw a sufficient force upon Beaufort, and take the steps necessary to reduce Fort Macon . . . you will endeavor to seize the railroad as far west as Goldsborough – should circumstances favor that movement . . . A great point would be gained in any event, by the effectual destruction of the Wilmington and Weldon Railroad (McClellan 1864:85,86).

The objectives of the joint force were many, and the destruction of the Wilmington and Weldon railroad in particular would have had a devastating effect on the Confederacy as at the time "all trains east of the Appalachian mountains traveled through that small north Carolina town [Weldon] to take supplies to the huge confederate army in Virginia" (Morrill 2002:133). From this point onward, however, Roanoke Island was set as their first objective in the state.

Confederate Defensive Preparations

The defenses of the North Carolina coast, and Roanoke Island in particular, were the product of disjointed and ultimately ineffective efforts by a number of individuals. Brigadier General Richard Gatlin was given command of the department of North Carolina and the defense of the coast in August 1861 (U.S. War Department 1883:183). From the beginning of his term, both he and Governor Clark made repeated requests to Richmond for reinforcements and supplies for the state, which only intensified after the capture of forts Hatteras and Clark; these requests were generally denied or ignored. The frustration of these two is perhaps best expressed in a letter by Governor Clark, in which he wrote that "we see just over our lines in Virginia near Suffolk two or three North Carolina regiments, well-armed, and well-drilled, who are not allowed to come to the defense of their homes" (Morrill 2002:250). The responses of Richmond to these pleas, on the other hand, are summed up in a reply to one of Clark's requests; "I regret to

say that the necessities of the public service absolutely forbid the transfer of any troops from Virginia at the present time" (Morrill 2002:250).

It was during this time that the first fortifications on Roanoke Island were constructed. Roanoke Island lies in a narrow space between Bodies Island and the mainland and separates Pamlico Sound in the south from Albemarle Sound in the north. The waters east and west of the island are known respectively as Roanoke Sound and Croatan Sound. With an average depth between one and three feet, Roanoke Sound was only accessible to small craft (Taylor et al. 1951:5).This left Croatan Sound, which ranged between two and half to four miles wide in 1862 (USCGS 1876), as the only navigable route between Pamlico and Albemarle Sounds, creating a choke point on the route north to Norfolk. Because of this, the fortifications on the island were concentrated on the western side facing into Croatan Sound. On 30 August 1861, the Third Georgia Regiment, under the command of Colonel Ambrose Wright, was headed to reinforce Fort Hatteras when they received news of the capture of that fort. The Third Georgia was then redirected to Roanoke Island, where they were joined by the North Carolina troops from Oregon Inlet who had abandoned the fort there and taken the cannon with them (Parker 1883:213,214). On arrival, Colonel Wright found some small batteries which had been under construction since May (Scharf 1887:369). With the threat of the Union troops now stationed at Fort Hatteras, Wright ordered the overhaul of these batteries and the construction of new earthwork forts. Figure 23 shows the location of these forts. Forts Huger, Blanchard, and Bartow had been completed by September 1861. At some point, a fourth fort, Fort Forrest, had been created by sinking two barges on the western shore of Croatan Sound, and an eighty foot redoubt had been constructed across the main north-south road of the island (Olson 1997:88-90).

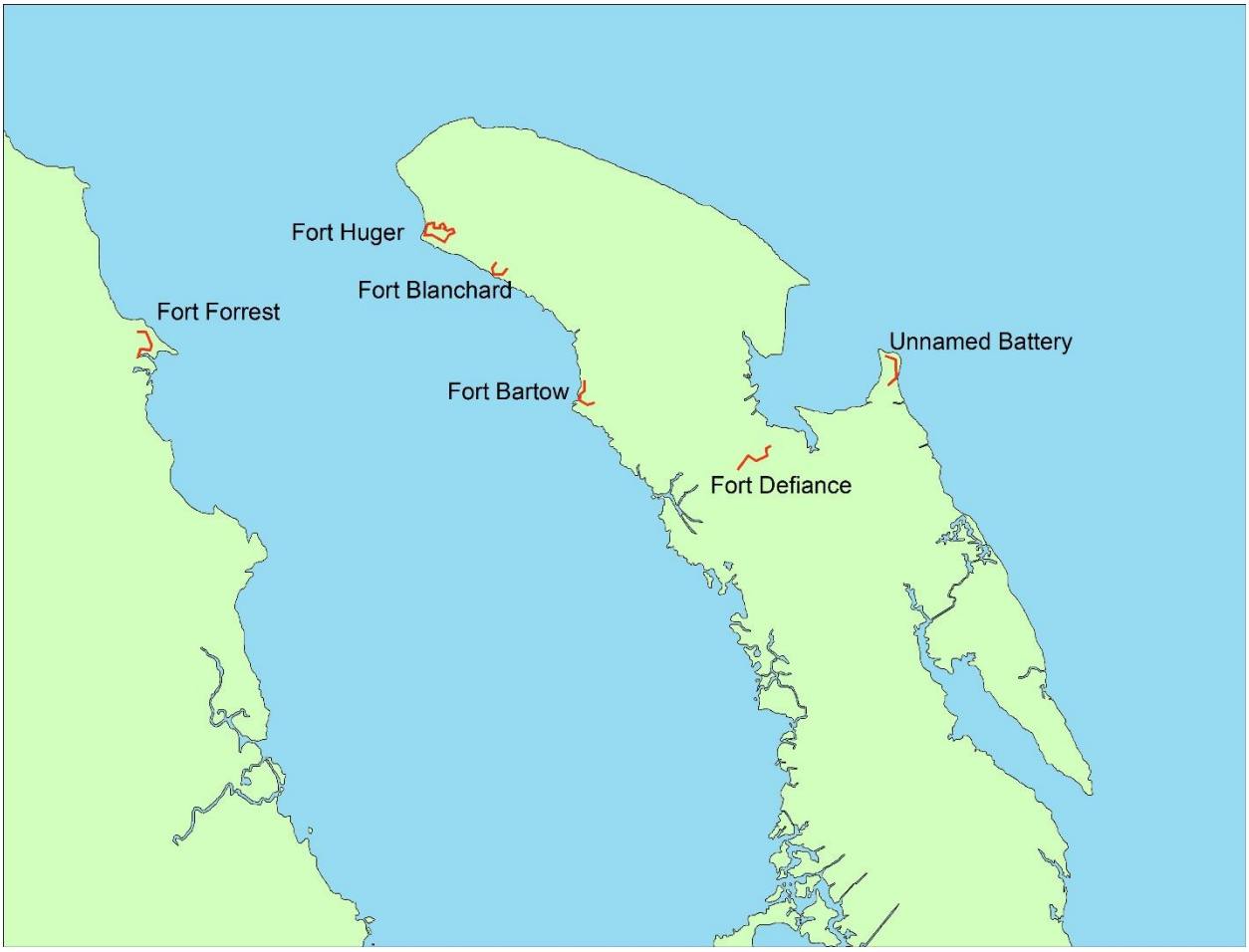



Figure 23: Location of Confederate Forts (By Lucas Simonds)

In addition to the Confederate Army's involvement in the defenses of the North Carolina Coast, the Confederate Navy had a small squadron of gunboats stationed in the sounds. This squadron began as the North Carolina State Navy when Governor Clark purchased a number of local merchant vessels for the defense of the coast (Scharf 1887:369). The state navy soon became known as the "Mosquito Fleet" in reference to the small size and light armament of its vessels. Control of the Mosquito Fleet was transferred to the Confederate Navy when North Carolina joined the Confederacy in May 1861, and the last of the North Carolina vessels was transferred to Confederate command by 20 August 1861. The squadron grew as more vessels

were purchased and captured, boasting six steam vessels and a number of sail by December (Olson 1997:84,100).

The Mosquito Fleet was under the command of Flag Officer Samuel Barron in August of 1861. Barron was captured at Fort Hatteras, however, and replaced by Flag-Officer William Lynch. Lynch soon became involved in the development of Roanoke Island's defenses as well, recognizing its importance. Writing on 17 September, Lynch remarked that:

> So great is the breadth of Croatan sound … that I am reluctantly forced to the conclusion that but little dependence can be placed upon land batteries for its defense … I am persuaded that the defense of this sound must be made at the marshes, 7 miles below, with floating batteries and gunboats, there being no soil wherewith to construct redoubts (U.S. Navy Department 1897b:729).

This letter was addressed to Major General Benjamin Huger, commander at Norfolk, who agreed in a letter on the following day to consider Lynch's recommendations. No immediate action was taken to alter the defenses of the island.

On 29 September, in response to the constant requests for assistance in the state, General D.H. Hill was charged with the defense of the coast between Albemarle Sound and the mouth of the Neuse River (U.S. War Department 1883:183). Writing to Stephen Mallory, Secretary of the Confederate Navy, on 18 October, Hill urged that:

> Roanoke Island is the key to one-third of North Carolina, and its possession by the enemy would enable him to seize the great railway connection between north and south of the Confederacy. This all-important island is in want of men and guns … Feeling that everything depended upon holding it, I came up last night to apply to the Navy Department for ordnance and ordnance stores. I found Commodore Forrest, Captain

> Fairfax, and General Huger fully as much concerned about the island as I was, but they could do nothing for me without your order (U.S. Navy Department 1897b:739).

On 23 October Secretary Mallory referred this request to the Secretary of War as he could "not furnish these guns" (U.S. Navy Department 1897b:739). In addition to his requests for ordnance, Hill began to make some plans to improve the defenses of the island. Before Hill could further bolster the island's defenses, however, the defense of that area was transferred to the command of Brigadier General Lawrence Branch, who never visited Roanoke Island (U.S. War Department 1883:188). The coast of North Carolina was then transferred to the Department of Virginia under General Huger, and placed under the immediate command of Brigadier General Henry Wise on 21 December 1861 (U.S. War Department 1883:184).

Wise himself did not inspect the defenses of Roanoke Island until 7 January 1862, (U.S. War Department 1883:127). Echoing Lynch's comments, General Wise was baffled after his first inspection of the island's defenses. In his after-action report of the battle, Wise writes that:

> I saw that the enemy might land at Pugh's or Ashby's a portion of their force, pass the batteries with all ease, round the north end of the island, and land another portion of their forces, and gain the rear of all the batteries without exchanging a shot with them, or the least danger of damage. Not a fort was in the right position … If the five batteries had been placed on those islands of the marsh and on the opposite shores every channel would have been guarded and the enemy would have been cut off from landing (U.S. War Department 1883:129).

Wise immediately took action in response to the failings he noted in the island's defense. On the island itself, the left flank of Fort Bartow was extended to meet the marsh south of the fort and two guns were placed on this extension (U.S. Navy Department 1897b:598). Wise also ordered

that a barricade of piles and blockships be created across Croatan Sound, an idea which had originated from Colonel H.M. Shaw, immediate commander of the island (U.S. War Department 1883:125,127). Furthermore, Wise wrote to General Huger suggesting that batteries be constructed in the marshes and requesting more troops for the island. In a response on 13 January, Huger approved the construction of floating batteries in the marshes, but remarked, "I do not consider large forces necessary for the defense of this island. If the batteries can keep off gunboats and transports the infantry will have little opportunity to act" (U.S. War Department 1883:152). Between 13 January and 7 February, Wise was occupied primarily in increasingly desperate attempts to secure more troops for the island, motivated particularly by news that Burnside Expedition had set out (U.S. War Department 1883:133-152). During this time, no progress was made on the batteries in the marshes, but the barricade of pilings was put in place from the western shore of Croatan Sound near Fort Forrest to within 1,700 yards of the island (U.S. Navy Department 1897b:598).

The Burnside Expedition Heads South

After a rendezvous at Hampton Roads, the joint Army-Navy fleet made south for Hatteras on the night of 11 January 1862. During the voyage south, Burnside transferred his headquarters from the large steamer *George Peabody* to the gunboat *Picket*, the smallest ship in the fleet, in order to instill confidence in his men as to the seaworthiness of the fleet as a whole. Burnside perhaps regretted this decision as on 12 January, after rounding Cape Hatteras, the wind picked up so that onboard *Picket*, "everything on the deck that was not lashed was swept overboard; and the men, furniture, and crockery below decks were thrown about in a most promiscuous manner" (Burnside 1887:663).

As the storm and ensuing fog cleared on the morning of 13 January 1862, the Burnside Expedition faced their first great challenge. Figure 24 illustrates Hatteras Inlet, which the fleet needed to pass through on their way to Roanoke Island. The entrance into Hatteras Inlet from the Atlantic Ocean is blocked by a sandbar, known at the time as "the bar." Similarly, the entrance from Hatteras Inlet into Pamlico Sound is also blocked by a sandbar, known at the time as "the swash" or "the bulkhead" (Burnside 1887:664-667). Despite both Burnside and Goldsborough having selected shallow draft ships for their fleet, the challenge of crossing through Hatteras Inlet would set the expedition back by over two weeks.

The crossing began easily enough as, around noon on 13 January, a tugboat from Fort Hatteras came out to pilot the fleet through. By the end of the afternoon, the majority of the fleet had crossed over the bar, save for the coal and water supply vessels and those troop transports which were too deep of draft to cross. During the crossing, the supply transport *City of New York* grounded on the bar, and would be broken up by the waves over the next day. The horse transport *Pocahontas* ran aground on the shore outside and was lost as well. The only other ship to be lost, however, was the gunboat *Zouave,* which sank in the inlet after having crossed over the bar. The only men to be lost during the crossing were two officers of the Ninth New Jersey, whose surfboat was swamped while crossing the bar as they returned to their ship after a visit with Burnside on *Picket* (Burnside 1887:664,665).

The relatively easy crossing into the inlet was followed by a storm on 14 January, which marked the beginning of a series of storms that buffeted the fleet in the inlet until 26 January (Burnside 1887:665). A soldier of the Twenty-Fifth Massachusetts describing that time wrote rather poetically that: As far as the eye can see, the water is rolling, foaming, and dashing over the shoals, throwing it's [sic] white spray far into the air as though the sea and sky meet.

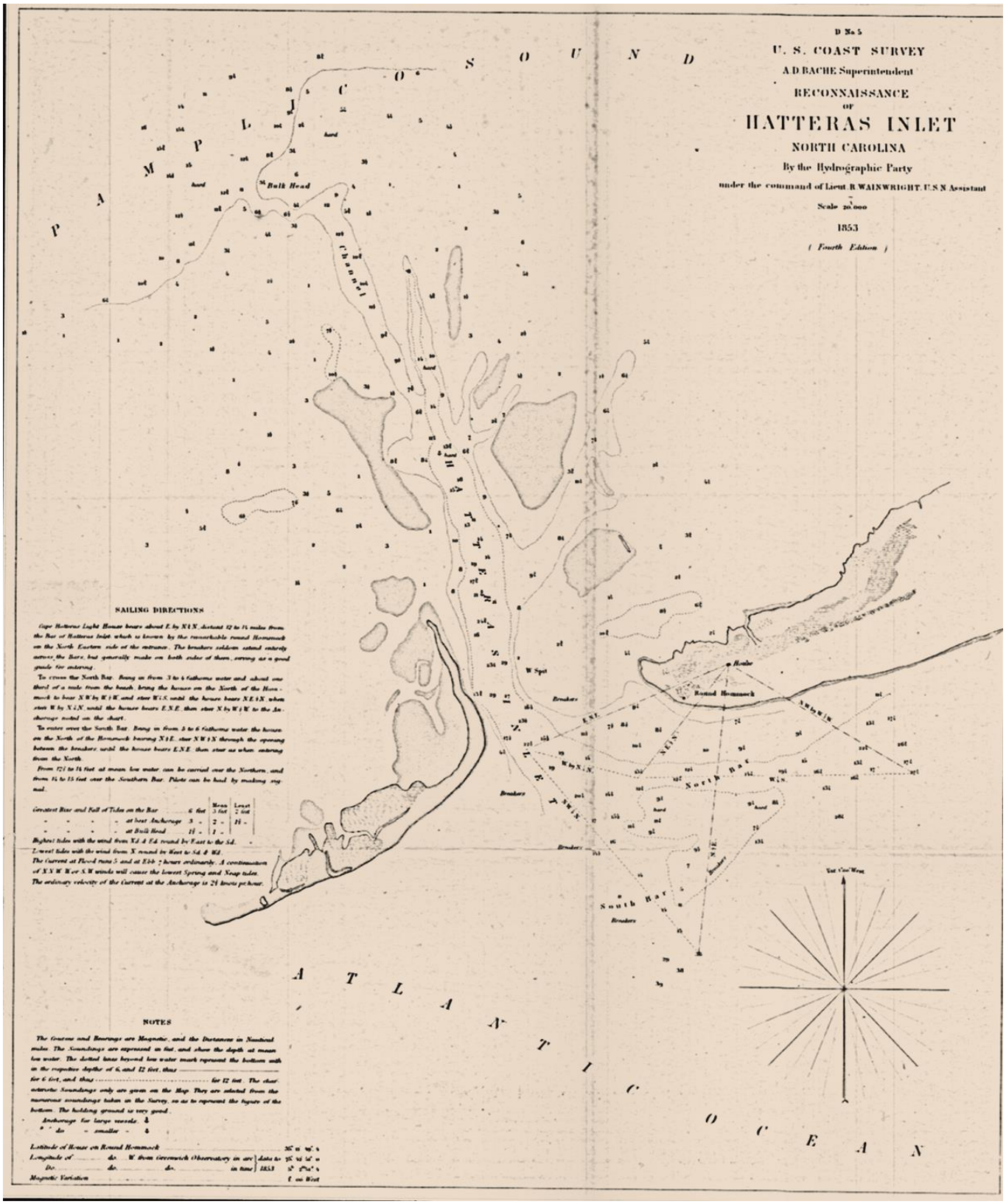



Figure 24: Hatteras Inlet ca.1853 (USCGS 1853)

> This is no time for man to war against man. The forces of Heaven are loose and in all their fury, the winds howls, the sea rages, the eternal is here in all his majesty. As one looks out on the grand yet terrible scene, he can but exclaim, "Great and marvelous are thy works, Lord, God, Almighty!" (Carbone 2001:31)

Surprisingly, no further ships or lives were lost during these storms, despite frequent danger to both ships and men. Burnside describes the conditions within the inlet, writing:

> Many of the vessels were driven from their anchors and grounded on the swash and the bar. Many collisions occurred, which caused great damage to the fleet. At times it seemed as if nothing could prevent general disaster (Burnside 1887:665).

Moreover, the dangers of the storm were compounded by the condition aboard the ships. Burnside had planned to supply the expedition with fresh water by means of schooners based out of Baltimore, and therefore only brought limited supplies along. With the water supply ships anchored outside the inlet, and the storms stopping other supply ships from sailing south, the supply of fresh water on most Army vessels was running dangerously low (U.S. War Department 1883:355). Burnside records one particularly desperate day when nearly the entire fleet spread their sails out to catch water during a rainstorm (Burnside 1887:665). Goldsborough, on the other hand, had supplied each of his ships with condensers to produce freshwater. In a letter to Assistant Secretary Fox, Goldsborough seemed rather annoyed that he "had to keep [the condensers] going day & night, in order to relieve the absolute want of the Army" (Fox 1920:234).

During the pauses between storms, a number of vessels attempted to make the crossing over the swash into Pamlico Sound, but with varying degrees of success. The most pressing problem was that the depth at high tide over the swash, which had previously been reported to be

eight feet, was actually closer to six feet, making most of the vessels in the fleet too deep of draft to cross (Burnside 1887:665). The Navy vessels had more success than those of the army, and in a letter to Assistant Secretary Fox on 23 January, Goldsborough reported that "all our own Naval vessels which have arrived here … are safely over the bulkhead & have been for several days" (Fox 1920:231). In that same report, Goldsborough remarked that only USS *Southfield* and USS *Stars and Stripes* had trouble making the crossing. In reference to USS *Stars and Stripes,* he wrote, "Our boys would not be foiled, & so they slewed her round stern foremost, & while she worked her propeller as hard as she could & thus gouged out a channel for herself, a small steamer on either side dragged her along inch by inch" (Fox 1920:232). Even as Goldsborough wrote, however, the fleet was "in the midst of a devil of a blow," and it would be some time before the Army vessels were finally able to make the crossing (Fox 1920:232-233).

The Army vessels were, on the whole, of considerably deeper draft than the navy vessels, and were unable to cross the swash, even after offloading as much as possible. In a letter on 21 January, Burnside requested that tugboats be sent from Baltimore to assist further in offloading men and supplies from his ships and to help pull them over the swash (U.S. War Department 1883:355). While waiting for these tugs to arrive, however, the Army resorted to a rather ingenious tactic to move their vessels into Pamlico Sound. According to Burnside's account of the crossing:

> Large vessels were sent ahead, under full steam, on the bar when the tide was running out, and then anchors were carried out by boats in advance so as to hold the vessels in position. The swift current would wash the sand from under them and allow them to float, after which they were driven farther on by steam and anchored again, when the sand would again wash out from under them. This process was continued for days, until a

broad channel of over eight feet was made, deep enough to allow the passage of the fleet into the sound (Burnside 1887:666).

As the storms cleared on 26 January, some of the Army gunboats finally crossed over the swash, and were followed by one of the largest steamers (Burnside 1887:666). Four water schooners arrived on 29 January, followed shortly by the requested tugboats on 31 January (U.S. War Department 1883:356,557), but owing to the need to further lighten many of the vessels for their passage through the inlet, it was not until 5 February that the supplies and men had been loaded back onto the Army vessels so that they were prepared to move (U.S. Navy 1987:551).

On the evening of 5 February, with the Army vessels at the ready, the combined fleet continued to Stumpy Point, which lies approximately ten miles south of Roanoke Island (U.S. Navy 1987:552). The next morning, 6 February, Flag Officer Goldsborough transferred his flag to USS *Southfield*, and by 08:00 the fleet was underway with USS *Ceres* and USS *William G. Putnam* a mile or so in advance (U.S. Navy 1987:552,558). The weather that day was thick, however, and despite a brief clear moment around 09:30, had become so thick by 11:00 that they stopped moving (U.S. Navy 1987:552). During the afternoon, the army gunboats *Picket, Vedette, Hussar, Lancer, Ranger, Chasseur,* and *Pioneer* offloaded their troops into transports and reported to Captain Hazard of the navy, who would command them during the upcoming engagement (U.S. War Department 1883:80, 89-92). Around 17:30, CSS *Appomattox* was allowed to come within sight of the fleet, as Goldsborough hoped that knowledge of the size of the Union fleet would unnerve the Confederate defenders (U.S. Navy 1987:552,559). Around 18:00, the fleet finally anchored near the Roanoke Marshes to wait for the next day (U.S. Navy 1987:559). At sunset, as Lynch was finally satisfied that the Union fleet would not attack that day, the Mosquito Fleet was allowed to anchor (Parker 1883:228).

That night, Captain William Parker of CSS *Beaufort*, whose recollections provide the bulk of the details for the activities of the Mosquito Fleet during the upcoming battle, paid a visit to Flag-Officer Lynch aboard CSS *Seabird*, where he found the Commodore reading *Ivanhoe*. After a long discussion of their plans for the following day, and their convictions that victory was impossible, their talk turned to literature, which continued uninterrupted until the ship's bell struck midnight. As Captain Parker walked down the gangway to return to his ship, Flag-Officer Lynch called out "'Ah! If we could only hope for success; but, come again when you can" (Parker 1883:228). As to Captain Parker, he describes his rather strange evening, saying:

> Here were two men looking forward to death in less than 24 hours – death, too, in defeat not victory – and yet able to lose themselves in works of fiction … Unknown to ourselves it must be as Campbell writes: "Hope springs eternal in the human breast!" (Parker 1883:229).

Events of the Battle

Before continuing with a narrative of the battle on 7 and 8 February, it is important to give a brief explanation regarding the times presented for the events of the battle. Owing to differences of over an hour in the times reported for certain events by officers on board different vessels, it is impossible to simply present a timeline of events as they are recorded in the *Official Records*, as this would place many events out of the sequence in which they actually occurred. In order to rectify such discrepancies, the times reported by Henry Van Brunt, Secretary to Flag Officer Goldsborough aboard USS *Southfield*, will be assumed as correct for the key events of the battle. Times reported in other accounts of the battle which diverge significantly from those reported by Van Brunt have been adjusted to fit within this sequence of events. It should also be

noted that the following narrative is, unfortunately, somewhat Union-centric, as far more Union accounts of the battle are available.

Before the sun rose on 7 February 1862, Flag-Officer Lynch sent CSS *Appomattox* to Edenton, leaving only seven vessels to defend the island (Parker 1883:229). For the men of the U.S. Navy, 7 February began with a signal to "let the men take their breakfast" at 07:00 (U.S. Navy Department 1897b:558). By 09:00, a fog bank that had covered the area dispersed, and the fleet began to get into order (U.S. Navy Department 1897b:588). As Lynch observed this movement, he ordered the ships of the Mosquito Fleet into line abreast north of the barricade to wait for the advance of the Union fleet (Parker 1883:229). At 09:55, Goldsborough signaled to "get underway" (U.S. Navy Department 1897b:588). As the bulk of the fleet advanced together, Goldsborough ordered USS *Ceres*, USS *William G. Putnam*, and USS *Underwriter* ahead. USS *Ceres* and USS *William G. Putnam* were to keep within 400 yards of USS *Southfield*, but USS *Underwriter* was instructed to discover "as early as possible if a battery had been erected on Sandy Point" (U.S. Navy Department 1897b:552). At 10:15, Goldsborough signaled "[o]ur country expects every man to do his duty," and, "being anxious to make a decided impression upon the enemy early in the contest," ordered all the steamers with 9-inch guns to close up at 10:25 (U.S. Navy Department 1897b:552,588).

At 10:30, after the advance ships came within view, a Confederate gun was fired to announce their approach, in response to which Goldsborough signaled to "[f]ollow and engage the enemy" (U.S. Navy Department 1897b:559,561). Shortly thereafter, at 10:45, USS *Ceres* received permission to engage the Confederate gunboats, coming within range of the 30 pdr Parrott Rifle by 11:00 (U.S. Navy Department 1897b:575). Around 10:50 USS *Louisiana* ran aground in the marshes; the Lieutenant commanding USS *Louisiana* reported that, after striking

an obstruction, the ship "swung entirely round, bearing her weight upon the propeller," at which point he ordered those ships under his command with 9-inch guns to continue on; USS *Louisiana* was not freed from the channel until the naval division had finished passing through, with the help of USS *I.N. Seymour*. These two vessels then quickly moved to rejoin the rest of the squadron (U.S. Navy Department 1897b:557,588).

At 11:25, after firing two shells at the area, USS *Underwriter* signaled "[n]o battery on Sand Point" (U.S. Navy Department 1897b:561,588). Soon thereafter, Goldsborough ordered USS *Southfield* alongside USS *Underwriter*, and at 11:38 a Confederate vessel fired on the two (U.S. Navy Department 1897b:559,561). One of the Union vessels responded immediately, and Goldsborough signaled to "close in upon the enemy" (U.S. Navy Department 1897b:559). Following closely on this order, USS *I.N. Seymour* drew within one and a half miles of Fort Bartow and opened fire with every gun (U.S. Navy Department 1897b:575). It is also around this time that reports from both sides agree that the firing became general at long range between the opposing forces (Parker 1883:229; U.S. Navy Department 1897b:559,588). As the Union forces continued to advance, Lynch ordered his gunboats to draw back from the barricade in the direction of Fort Huger; but as the Union vessels continued to focus their fire on Fort Bartow, they soon returned to their original position (Parker 1883:229).

By 11:50, all of the Union gunboats had crossed through the marshes into Croatan Sound; and by 12:00, most were in range of either the Confederate gunboats or Fort Bartow (U.S. Navy Department 1897b:588). Around this time, USS *Valley City*, USS *Commodore Perry*, USS *Morse*, USS *Whitehead*, and USS *Henry Brinker*, were all drawn up "within three-quarters of a mile of the shore, and engaged with the rebel battery [Fort Bartow]" (U.S. Navy Department 1897b:566). Early during the general action, USS *Underwriter* moved in close to the barricade,

but after noticing the number of guns trained on that position from Forts Forrest and Bartow, dropped back out of range to engage with the gunboats (U.S. Navy Department 1897b:562). The commander of USS *Stars and Stripes*, on the other hand, reports that he had drawn his vessel in "as near as the circumstances would admit" and opened fire on both the fort and the gunboats. As would be the case with most Union vessels, USS *Stars and Stripes* also struck ground a number of times between 12:00 and 16:00 (U.S. Navy Department 1897b:555-557).

As the Union vessels continued to search for good firing positions, USS *William G. Putnam* ran up the right side of the Union squadron firing continuously. Once within range of Fort Bartow, the ship turned its broadside to the fort and continued firing from that position for the remainder of the engagement (U.S. Navy Department 1897b:576). Around 13:00, Lynch ordered the Confederate gunboats north again, but they quickly returned to the barricade (Hinds 1998:84). During this maneuver, USS *Commodore Barney* ran aground in an attempt to come within range of 10-second fuses. While waiting to get afloat again, the gunners were able to fire thirty 10-second shells; as a result of this fire and that of the other gunboats nearby, the barracks at Fort Bartow burst into flames around 13:30 (U.S. Navy Department 1897b:588). As the flames at the fort grew higher, USS *Hunchback* was disabled by a shot that "struck the engine, carrying away the top of one of the cylinder guide rods and the spring bow" (U.S. Navy Department 1897b:568). After signaling for instructions to USS *Southfield* and receiving the signal "use your own discretion" in reply, Lieutenant E.R. Calhoun anchored USS *Hunchback* and, with a spring line on the anchor cable, brought his ship to bear on Fort Bartow and continued firing (U.S. Navy Department 1897b:569).

Around 14:00, USS *Ceres* began firing on Fort Bartow as well as the enemy gunboats; and USS *Hetzel* was forced to withdraw after a 32-pound shot lodged in the coal bunker,

returning to action by 14:40 (U.S. Navy Department 1897b:552,575). Meanwhile, on the other side of the barricade, CSS *Ellis* ran out of ammunition, but was able to resupply from CSS *Forrest*, which was already out of commission due to a displaced propeller shaft (Hinds 1998:85). Captain Parker notes that it was at this time, close to 14:00, that the fire was reaching its heaviest (Parker 1883:229).

At 15:00, the first two army steamers loaded troops for landing. USS *Valley City* moved within a half mile of the shore to continue firing, while USS *Commodore Perry* and USS *Morse* withdrew, having expended their ammunition (U.S. Navy Department 1897b:566,567,588). Around that same time, USS *Delaware*, under the command of the hilariously named S.P. Quackenbush, which had been closing in since the beginning of the engagement, came within a ship's length of the shore and began firing shells with 5-second fuses on Fort Bartow. Soon after this, however, Lieutenant Quackenbush noticed an army transport moving towards the shore and fired a shell at the Confederate troops guarding the landing site, which promptly drove them off (U.S. Navy Department 1897b:563).

Around 15:15, in one of the more unusual occurrences of the battle, one of the 80-pound rifled guns aboard USS *Hetzel* exploded. As recorded in the report of Lieutenant H.K. Davenport:

> The part forward of the trunnions fell upon the deck; one-third of the breech went overboard, carrying away the port bulwarks; another flew high into the air and fell into the water just alongside; and the remaining portion, weighing about 1,000 pounds, was driven through the deck, breaking in one of the beams, passed through the magazine and the deck below, and lodged upon the keelson. The magazine was set on fire and only

> extinguished in time to avoid an explosion and utter destruction of the ship (U.S. Navy Department 1897b:559).

Although no one was killed by the explosion, six were injured, and after reporting the incident to the flagship, USS *Hetzel* withdrew from the battle (U.S. Navy Department 1897b:559). It was around this same time that many ships in the Union Fleet began to run out of ammunition. USS *Henry Brinker* withdrew for lack of ammunition at 15:20; at 15:55, USS *Ceres* signaled the same; and after this point, four more ships fired their last shells before the order to cease fire was given (U.S. Navy Department 1897b:574,588).

Around 16:00, five of the Confederate gunboats moved in closer to fire on the Union fleet (U.S. Navy Department 1897b:589). It was during this advance that CSS *Curlew*, the only ship lost during the battle, was struck. According to Captain Parker:

> A shot or shell struck the hurricane-deck of *Curlew* in its descent, and went through her decks and bottom as though they had been made of paper. Her captain, finding she was sinking, started for the shore, and as he passed me, hailed; but I could not make out what he said, and he being a very excitable fellow (the North Carolinians called him Tornado Hunter) I said to Johnson that I thought there was nothing the matter with him. "Oh yes there is," said J., "look at his guards." And sure enough he was fast going down. I put after him in the *Beaufort*, but he got her ashore in time. Hunter put his vessel ashore immediately in front of Fort Forrest, completely masking its guns, and we could not fire her for fear of burning up the battery (Parker 1883:230).

In an anecdote describing Hunter's excitability, Parker says that, "[h]e told me afterward that during the fight this day he found to his surprise that he had not trousers on. He said he could never understand it, as he had certainly put on a pair in the morning" (Parker 1882:230).

As CSS *Curlew* was sinking, the premature discharge of a gun aboard USS *Ceres* injured two gunners, causing that ship to withdraw for a short time (U.S. Navy Department 1897b:575). Not long after the Confederate advance had begun, however, Fort Bartow ceased firing at 16:25 and the gunboats withdrew at 16:30 (U.S. Navy Department 1897b:589). It was during this short pause that the first Union troops landed on the island. According to Burnside's account of the landing:

> Each brigadier-general had a light-draught steamer, to which were attached some 20 surf-boats in a long line in the rear. Both steamers and boats were densely filled with soldiers, and each boat bearing the national flag. As the steamers approached the shore at a rapid speed each surfboat was "let go," and with their acquired velocity and by direction of the steersman reached the shore in line (Department of War 1883:76).

Within an hour, 4,000 of Burnside's troops had been landed in this manner, and the landings continued, uninterrupted, until midnight, with one regiment landing the following morning (Burnside 1887:668). The respite from bombardment, however, proved to be short, as Fort Bartow opened fire again at 17:00 and a shell struck USS *Ceres* "on the upper deck, splitting one of the beams, going through the lower deck, bursting under the boiler, carrying away one of the grates of the furnace;" despite this damage, USS *Ceres* continued firing until the order to cease firing was given (U.S. Navy Department 1897b:575,576,589).

The Confederate gunboats drew in for a final time at 17:10, but withdrew by 17:45 (U.S. Navy Department 1897b:589). Goldsborough signaled "[c]ease firing" at 18:00, at which point the gunners on board USS *Commodore Perry* fired their last charge of powder (U.S. Navy Department 1897b:589). The troop landings continued into the night, including the landing of

some naval boat howitzers under the command of Midshipman Benjamin H. Porter; by midnight, nearly 10,000 Union soldiers had been landed on the island (U.S. Navy Department 1897b:553).

> As these landings continued, the Mosquito fleet anchored near Fort Forrest. Parker wrote: Upon the whole I was rather surprised to find myself alive, and congratulated myself upon having one night more before me. I directed my steward to serve out the cabin stores to the men and let them have a good supper – that was about what I thought of what would be the result of the next day's fight (Parker 1883:231).

