ABSTRACT


The Curlew is an iron-hull steamboat built in 1856 for passenger and freight service in North Carolina. It served as a gunboat for the Confederate Navy. It was sunk resisting the invasion of Roanoke Island in 1862. The Curlew is a case study of the progress of economic development in North Carolina, and a study of the role of the gunboat in the Confederate Navy. The Curlew also serves as an indicator of the state of iron shipbuilding technology in America during the 1850s. As an archaeological site, the Curlew remains are a rare extant example of early American iron shipbuilding.
An Historical and Archaeological Investigation of the Steamboat Curlew

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Christopher J. Olson

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Introduction

The Industrial Revolution in nineteenth-century America brought great changes to American society. Parallel improvements in agriculture and transportation vastly increased the production and wealth of the United States. Technology changed transportation systems that had been unimproved for thousands of years. For example, the steam engine gained pre-eminence as a means of water and land propulsion, displacing the five-thousand-year domination of the sailing ship and horse.

To explore the general trends of the nineteenth century is relatively easy. Close examination of a micro-section of this same period, however, can be frustrating, even in a supposed well-documented period. There are numerous subjects about which little is known, one such subject being the iron steamboat Curlew. The Curlew provided transportation service in North Carolina's sounds in the late 1850s, and served as a Confederate Navy gunboat before being sunk while resisting the invasion of Roanoke Island in 1862. The Curlew is a case study of the progress of economic development in North Carolina, and a study of the role of the gunboat in the Confederate Navy. The Curlew also serves as an indicator of the state of iron shipbuilding technology in America during the 1850s. As an archaeological site, the Curlew remains are a rare extant example of early American iron shipbuilding. This thesis will attempt to fill a gap in the historical
record of a segment of mid-nineteenth-century America by focusing exclusively on the Curlew.

The quality and quantity of documentation on the Curlew is varied. Until this study no extensive historical research has been performed exclusively on the Curlew. Standard Civil War histories gave the Curlew only a brief mention. The closest any person has come to writing a history based solely on this steamboat was a popular history written by a sports diver in 1989. This work was not comprehensive and does not examine the Curlew's peacetime and wartime activities. Previous archaeological research on other ersatz Confederate gunboats is scarce. Investigating the Curlew brings together historical and archaeological documentation that points out not only its Civil War service but its connection with the early economic development of North Carolina.

The Curlew operated during a period of slow economic growth in North Carolina. The geographical nature of the state greatly inhibited economic development. Eastern North Carolina residents who had access to the coastal waterways managed to prosper in comparison to the rest of the state. However, this created a conservative, politically dominant elite that maintained its wealth through its water access. The Curlew's owner represents these wealthy easterners. During this period Curlew operated between various coastal North Carolina towns.
The North Carolina sounds were a vital part of the Confederate war effort. The sounds were a haven for privateers and a transportation route for goods. Furthermore, they were also a source of timber, salt, and foodstuffs. The Confederacy made considerable efforts to defend the tidewater area. This defense included the establishment a navy. However, the Confederacy, lacked the shipbuilding capability of the Union. As a result the Confederate Navy was forced to find other means to raise a fleet, one that eventually consisted of an assortment of ironclads, commerce raiders, steamboats and sailing vessels of various designs and conversions. About one-third of this Navy consisted of converted, unarmored, lightly armed gunboats.¹ The majority of the histories of Confederate vessels, however, focus almost exclusively on the ironclads or commerce raiders. This thesis, therefore, will examine these unarmored gunboats by examining the history of one Confederate vessel: the Curlew.

The history of the Curlew can also shed light on the early period of American iron shipbuilding. It represents a case study in early American iron shipbuilding. Iron shipbuilding was slow to be accepted in the United States as compared to Britain. Yet it is still surprising that the remains of the Curlew show a style of frame attachment that appears out of date for its time period in the late 1850s. Comparisons of builders specifications of Harlan &
Hollingsworth ships between 1844 and 1861 show that this company used keeper framing techniques instead of angle iron framing for its ship construction. This is peculiar since there are examples of other contemporary iron shipyards that used more advanced techniques of construction. In this light it is interesting to note that two decades earlier, the U.S. Navy's first iron warship, built in Pennsylvania in 1843, already used the more advanced "T"-beam frame construction.² The reason for Harlan & Hollingsworth's use of antiquated technology is unclear, but may be connected to the poor transfer of technical experience between American iron shipbuilders. The keeper frame method may have also been a cheaper form of construction. This is an important consideration in an era where iron hulls cost about 20% more than wood hulls. Despite their primitive design, Harlan & Hollingsworth constructed 73 iron vessels between 1844 and 1861, making that firm the leading American iron shipbuilder.³

The Curlew has become a valuable archaeological site. Detailed plans, descriptions, and photos of this vessel have not survived. The scanty historical documentation on early American iron shipbuilding techniques makes archaeological research in this area very important. Despite the collapsed and encrusted nature of the wreck, information concerning construction details such as keeper framing were documented. The Phase II pre-disturbance site map, which is a product of this thesis, turns a non-descript pile of metal into a
coherent map that can be expanded in future examinations. The site map is also a basis to monitor any natural or man-made decay effecting the site in the future.