Parker's relief was tempered, however, as Flag-Officer Lynch ordered the Mosquito Fleet north to Elizabeth City to resupply (U.S. Navy Department 1897b:595). Although Lynch had hoped to return soon to renew the fight, the island would fall on the following day.

With the Mosquito Fleet absent, the bombardment of 8 February proved to be far smaller in scale than that of 7 February, as Goldsborough feared that fire from his ships could also hit Burnside's troops fighting on the island, and was reticent to fire at Fort Bartow (U.S. Navy Department 1897b:554). Nevertheless, Fort Bartow opened fire on the Union vessels at 09:00. Goldsborough signaled "Cease firing" at 09:10after hearing the fire on the island slacken, assuming that this indicated a Union advance (U.S. Navy Department 1897b:589). A few hours later, according to Van Brunt's report, "[a]t about meridian [12:00] *Valley City* and *Louisiana* fired several shots at the fort, eliciting no response. The fort was silenced and abandoned" (U.S. Navy Department 1897b:589). Hearing that the fight on land was still well south of the fort, Goldsborough ordered his fleet to return fire at 09:35 (U.S. Navy Department 1897b:554,589).

At 13:00, USS *Underwriter,* USS *Valley City,* USS *I.N. Seymour,* USS *John Lockwood,* USS *Whitehead,* USS *Ceres,* USS *William G. Putnam,* and USS *Henry Brinker* were ordered to find a way through the barricade (U.S. Navy Department 1897b:589). After some difficulty in

locating a channel, at 16:00, USS *Ceres* found a passage "between an unfinished row of piles and a sunken schooner." Soon thereafter, USS *John Lockwood* cut the chain holding two of the blockships together, and the remainder of the ships were able to pass through (U.S. Navy Department 1897b:562,589). At 16:45, Fort Bartow was captured, and Fort Forrest was abandoned at 17:00 (U.S. Navy Department 1897b:589). Finally, at 17:25, Goldsborough signaled "Victory" (U.S. Navy Department 1897b:589).

## Conclusion

This chapter has explored the wider geopolitical situation in which the battle took place. The imposition of the Union Blockade and the importance of the North Carolina sounds to blockade runners and privateers were discussed, both of which were important factors in driving the formation of the Burnside Expedition. Following this, the organization of the Burnside Expedition, the preparation of the Confederate defenses, and the events of January and February 1862 were discussed as a backdrop for the more detailed breakdown of the two forces in Chapter Five. Finally, a detailed account of the events of the battle was presented. In the following chapter, much of the information introduced here will be revisited and elaborated as various aspects of the opposing forces and battlefield are analyzed and interpreted as they relate to the decisions made and the actions taken during the battle.

# Chapter 5: Analysis – The Application of a Revised Theory of Battlefield Archaeology to the Battle of Roanoke Island

## Introduction

This chapter presents the analysis and interpretation of the data collected concerning the Battle of Roanoke Island. The goal of this analysis is to facilitate interpretations regarding human behavior and decision making during the battle. The analysis addresses generally the same areas as Bright's modified form of the METT-T/Principles of War approach; however, the structure of the analysis has been altered in order to formalize those modifications. This restructuring is built around the concept of military forces as complex systems and acknowledges the integral nature of the structure of those systems in producing their behavior. It also recognizes the interpretive value of approaches such as METT-T and the Principles of War and relies heavily on these frameworks. Through the application of these established frameworks in a new way and the introduction of some new concepts, a revised theory of battlefield archaeology is produced that is oriented primarily towards the study of human behavior in conflict. The tenets of this revised approach and the role of the established approaches within will be detailed throughout this chapter as they are encountered, but a brief introduction to the revised approach will be provided in the following paragraphs.

The term *human behavior* has been used often in the preceding chapters to refer to explanatory anthropological approaches to battlefield archaeology in contradistinction to more military-historical and descriptive approaches. Despite the utility of that term, a more accurate, albeit less eloquent term, would be *system behavior*. The actions of a military force in battle do not necessarily represent the behavior of an individual human, as would be suggested by the term human behavior, but rather the behavior of a complex sociotechnical system in which multiple

humans and pieces of technology interact to produce the coordinated behavior of the system as a whole. When interpreting the behavior of such a system in conflict, it cannot be treated as the behavior of an individual, and the structure of the system must therefore be understood in order to identify the source or sources of the behavior within the system. For the purposes of this study, multi-scale complex systems analysis serves as a means of mapping and understanding those structures which, in the context of military forces, are commonly known as command and control structures. The analysis of the command and control structures forms the first stage of the analysis in this chapter. Having analyzed the structure of a system and identified the possible sources of its behavior, however, the factors influencing the decision making processes which produce that behavior must then be addressed.

The factors that influence decision making can be separated generally into external factors, or the environment in which the decision is made, and internal factors, or those rules and heuristics internal to the decision maker, which guide their decisions. Factors from both of these categories must be considered in order to properly interpret decisions. Analysis must also be limited to those factors which actually influence military decision making, as these are markedly different from those factors influencing decisions made in everyday life. To this end, established frameworks from military science serve as guides to the analyses in the present study. METT-T, as a checklist of "relevant impacts on the planning process," serves as a guide to the environmental factors (Babits 2010:6). The Principles of War, as the condensation of longstanding general tactical principles, serve as an estimation of some of the internal rules guiding decisions made during battle. Those principles are augmented, however, by those drawn from tactical treatises contemporary to the battle, which deal more specifically with steam-powered vessels and bombardments.

In accordance with the theory described above, the analysis in the following sections will begin with a discussion of command and control structures. Following this will be sections dealing first with environmental factors and then with tactics. The tenets of the revised theoretical approach will be explored further as they are introduced and applied, and the implications of these factors on the interpretation of the behavior of the Union and Confederate forces at Roanoke Island will be addressed.

## Structures of Complex Systems: Command and Control

In this section, the structures of the complex sociotechnical systems that were the Union and Confederate forces at Roanoke Island will be explored. A complex system is a system in which the behavior of the system as a whole cannot be inferred from the behavior of an individual element of that system (Bar-Yam 2003:1). This is because the system is structured so as to translate the small-scale behaviors of its elements into large-scale coordinated behaviors. A common example of this is the human immune system, which translates the disparate behaviors of its various elements to the coordinated behavior of defending the body (Bar-Yam 2003:9). Conversely, when interpreting the behavior of such a system, the large-scale coordinated behavior of the system as a whole often masks the small-scale behaviors of the individual elements of the system that produced that behavior. This is especially relevant in the study of decision making during battle, as the decision making elements within the system must be identified to properly assess the motivations behind their decisions.

In the context of a military force, the structure which coordinates the behaviors of the system is known as a command and control structure. Most such structures are ordered hierarchically, and the decision which produced a particular behavior of the system can be traced to a single commander whose individual behavior was magnified through the command and

control structure of his force. Military forces can also be structured using a distributed system of command and control, however, in which more latitude is allowed to lower level commanders to operate within general guidelines set by the overall commander. Such structures greatly increase the possible complexity of the behavior of a system by allowing for multiple disparate actions that unified towards a single purpose.

In the following sections, the command and control structures of the Union and Confederate forces will be explored. Both the formal structures, those described in official documents, and the functional structures, those which can be inferred from primary accounts concerning the relationship between commanders and the actions of individual vessels, will be considered. These structures will be diagramed as best as is possible, and the implications of these structures on interpretations of the behavior of both forces will be discussed.

*Confederate*

The Confederate command and control structure is discussed first because it is the simpler of the two. As can be seen in Figure 25, the command structure of the Mosquito Fleet can be diagrammed as an idealized hierarchy with one element of the system, Flag Officer Lynch, coordinating the actions of eight subordinate elements, the individual vessels of his squadron. The existence of a formal structure along these lines cannot be confirmed from the limited official documentation that has been preserved from the Confederate Navy. It can, however, be inferred from the actions of the Mosquito Fleet as described in primary accounts of the battle. Although the actions of the Confederate squadron are never described in as much detail as those of the Union, the vessels of the Mosquito Fleet are consistently described as maneuvering as a group rather than individually (Parker 1883:229-230). In fact, the only instance in which a Confederate vessel is described as acting independently from the rest of the squadron is when Captain Hunter drove CSS *Curlew* away from the Mosquito Fleet and towards the shore

as his vessel sank (Parker 1883:230). While some semblance of a communal decision making process among the commanders of the squadron can be found in their council the night before the battle (Parker 1883:228), the coordinated actions of the squadron during the battle indicate more direct control by Lynch.

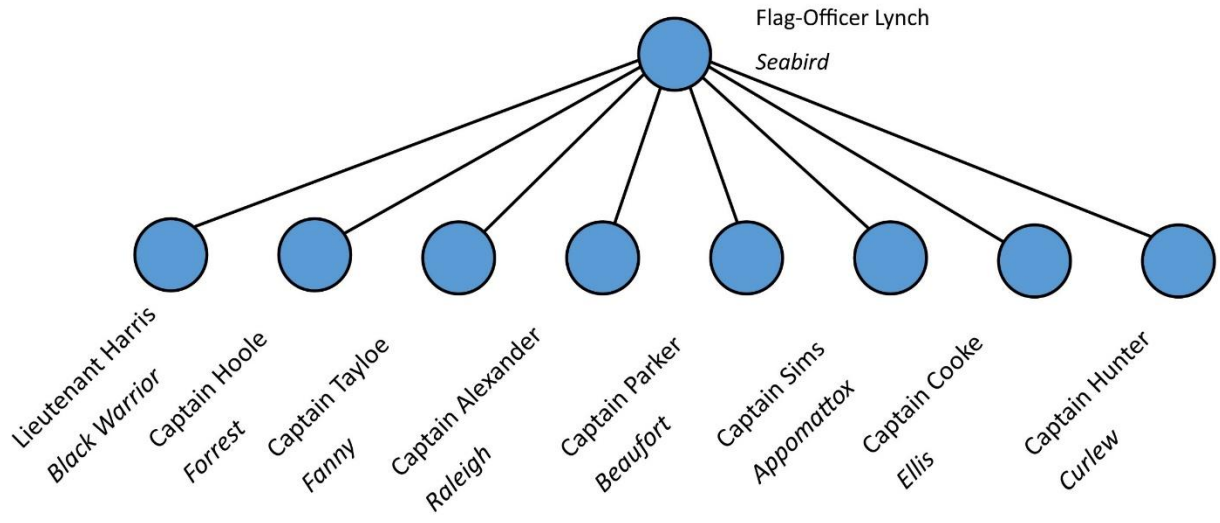



Figure 25: Confederate Command Structure (By Lucas Simonds; Parker 1883:229)

The actions of the Confederate squadron during the battle then match Bar-Yam's description of idealized hierarchies in which the behavior of a single element of a complex system is amplified by its structure as the coordinated behavior of the system as a whole (Bar-Yam 2003:8). For the purposes of interpretation, this functionally hierarchical structure greatly simplifies the analysis of the behavior of the Mosquito Fleet. As noted by Bar-Yam (2003:8), "to the extent that any single human being is responsible for coordinating the parts of an organization, the coordinated behaviors of the organization will be limited to the complexity of a single individual." Although the external and internal factors motivating Lynch's decisions must still be addressed, the origin of the behavior of the Confederate squadron need not be considered as all decisions will be assumed to come from Lynch himself.

*Union*

Unlike the Confederate squadron, traces of the formal command and control structure of the Union squadron can be found in official documents. Although no complete description of the structure is to be found in the Navy's *Official Records*, references to divisions and columns allow for a reasonably accurate diagram of the structure to be produced (Figure 26)

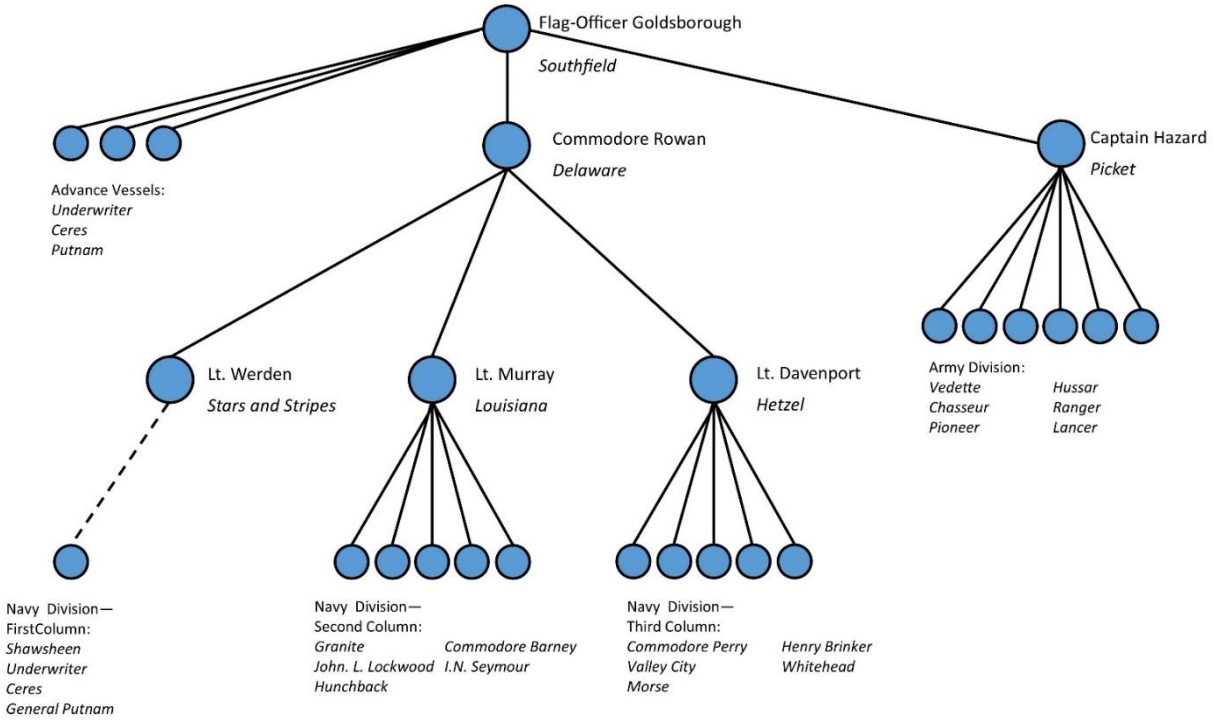



Figure 26: Union Command Structure (By Lucas Simonds; U.S. Navy 1897b:552-578)

Within the *Official Records*, it appears that Flag-Officer Goldsborough was in command of all of the offensive vessels of the expedition. Goldsborough then subdivided this command between an Army Division (gunboats outfitted by the Army) and a Navy Division (gunboats outfitted by the Navy). The Navy division was then subdivided into three columns. While this overall structure is rather easily determined from the *Official Records*, exactly which vessels belonged in which column is less clear. The vessels of the Army Division are listed at one point

(U.S. Navy Department 1897b:553), as are those of the second column (U.S. Navy Department1897b:557-558).

The vessels of the third column are never expressly listed; however, Lieutenant Chaplin, master of USS *Valley City*, reports that his vessel was part of the third column, and lists four other vessels with which he cooperated during the battle (U.S. Navy Department 1897b:565,566). If it is assumed that the five vessels listed by Chaplin made up the third column, then four vessels are left over. In Figure 26, these vessels have been listed as belonging to the first column, but the dotted line represents the uncertainty of that connection. The identification of those vessels as belonging to the first column would be especially suspect because three of them were sent ahead of the bulk of the squadron to reconnoiter and are never reported to have operated in concert with other vessels (U.S. Navy Department 1897b:552). Regardless of the details of the formal command and control structure of the Union Squadron, the functional command and control structure is far more important for the purposes of interpretation.

Aspects of the functional command structure of the squadron can be inferred from primary accounts of the battle which report interactions between vessels that break from the formal command structure. The first such break came early, when Goldsborough ordered all the vessels with 9 in. guns to gather around his flagship (U.S. Navy Department 1897b:552). In doing so, Goldsborough broke up the organization of the squadron into columns by creating a new group comprised of vessels from each of the three columns. After the start of the battle, Lieutenant Chaplin of USS *Valley City* was the only commander who reported working in company with other vessels from his column (U.S. Navy Department 1897b:565,566), with most other commanders describing how they took the actions they saw to be correct without reference to orders from their superiors (U.S. Navy Department 1897b:555-578).

The general independence of the individual vessels of the squadron is further supported by another incident during the battle. When USS *Hunchback* was disabled by engine damage, Lieutenant Colhoun, the master of that vessel, specifically asked Goldsborough for instructions (U.S. Navy Department 1897b:568). This in and of itself was a break of the formal command structure, as USS *Hunchback* formally fell under the command of Lieutenant Murray of the Second Column. Goldsborough's reply to the inquiry, however, is even more telling. Rather than delivering specific instructions, Goldsborough simply ordered Lieutenant Colhoun to "use your own discretion" (U.S. Navy Department 1897b:569), at which point Colhoun decided to anchor his vessel where it sat and continue fighting. This incident highlights the latitude which Goldsborough allowed his subordinate commanders, and indicates a high level of trust that they would make proper decisions during battle.

Based on the independence displayed by individual vessels and the direct breaks from the formal hierarchical structure, it appears that the functional command and control structure of the Union squadron was more distributed in nature. The information concerning this functional structure is not detailed enough to produce an accurate diagram, but the distributed nature of the structure has important implications for the interpretation of the coordinated behaviors of the Union Squadron. As the squadron was passing through the Roanoke marshes, Goldsborough signaled, "[o]ur country expects every man to do his duty" (U.S. Navy Department 1897b:588). This not so subtle nod to the Battle of Trafalgar indicates a possible desire to emulate Lord Nelson, a strong proponent of distributed command and control. If Goldsborough's functional command and control structure was similar to that espoused by Nelson, then his subordinate commanders would be allowed significant latitude to make their own decisions based on a

general plan of attack and a knowledge of Goldsborough's personal doctrine of naval combat (Palmer 2007:178, 192, 206).

The specific nature of Goldsborough's distributed command and control structure cannot be confirmed as such, although it seems highly probable. Nevertheless, the distributed nature of the structure does affect the interpretation of the behavior of the squadron. When analyzing particular behaviors, the roles of individual commanders in producing the coordinated behaviors of the squadron must be considered alongside the role of Goldsborough as the overall commander.

*Discussion*

In the preceding sections, the formal and functional command and control structures of the Union and Confederate forces have been diagramed and the implications of those structure on the interpretation of the battle has been explored. In the case of the Confederate squadron, its small size and strict hierarchical structure allows for Flag-Officer Lynch to be considered as the origin of all its coordinated behaviors. In the case of the Union squadron, its functionally distributed structure dictates that both Flag-Officer Goldsborough and his subordinate officers must be considered as possible origins of behavior within the system, with many coordinated behaviors being the result of multiple independent behaviors. With these implications in mind, the following sections will explore the external and internal influences on the decision making processes which produced the behavior of both forces during the battle.

Environmental Influences: METT-T

Having explored the implications of the command and control structures of the Union and Confederate forces on the interpretation of their coordinated behaviors in the preceding paragraphs, this section focuses on an analysis of the external, or environmental, influences on

the decision making processes which took place during the battle. Many decisions are made in reaction to or influenced by environmental factors which can limit potential choices or provide unique opportunities. In order to limit the analysis to environmental factors which are relevant specifically to military decision making, this analysis will utilize the METT-T approach, which outlines a specific set of particularly relevant factors to be considered by commanders before a battle. Although this approach stems from modern terrestrial warfare, the factors which it entails are fundamental to the conduct of war, regardless of the time or place in which the battle in question occurred. While the definitions traditionally prescribed for some of the elements of terrain are inapplicable to the study of maritime battlefields, these definitions are easily altered to better reflect the considerations of naval warfare. In the following sections, the five elements of METT-T, as well as the five elements of KOCOA which fall under the category of terrain, will be explored as they relate to the Battle of Roanoke Island, and the potential influence of these factors on decision making processes during the battle will examined. Where the definitions of particular elements used here differ from those traditionally prescribed, the new definition will be given.

*Mission*

Mission is traditionally defined in the following way, "[t]he leader considers his mission as given to him by his commander. He analyzes it in light of the commander's intent two command levels higher, and derives the essential tasks his unit must perform in order to accomplish the mission" (Department of the Army 1992:46). With this definition as a guide, in the following sections, the official mission and the specific objectives derived therefrom will be examined for both forces respectively as they relate to the Battle of Roanoke Island. The specific objectives are of particular importance as they indicate what the commanders on the ground viewed as the most important parts of their mission as given by their superiors. The official

mission is also important, however, as it may contain wide ranging objectives outside of those pertaining to the battle in question, and it cannot be assumed that the immediate concerns of the battle at hand were the only pressures influencing the decision making process.

Union

Understanding the missions and objectives of the Union squadron is made easier by the detailed records preserved from the U.S. Army and Navy. The official mission of the Burnside Expedition as a whole was to damage Confederate lines of communication in eastern North Carolina, as is outlined in McClellan's orders for the expedition (McClellan 1864:85-86). Within those orders, the specific mission that was carried out on 7 and 8 February is also outlined. McClellan wrote:

> Your first point of attack will be Roanoke Island and its dependencies. It is presumed that the Navy can reduce the batteries on the marshes and cover the landing of your troops on the main island, by which, in connection with a rapid movement of the gunboats to the northern extremity as soon as the marsh battery is reduced, it may be hoped to capture the entire garrison of the place (U.S. War Department 1883:352).

In this, McClellan not only outlined the official mission of the joint Army-Navy force, but also detailed specific objectives which he believed would lead to the success of that mission. As will be shown, this mission was preserved in the plan of attack developed by Burnside and Goldsborough, but the specific objectives were modified to better fit their idea of how the mission would be best accomplished.

As the squadron waited at Hatteras Inlet for those vessels that were unable to pass over the swash, Goldsborough and Burnside developed the following plan of attack:

> The naval division was to lead from the time of starting up to that of encountering the enemy. The marshes, in case of being defended by a battery and the enemy's vessels, were to be passed by, noticing the former only in transitory way, and by dashing without delay directly at the latter. On approaching Roanoke Island sufficiently near, the batteries at Pork and Sandy points (if any at the latter), and the vessels of the enemy, if drawn up to meet us, were to be the first objects assailed by the naval division, aided by such fighting vessels under the general command of Commander Samuel F. Hazard as the army division could afford. While this work was going on, the army, under cover of its own vessels and six of our armed launches, was to land at Ashby's Harbor, or, if preferable, a portion of it at Sandy Point, half a mile above (U.S. Navy Department 1897b:551).

The first and most obvious deviation here from McClellan's orders is Goldsborough's injunction to rush past any batteries located in the marshes rather than reducing them outright. In correspondence with Stephen Rowan, Commander of the Naval Division, Goldsborough stated explicitly, "I intend no delay in going through the marshes, but every vessel is to dash ahead as fast as she can and at the vessels of the enemy" (U.S. Navy Department 1897b:537). Goldsborough evidently placed little stock in the threat of batteries in the marshes, which could be passed by, or the Confederate vessels, which he assumed would be easily driven off. The second major change from McClellan's orders was the plan to focus only on vessels drawn up near the landing site and on the closest batteries rather than working to move towards the northern end of the island.

From this plan of attack, two specific objectives can be observed. The first was to gain control of the water immediately surrounding the planned landing site. Goldsborough's plan

describes a series of actions by which the enemy vessels are to be driven north and then held there while the Army carried out its landing operations. The second was to cover the Army's landing operations. This objective was to be carried out partly by focusing fire on the nearby batteries and the enemy vessels, and partly by assigning the Army division and some armed launches to fire onto the shore ahead of the landing craft. When interpreting the behavior of the Union squadron, it must be remembered that these were the primary objectives that Goldsborough and his subordinates had in mind as they made decisions during the battle.

Confederate

Ostensibly, the mission of the Confederate force was to hold Roanoke Island against the Union assault. In the case of the forces stationed on the island, this was unequivocally true; their official mission was to defend Roanoke Island. In the case of the Mosquito Fleet, however, this was only partially the case. While their official mission on 7 February was to defend the island, it should not be forgotten that the Mosquito Fleet, and Lynch specifically, were charged with the defense of the entirety of the coast of North Carolina. Although Lynch was indeed involved in developing the defenses of the island from an early stage, he was also involved in the defenses of Fort Macon (U.S. Navy Department 1897b:727,729), as well as many other points within the sounds. That being said, it is undeniable that Lynch took a particular interest in the defense of Roanoke Island, which he called the "backdoor to Norfolk" (U.S. Navy Department 1897b:727), and he even went so far as to claim that Fort Forrest, which had been constructed out of two canal barges, was a "floating battery" and should therefore fall under his command rather than that of General Wise (U.S. Navy Department 1897b:764).

Unfortunately, no plan of attack for the Confederate Squadron has been preserved, and a plan can only be inferred from the extant records. The only real detail of any sort is recorded by

Captain Parker, who notes that during a meeting of the Confederate captains before the battle, they decided to form up in line abreast behind the barricade and wait for the Union attack (Parker 1883:229). By this detail alone, it would appear that the Confederate squadron had no set specific objectives other than the general defense of the island. This is corroborated in Lynch's after-action report, where he notes, "the battery was so sorely pressed that I felt bound to annoy its assailants as much as possible" (U.S. Navy Department 1897b:595). Lynch's description of his objective as the need to "annoy" the Union squadron suggests that his major objective for the day was not to do serious damage to the Union vessels, but merely to harass them in hopes he might distract them from their bombardment. Unlike the Union squadron, the behavior of which can be interpreted as being at least in part related to specific objectives set out before the battle, the behavior of the Confederate squadron took place under a vague objective of waiting for and harassing the enemy. Therefore, when interpreting the behavior of the Confederate squadron, other factors should be considered to be more influential than any specific missions or objectives.

*Enemy*

As defined in U.S. Army doctrine, when considering the enemy, "[t]he leader considers the type, size, organization, tactics, and equipment of the enemy he expects to encounter. He identifies their greatest threat to his mission [sic] find their greatest vulnerability" (Department of the Army 1992:46). This element of METT-T has been used in the past as a means of assessing one force which was deemed the "enemy" as compared to the other force which was discussed under the element of Troops Available (Babits 2010:61). It serves a far more useful analytical purpose, however, when used to assess the intelligence each force possessed concerning their enemy before the battle. Decisions made early in a battle, before the actual state of the enemy force has been observed, are necessarily made based on a perceived state of the

enemy. The disparity between the perceived and actual states of a force means that decisions made during the early stages of a battle may seem irrational if the fact that those decisions were made based on the perceived state is not taken into consideration. In the following sections, the intelligence each force possessed about their enemy before the battle will be discussed to the best extent possible based on official documents from the months leading to the battle.

Union

As indicated by Goldsborough's plan of attack, Union intelligence on the Confederate defenses was incomplete at the time the plan was drafted, particularly in regards to the existence of batteries at the marshes and at Sand Point. On 6 February, however, the Union squadron passed through the marshes, dispelling any notion that a battery might have been constructed there, though they did not pass far enough into Croatan Sound to confirm the existence of a battery at Sand Point (U.S. Navy Department 1897b:552). On 7 February, the Union commanders were unsure about the existence of one of the Confederate batteries, and it is unclear exactly what, if anything, they knew concerning the armament of any of the batteries.

In contrast to their intelligence on the land defenses of the island, the Union commanders would have possessed relatively good intelligence on the strength and character of the vessels of the Mosquito Fleet. A number of officers involved in the expedition, such as Colonel Rush Hawkins, Commander Stephan Rowan, and numerous lieutenants commanding the gunboats, had served previously in the state. During the capture of the Hatteras forts and in the following months, they would have encountered the Confederate gunboats on multiple occasions (Hawkins 1887: 632-659). Therefore, although the Union commanders may not have known which of the Confederate vessels were present at the island, they would have known the general qualities of the vessels they would face.

The only significant impact of the Union commanders' perceived state of their enemy when interpreting their behavior relates to decisions made concerning the possible battery at sand point. In particular, Goldsborough's decision to send a vessel ahead to look for that fort was undoubtedly a result of this gap in knowledge. All other early decisions, including the plan of attack outlined previously were based either on accurate intelligence, as in the case of the location of the existing forts and the quality of the Confederate vessels, or in spite of insufficient intelligence, as in the case of the armament of the forts.

Confederate

In slight contrast to the Union perceptions of their enemy, the Confederate squadron was able to gather reasonably accurate intelligence some time before the battle. The Confederate defenders had been aware of a force amassing at Fort Monroe for months; but as late as 4 January, it was generally assumed that this force was to attack Norfolk, and it was not until the Burnside Expedition set out on 11 January that it was finally accepted that their destination was Roanoke Island (U.S. War Department 1883:133; U.S. Navy Department 1897b:754). The first detailed intelligence on the Union force was gathered on 20 January during a reconnaissance cruise. Writing on 22 January, Lynch reported:

> We looked into the inlet and there saw a large fleet of steamers and transports. We counted twenty-one of the former all inside the spit; a fog bank concealed those outside … They are evidently prepared for a general movement … the enemy's force consists of twenty-four gunboats, seven large steamers, and sixteen transports" (U.S. War Department 1883:147).

Between this first sighting and the battle, vessels of the Mosquito Fleet returned to reconnoiter the Union fleet a number of times. In fact, in one instance, Goldsborough recollects

that he allowed the Confederate gunboats to approach because he wanted them to know the size of the force they faced (U.S. Navy Department 1982:552). Unlike the Union, while the Confederate commanders may not have known the exact armament of the individual enemy vessels, they could be relatively certain about the nature of the enemy they faced. In the case of the Confederate squadron, their perceived state of their enemy did not differ enough from the actual state of their enemy to affect decisions made early in the battle. When interpreting the behavior of the Confederates, this perceived state need not be taken into consideration.

### *Terrain*

Terrain is perhaps the most important environmental factor to be taken into consideration. The landscape of a battlefield can have a significant influence on the manner in which a battle is fought and the decision making processes during that battle. In some cases elements of the terrain limit the options available to a commander, thereby forcing particular decisions. In other cases, specific terrain can present opportunities not available on other battlefields. Within METT-T, terrain is further subdivided by KOCOA, which is a framework that outlines elements of the terrain that are generally considered to be militarily significant. As a framework developed for terrestrial warfare, some of the traditional definitions within KOCOA must be modified for their application to a maritime battlefield; such changes will be acknowledged as they occur. In the following section, a general overview of the landscape of the battlefield will be presented without interpretations regarding the military significance of any given features. Following this, the five elements of KOCOA will be explored as they relate to the battlefield of Roanoke Island and the implications of the terrain on the interpretation of behavior will be examined.

#### Overview

Before considering the militarily significant aspects of the terrain and their influence on the battle, a brief survey of the general features of the landscape is necessary. Figure 27 depicts a

digital reconstruction of Roanoke Island and Croatan Sound ca. 1862. Today, Roanoke Island is nearly eight miles long, averages two miles in width, and has a total area close to 18 square miles. Significant erosion has taken place around the edges of the island; however, its general shape has not changed significantly. At the time of the battle, the majority of the island was swampy marshland; with areas of solid ground concentrated in the north, a small area in the south, and along a narrow spine of land connecting the two, along which the main north-south road of the island was constructed (Mallison 1998:63-64). The forts of the island will be discussed separately, but it bears noting that they were all located so as to be connected to this main road. Croatan Sound runs the length of the western side of the island, with an approximate total area of 35 square miles (Taylor et al. 1951:3, 5). At the time of the battle, Croatan Sound ranged between two and a half and four miles in width, with an average depth around eight and a half feet (USCGS 1876). This average depth misrepresents the bathymetry of the sound, however, which was described by the US Coast Survey as "uneven and broken" (USCGS 1876). Figure 28 represents a recreation of the historic bathymetry of the sound based on soundings from *Coast Chart No.40*. As can be seen, in the northern half of the sound, deep water was concentrated in two channels. On either side of these channels, depths quickly dropped below seven feet. In the southern half of the sound, south of a large area of shoal water along the western edge, the bottom was much more regular with depths between 8 and 11 feet being found across the entire breadth of the sound. Although other artificial features such as jetties and docks certainly defined the shore of the island and the mainland further, the number and location of such features cannot be easily determined, and they are therefore not taken into consideration here.


Figure 27: Digital Reconstruction of Roanoke Island and Surrounding Area ca. 1862 (By Lucas Simonds)

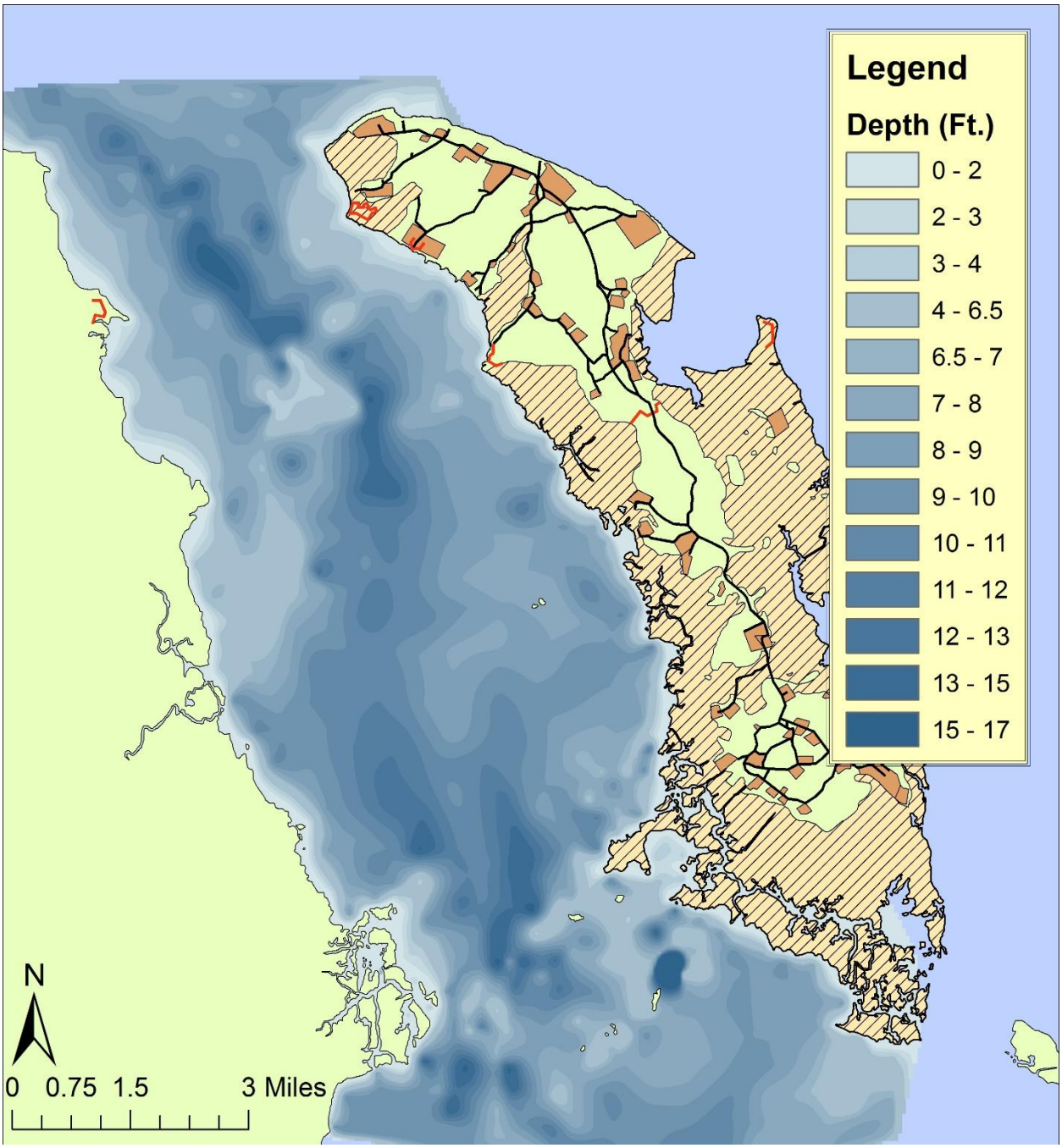



Figure 28: Digital Reconstruction of Croatan Sound Bathymetry ca. 1862 (By Lucas Simonds)

Key Terrain

The primary criterion in delineating key terrain is that its "seizure or retention affords a marked advantage to either combatant" (U.S. Army 1992:46). In the case of an amphibious landing operation such as the Battle of Roanoke Island, the primary key terrain areas are those where the interface of the water and land allow for troops to be landed easily. Control of a good landing site and the water around it allows, in the case of the attacker, for the troops to be landed safely, thereby fulfilling the primary objective of their mission. In the case of the defenders, control of such an area allows, at worst, a chance to fire on highly vulnerable troops packed into landing boats, and, at best, the complete prevention of any landing. In addition to landing sites, other areas of key terrain in a shallow body of water such as Croatan Sound would be areas of water deep enough for vessels to maneuver safely. Grounding during a battle could lead quickly to the destruction of a vessel, and water in which vessels can operate freely presents a significant advantage to those vessels which can occupy it.

In reference to that second set of key terrain areas, Figure 29 depicts the delineation of the sound into areas based on their depth. Exactly which areas of the water would be navigable depends on the draft of the individual vessels, but general areas can be determined. Those areas marked in red would have been navigable to some degree by the smaller vessels of the Confederate Squadron, but were too shallow for those of the Union Squadron. Those areas marked in orange would have been navigable to the smaller vessels of the Union Squadron and all those of the Confederate Squadron. Those areas marked in green would have been navigable to all the vessels of both squadrons. Naturally, however, the classification of any of these areas as navigable would be dependent on the draft of each individual vessel.

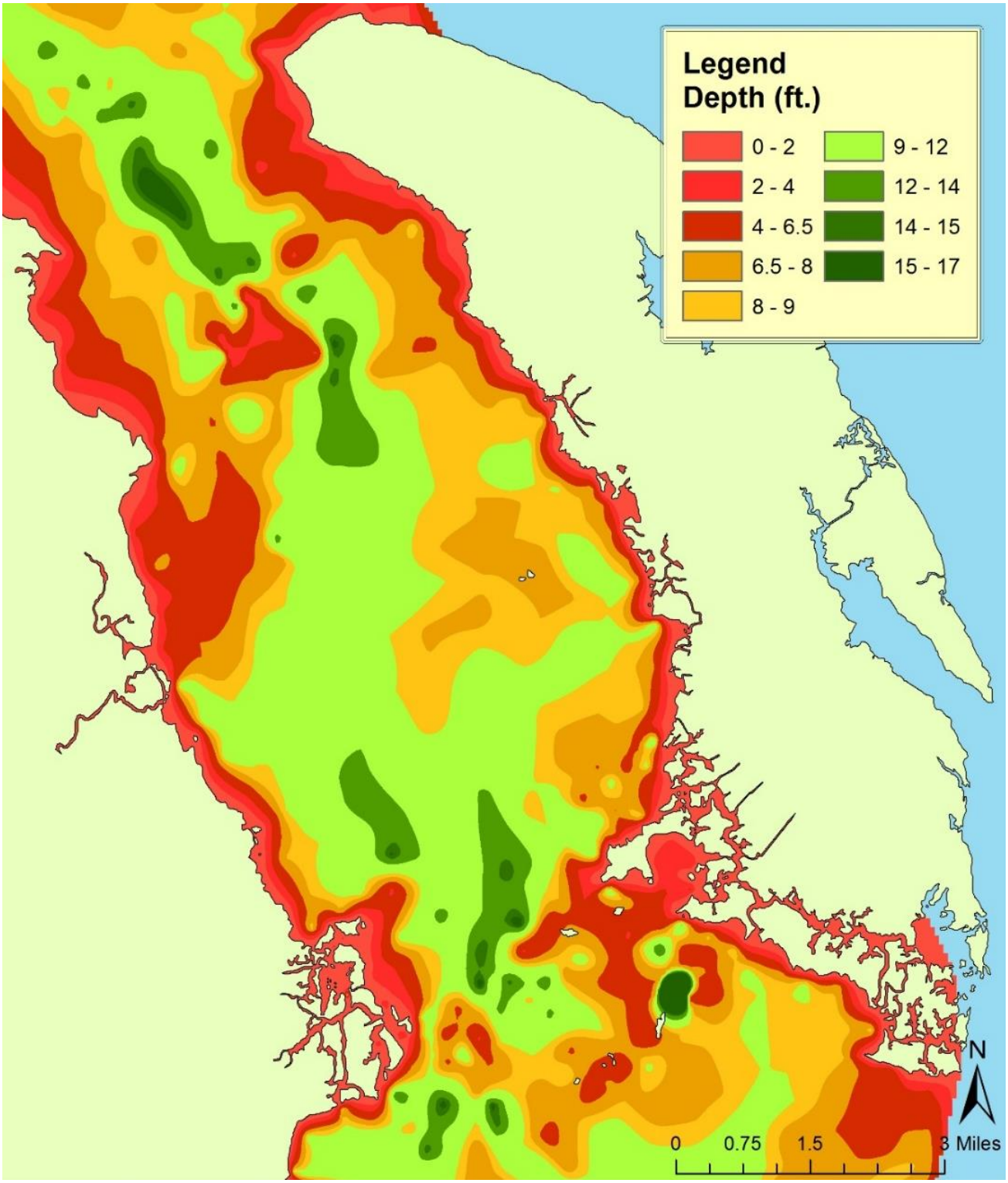


Figure 29: Color Coded Bathymetry of Croatan Sound (By Lucas Simonds)

Unlike areas of sufficiently deep water, which could be found throughout much of the battlefield, good landing sites were scarce on the island. As mentioned previously, the locations of the numerous docks and other small landing areas which undoubtedly existed on the island at the time are unknown. In the case of a large fighting force landing on a hostile shore, however, such landing sites would be of little use. Due to the nature of the landing operations, in which troops were carried from their transports to the island in small boats, a specific set of criteria describes good landing sites. First, so that the troops being landed would not spend too much time in their poorly defended open boats, a good landing site would have water sufficiently deep for the transport ships to approach relatively close to shore. Second, on an island such as Roanoke, where the majority of the landmass consists of swampy marshland, a good landing site would be on or very close to solid ground, so as to not deliver the troops onto such difficult and disadvantageous terrain. Finally, a good landing site would be close enough to the enemy defenses to allow the troops to move quickly towards their objectives, while staying out of the field of fire of enemy cannon, so as not to expose the troops to heavy cannon fire during their landing. Considerations such as access to roads and shelter from rough seas are also important, but less necessary than those three listed above.

An inspection of the battlefield landscape in light of these considerations quickly narrows the areas that could be considered good landing sites. Although, as demonstrated in Figure 30, the majority of the island lay outside the fields of fire of the Confederate forts, the other two criteria are more difficult to meet. Areas where the interface between island and sound included relatively deep water are common. An examination of the makeup of the island, however, reveals that the land in the majority of these interfaces was marshy. The area marked as key terrain in Figure 30 represents the water in and around Ashby's Harbor. As can be seen in Figure 31,

Ashby's Harbor combined relatively deep water with a relatively short trip through the marsh to solid ground. When considering that this area also lay outside the fields of fire of the Confederate forts and was connected to the main road on the island, it become apparent that Ashby's Harbor represented a unique landing site on an island which would otherwise present significant difficulties to an invading force.

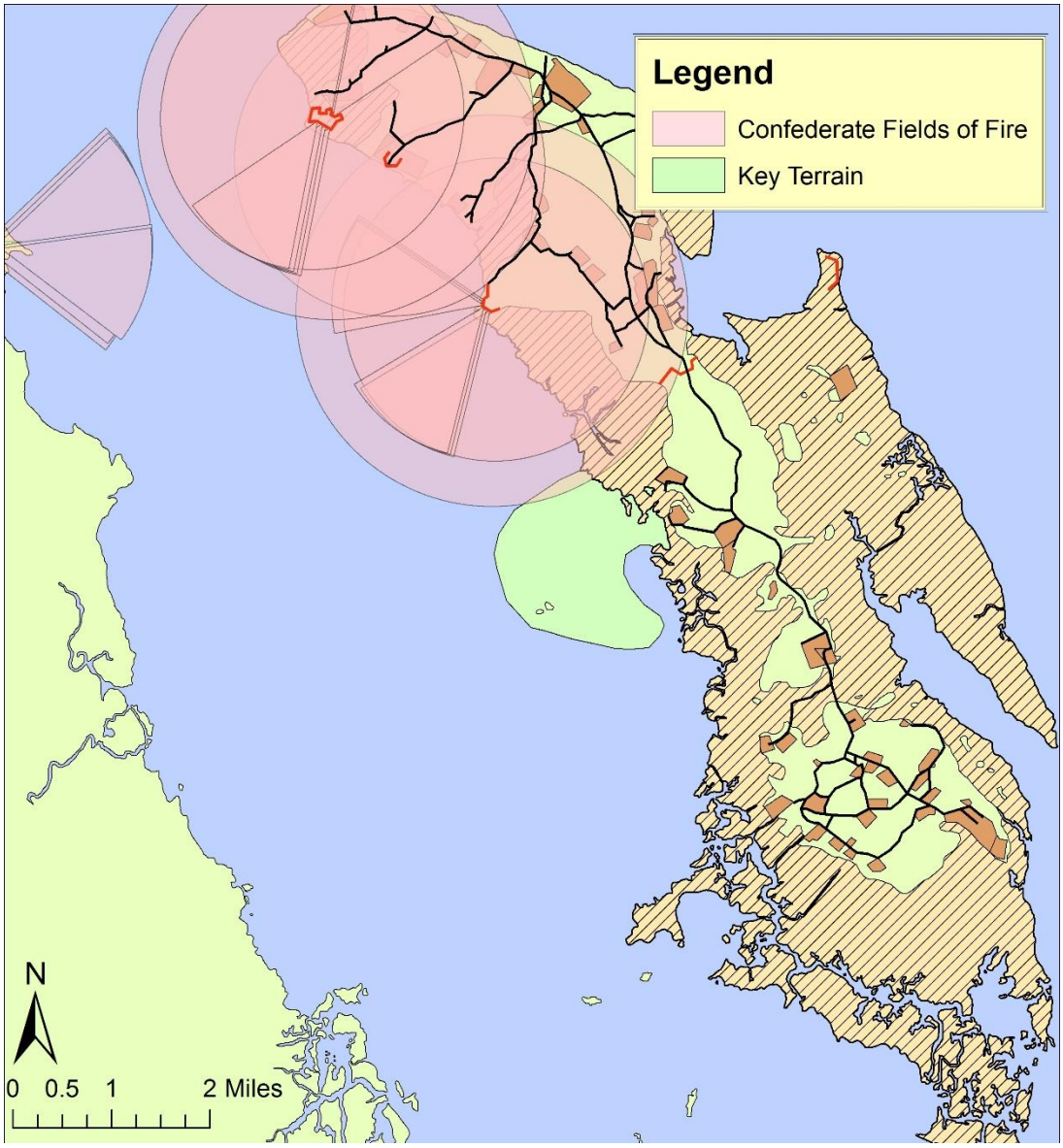



Figure 30: Key Terrain (By Lucas Simonds)

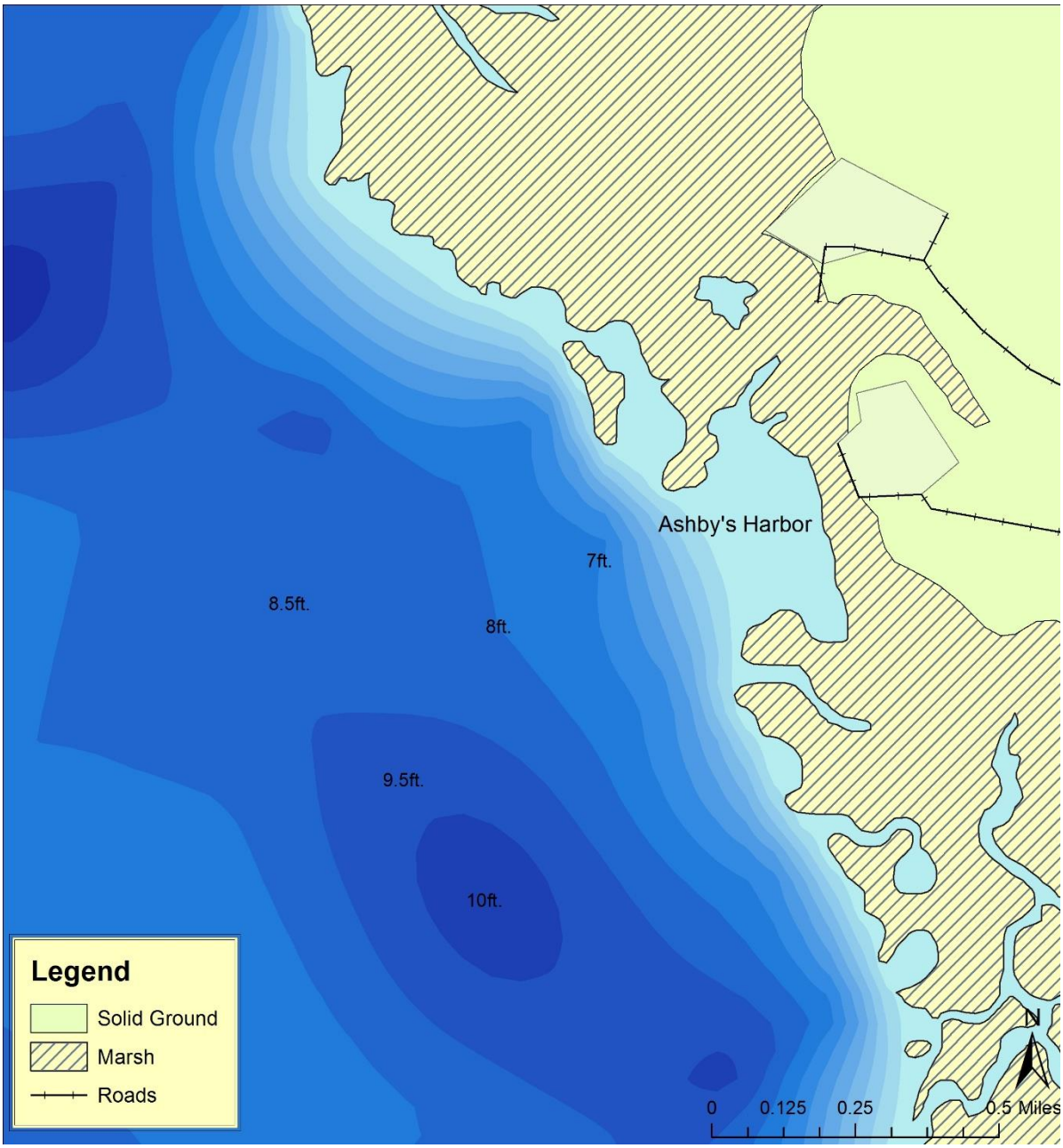



Figure 31: Ashby's Harbor ca. 1862 (By Lucas Simonds)

When interpreting behaviors from the battle, it would generally be assumed that both sides would focus their efforts on controlling these areas of key terrain. While the precise advantage gained by either side through such control would be different, the terrain would be advantageous nonetheless. Failure by either side to attempt to control these areas could be

interpreted as the result of the influence of other environmental or internal factors. Alternatively, it could also be a sign of incompetence on the part of the commander who failed to do so, although such an interpretation should only be made with significant reservations.

Obstacles

On the opposite end of the spectrum from key terrain, obstacles are terrain features that present a disadvantage to combatants of either side. Generally, obstacles can be divided between natural terrain features and artificial additions. The only natural obstacles on the battlefield in Croatan Sound were shoals and other areas of shallow water. Just as areas of deep water provide the advantage of unrestricted movement, areas of shallow water restrict the movement of vessels through the battlefield and can place them in great danger if they run aground. The depth of water that defines a certain area as an obstacle is of course directly related to the draft of each individual ship, and the same areas depicted in Figure 30 apply here.

In terms of artificial obstacles, the only example at Roanoke Island was the series of pilings and blockships commonly referred to as the barricade. Designed both to force the Union vessels to move closer to shore and to possibly trap any vessels which unknowingly traveled over it, the exact location of the barricade is unclear. Primary sources record that pilings were driven in from the eastern edge of Fulker's Shoals to within 1,700 yards of the island, and that pilings and blockships obstructed the channel on the western side (U.S. Navy Department 1897b:598). Figure 32 depicts possible locations of the obstructions. The orange line is based on markings from US Coast Survey *T-Sheet No.933* (USCGS 1864). The red lines are based on the position of the barricade in *A Sketch of Roanoke Island* (Foster 1866). The purple points are the sunken vessels found in surveys by the UAB (Henry 2003b; 2005). The location of these vessels

provide a good idea of where the western portion of the barricade was located; however, the direction in which that barricade continued eastward is unclear.

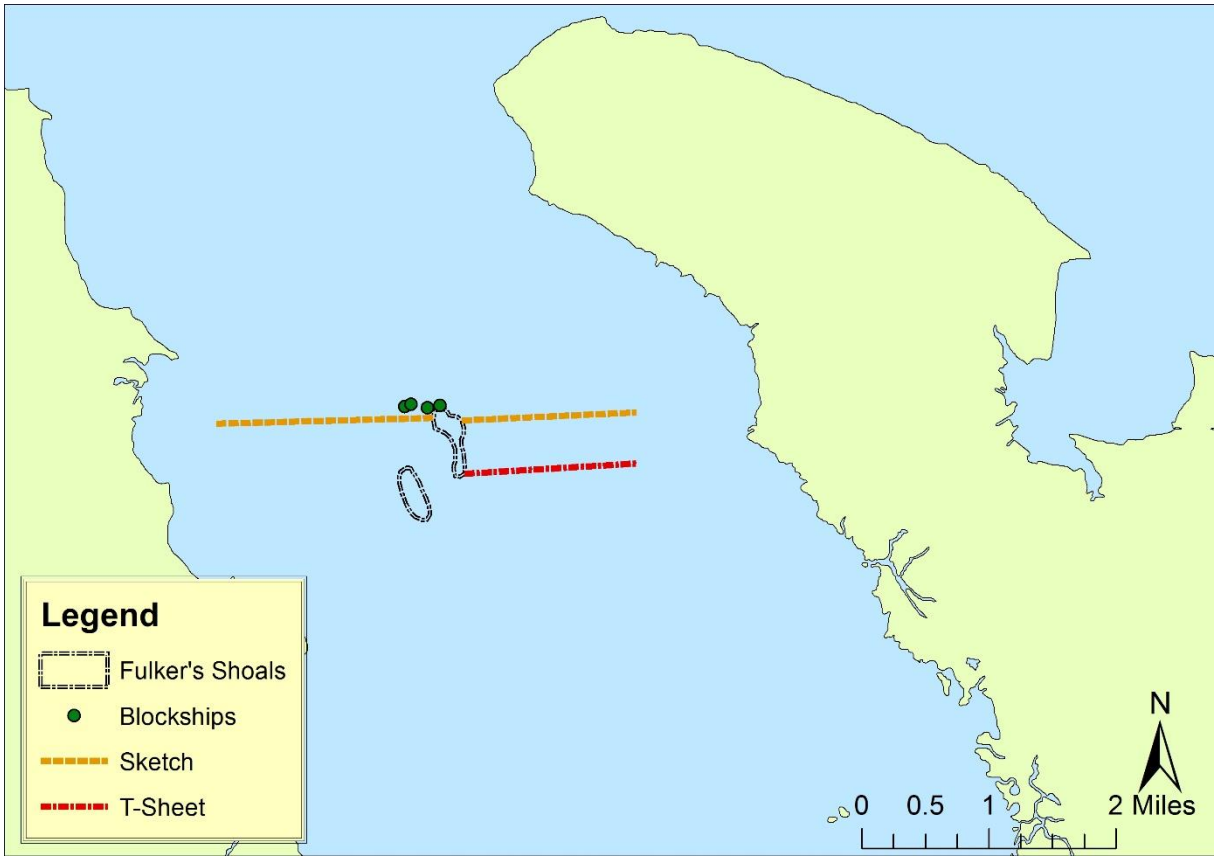



Figure 32: Obstacles (By Lucas Simonds)

The influence of these obstacles varies depending on the squadron in question. While both sides would have sought to avoid shoal water, the exact depth of water which constituted an obstacle varies between vessels. In the case of the barricade, it would be assumed that the Union squadron would attempt to avoid it. Conversely, while the Confederate squadron could not travel through the barricade, the knowledge that it prevented the Union squadron from entering the northern half of the sound may have provided a feeling of protection. Confederate decisions related to their position relative to the barricade could then be interpreted as being influenced by the protection which it provided

Cover and Concealment

Cover provides protection from fire, whereas concealment provides protection from observation (Department of the Army 1992:46). Essentially no cover or concealment was available for either squadron in Croatan Sound. The low profile of the island and the uncomplicated nature of the sound itself meant that both sides fought more or less in the open. Some cover was provided for individual sailors and soldiers by the bulwarks on the gundecks of the vessels and by the earthworks of the forts, but the vessels themselves could not hope to find cover or concealment, and the forts were out in the open as well. In general the only influence cover and concealment may have had is the moderate level of protection provided by the barricade as described in the preceding section, and this element does not need to be seriously considered in interpretations.

Observation and Fields of Fire

As described previously, the nature of the battlefield provides almost no areas that would be unobservable from almost any other area. As shown in Figure 33, viewshed analyses based on points within the batteries and in the sound itself show a field of observation over almost all of Croatan Sound. Although the exact field of observation from any particular vessel would depend on the location of that vessel, it seems that most points on the battlefield would offer essentially unobstructed views of any other point on the battlefield.

Fields of fire, on the other hand, are significantly more difficult to discern. Figure 34 depicts the fields of fire of the cannon in the Confederate forts: circular fields for those guns mounted *en barbette* and cone shaped fields for those mounted *en embrasure*. The fields of fire for these guns would not have changed over the course of the battle.

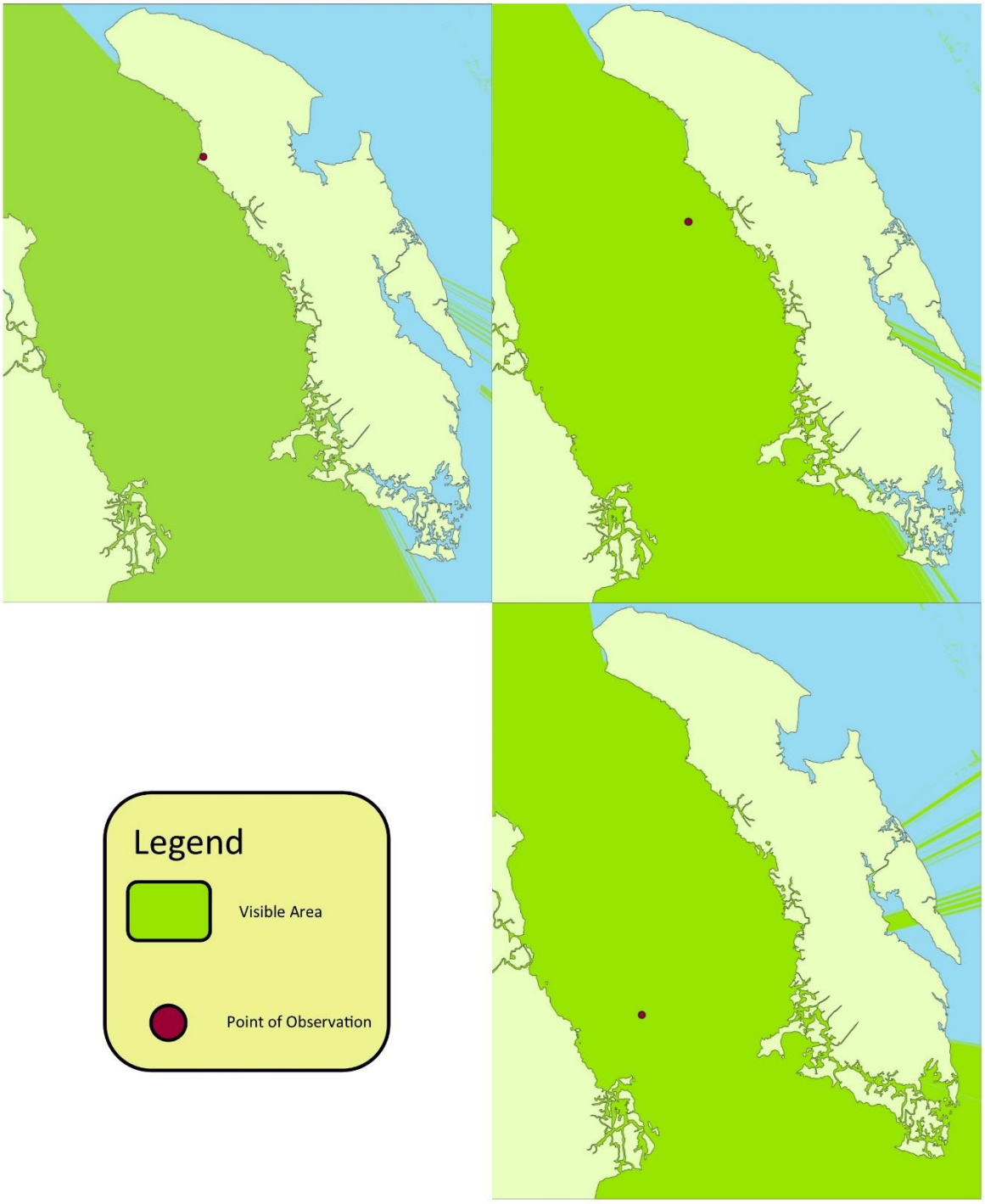



Figure 33: Viewsheds in Croatan Sound (By Lucas Simonds)

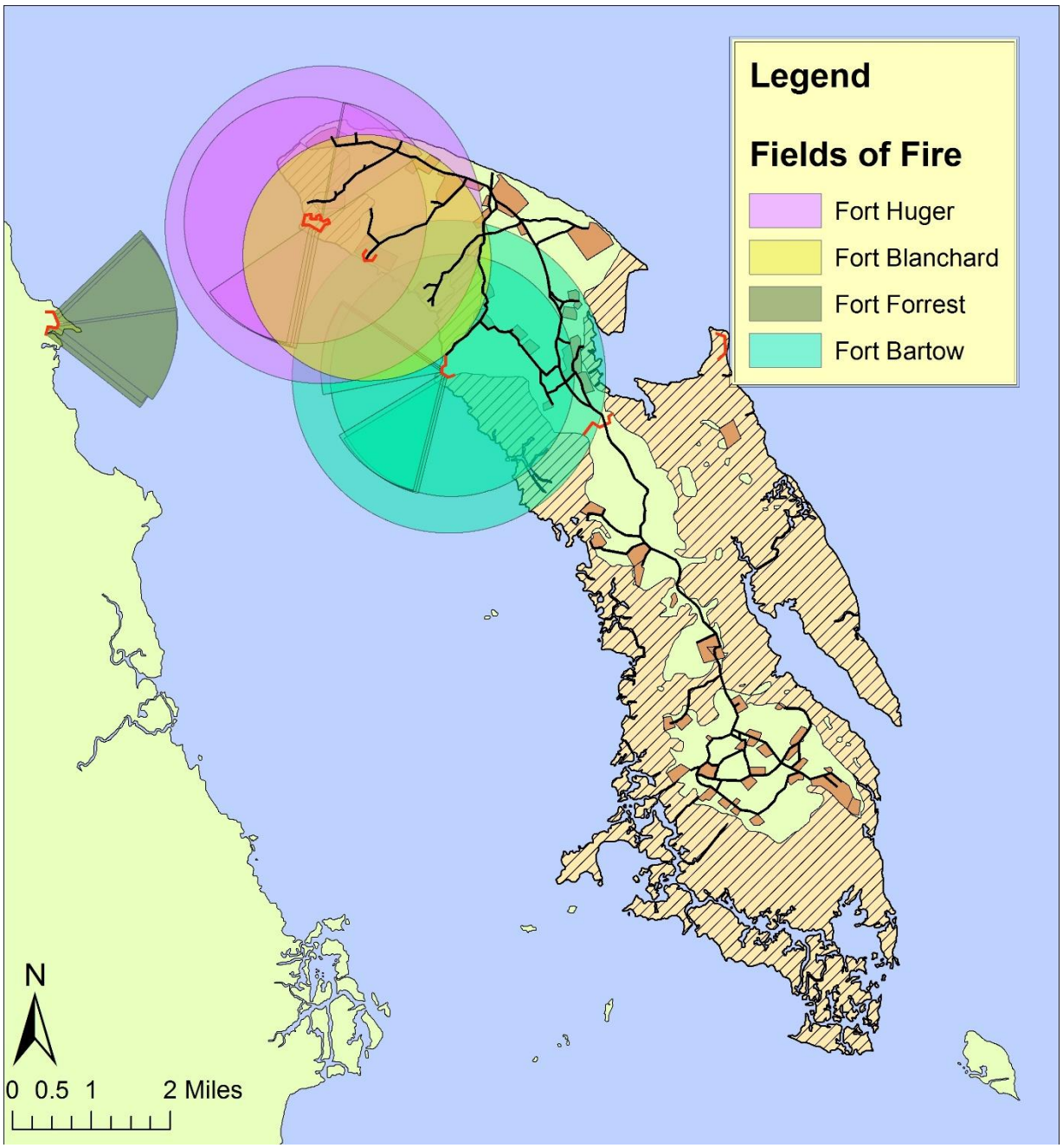



Figure 34: Fields of Fire - Confederate Forts (By Lucas Simonds)

The fields of fire for mobile points such as the vessels, on the other hand, are less easy to pin down because they are dependent on the position and orientation of a vessel at a given moment. An attempt has been made, however, to approximate the locations of the vessels during the battle, and thereby give some idea of their potential fields of fire.

Except for their brief forays south late in the battle, the Confederate vessels stayed north of the barricade, occasionally drawing north to the area of Fort Huger (U.S. Navy Department 1897b:588-589). Within this area, a representative field of fire for CSS *Sea Bird* is also depicted. Contemporary illustrations depict cannon on CSS *Sea Bird* as being mounted on a standard naval carriage (Figure 19); therefore, the field of fire of the cannon has been limited to a 45$^{o}$ angle. The location of the Confederate vessels and the field of fire of CSS *Sea Bird* can be seen in Figure 35.

Figure 36 depicts the approximate locations of a number of the Union vessels based on the ranges at which they reportedly fired on Fort Bartow. Here, the red of the Confederate fields of fire can be taken as off limits to the Union vessels, as it is reported that these cannon were never able to fire on the Union vessels (U.S. Navy Department 1897b:599). Within these areas, a representative field of fire for USS *Commodore Perry* is also depicted. As with CSS *Sea Bird*, the cannon on USS *Commodore Perry* were mounted on standard carriages (Figures 20 and 21), and their fields of fire are accordingly limited.

Like cover and concealment, observation had little influence on the battle and does not need to be considered. Fields of fire, on the other hand, could be influential in a number of ways. In the case of the Confederate squadron, a significant advantage could be gained by drawing Union vessels north into the crossfire of the forts. Conversely, the Union squadron would be best served by avoiding the fields of fire of as many Confederate cannon as possible. Additionally,

the fixed nature of the fields of fire of the cannon aboard the Union vessels required them to maneuver in order to properly aim at the island. All of these potential influences should be taken into consideration when interpreting the behavior of the opposing forces.

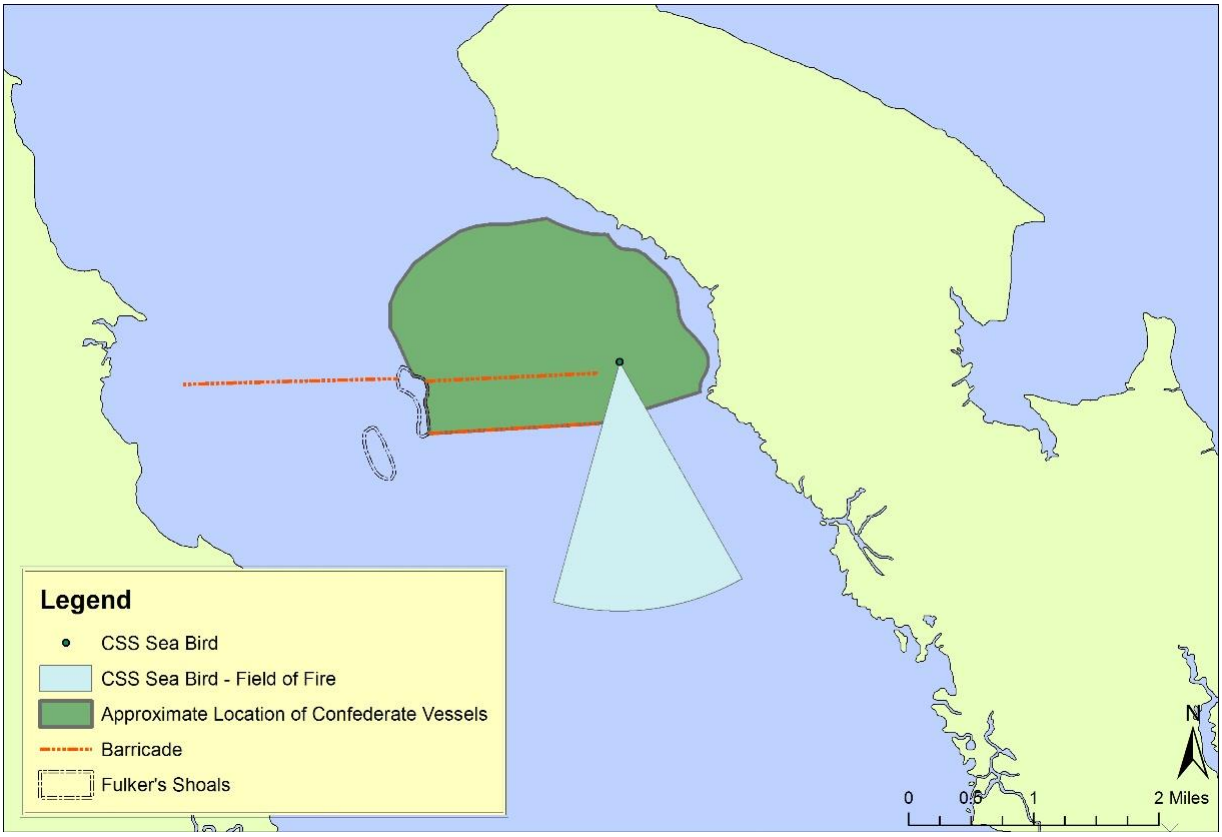



Figure 35: Approximate Location and Field of Fire of Confederate Vessels (By Lucas Simonds)

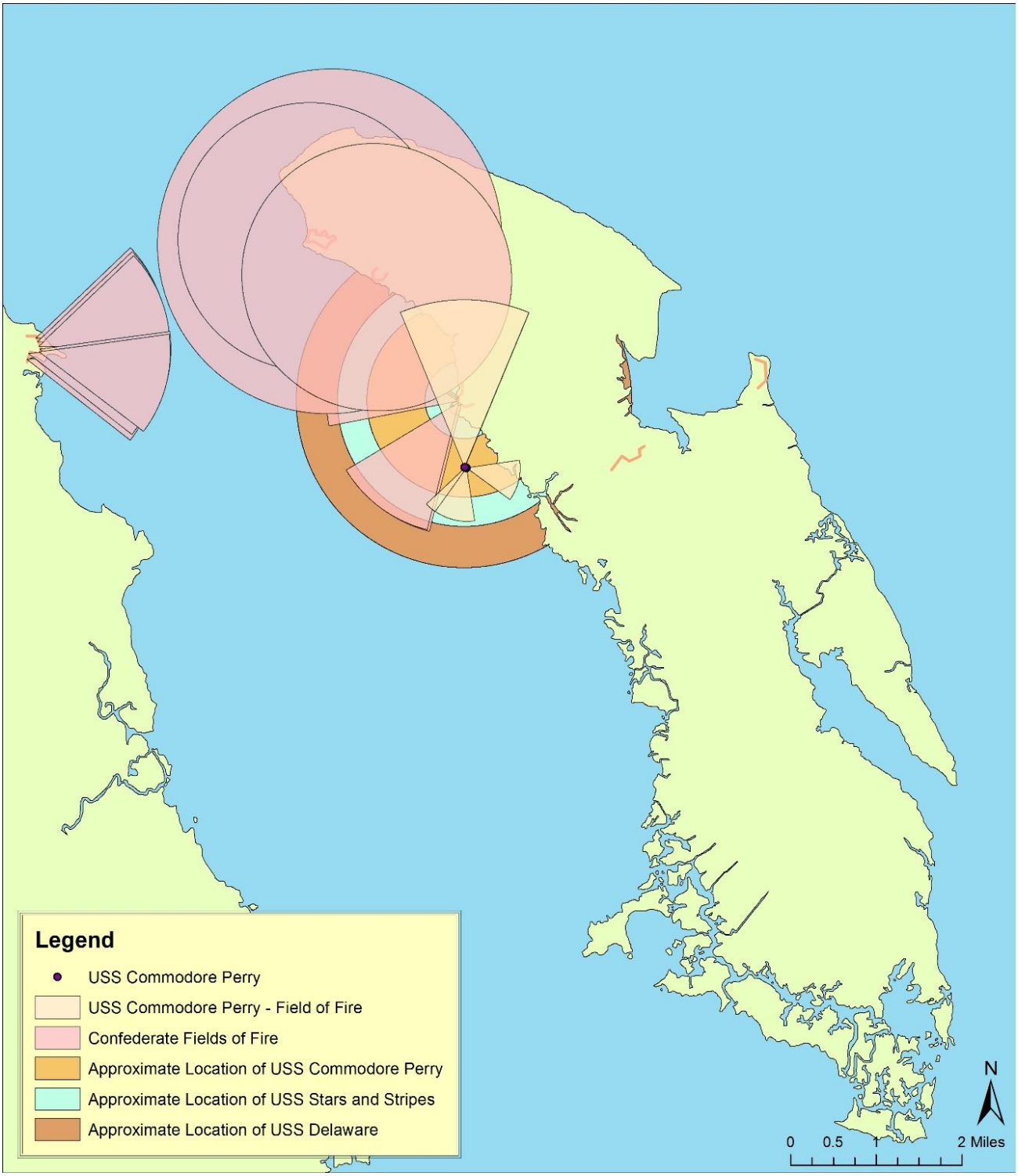



Figure 36: Approximate Location and Field of Fire of Union Vessels (By Lucas Simonds)

Avenues of Approach

The nature of the avenues of approach to a battlefield can also have significant effects on the course of the battle, sometimes restricting the ways in which units can be formed up during their approach. In the case of Croatan Sound, two avenues of approach led into the battlefield. The first was the northern entrance into the sound. While the northern entrance to Croatan Sound was wide open with a deep channel, as shown in Figure 37, that entrance was only accessible through Albemarle Sound, which itself was only accessible through the canals to the Chesapeake Bay, both of which were controlled by the Confederacy at the time of the battle. As such, although these canals could allow passage from the Chesapeake Bay into Albemarle Sound and through the northern entrance of Croatan Sound, the Confederate control of Norfolk barred access to this avenue of approach.

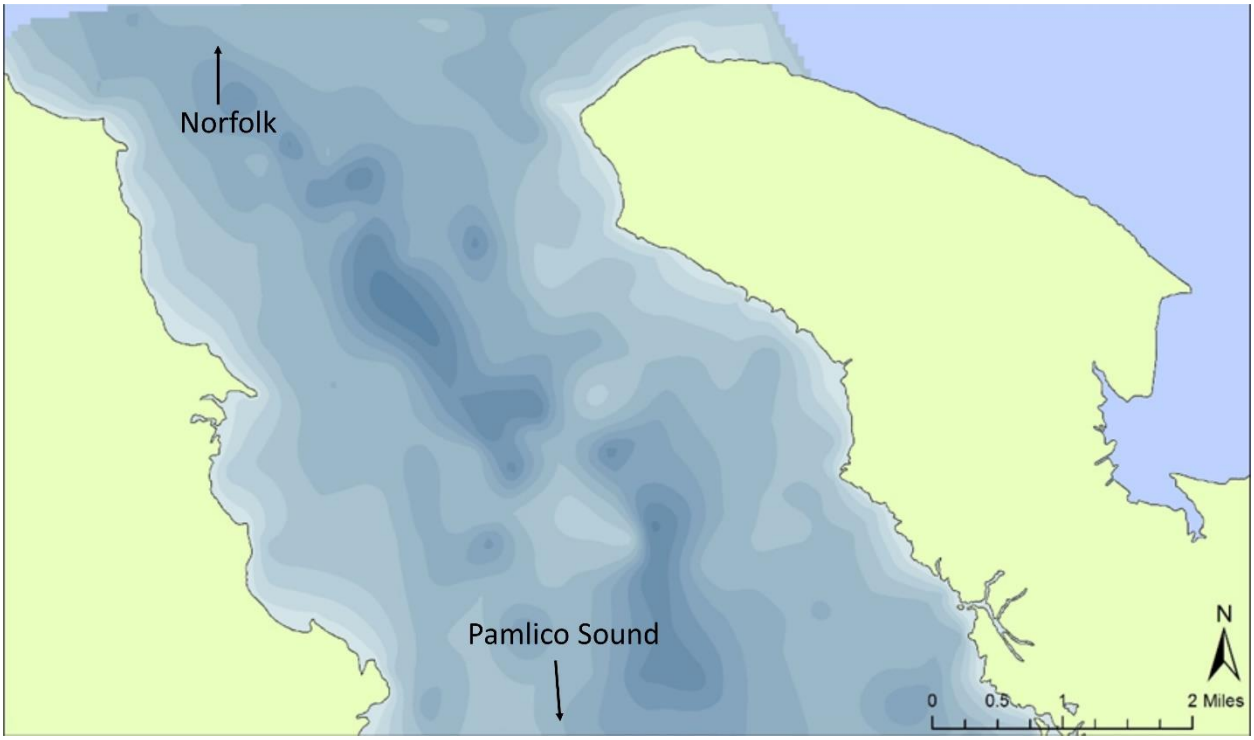



Figure 37: Northern Entrance to Croatan Sound ca. 1862 (By Lucas Simonds)

The second avenue of approach was the southern entrance into Croatan Sound. As this entrance was accessible from Pamlico Sound, which the Union force could enter through Hatteras Inlet, it was the only avenue of approach available at the time of the battle. Unlike the northern entrance to the sound, the southern entrance was obstructed by the Roanoke Marshes. The Roanoke Marshes are the most elusive feature of the historic landscape of the battlefield. In 1862, they were extensive enough to somewhat constrict navigation into Croatan Sound; however, the exact extent of the marshes at the time is difficult to determine. In 1783, the marshes covered most of the area between the southern end of Roanoke Island and the mainland, with only a single 60 foot wide channel allowing access into Croatan Sound (Franklin 1852:4). In 1817, Roanoke Inlet, located north of the island, closed, forcing the flow of water out of Albemarle Sound south through Croatan Sound and out Oregon Inlet. This began a process of erosion in Croatan Sound and the marshes which continues today (Riggs and O'Connor 1974:8). In 1840, what remained of the marshes was described as "of a soft alluvial character, with steep borders and irregular intermediate surroundings, (in some places fifty feet deep)" with "numerous channels around the tufts of the remaining islands" (Gwynn 1840:2). Both *Coast Chart No.40* (USCGS 1876) and *T-Sheet No.933* (USCGS 1864) depict rather limited marshes, mostly concentrated near the mainland and the southern end of the island (Figure 38). *A Sketch of Roanoke Island N.C.* (Foster 1866), however, shows much more significant marshland near the island, with many smaller islands in between (Figure 39).

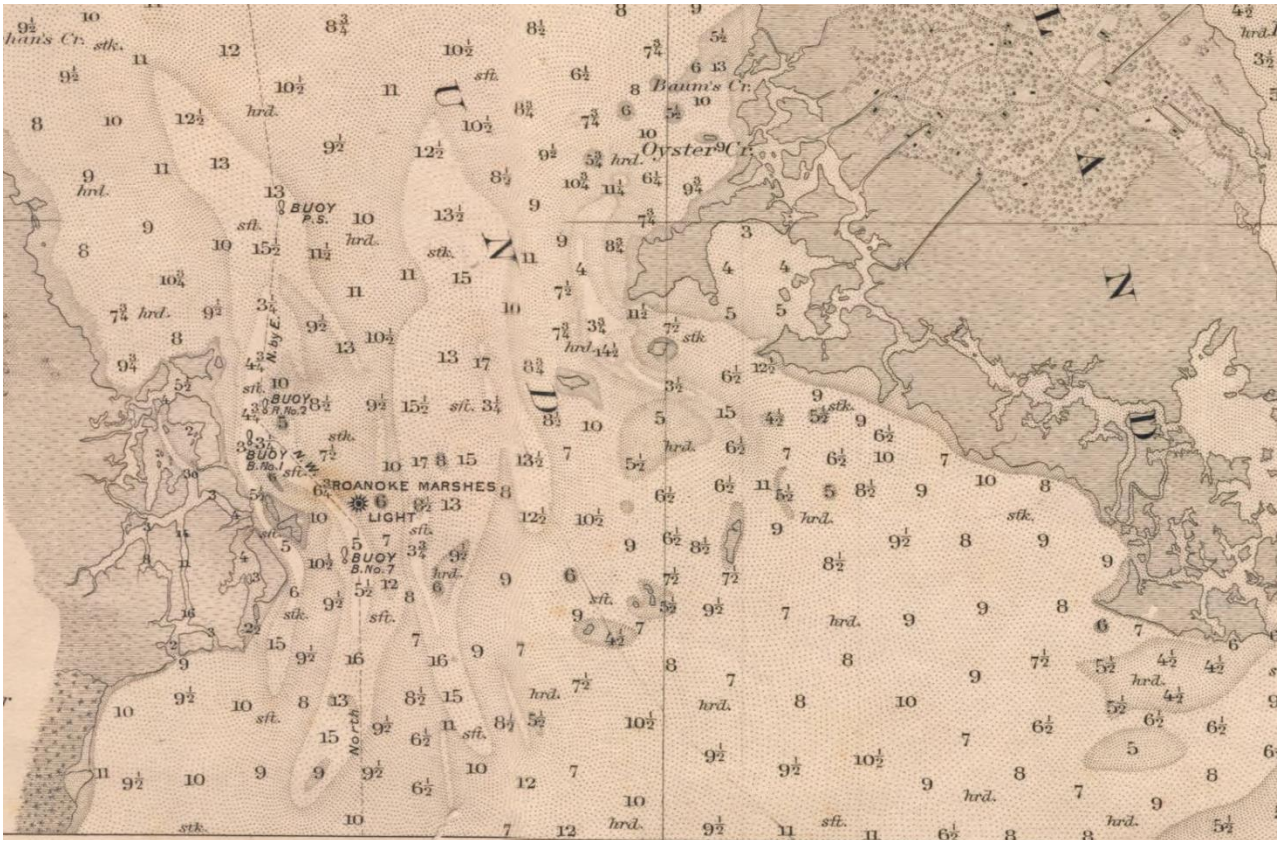


Figure 38: Roanoke Marshes as depicted on *Coast Chart No.40* (USCGS 1876)

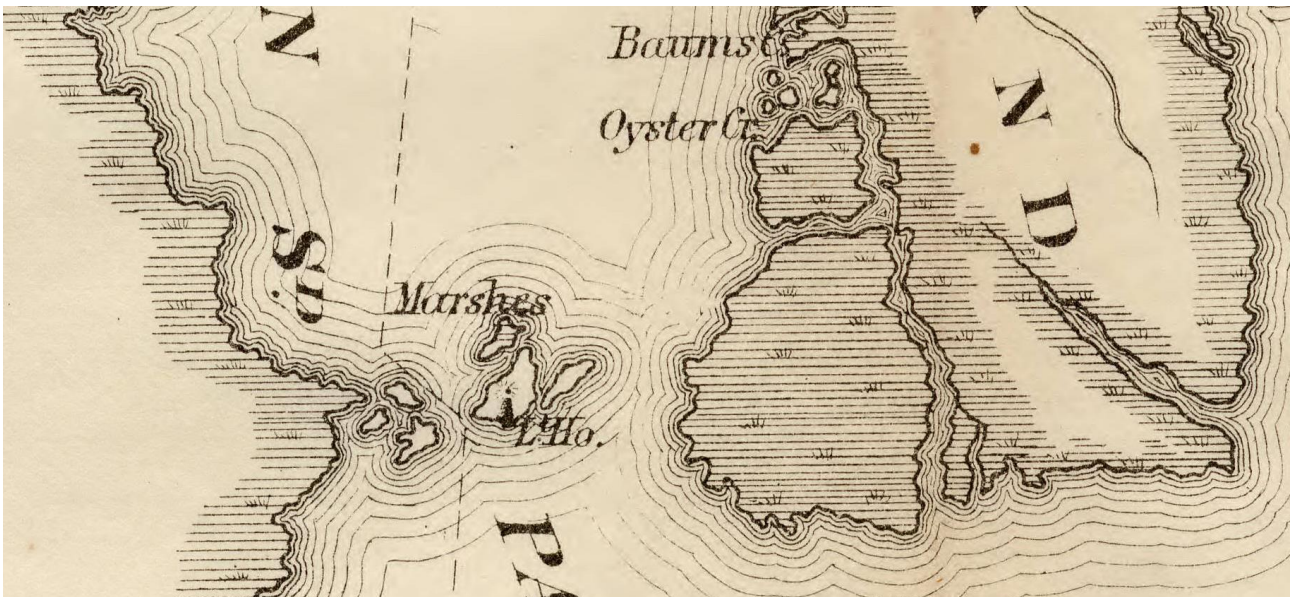


Figure 39: Roanoke Marshes as depicted on *A Sketch of Roanoke Island, NC* (Foster 1866)

For the purposes of the present study, the marshes as depicted in *Coast Chart No.40* are taken as accurate for two reasons. First, the sketch is rather imprecise in much of its depiction of the island when compared with *Coast Chart No.40*. Second, the sketch depicts the Roanoke Marshes lighthouse as being located on an island; but as can be seen in an image from *Leslie's Illustrated Newspaper* (Figure 40), the lighthouse was elevated on screw piles at the time of the battle. Because of this, it seems more likely that the depiction of the marshes that shows the lighthouse as in the water rather than on an island is accurate.

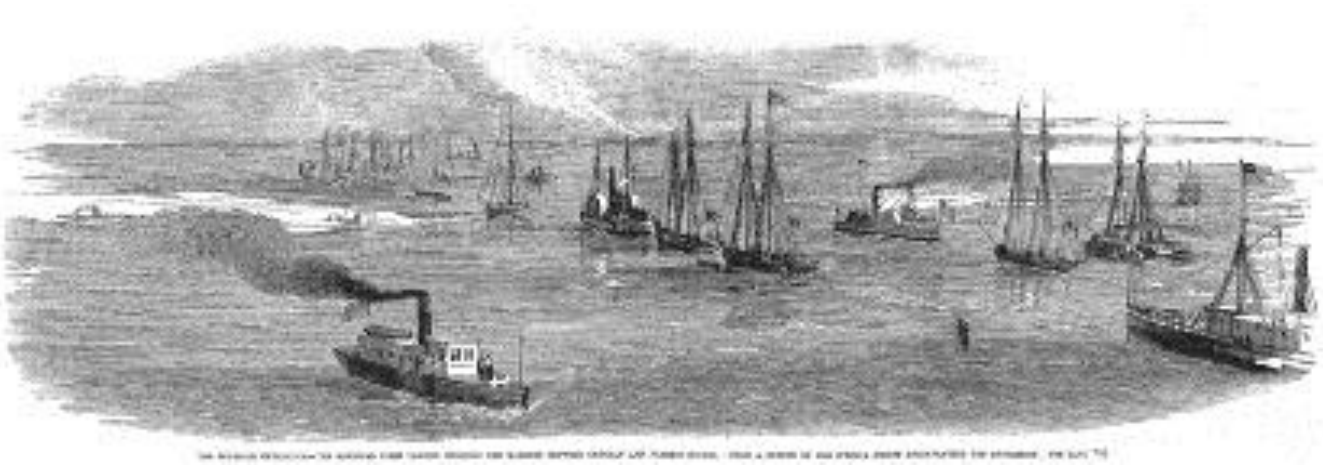


Figure 40: The Union Squadron Passing through the Roanoke Marshes (NYSL 2012)

The influence of the constrictive nature of the avenue of approach to the battlefield differs depending on the force in question. For the Union squadron, their passage through the narrow channel required caution, and their behavior as they passed through this area can be interpreted accordingly. For the Confederate squadron, the marshes created a natural choke point at which the numerical superiority of the Union squadron could be partially negated. The decision not to seize this advantage could be interpreted as incompetent, or as the result of other mitigating factors such as force composition or tactics.

*Troops Available*

In this section, the composition of the Union and Confederate forces will be considered. While the composition of a military force is not technically a factor external to that force, it is a factor external to the commanders making the decisions, and is an important influence on their decision making processes. The number, quality, and equipment of the troops available are perhaps the most important factors in determining the baseline capabilities of a force. While multiple external factors define the courses available to a particular force, the internal composition of that force can limit its potential responses to those external factors. In addition, it is also important to consider the forces which participated in a battle as they compare to one another; actions which would be possible when facing a force of similar or lesser capabilities can be impossible when facing a force of significantly greater capabilities, and the relative composition of the opposing forces can be highly influential in this regard. In the following sections, four aspects of the Union and Confederate squadrons will be considered: the vessels, external support to those vessels, the armament of those vessels, and the crews staffing those vessels. These four aspects will be examined separately, and the Confederate and Union forces will be compared and contrasted directly within each section. A particular emphasis will be placed on the implications of these aspects as compared between the two squadrons.

Vessels

In this section the number, size, and quality of the vessels of the Union and Confederate squadrons at Roanoke will be considered. The squadrons that met at Roanoke Island were the products of efforts by the Union and Confederate Navies to bolster their numbers early in the war. At the start of the war, the Union Navy possessed only 12 vessels which were ready for immediate service, with an additional 30 being available after being fitted out from ordinary or returned from Foreign Service (Soley 1887:614). The Confederate Navy, on the other hand,

consisted of 10 vessels seized by various southern states as they seceded (Scharf 1887:24). Before either side could begin construction efforts in earnest, they began purchasing and converting merchant vessels to fulfill their pressing needs. Both squadrons at Roanoke Island consisted entirely of merchant vessels purchased or seized during this time. Detailed statistics regarding the individual vessels of the Union and Confederate squadrons are found in Appendix B. Here, the squadrons are considered as coordinated units, as are their capabilities relative to each other.

First and foremost, the sheer number of vessels in each squadron must be considered. The Union Naval division consisted of eighteen fighting vessels, which were augmented by a further seven vessels outfitted by the Army, giving the Union squadron a total of twenty five vessels (U.S. War Department 1883; U.S. Navy Department 1897b; Silverstone 2001). Due to a dearth of information concerning the vessels of the Army Division, however, only those of the naval division will be considered. The Mosquito Fleet consisted of nine vessels, one of which, CSS *Appomattox*, was sent north on the morning of the battle, and one of which, CSS *Black Warrior*, was a schooner that lay at anchor out of range of the Union squadron leaving only seven fighting vessels (Parker 1883:229; Moebs 1991; Silverstone 2001). As these totals are compared to one another, the first obvious implication is that Confederate decisions would be made with the knowledge that they faced a numerically superior force, whereas Union decisions would be made with the knowledge that they faced a numerically inferior force. As will be demonstrated below, however, the Confederate force was not inferior in every aspect.

Although the vessels of the Union and Confederate squadrons were ostensibly similar in some ways, having all operated previously as merchant vessels in some capacity, they were very different from each other in actuality. As demonstrated in Table 1, the Union vessels were

significantly larger on average than those of the Mosquito Fleet. This would work in favor of the Union in one sense; larger vessels could mount more guns, hold more ammunition, and withstand more damage than smaller vessels. In another sense, however, the smaller average size of the Confederate vessels could have been an advantage to the Confederates.

| | Avg. Tonnage | Avg. Length (ft.) | Avg. Draft (ft.) | Max Tonnage | Max Length (ft.) | Max Draft (ft. | Min Tonnage | Min. Length (ft.) | Min. Draft (ft.) | # of Vessels |
|---|---|---|---|---|---|---|---|---|---|---|
| Union | 312.72 | 135.6 | 7.6 | 751 | 200 | 9 | 108 | 82 | 6 | 18 |
| Confederate | 145.25 | 85 | 4.5 | 350 | 135 | 4.5 | 65 | 85 | 4.5 | 7 |

Table 1: Vessel Statistics (Moebs 1991; Silverstone 2001)

Due to the uneven and constrictive nature of the bathymetry of Croatan Sound, smaller vessels should have had an easier time navigating its shoals and snags. Of particular importance would be the draft of the vessels, as vessels of shallower draft would be able to maneuver through a larger area of the sound. As can be seen in the table above, the Union squadron was considerably deeper of draft on average, however, a caveat to those numbers must be made. While the general disparity between the average drafts of the two squadrons is relatively accurate, the numbers themselves are almost certainly not. In the case of the Confederate squadron, as should be readily apparent, the drafts listed above are only those of one vessel, CSS *Curlew*, and do not represent the fleet as a whole. This is because the draft of CSS *Curlew* is the only available in official naval sources. In the case of the Union squadron, although drafts are recorded for all the vessels in the *Official Records* of the Navy, those drafts are undoubtedly inaccurate. USS *Southfield*, the draft of which is recorded as 6’6” in the *Official Records*, had an actual draft of 9’6” while serving in the Navy as the result of modifications and the addition of cannon and ammunition (Spirek 1993:57). It would be reasonable to assume that similar increases in draft occurred for all the Union vessels, and their officially recorded drafts are, in all likelihood, too low.

That being said, the discrepancy between the drafts listed here and the actual drafts of the vessels of the Union and Confederate squadrons does not change the fact that the Confederate squadron was, on average, significantly shallower of draft. If anything, the disparity between the two squadrons would grow if the actual drafts were used. In the case of the Confederate squadron, CSS *Curlew* was the largest vessel, and the drafts of the remaining six would undoubtedly be shallower, further lowering the average. In the case of the Union Squadron, the increase in overall draft would only push the average higher. The implications of these numbers therefore remain the same, despite the factual inaccuracy of those presented above. Namely, the Confederate squadron had a larger area of Croatan Sound at its disposal when devising maneuvers.

Despite the nominal advantage the Confederate squadron possessed by virtue of their shallow drafts, a much greater disparity existed between the quality and condition of the vessels of the Union and Confederate squadrons. When describing the Confederate squadron, Flag-Officer Lynch noted that it consisted of "two old side-wheel steamers and six propellers, the former possessing some speed, the latter slow in their movements, and one of them frequently displacing its shaft" (U.S. Navy Department 1897b:147). Captain Parker of CSS *Beaufort* notes further that all but two of those vessels were poor quality tugboats taken from service on the Albemarle-Chesapeake canal (Parker 1883:226). General Wise, for his part, complained that the tugboats would have done better service transporting troops and supplies from Norfolk to the island, rather than serving as "perfectly imbecile gunboats" (U.S. Navy Department 1897b:149,129). During the battle, these vessels fully reinforced the pessimism of the Confederate commanders. CSS *Forrest* was put out of commission early by a displaced propeller shaft, CSS *Curlew* was ripped apart by heavy shells in an attempt to close in on the Union

vessels, and the others apparently did nothing of note during the battle (Parker 1883:229-231). The Union vessels, on the other hand, although equally derided by their commanders, were apparently of a higher quality than the Confederate vessels. After weathering nearly three weeks of storms, being battered against each other, and running aground in Hatteras inlet, the vessels of the Union fleet seemed to display no serious faults and withstood both the onslaught of the Confederate cannon and the rigors of combat maneuvers and frequent groundings admirably. Despite the fact that the Union vessels, due to their deep drafts, were constantly running aground during the battle, none appear to have sustained significant damage, and they were able to keep up an impressive bombardment throughout. Although neither squadron consisted of top-of-the-line vessels then, it does seem the Union squadron was of at least marginally better quality. Considering the intelligence both sides possessed on their enemy before the battle, one implication of this disparity is that decisions on both sides would have been made with at least some knowledge of the quality of the vessels that opposed them; The Confederate squadron would have to consider their inferiority to the Union, and the Union squadron would have to consider their superiority to the Confederates.

Finally, the number of cannon that the opposing squadrons were able to mount on their vessels also had some influence on the battle. The limiting factor here, however, was not necessarily the number of cannon that the vessels were capable of mounting, but the number of cannon that were available. In the case of CSS *Curlew*, when Lynch requested more cannon from Norfolk to outfit the vessel, he was instructed to make do with the cannon he already had, as no more were available (U.S. Navy Department 1897b:733). Therefore, although the small tugs could certainly only mount a small number of cannon, it is unlikely that any of the Confederate vessels mounted as many as they could have. In the case of the Union, their vessels both could

and did mount significantly more cannon, with only the two smallest Union vessels, USS *Whitehead* and USS *Henry Brinker*, mounting less than two. This disparity in armament will be discussed at greater length in the section on armament, and it suffices to say here that the major implication of this fact is that once again that the Union squadron was superior to the Confederate squadron.

In summary, when the vessels alone are considered, the Union squadron was superior in almost every way to the Confederate squadron. Despite a nominal advantage to the Confederates in maneuverability, the Union vessels were larger, more reliable, and mounted more guns than the Confederate vessels. Additionally, they outnumbered the Confederate vessels by a factor of 3.5 to 1. The vessels alone did not make up the full combat power available to the Union and Confederate squadrons, however, and external support must also be considered.

External Support

In addition to the combat power of the vessels of the two squadrons, external support to those squadrons must also be considered. While the troops accompanying the Union squadron could technically be considered a form of external support as it was they who captured the island on 8 February, they did not play a direct role in the naval action of 7 February, and will not be considered here. The Confederate forts defending Croatan Sound, however, were an integral part of that action, and made up a significant portion of the total combat power of the Confederate defensive force. A force of which the Confederate squadron was only one part.

The Confederate forts were, in fact, significantly more valuable than the squadron in a number of ways. As has been demonstrated previously in Figure 34, the Confederate forts achieved a heavy concentration of fire in the northern part of the sound, which would have been devastating to any vessels caught in the crossfire. Additionally, apart from the obvious fact that

the forts were far less limited than the vessels in the number of cannon which they could mount, cannon mounted on land were also considerably more accurate than those mounted aboard vessels. Indeed, it is difficult to understate the increase in accuracy that came from eliminating the pitching and rolling motions of the gundeck of a moving or even relatively stationary vessel. It was a commonly accepted fact in the mid-19th century that cannon mounted in forts and batteries were far superior to those mounted on vessels, the disparity being described once in this way: "[i]t is generally admitted that four guns of the caliber of 18 or 24, protected by a wall and properly served, are equivalent to a ship of the line" (Jeffers 1850:175).

In practice, this assessment appears to have played out. During the bombardment of Sevastopol during the Crimean War (1853-1856), two British Ships of the Line firing 87 guns over the course of four hours (an estimated 7,700 rounds) at a stone battery at the range of 800 yards were unable to significantly damage the strength of its walls or make even the start of a breach (Dahlgren 1856:397). By comparison, during the bombardment of Bomarsund in the same war, three guns of a smaller size were capable of breaching a stone wall at 950 yards over the course of 8 hours with only 532 rounds when placed on land (Dahlgren 1856:398). It is fair to say then, that cannon mounted in the forts should have been considerably more accurate than those mounted on board the vessels of the Union and Confederate squadrons. Although the degree to which more accurate cannon such as the 9 in. shell guns and Parrott Rifles would have changed this equation is unclear, as even those cannon would have suffered from the motion of a vessel.

Table 2 presents the distribution of cannon between the Confederate forts. As will be discussed in the next section, Fort Bartow alone mounted as many cannon as the combined vessels of the Confederate squadron, and these forts were an invaluable asset to Flag-Officer

Lynch. The concentration of so many cannon in the forts has a number of implications on the decision making processes during the battle. On the part of the Confederate squadron, their decisions would likely be based around ensuring that they confronted the Union squadron within the fields of fire of the forts in order to fully utilize their available combat power. Conversely, the Union squadron would likely be concerned with avoiding the fields of fire of the forts at all costs so as to negate a large portion of the Confederate combat power.

| | Fort Bartow | Fort Blanchard | Fort Huger | Fort Forrest |
|---|---|---|---|---|
| No. of Cannon | 9 | 4 | 12 | 7 |

Table 2: Cannon per Fort (U.S. Navy Department 1897b:598)

Armament

In this section the armament of the Union and Confederate squadrons and the Confederate forts will be examined. The number and type of cannon as well as the type of ordnance they fired will be taken into consideration, as will the implications of these facts. Much like the vessels of the Union and Confederate squadrons, the armament in use at the Battle of Roanoke Island was the result of early efforts to fit out a large number of vessels before the production of new modern cannon designs could be increased. Because of the drastic demand for cannon, both new types, such as Dahlgren Shell Guns and Parrott Rifles, and old types, such as 32 pdr guns introduced in 1846, were used. Detailed information concerning each type of cannon in use during the battle can be found in Appendix D; here, the implications of the armament of each squadron as a whole and in relation to one another will be considered.

The first obvious statistic of note, as seen in Table 3, is the overall number of cannon that each side mounted. The Union squadron possessed a marked advantage here, although the cannon mounted in the Confederate forts did much to temper this discrepancy. Only four of the Confederate cannon mounted in the forts were ever able to fire on the Union vessels, however,

leaving the Confederates with a total of 12 usable cannon during the battle (U.S. Navy Department 1897b:599). The resulting disparity of 52 cannon between the Union and Confederate squadrons has similar implications to a number of factors discussed previously. Namely, Union decisions were made in light of a known superiority of fire, whereas Confederate decisions were made in light of a known inferiority of fire. This superior-inferior dichotomy between the two forces is only further reinforced when their armament is broken down by cannon type, as in Tables 4 and 5 below.

| | On Vessels | In Forts | Total |
|---|---|---|---|
| Union | 64 | 0 | 64 |
| Confederate | 8 | 33 | 41 |

Table 3: Overall Number of Cannon (U.S. Navy 1897b:598; Silverstone 2001)

| | 32 pdrs (33cwt/57cwt) | 8 in. Shell (55cwt/63cwt) | 9 in. Shell | Boat Howitzers (4 sizes) | Parrott Rifles (20/30/100 pdr) | Dahlgren Rifles | Banded and Rifled 32 pdrs |
|---|---|---|---|---|---|---|---|
| Point Blank Range (Yards) | 287 / 357 | 283 / 332 | N/A | N/A | N/A | N/A | N/A |
| Max Range (Yards) | 1598 / 2731 | 2600 / 1769 | 3450 | 1085-2640 | 4400 / 6700 / 8460 | N/A | 8460 |
| Effective Range (Yards) | <1300 | <1300 | >1300 | 1200-1300 | 3500 | N/A | 3500 |
| Caliber (Inches) | 6.4 | 8 | 9 | 4.62-5.82 | 3.67/4.2/6.4 | N/A | 6.4 |
| Weight of Projectile (Pounds) | 32 – Shot 26 - Shell | 49.8 | 72.5 – Shell 75-Shrapnel | 12-24 | 20 / 30 / 100 | N/A | 100 |
| Weight of Charge (Pounds) | 4.5 / 9 | 7 / 9 | 13 | 1-2 | 2 / 3.25 / 10 | N/A | 5-6 |

Table 4: Statistics by Cannon Type (Dahlgren 1856: 30-34; Holley 1865:478-481; U.S. War Department 1883; U.S. Navy Department 1897b: 555-578; Canfield 1969:20; Ripley 1970:369-370)

| | 32 pdrs | 8 in. Shell | 9 in. Shell | Boat Howitzers | Parrott Rifles | Dahlgren Rifles | Banded and Rifled 32 pdrs |
|---|---|---|---|---|---|---|---|
| Union | 18 | 6 | 16 | 12 | 9 | 3 | 0 |
| Confederate | 30 | 0 | 0 | 0 | 0 | 0 | 11 |

Table 5: Distribution of Cannon Types (U.S. Navy 1897b:598; Silverstone 2001)

As can be seen in Table 5, 32 pdr naval guns made up a large part of the armament of both forces. Along with the 8 in. shell guns, these smoothbore cannon were relics of the U.S. Navy's system of naval armament established in 1845, which had since been replaced (Dahlgren 1856:23). While still capable of acceptable ranges and firing reasonably large projectiles, these guns were horribly inaccurate at range. In tests carried out in the 1850s, a 57 cwt 32 pdr gun only hit its target 3 out of 10 times at 1300 yards, and a 63 cwt 8 in. gun only hit the same target 5 times out of 10 at that distance (Dahlgren 1856:242). By comparison, the more modern 9 in. shell gun hit its target 10 out of 10 times in a nearly identical test (Dahlgren 1856:97).

Nearly three quarters of the Confederate armament was made up of these relatively powerful but inaccurate guns. The final quarter, however, was comprised of 32 pdr guns that had been banded and rifled to improve their power and range. Describing one such gun captured in the battle, Union Ordnance Officer Lieutenant Daniel Flagler wrote:

> The gun is manufactured from a 32-pounder navy gun of 61-cwt. A portion at the breech was turned down to a perfect cylinder, and then wrought-iron cylinders shrunk around the breech, similarly to the Parrott gun. The cylinder, when complete, is 24½ inches long and 1½ inches thick. The few experiments I have been able to make with the gun show that it

> will compare not unfavorably in range and accuracy of fire with the Parrott gun (U.S. War Department 1883:81).

This wrought iron band allowed the breech of the gun to withstand greater pressure, and thereby fire heavier projectiles. Goldsborough reports that such guns fired 100 pound projectiles (Fox 1920:238), and the Parrot gun mentioned by Flagler is likely the 100 pdr Parrott Rifle. If so, these banded and rifled guns would have been formidable indeed. Lynch cautioned, however, that the maximum charge to be used in them was six pounds (U.S. Navy Department 1897b:753). This charge, four pounds lighter than that of a genuine Parrott Rifle, indicates that the guns may have been of inferior quality in some respects.

By comparison, the Union Navy also mounted more 32 pdr guns than any other single type of cannon, however, these made up a much smaller portion of the total Union armament, comprising less than one third of the total cannon. In combination with the 8 in. shell guns, outdated cannon made up slightly more than one third of the total, with the rest being various modern types, the most common of which was the 9 in. shell gun. Once again, these facts suggest a situation in which Union decisions would be made from a position of known superiority and Confederate decisions would be made from a position of known inferiority; The Union mounted more modern type cannon, and even those Confederate cannon which were theoretically equal to modern types were not considered reliable enough to be used at full strength. While the disparity between the two forces should be thoroughly established at this point, an examination of the number and type of ordnance fired during the battle illustrates exactly how wide of a gulf existed between them.

Far more informative than the number and type of guns used at the battle, are figures on number and type of ordnance fired on 7 February. On that day, during approximately 6 hours, the

vessels of the Union Navy Division alone fired 2,665 rounds, weighing a total of 128,048 pounds. Of that number, 2,446, a total of 120,702 pounds, were explosive shells, with the remainder being made up of solid shot and shrapnel (U.S. Navy Department 1897b:555-578). Table 6 presents a breakdown of this total number by type of cannon.

| | 32 pdrs | 8 in. Shell | 9 in. Shell | Boat Howitzers | Parrott Rifles | Dahlgren Rifles |
|---|---|---|---|---|---|---|
| Rounds | 427 | 100 | 1012 | 413 | 738 | 104 |

Table 6: Rounds Fired by Cannon Type - Union (U.S. Navy Department 1897b:555-578)

As can be seen in the table above, although the older cannon made up over one third of the total number, they only fired one quarter of the total rounds fired. The 9 in. shell guns, by comparison, fired slightly less than half of the total rounds, and the modern cannon were, overall, fired much more often than their older counterparts. A more detailed accounting of the ordnance fired by the Union can be found in Appendix C.

Among the Confederate cannon, only three of the smoothbore 32 pdr guns were ever able to fire on the Union vessels. All of these guns were mounted in Fort Bartow, where it is recorded that they fired a combined total of 205 rounds (U.S. War Department 1883:181). In the case of the banded and rifled 32 pdr guns, the full number of rounds fired must be estimated. Of the 11 guns of this type, 2 were in Fort Huger and out of range of the Union vessels, leaving 9 active guns. The single gun of this type mounted in Fort Bartow fired only 30 rounds over the approximate six and a half hours that the Confederates were firing, an average rate of fire of one shot in 13 minutes (U.S. War Department 1883:181). If this rate of fire were extrapolated to all the guns of this type, they would have fired 270 rounds total. Compared to the rate of fire among the Union 100 pdr Parrot rifles, however, this is relatively slow, and it is unclear why the gun in Fort Bartow was fired at such a slow rate. Nonetheless, it can be safely assumed that the banded

and rifled 32 pdr guns aboard the Confederate vessels were likely fired at least somewhat faster than this. It has been noted that these guns were often compared to the 100 pdr Parrott Rifles. Assuming that they had a similar rate of fire, their output can be estimated. Among the Union cannon, the average 100 pdr Parrott Rifle fired 97 rounds over the course of 6 hours, at a rate of 1 round every 3.7 minutes. Extrapolating this rate of fire to the Confederate banded and rifled guns, during the 6 hours and 20 minutes that they were firing, they could have fired 103 rounds each. Adding the 30 rounds from the shore mounted gun, the total rounds fired would have been 854. Due to limitations on ammunition, however, it is more likely that the true figure falls somewhere between the extremes presented above. As can be seen in Table 7, with the addition of the fire of the smoothbore guns, the combined total of the Confederate cannon would have been between 475 and 1,056 rounds weighing between 33,560 and 91,960 pounds.

| | 32 pdr Smoothbores | Banded and Rifled 32 pdrs |
|---|---|---|
| Rounds | 205 | 270 - 854 |

Table 7: Estimated Rounds Fired by Cannon Type - Confederate (U.S. War Department 1883:181)

Considering the Confederate deficit of active cannon when compared to the Union (11 to 64), the possibility that the Confederate cannon fired nearly half as many rounds is rather impressive, but the exact number of rounds they fired is unclear. Although even the higher figure would still place the Union in an advantageous position in regards to their total mass of fire, their greater advantage came in the form of the projectiles they fired. As noted, the vast majority of the Union fire was shells, which were more effective against both vessels and earthworks than solid shot. The degree to which the Confederates were also using shells is unknown; however, primary accounts seem to indicate that they were primarily firing solid shot. The Confederates certainly fired some shells; the captain of USS *Louisiana* reports that a small fire was ignited in the forehold of his vessel by a rifled shell (U.S. Navy Department 1897b:557). The report of the

ammunition fired in Fort Bartow notes, however, that the majority of the projectiles fired from that fort were round shot (U.S. Army 1887:181). This report is corroborated by the commander of USS *Commodore Perry*, which was struck at least eight times during the battle, but was little damaged. The commander of that vessel reported that, if his vessel had been struck by shells rather than solid shot, it would certainly have been sunk (U.S. Navy Department 1897b:565). This then, marked the greatest difference between the armaments of the opposing forces. Although the Confederate cannon could have fired a considerable amount in comparison to those of the Union, their fire was rather ineffective, doing little to damage the Union vessels. In contrast, although the Union did little damage to the Confederate earthworks, the one vessel struck by their fire, *Curlew*, was quickly sunk due to the effect of their heavy shells.

In summation, a great disparity existed between the armament of the Union and Confederate forces. The Union mounted more cannon, more of which were modern, and more of which were firing shells rather than round shot. As has been repeated often, the primary implication of these facts is that Union decisions would have been made from a known position of superiority, whereas Confederate decisions would have been made from a known position of inferiority.

Vessel Crews

Finally, the character of the crews staffing the Union and Confederate squadrons must be considered. This is one area in which the two squadrons were rather equal, inasmuch as both were staffed largely by untrained landsmen. Describing his defensive readiness, Lynch wrote:

> My greatest difficulty is in the want of men. So great has been the exposure of our crews that a number have been necessarily invalided; consequently the complements are very much reduced, some of them one-half. I have sent to Washington, Plymouth, Edenton,

> and Elizabeth City for recruits without success, and an earnest appeal to Commodore Forrest brought me only four from Norfolk. To meet the enemy I have not more than a sufficient number of men to fight half the guns (U.S. War Department 1883:147).

Of those who were available to staff the vessels, Captain Parker reports, "our gunners had no practice with their rifled guns, and our firing was not what it should have been, it was entirely too rapid and not particularly accurate" (Parker 1883:231). Describing the working of the cannon aboard *Beaufort,* Parker remarked that he was forced during the battle to call up men from the engine room to help work the cannon. After a shell burst over the ships, at which point the crew were commanded to drop to the deck, one coal passer refused to return to his position, and it was only after Parker threatened to kill the man that he got back up (Parker 1883:233).

Assuming that Parker's crew was at least somewhat representative, the crews of the Confederate vessels would have consisted of a wide range of experience levels, with experienced gunners handling the aiming and firing of the guns, while less experienced seamen performed other functions, such as the coal passer who was assigned to the side tackles (Parker 1883:231). The crew of CSS *Curlew*, for example, consisted of only 6 able bodied seamen and 20 ordinary seamen late in 1861, with the remainder being landsmen (Olson 1997:91), and similarly mixed crews were likely serving aboard all of the Confederate gunboats.

Similar information is not readily available about the crews of the Union vessels. By all accounts, they were likely in a similar state. Although no reports exist of the Union vessels being understaffed, the 8,000 naval personnel enlisted at the start of the war were not enough to staff every vessel being outfitted. As a result, the Union Navy brought in a horde of new sailors, the majority of which were landsmen (Coggins 1962:127). Assuming the vessels at Roanoke Island reflected this general excess of landsmen, it seems likely that the Union crews would have been

similarly mixed, with experienced specialists such as gunners, and inexperienced general seamen. While the inexperienced crews of the Union and Confederate squadrons would have impacted their effectiveness in battle, the only significant implication on decision making is that commanders may have been more reserved in their decisions due to a lack of faith in their crews.

*Time Available*

This final element of METT-T concerns the time that is available to carry out a mission or the objectives entailed therein. The time available to complete a mission can often influence when attacks are carried out and how quickly objectives are pursued. While it is not always a significant factor, the time available is nevertheless important to consider.

Union

The Union squadron operated under minor time constraints. The short distance between Norfolk and Roanoke meant that reinforcements and supplies could quickly be sent to the island, and it would have been important to capture the island before its defenses could be improved further. While no significant improvements were made, despite the Union's delay of 24 days at Hatteras Inlet (Burnside 1887:664-666), the specter of Confederate support from Norfolk likely played some role in the decision making processes of the Union commanders.

Confederate

Conversely, the Confederate defensive force, would have had impetus to hold out until reinforcements from Norfolk could arrive. Although the Confederate commanders had been largely unsuccessful in acquiring aid in the months leading to the battle, the actual assault on the island could have prompted some action in the command at Norfolk, and would not have been unreasonable to assume that reinforcements could arrive before the island fell.

## Internal Influence: Tactics

In the first section of this chapter, the implications of the command structures of the Union and Confederate squadrons on the interpretation of the coordinated actions of those squadrons were explored. In the second section, the environmental influences on the decision making processes that produced the coordinated actions of those squadrons were considered. In this third and final section, the internal influences on those decision making processes are examined. Although many decisions are made in response to particular environmental factors, these decisions are also guided by internal rules and heuristics which prescribe the proper response to those environmental factors. As with the study of environmental factors in the preceding section, it is important here to limit the analysis to internal factors that are relevant specifically to military decision making processes. For this purpose, the analysis here will be limited to tactical principles contemporary to the battle. As stated by A.H. Burne in his principle of "Inherent Military Probability," actions taken during a battle can be understood and even reconstructed by an "estimate of what a trained soldier would have done in the circumstances" (Keegan 1978:32). This principle expresses the fact that the tactical principles conveyed in military training are intended to facilitate decision making during battle by replacing common heuristics with sound tactical thinking. While other factors certainly come into play in the midst of battle, it is not unreasonable to assert that most decisions made during battle are made in light of tactical principles, particularly as one investigates decisions made in the higher levels of a command structure. The analysis in the following sections will therefore focus exclusively on tactical principles. This analysis will be further subdivided between tactical principles dealing with the ends towards which all tactical maneuvers should be performed and tactical principles which prescribe specific tactical maneuvers for specific situations. The Principles of War will

serve as a representation of the former, while the latter entails a brief examination of mid-19th century tactical treatises.

*Principles of War*

In this section, the influence of general tactical principles will be explored. General tactical principles, as opposed to specific tactical principles, outline the goals of tactical maneuvers generally rather than prescribing specific tactical maneuvers. For the purposes of this study, the Principles of War as currently published by the U.S. Army will be taken as a representation of general tactical principles from the time of the battle. Although these principles were first set down in their current form in 1921, they were intended as a condensation of longstanding tactical principles developed during the 19th century (Glenn 1998). A perusal of Antoine de Jomini's *The Art of War* (1854; 1862) reveals that these principles are, in fact, little altered from those that were prevalent in the mid-19th century. *The Art of War* was first available in an English translation in 1854, as well as in a revised edition in 1862, and was the only work on strategy and tactics taught at the US Military Academy until a translation of Carl von Clausewitz's *On War* was made available in 1871 (Weigley 1973:82-83,210). The Principles of War are essentially a more condensed form of Jomini's sprawling remarks on tactics, and therefore represent a concise but accurate picture of the general tactical principles that would have guided the decisions of the commanders at Roanoke Island. Below, each of the nine principles will be briefly summarized and their influences on decision making processes during the battle will be examined.

Objective

This principle states that a commander should "[d]irect every military operation toward a clearly defined, decisive, and attainable objective" (Department of the Army 2008:143). In more practical terms, a commander is instructed to use objectives to "focus combat power on the most

important tasks" and "clarify what subordinates need to accomplish by emphasizing the outcome rather than the method" (Department of the Army 2008:143).

The actions of the Union squadron demonstrate clearly the influence of this principle. Goldsborough's plan of attack (U.S. Navy Department 1897b:551) not only outlines clear and concise objectives, but they are focused on the desired outcomes rather than specific methods, which allowed his subordinate commanders the latitude to work effectively towards those goals. The objectives of the Confederate squadron, on the other hand, appear to have been more loosely defined. As will be discussed in the next section, however, this flexibility may well have been a desirable state according to the tactics of defensive operations.

Offensive

Stated simply, the principle of offensive is that a commander should "seize, retain, and exploit the initiative" (Department of the Army 2008:143). The initiative refers to an advantage over the enemy gained through offensive actions which define the "nature, scope, and tempo of an operation" and "compel and enemy to react" (Department of the Army 2008:143). In practice, this principle is manifested as decisive actions taken to force the enemy to react rather than in reaction to the enemy.

Again, the influence of this principle is most clearly observed in the actions of the Union Squadron. Goldsborough prioritized decisive offensive action early in the battle by ordering the vessels mounting 9 in. guns to the front of the squadron, and his subordinates maintained the offensive initiative throughout the battle by remaining focused on the bombardment rather than reacting to the actions of the Confederate Squadron. Although the actions of the Confederate Squadron seem to be far more reactionary during the battle, this is not without good reason. The principle of offensive also states that, "[d]efensive operations shape for offensive operations by

economizing forces and creating conditions suitable for counterattacks" (Department of the Army 2008:143). In more elaborate terms, Jomini described the tactics of defensive battles in the following way:

> …a general who occupies a well-chosen position, where his movements are free, has the advantage of observing the enemy's approach; his forces, previously arranged in a suitable manner upon the position, aided by batteries placed so as to produce the greatest effect, may make the enemy pay very dearly for his advance over the space separating the two armies (Jomini 1862:185).

In contrast to offensive operations then, commanders of a defending force are advised to find a solid defensive position and wait for the proper time to seize the offensive initiative in a counterattack. For all the faults in the Confederate Squadron, their position at the start of the battle does align well with this principle. Situated in the crossfire of the forts with the added obstacle of the barricade, the Confederate Squadron was safe to observe the advance of the Union while preparing a counterattack which could turn the tide of the battle. The fact that such a counterattack never materialized does not negate the tactical logic behind the decision to form up in that position at the start of the battle.

Mass

A commander should "concentrate the effects of combat power at the decisive place and time" (Department of the Army 2008:144). This principle of mass is what Jomini called the Fundamental Principle of War, and he spent considerable time elaborating on it in his work. Describing this principle, Jomini wrote that it is best understood by the following maxims:

1. To throw by strategic movements the mass of an army, successively, upon the decisive points of a theater of war, and also upon the communications of the enemy as much as possible without compromising one's own.
2. To maneuver to engage fractions of the hostile army with the bulk of one's forces.
3. On the battle-field, to throw the mass of the forces upon the decisive point, or upon that portion of the hostile line which it is of the first importance to overthrow.
4. To so arrange that these masses shall not only be thrown upon the decisive point, but that they shall engage at the proper times and with energy (Jomini 1854:82).

The influence of the principle of mass is most obvious in the actions of the Union Squadron. The concentration of the squadron controlling the water surrounding Ashby's harbor was decisive in allowing the success of the Army's landing operations. While the Army still had much to deal with on the island itself, the completion of the landing operations essentially marked the success of the naval action during the battle. The Confederate Squadron, on the other hand, was unable to achieve mass, despite attempts to do so. The concentration of the majority of the Confederate combat power in the forts to the north meant that Union vessels would have to be drawn into the crossfire in order for a mass of combat power to be asserted. At multiple points during the battle, the Confederate squadron feinted north in the attempt to bring some Union vessels into the fields of fire of the forts (U.S. Navy Department 1897b: 588). These unsuccessful feints demonstrate that Flag-Officer Lynch was conscious of the principle of mass in his decision making processes.

Economy of Force

A corollary to mass, economy of force dictates that a commander should "allocate minimum essential combat power to secondary efforts" (Department of the Army 2008:144).

This principle complements mass as it is intended to retain as much combat power as possible for decisive strikes. Once again, the Union focus and determination on the objective of protecting the Army's landing operations demonstrates the influence of this principle. In the case of the Confederate Squadron, it cannot be said that Lynch unnecessarily allocated any of the combat power under his command to secondary efforts. In the Confederate force as a whole, however, the allocation of the majority of the combat power to defending the northern half of the island was detrimental to any attempts at achieving mass. Despite the importance of that decision to the battle as a whole, it was already unalterable in the context of the naval action during the battle, and the motivations behind that decision fall outside the scope of the present study.

Maneuver

Maneuver refers to placing the enemy at a disadvantage through the "flexible application of combat power" (Department of the Army 2008:144). A commander is advised to "concentrate and disperse" combat power so as to force the enemy to "confront new problems and new dangers faster than they can counter them" (Department of the Army 2008:144). The influence of the principle of maneuver can be seen in the actions of both squadrons. The Union squadron maneuvered so as to avoid the fields of fire of the Confederate forts and was flexible enough to address the Confederate vessels when they became a threat (U.S. Navy Department 1897b: 589). The Confederate Squadron attempted to place the Union at a disadvantage through maneuvering by feinting to the north in order to draw Union vessels into the crossfire of the forts. When this was unsuccessful, they attempted to introduce a new problem by moving south to confront the Union Squadron directly.

Unity of Command

Commanders are advised to, "ensure [the] unity of effort under one responsible commander," for every objective (Department of the Army 2008:145). The influence of this principle can also been observed in both Squadrons. Despite the latitude allowed to the subordinate commanders in the Union Squadron, Goldsborough retained command over their efforts, as can be observed in Lt. Colhoun's request for instructions after USS *Hunchback* was disabled (U.S. Navy Department 1897b:568). The Confederate Squadron was unified further, with all actions stemming from Lynch directly.

Security

The principle of security states that a force should keep details about itself secret from the enemy while learning as much about the enemy force as possible (Department of the Army 2008:145). Accounts from both sides attest to the information gathering efforts of Union and Confederate forces, and these have been discussed previously. The Union force was highly concerned with secrecy before it left Fort Monroe (Fox 1920:223), but Goldsborough's attitude of wanting the Confederates to know the size of his force once they were in Pamlico Sound indicates an indifference to secrecy by that point. Similarly, no accounts attest to Confederate attempts at secrecy.

Surprise and Simplicity

These are the final two principles, the influence of which have, in essence, been discussed above (Department of the Army 2008:145). The principle of surprise states that a force should attempt to attack an enemy that is unprepared. The Union attempts at secrecy before they left Fort Monroe show this influence. The principle of simplicity states that a plan of attack should

be as simple as possible. This was discussed under objective, and both sides had relatively simple plans.

*Specific Tactical Principles*

Having explored the influence of general non-prescriptive tactical principles through The Principles of War in the previous section, the influence of specific prescriptive tactical principles will be examined in this section. Here, mid-19th century tactical principles dealing specifically with steam vessels, amphibious landings, and bombardments will be discussed and their influences will be summarized. The principles discussed below have been drawn from a select number of mid-19th century tactical treatises. Although many treatises from that time deal with naval tactics (Ross 1828; Moorsom 1848; Hoste 1854; Ward 1859), these focus primarily on sailing tactics or on fleet tactics for steam vessels, and have little bearing on small-scale littoral operations such as the Battle of Roanoke Island. For the purposes of this discussion, Jomini's *The Art of War* (1854; 1862), Howard Douglas' *Naval Warfare Under Steam* (1860) and *Naval Gunnery* (1855), and John Dahlgren's *Shells and Shell Guns* (1856), have served as the primary references. Below, principles from these sources will be described and their influence on the decision making processes during the battle will be explored.

1. <u>Steam vessels can ignore wind and currents, and should be formed and directed like Army units.</u>

   This principle is stated by Dahlgren (1856:394) and Douglas (1860:107), both of whom were excited by the unfettered range of motion that could be enjoyed by steam vessels. Douglas specifically echoes Jomini in his work, mentioning how this would allow for mass to be better directed on the decisive points of a naval battlefield (Douglas 1860:129,130). The most poetic description, however, comes from Constantine Moorsom, who remarks that a steam fleet was "an army in skates on a plain of ice" (Moorsom 1848:8). During the Battle of

Roanoke Island, this principle does not appear to have been significantly influential on the Union. Although they did maneuver as they pleased without regard to wind or currents, the Union squadron does not appear to have employed any particular formations or coordinated tactical maneuvers during the battle. Although the Confederate formation of line abreast was nothing new in naval warfare, Lynch's feinting maneuvers are far more reminiscent of Mongol horse archers than traditional naval tactics (Rossabi 1996), and Lynch may have been influenced by these injunctions to direct naval forces in the same manner as forces on land.

2. Steam vessels should be formed up so as to provide mutual defense to one another.

This principle is found in Douglas (1860:119,120) who argues strongly in favor of an echelon formation (Figure 41). Despite the tactical soundness of this principle, neither squadron at Roanoke Island appears to have been influenced to adopt such formations.

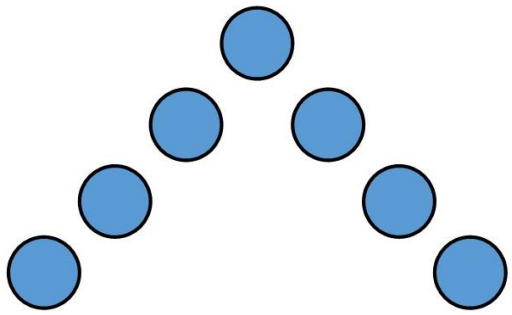


Figure 41: Echelon Formation (By Lucas Simonds)

3. Steam vessels, when bombarding shore batteries, should attempt to avoid the fire of those batteries.

This principle is found in Dahlgren (1856:393,394) who argues that steam vessels can either position themselves to avoid the fields of fire of the batteries, or remain in continuous motion to reduce their chance of being hit. This latter tactic, Dahlgren notes, was used successfully at Odessa and Sveaborg during the Crimean War (Dahlgren 1856:365,393) when

small Allied gunboats steamed in circles while bombarding Russian batteries, a tactic which became known during that war as "that witches' dance" (Hughes 1855:244). This principle would not have influenced the Confederates as they were not bombarding shore batteries. As has been observed previously, however, the Union vessels were extremely deliberate in finding positions that lay outside the field of fire of most of the Confederate guns (U.S. Navy Department 1897b: 599). Additionally, Lorenzo Traver, a surgeon aboard USS *Delaware*, notes that "very little damage was done to [the Union] fleet, owing to the continuous movement of [its] vessels backward and forward, which caused them to get out of the range of [the Confederate] guns" (Traver 1880:18,19). Although the Union vessels did not move in a circular pattern as described by Dahlgren, they positioned themselves so as to avoid most of the Confederate guns and then remained in constant motion so as to confuse the aim of those that could still fire upon them.

4. Amphibious landings should be accompanied by a large enough naval force to control the water around the landing site.

    This principle is described by Jomini in a section of *The Art of War* that deals with amphibious landings (Jomini 1854:256-259). It would appear to have been highly influential on the Union force, as the Union squadron was focused almost solely on gaining and holding control of the water around Ashby's Harbor.

5. A naval force should not attempt to destroy or capture a fort without the support of troops and artillery on the ground.

    This principle was the primary focus of a section entitled "On the Attack of Maritime Fortresses" in Douglas' *Naval Gunnery* (1855:335-376). Based largely on the failure of naval forces to effectively damage stone forts during the Crimean War, Douglas stresses on multiple

occasions that although naval bombardment is important, "no naval operation, however skillfully planned and gallantly executed, can, alone reap the fruits of its victory" (Douglas 1855:353). The influence of this principle can be observed in the Union plan of attack by the fact that Goldsborough ignored McClellan's injunction that the Navy should reduce the shore batteries outright, opting rather to trust in the Army to actually capture the forts on the island.

6. A force defending against an amphibious assault should guard the maritime approaches to the location they are defending and focus all available forces at the landing site.

This principle is also found in *The Art of War* (1862:251), and is Jomini's only injunction directed towards those defending against an amphibious assault. This principle had some influence before the battle as can be seen in the multiple officers who called for batteries at the marshes (U.S. War Department 1883:129; U.S. Navy Department 1897b:729). As those batteries were never constructed and only a small force was placed at Ashby's harbor (U.S. Navy Department 1897b:563) it would appear that this principle had little influence on the Confederate defensive stance at the time of the battle.

7. Forts should use explosive shells against ships.

This final principle is found in Dahlgren's work (1856:405), which expounds on the effectiveness of explosive shells against ships during the Crimean War. As has been discussed previously, the Confederates primarily fired round shot during the battle. This does not appear to be a choice so much as a simple lack of shells, which is not indicative of this principle being uninfluential.

## Conclusion

This concludes the analysis of the battle. In the first section of this chapter, the command and control structures of the Union and Confederate squadrons were explored, as were the

implications of those structures on the interpretation of the coordinated actions of those squadrons. In the second section the environmental influences on the decision making processes of the Union and Confederate commanders were considered through the lens of the METT-T framework. In the third and final section, tactical principles contemporary to the battle were discussed and the influence of these principles on decisions made during the battle was examined. Through these analyses, it has been demonstrated that a wide range of factors influenced the decision making processes of the Union and Confederate Commanders. These analyses have also provided a solid basis upon which interpretations of the actions of the Union and Confederate squadrons during the battle can be formed. In the following chapter, such interpretations will be interwoven with the narrative of the battle and information gained through archaeology in order to demonstrate the insights on the battle gained through this study and highlight the continuing significance of the battle in the form of the submerged cultural resources which remain in Croatan Sound.

# Chapter 6: Revised Account of the Battle – The Synthesis of the Historical Narrative, New Interpretations, and Archaeological Data

## Introduction

This chapter represents the culmination of the efforts carried out in the present study. Previous chapters have presented a traditional historical narrative of events before and during the battle, undertaken an in-depth analysis of the decision making processes during the battle, and outlined the methodology of an archaeological survey of the battlefield. In this chapter, the historical narrative of the battle will be interwoven with interpretations based on that analysis and the results of the most recent archaeological survey, as well as those from previous surveys. In this way, a revised explanatory account of the battle will be produced which demonstrates the effectiveness of the revised theoretical approach developed in the preceding chapter and highlights the continuing significance of the battle in the form of submerged cultural resources. This revised account will be divided into six distinct phases based on trends in the activities of the Union and Confederate Squadrons.

## The Unfortunate Predicament of Lynch and Wise (7 January 1862 – 6 February 1862)

This first phase comprises the activities of the Union and Confederate forces from General Wise's first inspection of Roanoke Island on 7 January through the day before the battle. During this phase, the Union force was engaged primarily in crossing through Hatteras Inlet (Burnside 1887:663-666), an activity which had little bearing on the events of the battle. The Confederate force, on the other hand, was engaged in a desperate scramble to improve the defenses of the island before the arrival of the Union force. With the forts on the island already established at the time of Wise's inspection (U.S. Department of War 1883:129), he was faced with the difficult task of determining what improvements could be made to those ineffective

defenses in the short amount of time available. While Wise devoted some energy to requests for reinforcements and attempts to build batteries at the Roanoke Marshes (U.S. Department of War 1883:133-152), the activities of the Confederate force, and the Mosquito Fleet in particular, were focused on constructing a barricade across the channel in Croatan Sound (U.S. Navy Department 1897b:598). This barricade was created by sinking a number of schooners as blockships to the west of Fulker's shoals and by driving in pilings on both the western and eastern sides of the shoals (U.S. Navy Department 1897b:598).

Despite efforts since the time of the battle to clear the channels, a number of these vessels have been located during archaeological surveys of the battlefield. Surveys in 2003 and 2005 were successful in locating four such schooners (Henry 2005), and the locations of these vessels has been key in determining the location of the barricade for the purposes of analysis The barricade was also the focus of the archaeological survey associated with the present study. This survey was intended to search for further wrecks associated with the barricade. Although the survey was successful in locating targets which appear to be ballast piles near the locations of two of the four wrecks located in previous surveys (Figures 42 and 43), no previously unknown cultural resources were discovered. Future surveys and investigations of these wrecks would be valuable, as these blockships represent an important part of North Carolina's submerged cultural heritage related to the Civil War, and the location of further blockships would lead to a better understanding of the layout of the barricade. Nevertheless, the confirmation of archaeological remains so close to the location of the barricade as recorded in historic sources (Figure 44) provides a valuable anchor between the past and present landscapes of the battlefield.

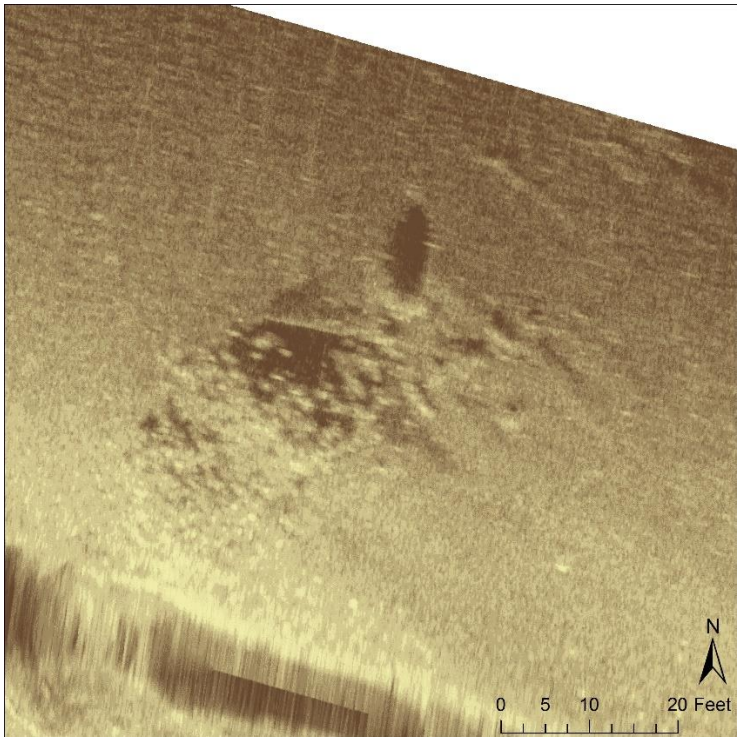



Figure 42: Contact 0011 – Possible Ballast Pile (By Lucas Simonds)

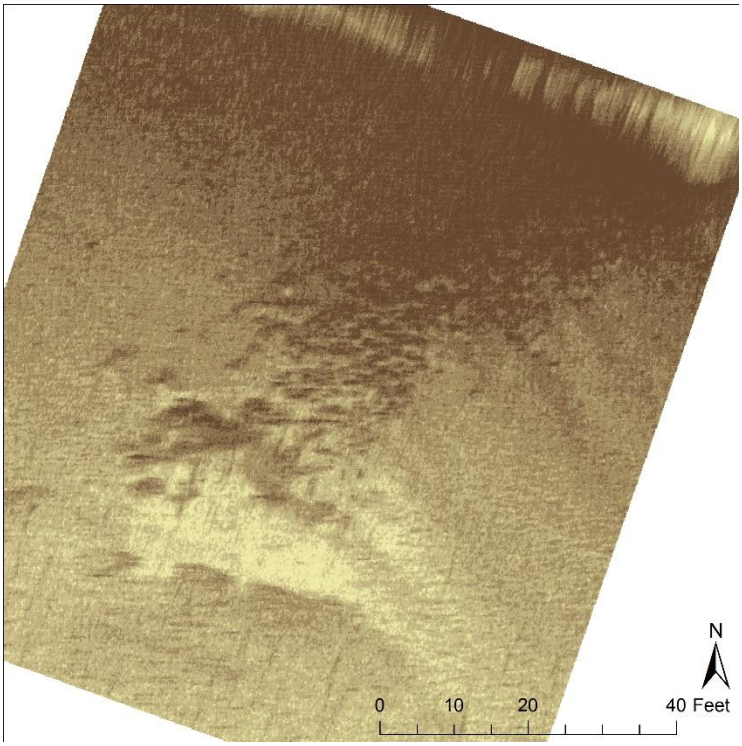



Figure 43: Contact 0007 - Possible Ballast Pile (By Lucas Simonds)

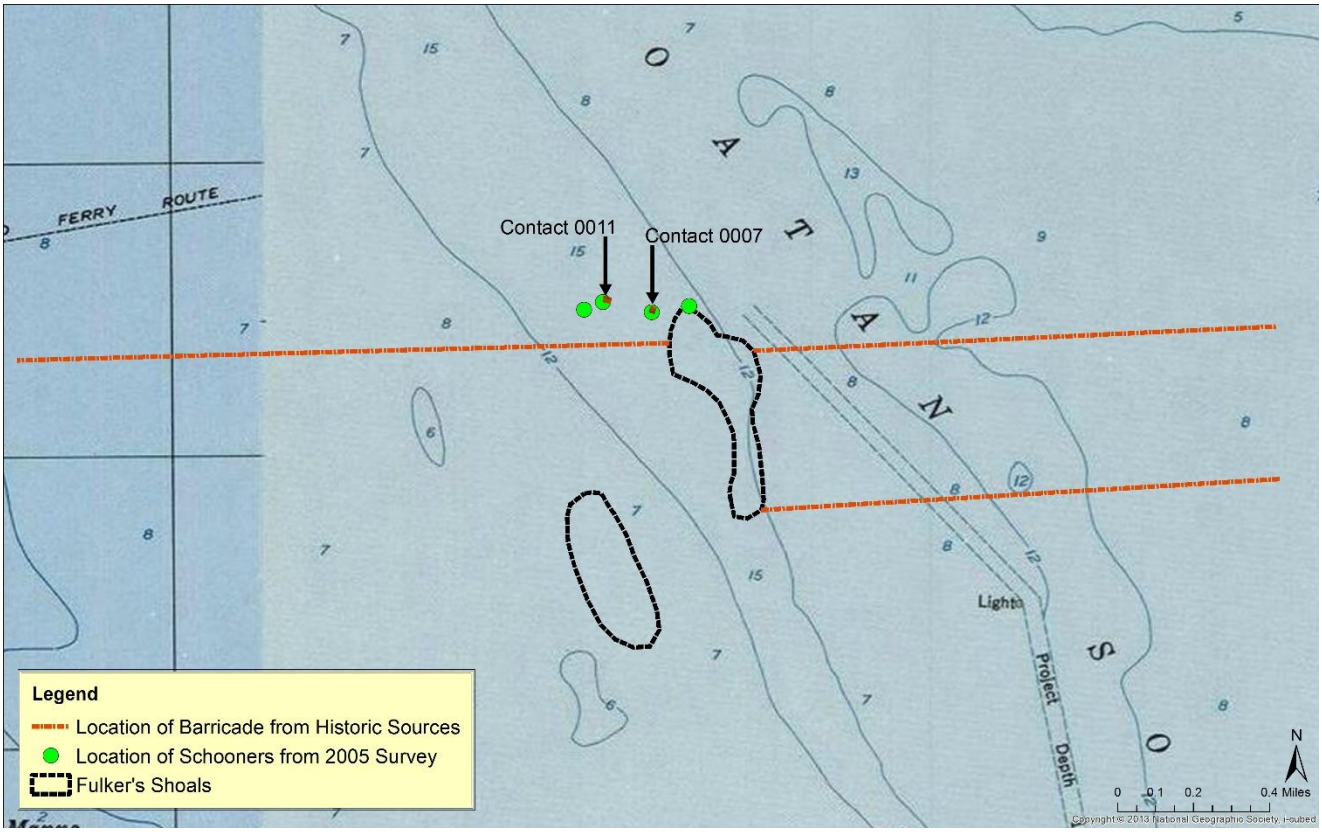



Figure 44: Location of Archaeological Remains of Confederate Barricade as Compared to Historic Data (By Lucas Simonds)

During this phase, the stage on which the battle took place was set. Wise's inability to establish batteries in the marshes left the majority of the Confederate combat power concentrated in the northern half of Croatan Sound, and the construction of the barricade played a major role in the defensive position taken by the Confederate Squadron, as will be discussed further in the next section.

By 5 February, the Union force was successful in their attempts to cross through Hatteras Inlet, and the time available for additional defensive preparations was at an end (U.S Navy Department 1897:552).Inclement weather on 6 February delayed the start of the battle and allowed the Confederate commanders additional time for reflection. Conversations between Captain Parker of CSS *Beaufort* and Flag-Officer Lynch on the eve of 7 February highlight the

inferior-superior dichotomy between the Union and Confederate forces that weighed heavily on the minds of the Confederate commanders. As recalled by Captain Parker, although they had spent the evening discussing literature, Lynch concluded their conversation by remarking "Ah! If only we could hope for success" (Parker 1883:228). Parker himself reflected a similar sentiment, noting that "here were two men looking forward to death in less than 24 hours – death, too, in defeat not victory" (Parker 1883:229). While similar accounts of a knowledge of assured victory among the Union commanders are not recorded, it is certain that such considerations influenced their decisions as well. The knowledge of superiority on the part of the Union and inferiority on the part of the Confederates undoubtedly played a role in the decision making processes of both squadrons.

The Approach (09:00 – 12:00)

This first phase of the battle itself began at 09:00 on 7 February when Goldsborough ordered the Union vessels to form and ended around 12:00 when the fighting became general. This phase was characterized on the part of the Union by maneuvers to quickly seize the offensive and on the part of the Confederates by a patient stillness in which they waited to launch a counterattack (Figure 45). As the initial motion of the Union vessels to move into formation became noticeable around 09:00, Lynch ordered the vessels of the Confederate Squadron to form in line abreast behind the barricade as had been agreed upon the night before (Parker 1883:229). This initial stance, which was the only significant action taken by the Confederate Squadron during this phase, was influenced by a number of factors. The Roanoke Marshes formed a natural bottleneck, forcing any attacking force to move slowly and deliberately as they passed through (U.S. Navy Department 1897b:552). Tactical principles concerning the defense against amphibious assaults dictated that the maritime approaches to vulnerable targets should be

guarded carefully (Jomini 1862:251). In light of this, the decision to not place the Confederate Squadron at the mouth of this bottleneck could be seen as a tactical blunder.


Figure 45: The Approach (09:00 - 12:00) (By Lucas Simonds)

That being said, the decision to form up behind the barricade rather than at the marshes was not made without good reason. The Confederate Squadron was vastly inferior to the Union Squadron, a fact which undoubtedly weighed on Lynch's mind. The lack of support from shore batteries at the marshes would have left the Confederate Squadron severely outmatched despite the advantage gained by the bottleneck, and the advantage of mass would still have fallen to the Union Squadron in such a situation. Rather than placing his squadron in such a disadvantageous position, Lynch chose to follow tactical principles which dictated that he should choose a strong defensive position covered by artillery batteries from which to wait and launch a counterattack (Jomini 1862:185). The position of the Confederate Squadron behind the barricade fits that description perfectly. Lynch's Squadron was placed within the crossfire of all the Confederate forts, and the barricade provided an additional deterrent to attempts by the Union Squadron to rush his vessels. From that position, Lynch was be able to observe the advance of the Union Squadron and plan his attempts to seize the offensive accordingly.

While the Confederate Squadron lay in wait behind the barricade, Goldsborough ordered the Union Squadron to move through the Roanoke Marshes into Croatan Sound. Because the channel through the marshes was unfamiliar and the existence of a battery on Sand Point had yet to be disproven, he ordered USS *Ceres,* USS *William G. Putnam,* and USS *Underwriter* ahead of the main part of the squadron. USS *Ceres* and USS *William G. Putnam* were to find the edges of the channel, while USS *Underwriter* was to check for the battery on Sand Point (U.S. Navy Department 1897b:552). Around 10:25, Goldsborough ordered that all the steamers with 9 in. guns should close in around his flagship (U.S. Navy Department 1897b:552). In this, Goldsborough sought to seize the offensive early by gaining control of the water around Ashby's Harbor, thereby massing an overwhelming force against any defenders that might be stationed

there and against the nearby Fort Bartow. The 9 in. shell guns were not only the most common modern cannon among the fleet, but apart from the 100 pdr Parrott Rifle, which was far less common, they fired the heaviest explosive shells of any cannon in use at the battle (Ripley 1970:368-370). By ordering the vessels with these guns forward, Goldsborough ensured that the most effective combat power available would be the first to come in contact with the enemy.

Following this order, the Union squadron continued to advance, with some vessels running aground in the marshes, but most coming through without trouble (U.S. Navy Department 1897b:557). At 11:25, USS *Underwriter* confirmed that there was no battery at Sand Point and came alongside Goldsborough's flagship to confer (U.S. Navy Department 1897b:561). As these two vessels lay alongside each other, one of the Confederate vessels fired on them. This shot was quickly answered by one of the Union vessels, at which point Goldsborough ordered the Union squadron to close in on the enemy (U.S. Navy Department 1897b:559). It is unclear why the Confederate vessel fired, as this event is only reported in Union sources. It is most likely that, seeing the Union vessels within range, Lynch chose that moment to begin his long-range harassment of the Union squadron. In any case, Goldsborough's order to close in on the enemy initiated the second phase of the battle.

The Fighting Becomes General (11:38 – 15:00)

The second phase of the battle began with Goldsborough's order to close in on the enemy at 11:38, and ended with the initiation of the Army's landing operations around 15:00. This phase was characterized on the part of the Union by independent actions among the individual vessels aimed at maintaining control of the water around Ashby's Harbor. On the part of the Confederates, this phase was characterized by attempts to seize the offensive initiative (Figure 46).

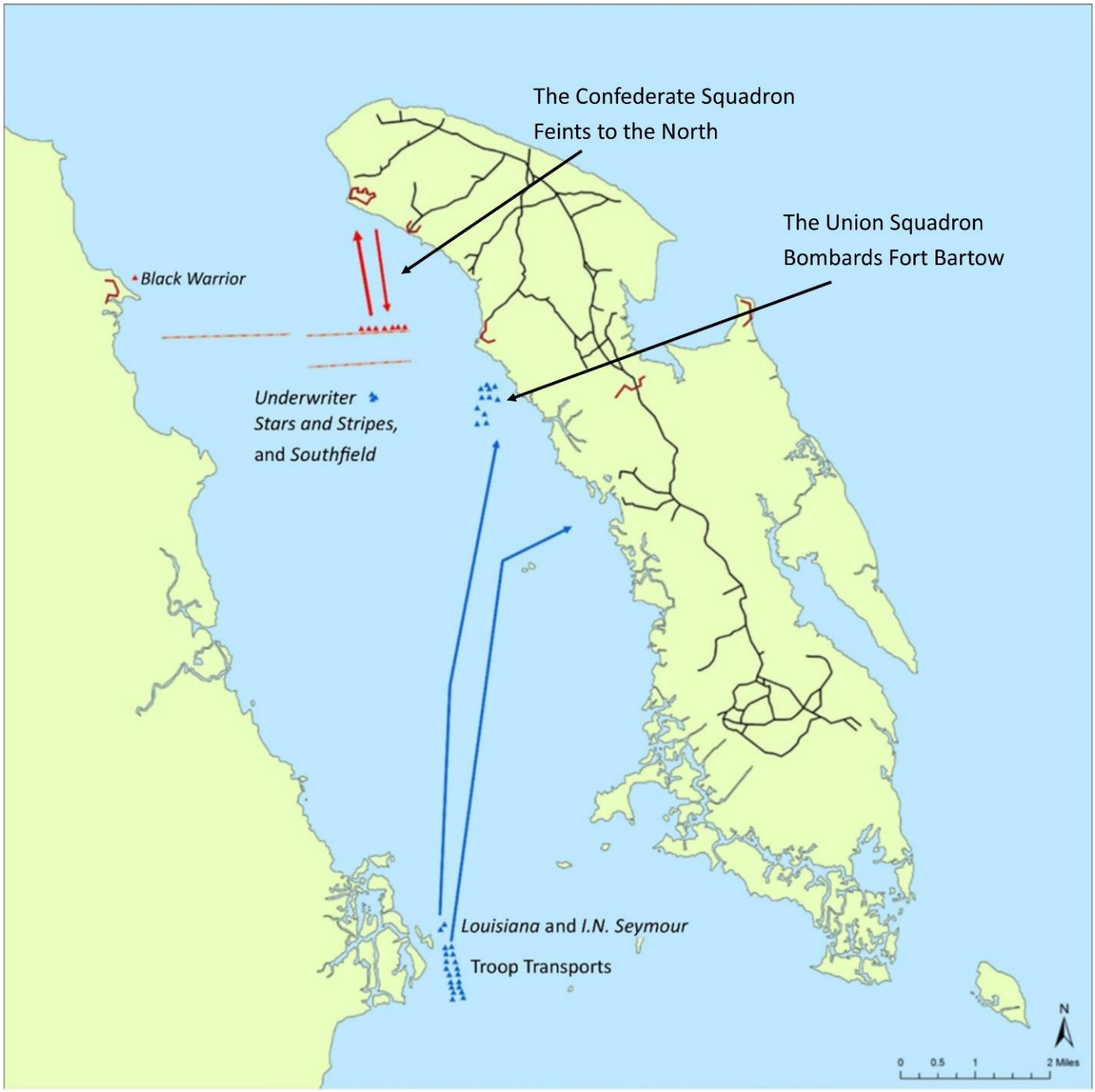



Figure 46: The Fighting Becomes General (11:38 – 15:00) (By Lucas Simonds)

As the Union vessels advanced within range of Fort Bartow and the Confederate vessels, they began opening fire. It is at this point that the latitude allowed to the subordinate commanders by Goldsborough becomes apparent. Some vessels, such as USS *I.N. Seymour*, began firing at long range (1.5 miles); while others, such as USS *Valley City*, USS *Commodore Perry*, USS *Morse*, USS *Whitehead*, and USS *Henry Brinker*, quickly drew up within 1300 yards of the fort (U.S. Navy Department 1897b:566,575). At that range, those vessels had to hug the shore of the island to avoid the fields of fire of most of the guns in the fort, and they remained in near constant motion both to avoid the fire of the guns and to avoid grounding in the shallow water (Traver 1880:18, 19; U.S. Navy Department 1897b:556). The actions of the individual commanders during this time reflect the influence of tactical principles concerning the bombardment of forts, as they sought to negate the combat power of the Confederate cannon.

When the Union vessels had advanced sufficiently, Lynch ordered his vessels north. This maneuver was described by Captain Parker as a feint which was intended to draw the Union vessels into the crossfire of the forts located further to the north (Parker 1883:229) In doing so, Lynch hoped to seize the offensive initiative by bringing some portion of the Union force into a position in which the full combat power of the Confederate force could be effectively massed. This action reflects not only the influence of the principles of offensive and mass, but also Lynch's knowledge of the inferiority of his squadron. At this early stage of the battle Lynch was not yet willing to risk his vessels in a confrontation with the Union squadron without the aid of the cannon in the forts.

Lynch's maneuver was unsuccessful, as the Union commanders were conscious of their objectives and the necessity to maintain focus on controlling the water around Ashby's Harbor.

The actions of the Union commanders reflect the influence of the principles of objective and economy of force as well as Jomini's injunction to control the water around the landing site of an amphibious operation. This focus allowed the Union Squadron to maintain the offensive initiative as they continued their bombardment of Fort Bartow. The time at which Lynch first attempted a feinting maneuver is not recorded, but a second attempt was made around 13:00. Shortly after this attempt, at 13:30, Union shells set the barracks at Fort Bartow on fire (U.S. Navy Department 1897b:588; Hinds 1998:84).

During this phase as the Union vessels maneuvered close to the fort, a number were struck by Confederate fire. USS *Hetzel* was forced to withdraw at 14:00 when a 32 pdr round shot lodged in its coal bunker, and USS *Hunchback* was disabled when round shot carried away one of the cylinder guide rods of its engine. Neither vessel was taken out of the action, however, with USS *Hunchback* anchoring and continuing to fire and USS *Hetzel* returning to the fight by 14:40 (U.S. Navy Department 1897b:552,568-569,575). The Confederate use of round shot rather than explosive shells, although not indicative of the influence of any tactical principles, nevertheless played an important role in the battle. USS *Hetzel,* for instance, would certainly not have fared so well had a shell exploded in its coal bunker rather than the round shot which found itself there. This continued use of round shout can likely be attributed to a simple lack of shells on the part of the Confederates, another of the many unfortunate circumstances the Confederate force encountered. Around 15:00, the Union Army transports began organizing for their landing operations, which launched the battle into its final phase (U.S. Navy Department 1897b:588).

Increasing Desperation (15:00 – 18:00)

This final phase of the battle began around 15:00 with the initiation of the Union Army's landing operations, and ended around 18:00 with the order to cease fire.

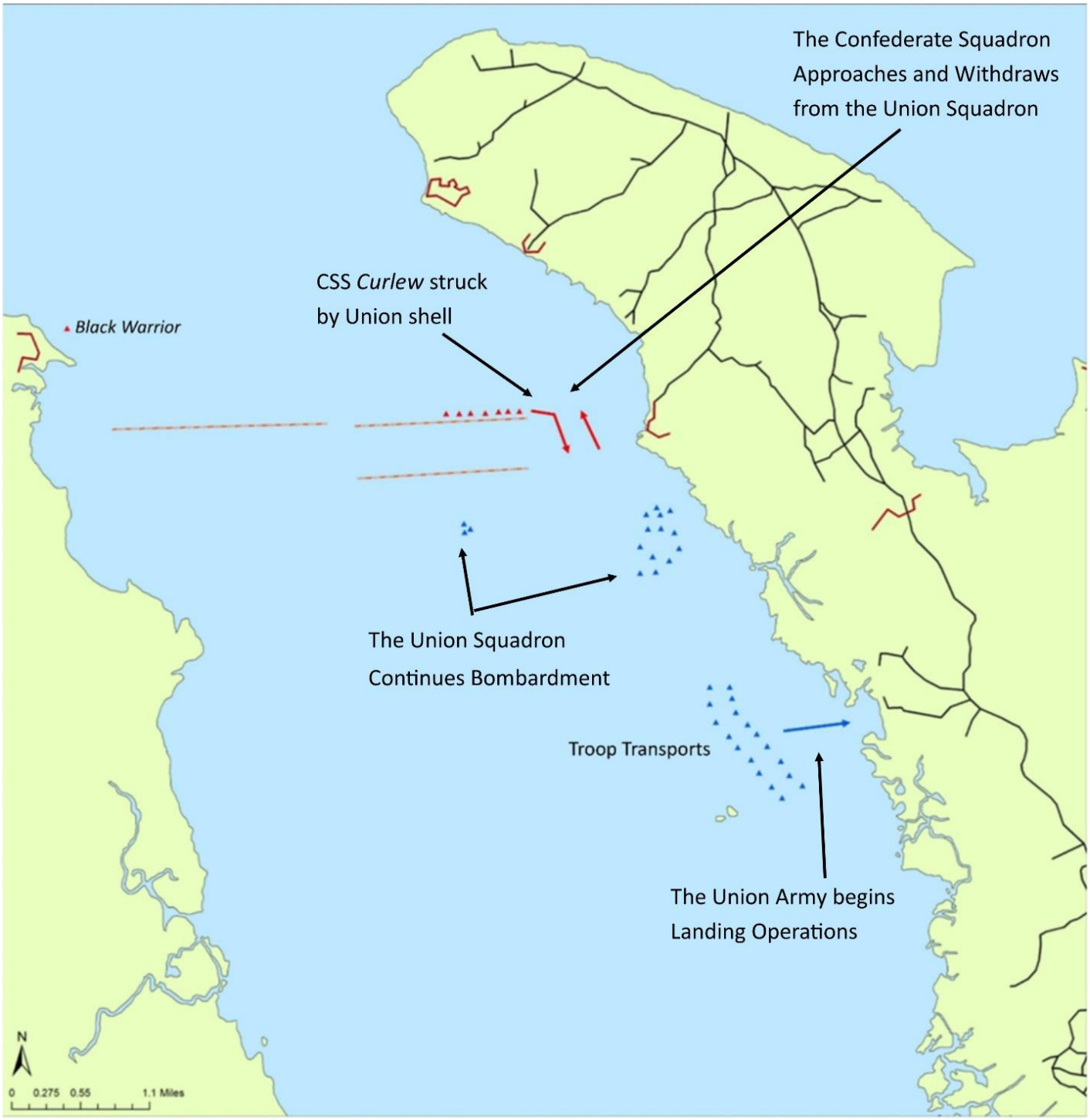



Figure 47: Increasing Desperation (15:00 – 18:00) (By Lucas Simonds)

This phase was characterized on the part of the Union by efforts to guard the landing operations as well as some unusual accidents aboard their vessels. On the part of the Confederates, this phase was characterized by increasingly desperate attempts to seize the offensive initiative before it became too late (Figure 47).

As the Army transports began their move towards the shore, the master of USS *Delaware* noticed the party of Confederate troops positioned near the landing site. He acted decisively, ordering his vessel in and driving the defenders off with a few shrapnel shells in order to allow the troops to be landed safely (U.S. Navy Department 1897b:563). This action highlights the latitude afforded to the individual vessels of the Union squadron, and shows the influence of tactical principles which dictated that landing operations should be covered by bombardments of the shore beforehand.

Around that same time, the first of two serious accidents occurred when the 80 pdr Dahlgren Rifle on board USS *Hetzel* exploded into four parts (U.S. Navy Department 1897b:559) (Figure 48). Although this accident is not indicative of any decision making processes during the battle, it does highlight the state of naval ordnance at this early stage in the war. The Dahlgren

Rifles were essentially experimental at this point, and the gun aboard USS *Hetzel* was only the tenth produced (Canfield 1969:8). The failure of that gun convinced the Navy to remove Dahlgren Rifles from service (Bell 2003:207); however, the use of such untested ordnance points to a desperation in the Navy when seeking to fit out so many vessels in such a short period of time. Although no one was killed in the explosion, six were injured, and USS *Hetzel* withdrew from the fight. It was also around this time that a number of vessels were forced to withdraw for lack of ammunition (U.S. Navy Department 1897b:574,588).

Around 16:00, Lynch ordered the first of two maneuvers in which the Confederate vessels moved south to close the Union squadron. These moves were influenced by an increasing desperation to seize the initiative, a feat which Lynch's feinting maneuvers had been unsuccessful in accomplishing.

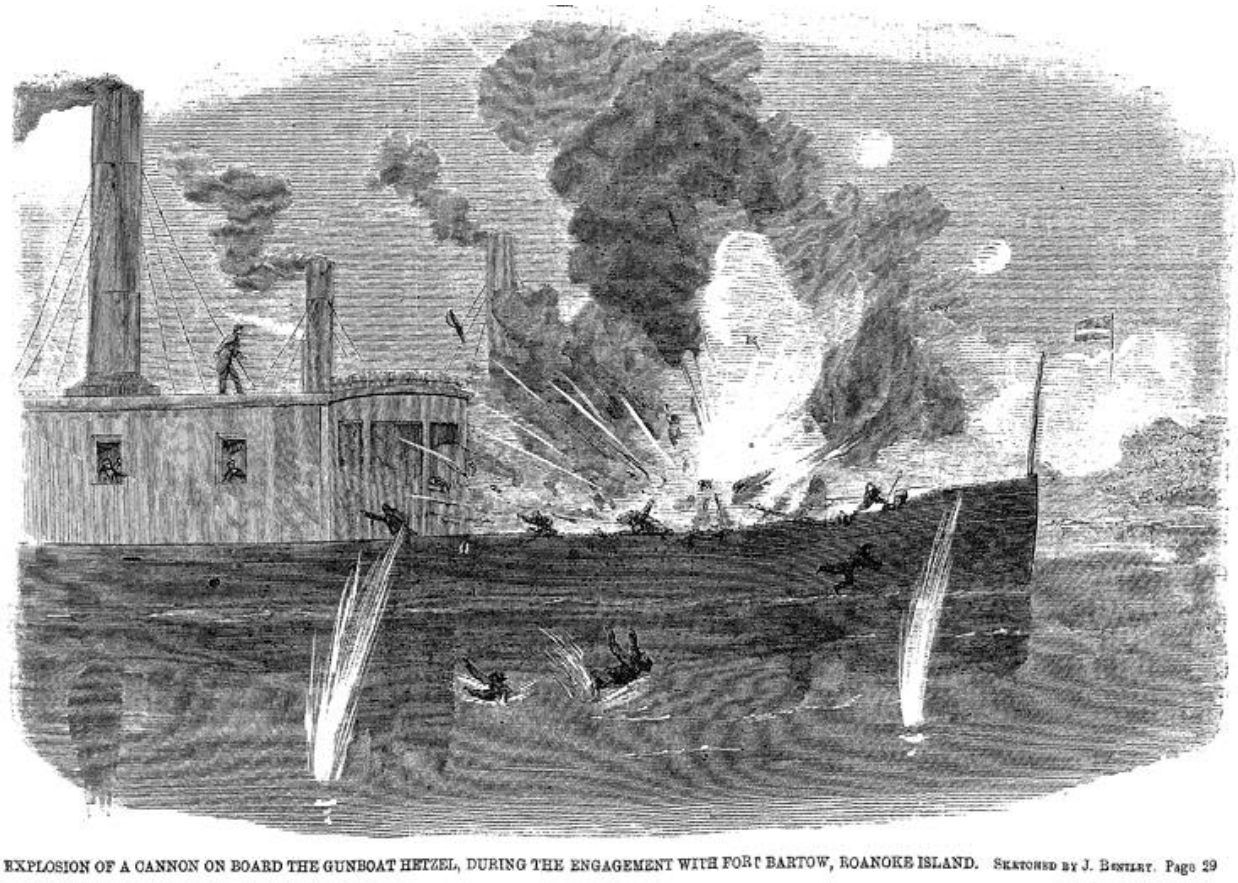



Figure 48: Explosion of the Dahlgren Rifle aboard USS *Hetzel* (NYSL 2012)

At this advanced stage of the battle, Lynch's desire to turn the tide of the battle through a seizure of the offensive finally outweighed his concerns over the inferiority of his squadron. As a result, he ignored the principle of mass and decided to confront the Union Squadron at close range with only the combat power of his vessels and some of the cannon of Fort Bartow at his disposal. This first maneuver, however, was less successful than the feinting maneuvers earlier in the battle, and it was during this counterattack that CSS *Curlew* was sunk (U.S. Navy Department 1897b:589).

Despite the unfortunate nature of the loss of CSS *Curlew* to the Confederate Squadron, the wreck of CSS *Curlew* is perhaps the most important submerged cultural resource related to the battle. Located in a 1988 magnetometer survey, the wreck was subsequently recorded by divers in 1993 (Henry 2003b). This wreck is important to the history of the Civil War in North Carolina as the vessel was an active part of the operations of the Mosquito Fleet in the months before the battle (Olson 1997:45). The wreck also presented an opportunity to study the modifications made to merchant vessels as they were converted for military service (Olson 1997:76). Beyond its significance to the Civil War history, however, *Curlew* is also important to the history of antebellum coastal North Carolina and to the history of iron shipbuilding. As an active steamer in the sounds before the war, it is an important relic of the economic activities which took place in that time. Additionally, *Curlew* is a prime example of the keeper-on-frame style of construction, a rare technique of iron shipbuilding found often on vessels built by Harlan and Hollingsworth in Delaware (Olson 1997:120). As one of the few extant vessels built using this technique, *Curlew* is vital to the understanding of this unique element of early American iron shipbuilding.

As with those archaeological remains related to the confederate barricade, the location of the wreck of CSS *Curlew* provides an anchor between the past and present landscapes of the battlefield (Figure 49). In this case, this anchor perhaps raises more questions than it answers. It is reported by Captain Parker that CSS *Curlew* sank, "immediately in front of Fort Forrest, completely masking its guns" (Parker 1883:230). Although the exact distance implied by the term immediately is unclear, it would seem likely that some remains of Fort Forrest could be located in close proximity to the wreck of CSS *Curlew*. A portion of the archaeological survey associated with the present study was focused on the area around the known location of the

wreck in order to search for such remains. While this survey was successful in locating what appears to be the wreck of CSS *Curlew* (Figure 50), no additional cultural resources were discovered, and the location of any remains of Fort Forrest remains unknown.

Due in large part to the loss of CSS *Curlew*, Lynch was quick to order the Confederate Squadron to retire at 16:30 after Fort Bartow ceased firing; it was during this pause that the first Union troops landed on the island (Department of War 1883:76). Having not yet lost hope, Lynch ordered his vessels to advance again at 17:10, but they were quickly repulsed, withdrawing at 17:45. Shortly thereafter, Goldsborough gave the order to cease fire, and the Union vessels withdrew out of the range of Fort Bartow, ending the naval action of 7 February (U.S. Navy Department 1897b:589).


Figure 49: Location of the Wreck of CSS Curlew (By Lucas Simonds)

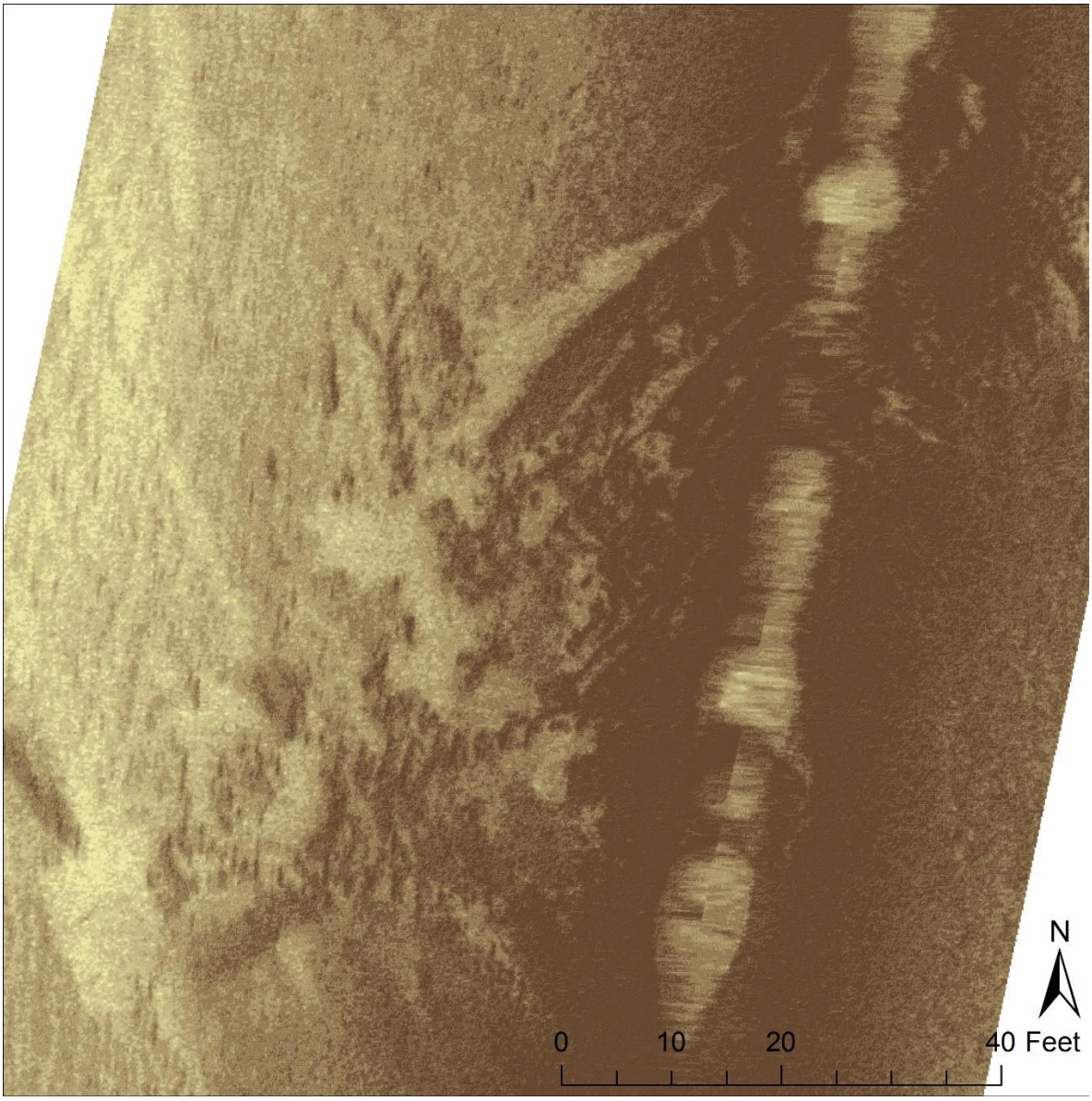



Figure 50: Contact 0023 – Possible wreck of CSS *Curlew* (By Lucas Simonds)

The Following Day (8 February 1862)

During the night, the Union landings continued and the men of the Confederate squadron counted themselves lucky to be alive (Parker 1883:231). Due to a lack of ammunition, Lynch

ordered his squadron north to Elizabeth City. Lynch hoped that he would be able to quickly resupply there and return to fight on the following day, Elizabeth City being only 35 miles away, and given the optimistic view that the Confederate troops stationed on the island would be able to hold off the Union force (U.S. Navy Department 1897b:595). Lynch was unable to find sufficient ammunition in Elizabeth City, and was forced to send a vessel north to procure more from Norfolk (U.S. Navy Department 1897b:595). Due to this delay, the Mosquito Fleet was not present for the fight on 8 February, and the naval action that day was accordingly limited. On 8 February 1862, the Union squadron was engaged in desultory exchanges of fire with Fort Bartow and attempts to break through the barricade, while Burnside's troops slowly but surely pushed northward on the island, eventually capturing all of the forts and ending the Battle of Roanoke Island (U.S. Navy Department 1897b:589).

## Conclusion

The Confederate defeat at Roanoke Island was resounding, due in no small part to the solid tactical principles on which the Union assault was based. In accordance with the advice of Jomini and Douglas, the Union squadron sought to gain control of the water around Asbhy's Harbor which allowed a safe landing of the troops to capture the island. Due to the nature of the fields of fire of the Confederate forts, Union commanders, operating with significant latitude, were able to maneuver to areas which negated the majority of the Confederate combat power, from which they were able to effectively mass their own combat power. The Confederate defeat was not caused by any tactical blunders during the battle, but rather by decisions made in the months before the battle took place. As has been discussed above, Lynch was following sound tactical principles as he chose his position at the start of the battle, and he attempted to seize the offensive initiative at multiple points. Unfortunately for Flag-Officer Lynch, the environment in

which the battle took place heavily favored the Union Squadron, and he was simply unable to overcome that natural disadvantage.

The causes of that unfavorable environment fall largely outside the scope of the present study, which is focused specifically on the naval action of 7 February. Some interpretations concerning the decisions which led to that environment can nevertheless be made. In an investigation into the causes of the defeat at Roanoke Island, a Committee from the Confederate House of Representatives placed the blame for the defeat not on Flag-Officer Lynch or General Wise, but on General Huger and Secretary of War J.P. Benjamin (U.S. War Department 1883:191). The absurd rate at which the command of the area's defense was shifted between officers hindered improvements to the defenses of the island, which were improperly placed and poorly equipped; by the time General Wise was given command he did not have enough time to fully implement the improvements which he knew to be imperative to the defense of the island (U.S. War Department 1883:129). In addition, the bullheaded insistence of Secretary Benjamin and General Huger that troops and supplies were needed for Norfolk left Roanoke Island with too few good cannon and not enough troops on the ground (U.S. War Department 1883:115; U.S. Navy Department 1897b:739). Although the causes of the obstinacy of these superiors falls yet further outside the purview of the present study, it is clear that Flag-Officer Lynch's decisions were made in an unfavorable environment created by his predecessors and kept in place by his superiors.

At this point, the extent of the results produced by the present study has been reached. Through the analysis of the battle in Chapter Five, a revised explanatory account has been produced which provides interpretations of the decision making processes that led to the actions taken by the Union and Confederate Squadrons. Although, as discussed in the preceding

paragraph, this analysis cannot provide interpretations of every decision which led to the outcome of the battle, many of which took place months before the battle itself, the account presented in this chapter is far more informative concerning the behavior of complex military systems in battle than a descriptive historical narrative. In the following chapter the research questions posed in the introduction to this study will be answered, and the merits of the approach demonstrated here will be considered. Future avenues of research will also be outlined.

# Chapter 7: Conclusion

## Introduction

This chapter concludes the thesis by returning to the research questions posed in Chapter One. In this way, the theory and execution of this study can be considered in a more critical light and the merits of this revised approach can be assessed. The revised approach demonstrated in this thesis, although drawing from a number of established theoretical approaches, has been constructed expressly for the purpose of examining human behavior and decision making during battle. By beginning with an analysis of command and control structures, a more accurate picture of the interactions within a force which produce its behavior can be painted and the sources of behavior within that force can be identified. This revised approach then allows for a wide scope of internal and external motivating factors to be considered, which moves towards a more complete understanding of the causes of particular behaviors. That being said, this approach is also not without its faults. These will be addressed to some degree in the questions below, though an additional section containing a critique of this approach will follow. This chapter will then be concluded with an assessment of future related avenues of research.

## Research Questions

*Is there an observable benefit to the use of this revised theoretical framework over the METT-T/Principles of Approach for the purpose of examining human behavior in conflict?*

There are a number of observable benefits to the use of the revised theoretical approach utilized in this study when compared to the METT-T/Principles of War Approach. First and foremost, the revised approach allowed for the implications of command and control structures to be considered. This makes it possible to better identify the decision makers within each force,

thereby refining estimates of the influences on individual decision making processes. This revised approach repurposed both METT-T and the Principles of War to better address factors important to the study of human behavior rather than the study of purely military-historical factors. Rather than serving as means of organizing details concerning the forces and the battlefield or as measures by which the tactics of the commanders are critiqued, these approaches serve as guides to the analysis of the environmental and internal factors which influenced decision making processes during the battle. Although this is not to say that the use of these approaches for military-historical purposes as described above is invalid, the function of these approaches within the revised theoretical approach was better suited to the study of human behavior.

As a result, the present study was capable of producing interpretations concerning the decision making processes that produced the actions of the forces in the battle that would not have been possible through a standard METT-T/Principles of War analysis. This allows for the in depth understanding of the events of the battle, which was presented in Chapter Six. Additionally, the comparison of the results of the present study could provide insights into human behavior in conflict more generally when compared with the results of similar analyses of other battles, a possibility which will be discussed further at a later point in this chapter.

*Does an anthropologically based battlefield study provide significant interpretive value over traditional narratives of a battle?*

The answer to this question is not as clear cut as with the previous question. In one sense, yes: the analyses performed in the present study allowed for myriad interpretations concerning the decision making processes of the commanders to be made. It must be noted, however, that many, although not all, of these interpretations would have been possible through a

straightforward examination of the primary sources. The Union accounts of the battle are filled not only with records of what actions were taken during the battle, but often with explanatory remarks as to why those particular actions were taken. In fact, many of the interpretations in Chapter Six can also be found in the words of the Union commanders within the *Official Records* of the Navy. In this sense then, the anthropologically based study is redundant when sufficient explanation is already provided in primary accounts of the battle. That being said, many interpretations concerning the decision making processes behind certain actions, particularly those of the Confederates, are not to be found in the primary accounts. In particular, the primary accounts are almost completely silent in regards to the tactical principles which guided such decisions. Additionally, the records of the Battle of Roanoke Island can by no means be taken as exemplary of all battle records, and many battles, particularly those from earlier periods of history, would most certainly benefit from an anthropologically based study in addition to the study of extant primary accounts.

*What is the extent and state of preservation of the submerged cultural resources left by the naval action at the Battle of Roanoke Island in Croatan Sound?*

A number of submerged cultural resources remain from the battle. Four Confederate blockships are known to rest on the sound floor in various states of preservation, although only two were located in the most recent survey. Additionally, CSS *Curlew* lies in an unknown state of preservation in shallow water. Unfortunately, the survey associated with the present study was unsuccessful in expanding an accounting of the extent of the submerged cultural resources related to the battle. It is possible that further blockships remain in the channel, though none were located in the most recent survey. Additionally, it is possible that some remains of Fort Forrest lie underwater, although again, none were detected. Finally, many shot and shell are

undoubtedly still in the sound, as well as the pieces of the exploded Dahlgren Rifle from USS *Hetzel*. These resources, however, would best be located by a magnetometer rather than side-scan sonar.

Shortcomings & Future Research Possibilities

Although the revised theoretical approach developed in this study has improved on established approaches in a number of ways, it is also not without its own shortcomings. First, this approach is limited to the study of actions taken during the battle itself. In the case of the Battle of Roanoke Island, the pivotal decisions that placed the Confederate Squadron is such a disadvantageous environment were made long before the battle by commanders not directly involved in the actions taken during the battle itself. In situations such as this, where the decisions of bureaucrats and high-ranking officers became so influential during the battle, analyses should be expanded to address the decisions that produced the environment in which the battle took place.

Second, although this approach takes a wide range of significant environmental and internal factors into consideration, it cannot hope to fully address the multitude of factors which ultimately weigh on decisions made during conflict. As stated rather eloquently by Jomini:

> War, however, in its ensemble, is not a science but an art. If strategy, especially, can be subjected to dogmatic maxims which approach the axioms of positive sciences, it is not the same as a whole with the operations of a war, and combats among others will often escape all scientific combinations, to offer us acts essentially dramatic, in which personal qualities, moral inspirations, and a thousand other causes, will play at times the first part. The passions which shall agitate masses, called to hurl themselves against each other – the warlike qualities of those masses – the character, energy and the talents of their chiefs

> – the greater or les martial spirit, not only of nations but even of epochs – in a word, all that which may be called the poetry and the metaphysics of war, will ever have an influence upon its results (Jomini 1854:325).

Due to the inconceivable number of influences on the decisions made in combat, any attempt to base the interpretation of those decisions on a limited number of "significant factors," as in the present study, will naturally fall short of the full scope of potential influences. A study of all such influences, however, would require far more pages than the overabundance which have been spent here in the study of a small and relatively uncomplicated battle.

Finally, while the theoretical approach utilized in the present study allows for the interpretation of logical decisions based on factors considered influential in most military circles, it provides little potential for the interpretation of illogical or incompetent decisions. Although it is a relatively uncomplicated exercise to explain why a commander would chose to mass his force against a small fraction of the enemy, the explanation of the decisions which led the enemy commander to allow such a small fraction of his force to be overwhelmed is far less straightforward. To take events from the Battle of Roanoke Island as an example, even if the analysis were expanded to include the decisions which created the environment in which the battle was fought, it is unlikely that a satisfactory and logical conclusion could be reached as to why the southern half of the island was left completely undefended by the initial positioning of the Confederate forts. The full interpretation of such incompetent decisions would require a significant expansion of the analysis, as the influences on illogical decisions are far more varied and inconsistent than those guiding logical decisions. Efforts could be made in such cases to target the specific influence on those particular poor decisions; however, it is unlikely that any consistent framework for analysis of incompetent decisions could be devised.

Having discussed the shortcomings of the present study, it still remains to discuss the potential avenues of future research that this study suggests. Beginning with the Battle of Roanoke Island in particular, further archaeological research could be beneficial. A magnetometer survey studying the patterns of Union and Confederate ordnance in the water could allow for a better understanding of the location and movements of the vessels during the battle. Such a study could be assisted further by a metal detector survey around the location of Fort Bartow in order to ascertain the pattern of ordnance fired into the fort by the Union squadron. Additionally, the location, retrieval, and conservation of the pieces of the exploded Dahlgren Rifle would be beneficial to the understanding of this rare cannon type. The survey associated with the present around the Confederate blockships and the wreck of CSS *Curlew* could also be expanded. Although only four blockships have been located to date, it is possible that as many as 16 blockships were sunk, and some may remain to be discovered (Henry 2003b:13). An expanded survey area around the known location of the four blockships may be successful in locating additional vessels.

Furthermore, despite the intensive investigation of the wreck of CSS *Curlew*, it remains to be discovered if any trace of Fort Forrest has been preserved. As can be seen in Figure 51, much of the mainland of 1862 is now submerged, including the current location of CSS *Curlew*. While Fort Forrest would appear to have been located on an area which is not currently submerged, its location nearly 350 meters from the wreck of CSS *Curlew* and the general impreciseness of *A Sketch of Roanoke Island, NC* (Foster 1866) on which that location is based, would suggest that this location is not entirely accurate. The description of CSS *Curlew* wrecking "immediately" in front of the fort (Parker 1883:230) would in fact suggest that some remains of the fort could lie in areas that are currently submerged. Due to the depth of the water

near shore, the survey associated with the present study was not able to approach closer than approximately 100 meters. Therefore, although this survey was unsuccessful in locating any remains of the fort, surveys on foot on the mainland and in the shallow waters near-shore could potentially turn up some evidence of the fort.

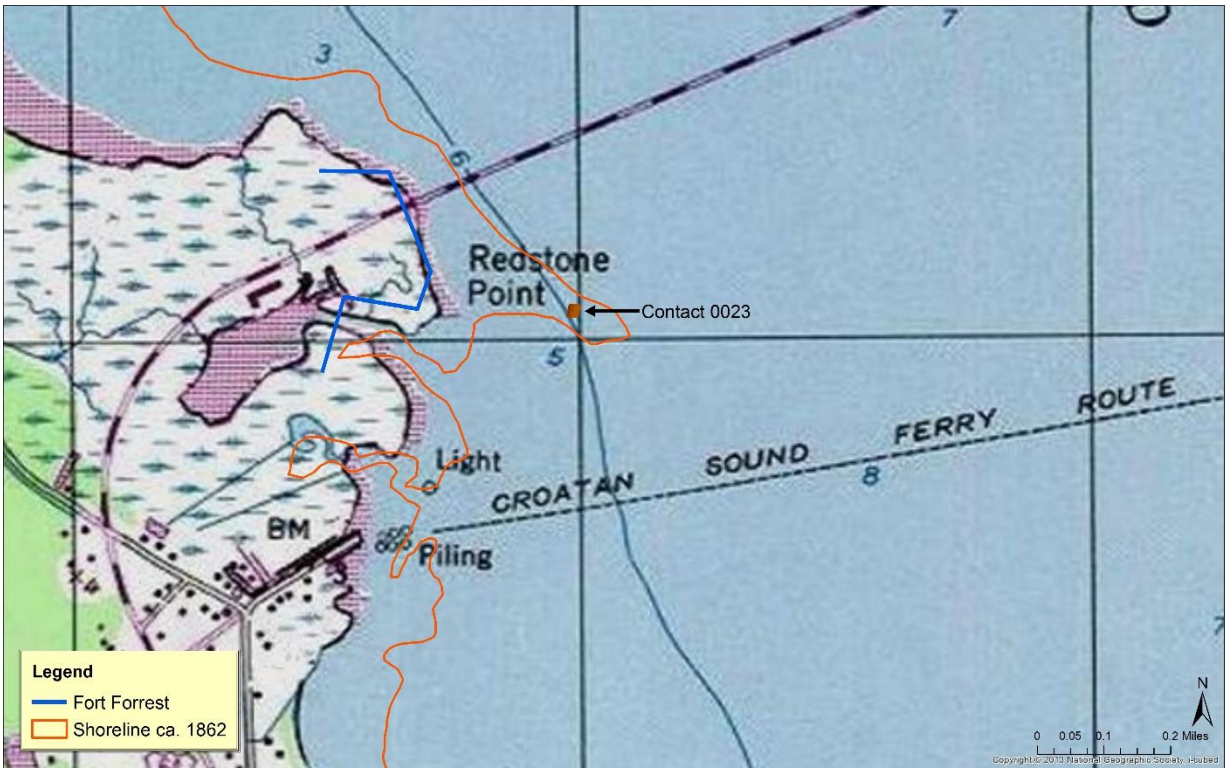



Figure 51: Comparison of Modern and Historic Shorelines in Reference to the Locations of CSS *Curlew* and Fort Forrest (By Lucas Simonds)

Turning finally to the future research potential as regards the revised theoretical approach devised during the present study, further studies employing this approach would be beneficial in a number of ways. The repeated use of the approach would allow for it to be further refined, particularly if it were applied to battles from various time periods. The varied nature of military thought both before and after the Civil War and the rapidly changing technologies of war would almost certainly require modifications that would make this approach more widely applicable. Additionally, this approach has the potential to yield conclusions concerning human behavior in

conflict more generally rather than as relates to this battle in particular. Through the systematic and comparative application of this approach to contemporary battles such as others from the Civil War and, perhaps, some from the Crimean War, a larger dataset could be created from which trends concerning human behavior over the course of these battles could be inferred. Similar studies could be carried out on other sets of contemporaneous battles; however, inferences between time periods would be less valuable due changes in technology and accompanying changes in tactics.

In conclusion, the Battle of Roanoke Island, as has been often noted, is an important battle to the history of North Carolina, the United States, and the U.S. Navy. Although this study has gone some way towards expanding the base of knowledge concerning this battle, further research would be beneficial. Analysis of the military-politico forces which created the environment of the battle would be enlightening, as would continued archaeological survey in and around Croatan Sound and Roanoke Island. In the case of this thesis, the battle has also served as an excellent opportunity to test the application of a revised theory of battlefield archaeology. It can only be hoped that this battle will continue to stand as a testament to the ingenuity of the U.S. and Confederate Navies during the Civil War and to serve as a trove of research long into the future.

# References


Babits, Lawrence E.
2010 Battlefield Analysis: Six Maritime Battles in Maryland, Revolutionary War and War of 1812. Report to Maryland Historical Trust, Crownsville, MD, from New South Associates, Stone Mountain, GA.

Bar-Yam, Yaneer
2003 *Complexity of Military Conflict: Multiscale Analysis of Littoral Warfare.* New England Complex Systems Institute, Report for Contract, No. F30602-02-C-0158, Cambridge, MA. <http://www.necsi.edu/projects/yaneer/ssg_necsi_3_litt.pdf>. Accessed 9 December 2013.

Barrett, John Gilchrist
1975 *The Civil War in North Carolina*. University of North Carolina Press, Chapel Hill, NC.

Bell, Jack
2003 *Civil War Heavy Explosive Ordnance: A Guide to Large Artillery Projectiles, Torpedoes, and Mines.* University of North Texas Press, Denton, TX.

Bright, John C.
2012 *Stalking the Gray Wolf: A KOCOA Terrain Analysis of the Battle of the Atlantic off the North Carolina Coast*. Master's Thesis, Department of History, East Carolina University, Greenville, NC.

Burnside, Ambrose E.
1887 The Burnside Expedition. In *Battles and Leaders of the Civil War Grant-Lee Edition,* Vol. 1 Part 2, pp. 660-669, The Century Co., New York, NY.

Canfield, Eugene B.
1960 *Notes on Naval Ordnance of the American Civil War*. The American Ordnance Association, Washington, D.C.

1969 *Civil War Naval Ordnance*. Naval History Division, US Navy Department, Washington, D.C.

Campbell, R. Thomas
2005 *Storm Over Carolina: The Confederate Navy's Struggle for Eastern North Carolina*. Cumberland House, Nashville, TN.

Carbone, John Stephen
2001 *The Civil War in Coastal North Carolina*. Division of Archives and History, North Carolina Department of Cultural Resources, Raleigh, NC.

Coggins, Jack
1962 *Arms and Equipment of the Civil War.* Doubleday & Company, Garden City, NY.

Dahlgren, John A.
1852 *System of Armament for Boats*. A. Hart, Philadelphia, PA.

1856 *Shells and Shell Guns*. King & Baird, Philadelphia, PA.

Department of the Army
1992 *FM 7-8 Infantry Rifle Platoon and Squad.* Department of the Army, Washington, DC.

2008 *FM 3-0 Operations*. Department of the Army, Washington, DC.

Douglas, Howard
1855 *A Treatise on Naval Gunnery*. John Murray, London, UK.

1860 *On Naval Warfare with Steam.* John Murray, London, UK.

Dougherty, Kevin
2010 *Strangling the Confederacy: Coastal Operations of the American Civil War*. Casemate, Philadelphia, PA.

Drexler, Carl G. Carlson
2009 Finding Battery Positions at Wilson's Creek, Missouri. In *Fields of Conflict: Battlefield Archaeology from the Roman Empire to the Korean War,* Douglas Scott, Lawrence E. Babits and Charles Haecker, editors, pp. 58-74. Potomac Books Inc., Dulles, VA.

Dunbar, Gary S.
1958 *Historical Geography of the North Carolina Outer Banks*. Louisiana State University Press, Baton Rouge, LA.

ESRI
2013a *USA Topo Maps*. ArcGIS Map Service. ESRI, Redlands, CA.

2013b ArcGISonline repository <http://arcgisonline.com> Accessed 13 December 2013

Fox, Gustavus Vasa
1920 *Confidential correspondence of Gustavus Vasa Fox, Assistant Secretary of the Navy, 1861-1865*. Naval History Society, New York, NY.

Franklin, W.B.
1852 *Report to Colonel J.J. Abert, Chief of the Corps of Topographical Engineers, U.S. Army, August 23, 1852.* National Archives RG77 "Records of the Corps of Engineers"

Foster, John G.
1866 *A Sketch of Roanoke Island, N.C.* Bowen and Company, Philadelphia, P.A. <http://dc.lib.unc.edu/cdm/ref/collection/ncmaps/id/2328>. Accessed 9 December 2013.

Fox, Richard A., Jr. and Douglas D. Scott
1991 The Post-Civil War Battlefield Pattern: An Example from the Custer Battlefield. *Historical Archaeology* 25(2):92-103.

Gibson, Charles Dana and E. Kay Gibson
1995 *The Army's Navy Series: Assault and Logistics, Union Army Coastal and River Operations 1861-1862,* Vol. 2, Ensign Press, Camden, ME.

Glenn, Russell W.
1998 No More Principles of War? *Parameters* Spring 1998:48-66. Strategic Studies Institute <http://strategicstudiesinstitute.army.mil/pubs/parameters/Articles/98spring/glenn.htm> Accessed 22 Jan. 2014

Gwynn, Walter
1840 Documents relating to the Opening of an Inlet at or near Nag's head, on the Coast of Carolina. In *Public Documents Printed by order of The Senate of the United States during the First Session of the Twenty-Sixth Congress* Vol. 8, Document No. 603. Washington, D.C.

*Harper's Weekly*
1862 Destruction of Commodore Lynch's Fleet by the Union Gun-Boats. *Harper's Weekly* 1 March, New York, NY.

Hawkins, Rush C.
1887 Early Coast Operations in North Carolina. In *Battles and Leaders of the Civil War Grant-Lee Edition,* Vol. 1 Part 2, pp. 632-659, The Century Co., New York, NY.

Heckman, Elsa
2009 Battlefield Viewsheds, or What the General Saw: Lookout Mountain Battlefield, Chattanooga, Tennessee. In *Fields of Conflict: Battlefield Archaeology from the Roman Empire to the Korean War,* Douglas Scott, Lawrence E. Babits and Charles Haecker, editors, pp. 84-101. Potomac Books Inc., Dulles, VA.

Henry Nathan
2003a *1988 Survey of Croatan Sound: Part of Operation Raleigh.* NC Department of Cultural Resources, Manuscript available at Underwater Archaeology Branch, Kure Beach, NC.

2003b *Croatan Sound Civil War Shipwreck Project.* NC Department of Cultural Resources, Manuscript available at Underwater Archaeology Branch, Kure Beach, NC.

2003a *2005 Inspection of Acoustic Targets in Croatan Sound.* NC Department of Cultural Resources, Manuscript available at Underwater Archaeology Branch, Kure Beach, NC.

Hinds, John W.
1998 *Invasion and Conquest of North Carolina: Anatomy of a Gunboat War.* Burd Street Press, Shippensburg, PA.

Holley, Alexander L.
1865 *A Treatise on Ordnance and Armor.* D. Van Nostrand, New York, NY.

Hoste, P. Paul
1854 *A Treatise on Naval Tactics*. J.D. Boswall Trans. Longman, Rees, Orme, Brown, & Co. London, UK

Jeffers, William
1850 *A Concise Treatise on the Theory and Practice of Naval Gunnery*. D. Appelton & Company, Philadelphia, PA.

Jomini, Antoine de
1854 *Summary of the Art of War or A New Analytical Compend of the Principal Combinations of Strategy, of Grand Strategy, of Tactics and of Military Policy,* O.F. Winship and E.E. McLean, translators. G.P. Putnam & Company, New York, NY.

1862 *The Art of War,* G.H. Mendell and W.P. Craighill, translators. J.B. Lippincott & Co., Philadelphia, PA.

Keegan, John
1978 *The Face of Battle*. The Viking Press, New York, NY.

Lowe, David W.
2000 Battlefield Survey: American Battlefield Protection Program Battlefield Survey Manual. Department of the Interior, National Park Service, American Battlefield Protection Program, Washington, D.C.

Lydecker, Andrew and Stephen R. James
2005 *Archaeology of the Civil War Naval Operations on the Ogeechee River, Georgia.* Panamerican Consultants, Final Report, Contract No. 46200-341-0000000242, Memphis, TN.

Mabeltini, Charles Brian
2012 *The Hammock Landing Battery and the Confederate Defenses of the Apalachicola River, Florida*. Master's Thesis, Department of Anthropology, University of West Florida, Pensacola, FL.

Mallison, Fred M.
1998 *The Civil War on the Outer Banks: A History of the Late Rebellion along the Coast of North Carolina from Carteret to Currituck, with Comments on Prewar Conditions and an Account of Postwar Recovery*. McFarland & Company, Jefferson, NC.

McClellan, George B.
1864 *The Army of the Potomac: Gen. McClellan's Report of its Operations while under his Command.* G.P. Putnam, New York, NY.

Merrill, James M.
1957 *The Rebel Shore; the Story of Union sea power in the Civil War*. Little Brown, Boston, MA.

Moebs, Thomas Truxton
1991 *Confederate States Navy Research Guide: Confederate Naval Imprints Described and Annotated, Chronology of Naval Operation and Administration, Marine Corps and Naval Officer Biographies, Description and Service of Vessels, Subject Bibliography*. Moebs Publishing Company, Williamsburg, VA.

Moorsom, Constantine Richard
1843 *The Principles of Naval Tactics Exemplified*. William Clowes and Sons. London, UK.

Morrill, Dan L.
2002 *The Civil War in the Carolinas*. Nautical & Aviation Publishing Company, Charleston, SC.

National Archives
1860-1865 Gun boat "Commodore Perry", ca. 1860 – ca.1865. Photograph 111-B-130, National Archives at College Park, College Park, MD.

1864 U.S.S. Commodore Perry, a ferryboat converted into a gunboat, Pamunkey River, VA., 1864. Photograph 111-B-411, National Archives at College Park, College Park, MD.

National Park Service
2013a Glossary: Military Earthwork Terms. In *05 Currents: Sustainable Military Earthworks Management*. Historic Landscape Initiative.
<http://www.nps.gov/hps/hli/currents/earthworks/index.htm> Accessed 16 December 2013.

2013b Bodie Island Light Station. Cape Hatteras National Seashore, North Carolina.
<http://www.nps.gov/caha/historyculture/bodie-island-light-station.htm> Accessed 23 January 2014.

National Oceanic and Atmospheric Administration
2012 Historical Map & Chart Collection. United States Office of Coast Survey
<http://historicalcharts.noaa.gov/>. Accessed 9 December 2013.

New York State Library
2012 Battle of Roanoke Island Online Exhibit. Manuscripts and Special Collections
<http://www.nysl.nysed.gov/mssc/roanoke/>. Accessed 16 December 2013.

Olson, Christopher J.
1997 *An Historical and Archaeological Investigation of the Steamboat Curlew*. Master's Thesis, Department of History, East Carolina University, Greenville, NC.

Palmer, Michael A.
2005 *Command at Sea: Naval Command and Control since the Sixteenth Century*. Harvard University Press, Cambridge, MA.

Parker, William H.
1883 *Recollections of a Naval Officer: 1841-1865.* Charles Scribner's Sons, New York, NY.

Reed, Rowena
1978 *Combined Operations in the Civil War*. Naval Institute Press, Annapolis, MD.

Richards, Nathan, Tom Allen, John Bright, Joseph Hoyt, and John Wagner
2011 Research Design: The Battle of the Atlantic Expedition 2011, The Battle of Convoy KS-520. Unpublished manuscript, on file, East Carolina University, Greenville, NC.

Riggs, Stanley R. and M.P. O'Connor
1974 *Relict Sediment Deposits in a Major Transgressive Coastal System*. North Carolina State University, Raleigh, NC.

Ripley, Warren
1970 *Artillery and Ammunition of the Civil War.* Promontory Press, New York, NY.

Ross, John
1828 *A Treatise on Navigation by Steam*. Longman, Rees, Orme, Brown, and Green. London, UK.

Rossabi, Morris
1996 Mongols. In *The Reader's Companion to Military History*, Robert Cowley and Geoffrey Parker, editors, pp. 308-310. Houghton Mifflin, New York, NY.

Scharf, J. Thomas
1887 *History of the Confederate States Navy from its Organization to the Surrender of its Last Vessel.* Rogers & Sherwood, New York, NY.

Scott, Douglas, Richard A. Fox, Jr., Melissa A. Connor, and Dick Harmon
1989 *Archaeological Perspectives on the Battle of Little Bighorn*. Oklahoma University Press, Norman.

Silverstone, Paul H.
2001 *Civil War Navies, 1855-1883*. Naval Institute Press, Annapolis, MD.

Snow, D.R.
1981 Battlefield Archaeology. *Early Man* 3(1):18-21.

Soley, James Russell
1887 The Union and Confederate Navies. In *Battles and Leaders of the Civil War Grant-Lee Edition,* Vol. 1 Part 2, pp. 611-631, The Century Co., New York, NY.

State Library of North Carolina
2010 North Carolina Maps. State Library of North Carolina, Raleigh, NC <http://www.lib.unc.edu/dc/ncmaps/>. Accessed 13 December 2013.

Spirek, James D.
1993 *USS Southfield: An Historical and Archaeological Investigation of a Converted Gunboat*. Master's Thesis, East Carolina University, Greenville, NC.

Symonds, Craig L.
2008 *Lincoln and His Admirals: Abraham Lincoln and the US Navy, and the Civil War.* Oxford University Press, New York, NY.

Taafe, Stephen R.
2009 *Commanding Lincoln's Navy: Union naval Leadership during the Civil War.* Naval Institute Press, Annapolis, MD.

Taylor, Harden F.
1951 *Survey of Marine Fisheries of North Carolina*. The University of North Carolina Press, Chapel Hill, NC.

Traver, Lorenzo
1880 *The Battles of Roanoke Island and Elizabeth City*. N.B. Williams & Co., Providence, RI.

United States Coast and Geodetic Survey
1853 *Coast Chart D No.2: Reconnaissance of Hatteras Inlet North Carolina.* United States Coast and Geodetic Survey, Washington, D.C. <http://dc.lib.unc.edu/cdm/singleitem/collection/ncmaps/id/5352/rec/3>. Accessed 9 December 2013.

1855 *Coast Chart D No.2: Preliminary Chart of Albemarle Sound North Carolina.* United States Coast and Geodetic Survey, Washington, D.C. <http://historicalcharts.noaa.gov/historicals/preview/image/AR15-00-1855>. Accessed 9 December 2013.

1864 *T-Sheet No.933: Croatan Sound, Hog Island to Redstone Point.* United States Coast and Geodetic Survey, Washington, D.C. <http://historicalcharts.noaa.gov/historicals/preview/image/T00933-00-1864>. Accessed 9 December 2013.

1876 *Coast Chart No.40: Albemarle Sound N. Carolina eastern part from the Atlantic Ocean to the Pasquotank River*. United States Coast and Geodetic Survey, Washington, D.C. <http://dc.lib.unc.edu/cdm/ref/collection/ncmaps/id/2394>. Accessed 9 December 2013.

United States Geological Survey
2013 National Elevation Dataset <http://www.ned.usgs.gov> Accessed 13 December 2013.

United States Navy Department
1897a *Official Records of the Union and Confederate navies in the War of the Rebellion,* Ser. 1 Vol. 5. United States Navy Department, Washington, DC.

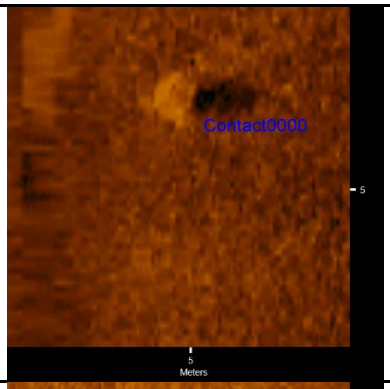
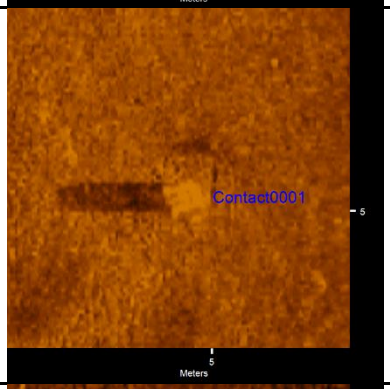
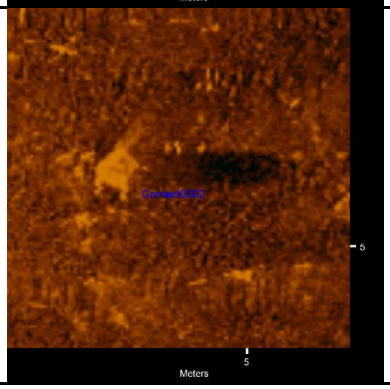
1897b *Official Records of the Union and Confederate navies in the War of the Rebellion,* Ser. 1 Vol. 6. United States Navy Department, Washington, DC.

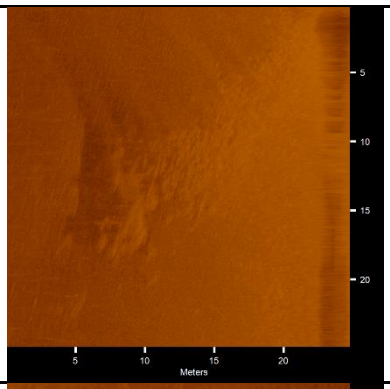
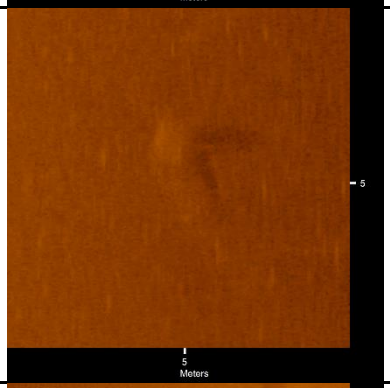
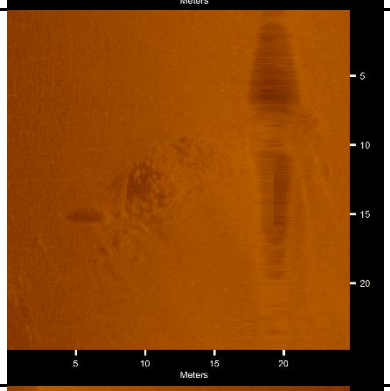
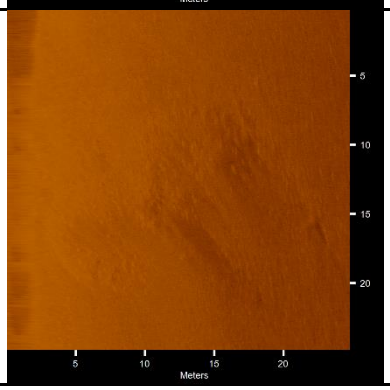
United States War Department
1883 *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, Ser.1 Vol.9

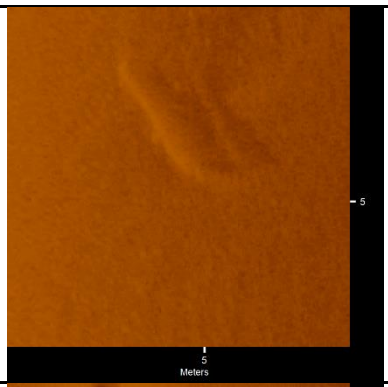
Ward, James H.
1870 *A Manual of Naval Tactics: Together with a Brief Critical Analysis of the Principal Modern Naval Battles.* D. Van Norstrand, New York, NY.

Weigley, Russell
1973 *The American Way of War*. Indiana University Press, Bloomington, Indiana

# Appendix A: Sonar Targets

| Target Image | Target Info | User Entered Info |
|---|---|---|
|  | **Contact0000**<br>• Sonar Time at Target: 9/17/2013 6:27:51 PM<br>• Click Position<br>35° 53.85508' N 075° 42.81943' W (WGS84)<br>• Heading: 41.400 Degrees | **Dimensions and attributes**<br>• Target Width: 1.05 Meters<br>• Target Height: 0.75 Meters<br>• Target Length: 1.12 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0001**<br>• Sonar Time at Target: 9/17/2013 6:45:49 PM<br>• Click Position<br>35° 53.65316' N 075° 42.86279' W (WGS84)<br>• Heading: 179.800 Degrees | **Dimensions and attributes**<br>• Target Width: 0.67 Meters<br>• Target Height: 1.86 Meters<br>• Target Length: 0.86 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0002**<br>• Sonar Time at Target: 9/17/2013 7:26:50 PM<br>• Click Position<br>35° 53.73497' N 075° 43.05487' W (WGS84)<br>• Heading: 28.800 Degrees | **Dimensions and attributes**<br>• Target Width: 0.68 Meters<br>• Target Height: 0.47 Meters<br>• Target Length: 0.68 Meters<br>• Classification1: Crab Pot<br>• Description: |

| | | |
|---|---|---|
|  | **Contact0007**<br>• Sonar Time at Target: 3/2/2014 9:34:49 AM<br>• Click Position<br>35° 54.31843' N 075° 44.08714' W (WGS84)<br>• Heading: 292.990 Degrees | **Dimensions and attributes**<br>• Target Width: 6.66 Meters<br>• Target Height: 0.00 Meters<br>• Target Length: 19.31 Meters<br>• Classification1: Possible Ballast Pile<br>• Description: Possibly a Confederate Blockship |
|  | **Contact0009**<br>• Sonar Time at Target: 3/2/2014 10:03:13 AM<br>• Click Position<br>35° 54.27664' N 075° 43.99886' W (WGS84)<br>• Heading: 105.200 Degrees | **Dimensions and attributes**<br>• Target Width: 1.11 Meters<br>• Target Height: 0.45 Meters<br>• Target Length: 0.91 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0011**<br>• Sonar Time at Target: 3/2/2014 9:57:50 AM<br>• Click Position<br>35° 54.33381' N 075° 44.18869' W (WGS84)<br>• Heading: 106.830 Degrees | **Dimensions and attributes**<br>• Target Width: 4.23 Meters<br>• Target Height: 0.00 Meters<br>• Target Length: 11.69 Meters<br>• Classification1: Possible Ballast Pile<br>• Description: Possibly a Confederate blockship |
|  | **Contact0017**<br>• Sonar Time at Target: 3/2/2014 12:24:22 PM<br>• Click Position<br>35° 54.15250' N 075° 44.05022' W (WGS84)<br>• Heading: 103.160 Degrees | **Dimensions and attributes**<br>• Target Width: 4.97 Meters<br>• Target Height: 0.00 Meters<br>• Target Length: 10.76 Meters<br>• Classification1: Unknown<br>• Description: |

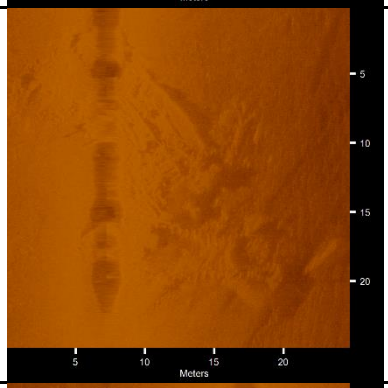



### Contact0022

- Sonar Time at Target: 3/2/2014 1:34:29 PM
- Click Position
  35° 54.53486' N 075° 45.86351' W (WGS84)
- Heading: 23.510 Degrees

### Dimensions and attributes

- Target Width: 0.75 Meters
- Target Height: 0.00 Meters
- Target Length: 3.41 Meters
- Classification1: Unknown
- Description: Shaped somewhat like a cannon

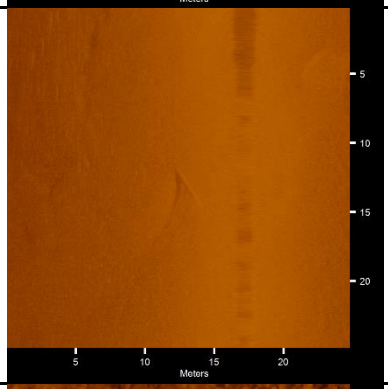



### Contact0023

- Sonar Time at Target: 3/2/2014 1:46:22 PM
- Click Position
  35° 54.61693' N 075° 45.86110' W (WGS84)
- Heading: 189.460 Degrees

### Dimensions and attributes

- Target Width: 12.50 Meters
- Target Height: 0.00 Meters
- Target Length: 25.37 Meters
- Classification1: Shipwreck
- Description: Likely CSS Curlew

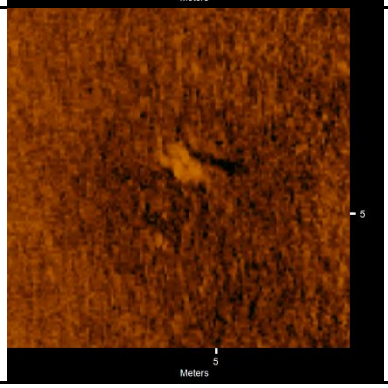



### Contact0024

- Sonar Time at Target: 3/2/2014 1:46:48 PM
- Click Position
  35° 54.59584' N 075° 45.85871' W (WGS84)
- Heading: 171.630 Degrees

### Dimensions and attributes

- Target Width: 0.28 Meters
- Target Height: 0.00 Meters
- Target Length: 2.70 Meters
- Classification1: Unknown
- Description: Associated with nearby shipwreck

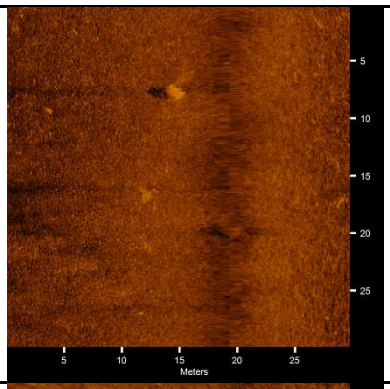
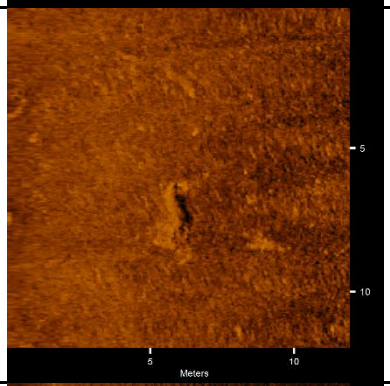
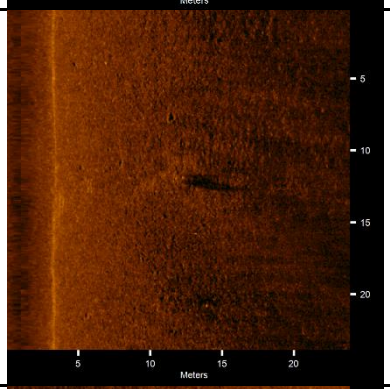
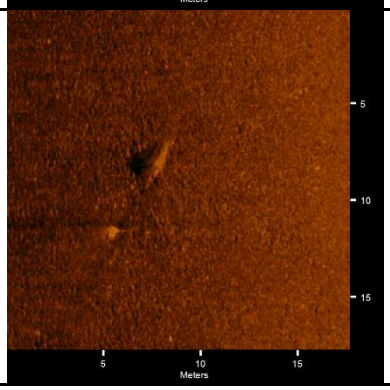


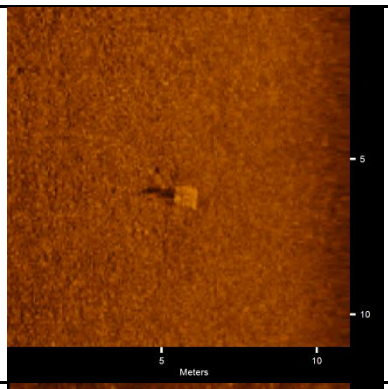
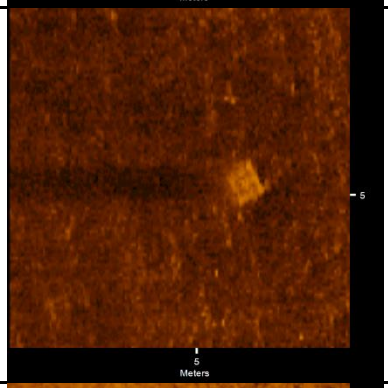
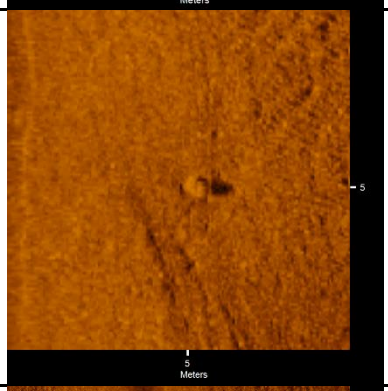
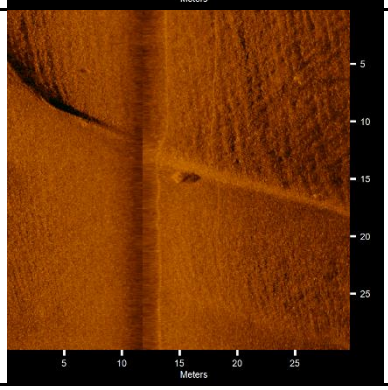

### Contact0029

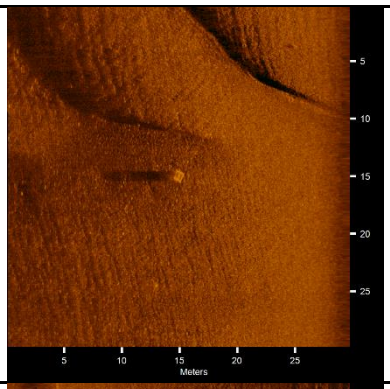
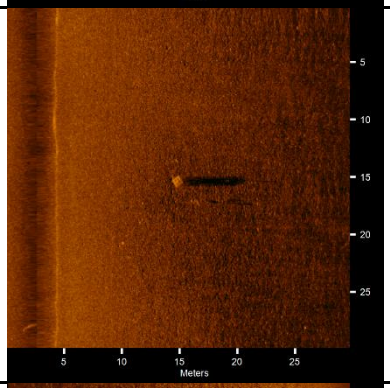
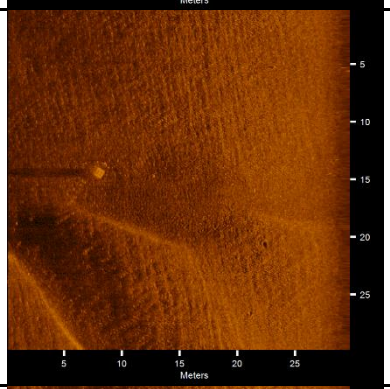
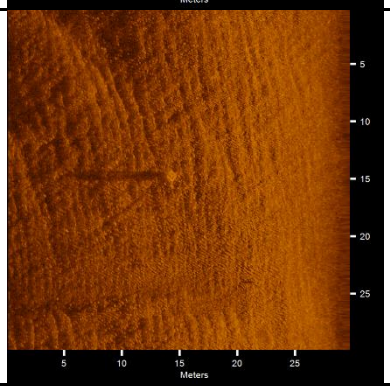
- Sonar Time at Target: 9/19/2013 2:23:26 PM
- Click Position
  35° 53.82302' N 075° 45.00193' W (WGS84)
- Heading: 25.000 Degrees

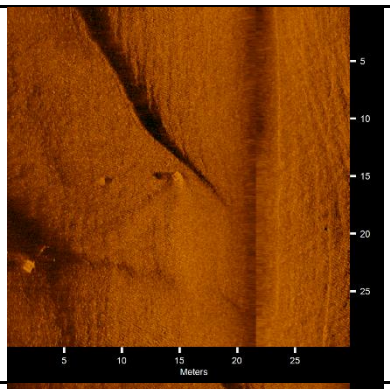
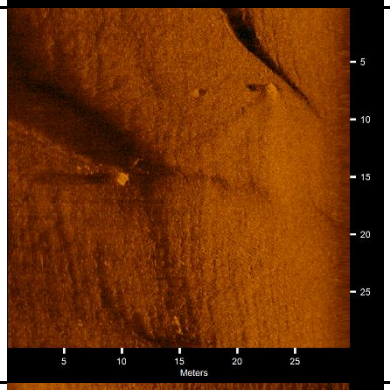
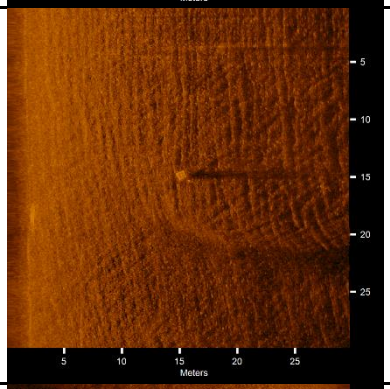
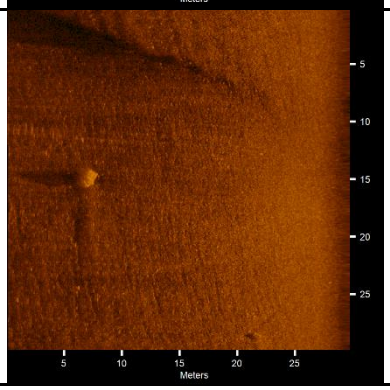
### Dimensions and attributes

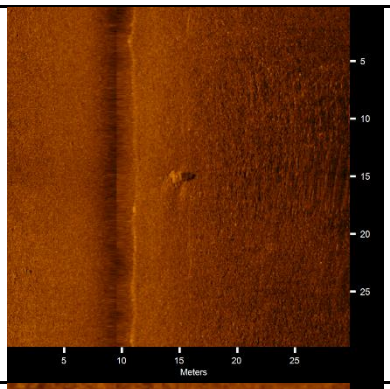
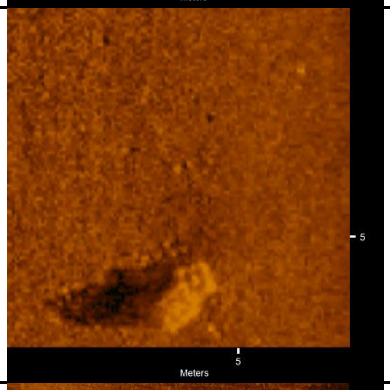
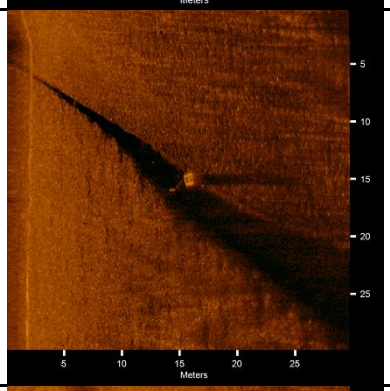
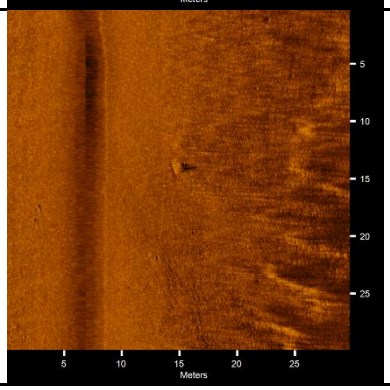
- Target Width: 0.85 Meters
- Target Height: 0.00 Meters
- Target Length: 1.00 Meters
- Classification1: Unknown
- Description:

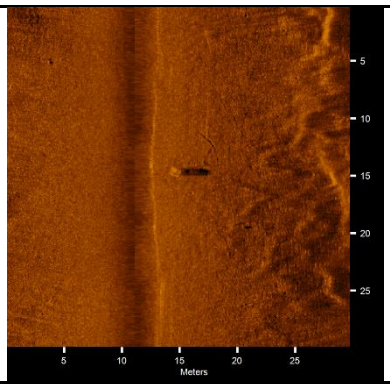
| | | |
|---|---|---|
|  | **Contact0030**<br>• Sonar Time at Target: 9/19/2013 2:35:31 PM<br>• Click Position<br>35° 53.91299' N 075° 44.96657' W (WGS84)<br>• Heading: 173.700 Degrees | **Dimensions and attributes**<br>• Target Width: 1.25 Meters<br>• Target Height: 3.77 Meters<br>• Target Length: 1.31 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0031**<br>• Sonar Time at Target: 9/19/2013 2:56:11 PM<br>• Click Position<br>35° 53.98375' N 075° 44.93319' W (WGS84)<br>• Heading: 34.000 Degrees | **Dimensions and attributes**<br>• Target Width: 0.61 Meters<br>• Target Height: 0.00 Meters<br>• Target Length: 1.43 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0032**<br>• Sonar Time at Target: 9/19/2013 5:53:13 PM<br>• Click Position<br>35° 53.65947' N 075° 44.86347' W (WGS84)<br>• Heading: 37.300 Degrees | **Dimensions and attributes**<br>• Target Width: 0.75 Meters<br>• Target Height: 0.37 Meters<br>• Target Length: 0.62 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0033**<br>• Sonar Time at Target: 9/19/2013 5:58:33 PM<br>• Click Position<br>35° 53.97278' N 075° 44.88503' W (WGS84)<br>• Heading: 32.100 Degrees | **Dimensions and attributes**<br>• Target Width: 0.69 Meters<br>• Target Height: 0.17 Meters<br>• Target Length: 2.03 Meters<br>• Classification1: Unknown<br>• Description: |

| | | |
|---|---|---|
|  | **Contact0034**<br>• Sonar Time at Target: 9/19/2013 6:23:44 PM<br>• Click Position<br>35° 54.06133' N 075° 44.80788' W (WGS84)<br>• Heading: 14.000 Degrees | **Dimensions and attributes**<br>• Target Width: 0.61 Meters<br>• Target Height: 0.27 Meters<br>• Target Length: 0.65 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0035**<br>• Sonar Time at Target: 9/19/2013 6:24:39 PM<br>• Click Position<br>35° 54.12192' N 075° 44.82630' W (WGS84)<br>• Heading: 26.200 Degrees | **Dimensions and attributes**<br>• Target Width: 0.90 Meters<br>• Target Height: 0.36 Meters<br>• Target Length: 0.98 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0036**<br>• Sonar Time at Target: 9/19/2013 6:46:27 PM<br>• Click Position<br>35° 54.05411' N 075° 44.73477' W (WGS84)<br>• Heading: 13.300 Degrees | **Dimensions and attributes**<br>• Target Width: 0.72 Meters<br>• Target Height: 0.22 Meters<br>• Target Length: 0.63 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0037**<br>• Sonar Time at Target: 9/19/2013 6:52:24 PM<br>• Click Position<br>35° 53.97774' N 075° 44.69945' W (WGS84)<br>• Heading: 179.800 Degrees | **Dimensions and attributes**<br>• Target Width: 0.94 Meters<br>• Target Height: 0.72 Meters<br>• Target Length: 1.11 Meters<br>• Classification1: Crab Pot<br>• Description: |

| | | |
|---|---|---|
|  | **Contact0038**<br>• Sonar Time at Target: 9/19/2013 6:52:25 PM<br>• Click Position<br>35° 53.97569' N 075° 44.68780' W (WGS84)<br>• Heading: 179.100 Degrees | **Dimensions and attributes**<br>• Target Width: 0.83 Meters<br>• Target Height: 0.64 Meters<br>• Target Length: 1.02 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0039**<br>• Sonar Time at Target: 9/19/2013 7:07:04 PM<br>• Click Position<br>35° 53.82630' N 075° 44.67276' W (WGS84)<br>• Heading: 20.000 Degrees | **Dimensions and attributes**<br>• Target Width: 0.69 Meters<br>• Target Height: 0.63 Meters<br>• Target Length: 0.66 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0040**<br>• Sonar Time at Target: 9/19/2013 7:09:50 PM<br>• Click Position<br>35° 53.98119' N 075° 44.68677' W (WGS84)<br>• Heading: 23.600 Degrees | **Dimensions and attributes**<br>• Target Width: 0.70 Meters<br>• Target Height: 0.53 Meters<br>• Target Length: 0.82 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0041**<br>• Sonar Time at Target: 9/19/2013 7:11:05 PM<br>• Click Position<br>35° 54.04984' N 075° 44.68453' W (WGS84)<br>• Heading: 15.300 Degrees | **Dimensions and attributes**<br>• Target Width: 0.69 Meters<br>• Target Height: 0.69 Meters<br>• Target Length: 0.55 Meters<br>• Classification1: Crab Pot<br>• Description: |

| | | |
|---|---|---|
|  | **Contact0042**<br>• Sonar Time at Target: 9/19/2013 7:16:05 PM<br>• Click Position<br>35° 54.04485' N 075° 44.63622' W (WGS84)<br>• Heading: 176.800 Degrees | **Dimensions and attributes**<br>• Target Width: 0.58 Meters<br>• Target Height: 0.33 Meters<br>• Target Length: 0.60 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0043**<br>• Sonar Time at Target: 9/19/2013 7:16:09 PM<br>• Click Position<br>35° 54.04123' N 075° 44.62706' W (WGS84)<br>• Heading: 182.900 Degrees | **Dimensions and attributes**<br>• Target Width: 0.86 Meters<br>• Target Height: 0.51 Meters<br>• Target Length: 1.10 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0044**<br>• Sonar Time at Target: 9/19/2013 7:16:59 PM<br>• Click Position<br>35° 53.99583' N 075° 44.65115' W (WGS84)<br>• Heading: 186.100 Degrees | **Dimensions and attributes**<br>• Target Width: 0.74 Meters<br>• Target Height: 0.56 Meters<br>• Target Length: 0.72 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0045**<br>• Sonar Time at Target: 9/19/2013 7:18:52 PM<br>• Click Position<br>35° 53.89582' N 075° 44.61849' W (WGS84)<br>• Heading: 178.700 Degrees | **Dimensions and attributes**<br>• Target Width: 0.77 Meters<br>• Target Height: 0.40 Meters<br>• Target Length: 0.92 Meters<br>• Classification1: Crab Pot<br>• Description: |

| | | |
|---|---|---|
|  | **Contact0046**<br>• Sonar Time at Target: 9/19/2013 7:19:56 PM<br>• Click Position<br>35° 53.83890' N 075° 44.63756' W (WGS84)<br>• Heading: 195.100 Degrees | **Dimensions and attributes**<br>• Target Width: 0.83 Meters<br>• Target Height: 0.32 Meters<br>• Target Length: 0.82 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0047**<br>• Sonar Time at Target: 9/19/2013 7:32:53 PM<br>• Click Position<br>35° 53.90074' N 075° 44.61793' W (WGS84)<br>• Heading: 28.900 Degrees | **Dimensions and attributes**<br>• Target Width: 0.96 Meters<br>• Target Height: 0.56 Meters<br>• Target Length: 1.67 Meters<br>• Classification1: Unknown<br>• Description: |
|  | **Contact0048**<br>• Sonar Time at Target: 9/19/2013 7:33:11 PM<br>• Click Position<br>35° 53.91536' N 075° 44.60308' W (WGS84)<br>• Heading: 17.900 Degrees | **Dimensions and attributes**<br>• Target Width: 0.86 Meters<br>• Target Height: 0.59 Meters<br>• Target Length: 1.06 Meters<br>• Classification1: Crab Pot<br>• Description: |
|  | **Contact0049**<br>• Sonar Time at Target: 9/19/2013 7:36:02 PM<br>• Click Position<br>35° 54.07205' N 075° 44.60417' W (WGS84)<br>• Heading: 22.700 Degrees | **Dimensions and attributes**<br>• Target Width: 0.86 Meters<br>• Target Height: 0.20 Meters<br>• Target Length: 0.84 Meters<br>• Classification1: Crab Pot<br>• Description: |




## Contact0050

- Sonar Time at Target: 9/19/2013 7:42:33 PM
- Click Position
  35° 53.92580' N 075° 44.57503' W (WGS84)
- Heading: 198.600 Degrees

## Dimensions and attributes

- Target Width: 0.82 Meters
- Target Height: 0.80 Meters
- Target Length: 0.80 Meters
- Classification1: Crab Pot
- Description:

# Appendix B: Vessel Statistics

Union Vessels

| Name | Armament | Tonnage | Length | Beam | Draft | Complement | Speed (Kts) |
|---|---|---|---|---|---|---|---|
| Ceres | 1 – 30pdr Parrott Rifle<br>1 – 32pdr 33cwt | 144 Burden | 108’4” | 22’4” | 6’3” | 45 | 9 |
| Chasseur | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Commodore Barney | 3 – 9” Shell Guns<br>1 – 100pdr Parrott Rifle | 512 Burden | 144’6” | 33’ | 9’ | 108 | 11 |
| Commodore Perry | 2 – 9” Shell Guns<br>2 – 32pdr 47cwt<br>1 – 12pdr Boat Howitzer | 512 Burden | 144’6” | 33’ | 9’ | 108 | 11 |
| Delaware | 1 – 9” Shell Gun<br>1 – 32pdr 57cwt<br>1 – 12pdr Rifled Boat Howitzer | 357 Burden | 161’ | 27’ | 6’ | 65 | 13 |
| Henry Brinker | 1 – 30pdr Parrott Rifle | 108 Burden | 82’ | 26’7” | 7” | 18 | 5 |
| Hetzel | 1 – 9” Shell Gun<br>1 – 80pdr Dahlgren Rifle | 301Burden | 150’ | 22’ | 6’6” | 69 | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hunchback | 3 – 9” Shell Guns 1 – 100pdr Parrot Rifle | 517 Burden | 179’5” | 29’3” | 9’ | 99 | 12 |
| Hussar | 1 – 30pdr Parrott 1 – 6pdr Wiard Boat Howitzer | N/A | N/A | N/A | 9’8” | N/A | N/A |
| I.N. Seymour | 1 – 30pdr Parrott Rifle 1 – 12pdr Rifled Boat Howitzer | 133 Burden | 100’ | 19’8” | 6’6” | 30 | 11 |
| John L. Lockwood | 1 – 80pdr Dahlgren Rifle 1 – 12pdr Rifled Boat Howitzer 1 – 12pdr Boat Howitzer | 180 Burden | 114’ | 24’ | 6’6” | 30 | 11 |
| Lancer | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Louisiana | 1 – 8” 63cwt 2 – 32pdr 57cwt 1 – 32pdr 33cwt 1 – 12pdr Rifled Boat Howitzer | 438 Displacement 295 Burden | 143’2” | 27’3” | 8’6” | 85 | |
| Morse | 2 – 9” Shell Guns | 513 Burden | 142’6” | 33’ | 8’6” | 96 | 11 |
| Picket | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pioneer | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ranger | 1 – 30pdr Parrott<br>1 – 12pdr Wiard Boat Howitzer | N/A | N/A | N/A | N/A | N/A | N/A |
| Shawseen | 2 – 20pdr Parrott Rifles | 126 Burden | 118’ | 22’6” | 7’3” | 40 | N/A |
| Southfield | 1 – 100pdr Parrott Rifle<br>3 – 9” Shell Gun | 751 Burden | 200’ | 34’ | 6’6” | 61 | 12 |
| Stars and Stripes | 4 – 8” 55cwt<br>1 – 20pdr Parrott Rifle<br>2 – 12pdr Boat Howitzers | 407 Burden | 150’6” | 34’6” | 9’ | 94 | 10.5 |
| Underwriter | 1 – 80pdr Dahlgren Rifle<br>1 – 8” 63cwt<br>2 – 12pdr Boat Howitzers | 341 Burden | 185’ | 23’7” | 8’1” | 69 | N/A |
| Valley City | 4 – 32pdr 42cwt<br>1 – 12pdr Rifled Boat Howitzer | 190 Burden<br>318 Unregistered | 133’ | 21’10” | 8’4” | 82 | 10 |
| Vedette | 1 – 30pdr Parrott<br>1 – 12pdr Wiard Boat Howitzer | N/A | N/A | N/A | N/A | N/A | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Whitehead | 1 – 9” Shell Gun | 132 Displacement | 93’ | 19’9” | 8’ | 45 | N/A |
| William G. Putnam | 4 – 32pdr 51cwt<br>2 – 32pdr 33cwt<br>1 – 20pdr Parrott Rifle<br>1 – 24pdr Boat Howitzer | 149 Burden | 103’6” | 22’ | 7’6” | 62 | 7 |

Sources: U.S. War Department 1883; U.S. Navy Department 1897b; Silverstone 2001.

Confederate Vessels

| Name | Armament | Tonnage | Length | Beam | Draft | Complement |
|---|---|---|---|---|---|---|
| Beaufort | 1 – 32pdr Banded and Rifled | N/A | 85’ | 17’6” | | N/A |
| Curlew | 1 – 32pdr Banded and Rifled | 260 | 150’ | 24’ | 4’6” | N/A |
| Ellis | 1 – 32pdr Banded and Rifled | N/A | N/A | N/A | N/A | N/A |
| Fanny | 1 – 32pdr Banded and Rifled<br>1 – 8pdr Rifled | N/A | N/A | N/A | N/A | 49 |
| Forrest | 1 – 32pdr Banded and Rifled | N/A | N/A | N/A | N/A | N/A |
| Raleigh | 1 – 32pdr Banded and Rifled | 65 | N/A | N/A | N/A | N/A |
| Sea Bird | 1 – 32pdr Banded and Rifled<br>1 – 32pdr | 202 | 133’ | N/A | N/A | 42 |

Sources: Parker 1883, Moebs 1991, Silverstone 2001.

# Appendix C: Ammunition Expended – Union Naval Division

| Vessel | 32 pdr Shot | 32 pdr Shell | 8" Shell | 8" Hollow Shot | 12 pdr Hotchkiss Shell | 12 pdr Dahlgren Shell | 9" Shell | 9" Shrapnel | 80 pdr Dahlgren Shell | 80 pdr Dahlgren Shot | 80 pdr Cochran Shell | 80 pdr Hotchkiss Shell | 20 pdr Parrott Shell | 20pdr Parrott Shrapnel | 30 pdr Parrott Shell | 100 pdr Parrott Shell | 100 pdr Parrott Shot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ceres | N/A | 55 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 38 | N/A | N/A |
| Commodore Barney | N/A | N/A | N/A | N/A | N/A | N/A | 124 | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Commodore Perry | N/A | N/A | N/A | N/A | N/A | N/A | 172 | 20 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Delaware | N/A | 22 | N/A | N/A | N/A | 79 | 72 | | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Henry Brinker | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Hetzel | N/A | N/A | N/A | N/A | N/A | N/A | 50 | N/A | N/A | 22 | 11 | 9 | N/A | N/A | N/A | N/A | N/A |
| Hunchback | N/A | N/A | N/A | N/A | N/A | N/A | 204 | 4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 76 | 24 |
| I.N. Seymour | N/A | N/A | N/A | N/A | N/A | 112 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 91 | N/A | N/A |
| John L. Lockwood | N/A | N/A | N/A | N/A | N/A | 86 | N/A | N/A | 62 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Louisiana | N/A | 122 | 34 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Morse | N/A | N/A | N/A | N/A | N/A | N/A | 120 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Shawsheen | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 82 | N/A | N/A | N/A | N/A |
| Southfield | N/A | N/A | N/A | N/A | N/A | N/A | 148 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 87 | 6 |
| Stars and Stripes | N/A | N/A | 47 | 19 | 27 | 4 | N/A | N/A | N/A | N/A | N/A | N/A | 73 | 29 | N/A | N/A | N/A |
| Underwriter | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Valley City | 14 | 171 | N/A | N/A | N/A | 105 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Whitehead | N/A | N/A | N/A | N/A | N/A | N/A | 98 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| William G. Putnam | 25 | 18 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 47 | 56 | N/A | N/A | N/A |
| **Total** | 39 | 388 | 81 | 19 | 27 | 386 | 988 | 24 | 62 | 22 | 11 | 9 | 202 | 85 | 129 | 163 | 30 |

Source: U.S. Navy Department 1897b

# Appendix D: Statistics by Cannon Type

32 pdr Guns

| Size | Charge (lbs) | Projectile | Elevation | Range (yards) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1st Graze | 2nd Graze | 3rd Graze | 4th Graze | 5th Graze | Extreme Range |
| 33 cwt | 4.5 | Shot | **Point Blank** | 287 | 708 | 1256 | N/A | N/A | N/A |
| | | | **1º** | 581 | 979 | N/A | N/A | N/A | N/A |
| | | | **2º** | 857 | N/A | N/A | N/A | N/A | N/A |
| | | | **3º** | 1140 | 1546 | 1759 | N/A | N/A | N/A |
| | | | **4º** | 1398 | 1446 | N/A | N/A | N/A | N/A |
| | | | **5º** | 1598 | N/A | N/A | N/A | N/A | N/A |
| | | Shell | **5º** | 1648 | N/A | N/A | N/A | N/A | N/A |
| 42 cwt | 6 | Shot | **Point Blank** | 313 | 731 | 1040 | N/A | N/A | N/A |
| | | | **1º** | 672 | 1143 | 1458 | N/A | N/A | N/A |
| | | | **2º** | 988 | N/A | N/A | N/A | N/A | N/A |
| | | | **3º** | 1274 | 1705 | 1875 | N/A | 2010 | N/A |
| | | | **4º** | 1505 | 1643 | 1717 | N/A | N/A | N/A |
| | | | **5º** | 1756 | N/A | N/A | N/A | N/A | N/A |
| | | Shell | **5º** | 1710 | N/A | N/A | N/A | N/A | N/A |
| 51 cwt | 7 | Shot | **Point Blank** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | **1º** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | **2º** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | **3º** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | **4º** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | **5º** | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Shell | **5º** | N/A | N/A | N/A | N/A | N/A | N/A |
| 57 cwt | 9 | Shot | **Point Blank** | 357 | 782 | N/A | N/A | N/A | N/A |
| | | | **1º** | 770 | 1310 | 1622 | 1930 | 2060 | 3400-3600 |
| | | | **2º** | 1154 | 1638 | 1928 | N/A | N/A | 2400-2700 |
| | | | **3º** | 1449 | 1792 | 1962 | N/A | N/A | N/A |
| | | | **4º** | 1708 | N/A | N/A | N/A | 1819 | 1750 – 1960 |
| | | | **5º** | 1932 | N/A | N/A | N/A | N/A | N/A |
| | | | **6º** | 2144 | N/A | N/A | N/A | N/A | N/A |
| | | | **10º** | 2731 | N/A | N/A | N/A | N/A | N/A |
| | | Shell | **5º** | 1850 | N/A | N/A | N/A | N/A | N/A |

Sources: Dahlgren 1856: 30-32; Canfield 1969:20

8 in. Shell Guns

| Size | Charge (lbs.) | Elevation | Range (yards) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1st Graze | 2nd Graze | 3rd Graze | 4th Graze | Extreme Range |
| 55 cwt | 7 | **Point Blank** | 283 | N/A | N/A | N/A | N/A |
| | | **1º** | 579 | 1054 | N/A | N/A | N/A |
| | | **2 º** | 869 | 1517 | 1815 | N/A | N/A |
| | | **3 º** | 1148 | 1732 | 2015 | N/A | N/A |
| | | **4 º** | 1413 | 1847 | 1965 | N/A | N/A |
| | | **5 º** | 1657 | 1754 | N/A | N/A | N/A |
| | | **6 º** | 1866 | N/A | N/A | N/A | N/A |
| | | **8 º** | 2315 | N/A | N/A | N/A | N/A |
| | | **10 º** | 2600 | N/A | N/A | N/A | N/A |
| 63 cwt | 9 | **Point Blank** | 332 | 735 | 960 | N/A | N/A |
| | | **1º** | 662 | 1138 | N/A | N/A | 3416 |
| | | **2 º** | 966 | 1650 | N/A | N/A | N/A |
| | | **3 º** | 1264 | 1820 | 2031 | N/A | N/A |
| | | **4 º** | 1540 | N/A | N/A | N/A | N/A |
| | | **5 º** | 1769 | 1915 | N/A | N/A | 1938 |

Sources: Dahlgren 1856:33, 34

Dahlgren Boat Howitzers

| Type | Charge (lbs) | Elevation | Range (yards) |
|---|---|---|---|
| 12 pdr Smoothbore (medium/heavy) | 1 | 5º | 1085 |
| 12 pdr Rifled | 1 | 5º | 1770 |
| | | ? º | 2640 |
| 20 pdr rifled | 2 | 5º | 1960 |
| 24 pdr Sometimes Rifled | 2 | 5º | 1270 |

Sources: U.S. Navy Department 1897: 555-578; Ripley 1970:369.

Dahlgren Shell Guns

| Type | Charge (lbs) | Elevation | Range (yards) |
|---|---|---|---|
| 9 in. Smoothbore | 13 | 5º | 1710 |
| | | 15º | 3450 |

Sources: Canfield 1969:20; Ripley 1970:370

Dahlgren Rifles

No Data

Parrott Rifles

| Type | Charge (lbs.) | Elevation | Range (yards) | Deviation (yards) |
|---|---|---|---|---|
| 20 pdr | 2 | 5 º | 2100 | N/A |
| | | 15º | 4400 | |
| 30 pdr | 3.25 | 5 º | 2200 | |
| | | 10 º | 3960 | |
| | | 12º | 4400 | |
| | | 13.5º | 4576 | |
| | | 15º | 4840 | |
| | | 16º | 5060 | |
| | | 17.5º | 5280 | |
| | | 25º | 6700 | |
| 100 pdr | 10 | 5 º | 2234 | 4 |
| | | 10 º | 3544 | 4.3 |
| | | 15 º | 4994 | 41.6 |
| | | 20 º | 6028 | 62.5 |
| | | 25 º | 6916 | 82.8 |
| | | 30 º | 7930 | 153.5 |
| | | 35 º | 8460 | 201.1 |

Sources: Holley 1865:478-481; U.S. War Department 1883:80-92; Ripley 1970: 370

Wiard Boat Howitzers

| Type | Elevation | Range (yards) |
|---|---|---|
| 6pdr | 10º | 3520 |
| 12 pdr | 10º | 4400 |
| | 15º | 4840 |

Sources: U.S. War Department 1883:80-92

Banded and Rifled 32 pdr guns

Comparable to 100 pdr Parrott Rifle