This thesis, therefore, will examine the Curlew within the context of three topics: Iron ship construction, eastern North Carolina antebellum economic development, and the Civil War. It will cover the Curlew's construction in the context of the development of American iron shipbuilding up to 1860. It will also discuss the predicament of North Carolina's early federal commercial and economic situation. This thesis will also examine the North Carolina steamboat trade, and the role that the Curlew played in that trade. In addition, this thesis will examine the role of the Confederate Navy gunboat squadron in North Carolina sounds, and the Curlew's service in that squadron. Finally, this thesis will report on the archaeological field investigations of the Curlew site and its results. This thesis, containing both archaeological and historical aspects, will help to relate the Curlew's role in the ante-bellum period of steam navigation in North Carolina, the role of the gunboat in the Confederate Navy, and of the retrograde nature of iron shipbuilding technology in America before 1860.
Endnotes


Chapter 1: The Curlew and Antebellum North Carolina

Introduction

The steamboat Curlew represents a product of the economic development of antebellum North Carolina that in turn was shaped by the geography of the state.

The North Carolina sound region is a fertile agricultural area, and as such was important to the livelihood of North Carolina coastal plain residents. Although eastern North Carolinians were able to create trade networks, geography, in the form of a lack of deep-water access, restricted the amount of economic growth the state was capable of achieving. For this reason North Carolina products had to be transported through neighboring states to be exported, enabling other states to profit from North Carolina products. A conservative state government, dominated by eastern counties of North Carolina, also hindered economic growth. The result was a very slow economic growth rate for antebellum North Carolina.

Originally, water craft such as schooners, barges, and ferries were built to enable North Carolina entrepreneurs to tap into the intercoastal trade with neighboring states, and contributed to the state’s economic growth. By the 1850s, years behind many other states, steamboats became part of the economic development of antebellum North Carolina, and eventually contributed to the defense of the sounds during
the Civil War. To fully understand the Curlew's significant role in the antebellum period, it is necessary to explain how geography affected North Carolina's commerce, a commerce in which the Curlew participated.

Coastal North Carolina Geography

The coast generally lies in a northeast to southwest direction between the Virginia and South Carolina borders. North Carolina's coastline is 330 miles long, which ranks it as the second longest among the Atlantic states (behind Florida, which has 399 miles). From Virginia, the North Carolina coast extends south by southeast for a considerable distance before turning south by southwest at Cape Hatteras. From Cape Hatteras the coastline continues southwest to Cape Fear, from which it extends in a west by southwest direction into South Carolina. The coastline has five major shoals lying offshore: Platt Shoals, Wimble Shoals, Diamond Shoals, Lookout Shoals, and Frying Pan Shoals (Figure 1).¹

North Carolina's entire coastline is characterized by low, sandy islands that separate the ocean waters from the sounds. These sandy islands extend almost the entire length of North Carolina, and are known as the Outer Banks, or barrier islands. These islands vary in width, usually between less than one mile wide and three miles wide.
Figure 1: North Carolina coastal sounds, inlets, and shoals. Adapted from Logan's "Historical Geographical Study of North Carolina Ports."
Several shallow gaps, or inlets, penetrate these barrier islands and connect the inland sounds to the Atlantic.\textsuperscript{2}

The sounds of North Carolina cover large areas, particularly in the northeast. The width of the sounds varies, though they generally decrease in size from north to south. The largest sound, the Pamlico, is sixty miles wide. Further south, near the Cape Fear River, the sounds are only about 1000 yards wide. The northeastern sounds, the Pamlico and the Albemarle, extend deep into mainland North Carolina, and form entrances to the Pamlico, Chowan and Neuse Rivers. These rivers extend nearly a third of the way into the state's interior. The sounds have no distinct channels, and have mostly level bottoms except for occasional sandbars. These sandbars are usually found near the mainland and the Outer Banks.\textsuperscript{3}

The terrain directly to the west of the sounds is part of the North Atlantic Coastal Plain. Its geography is characterized by flat or gently rolling land that is less than one hundred feet in elevation. Swamps are interspersed throughout the area. Along the inland part of the coastal plain, adjacent the piedmont, the terrain rises to approximately two or three hundred feet in elevation. Large areas are imperfectly drained, and river valleys become less distinct as rivers broaden to the east into the coastline sounds. There are a great number of small creeks, rivers,
and bays which access the area. As a result, most of the coastal plain is near navigable waters.\(^4\)

The geographic nature of the sounds of North Carolina created a commerce that is mostly waterborne. The inhabitants along the sounds tended to rely on various watercraft, including barges, lighters, schooners, and steamboats. The *Curlew* was among the watercraft that carried to market the vast agricultural product of the region.

**Coastal North Carolina Agricultural Products**

North Carolina was an agricultural producing state for most of the nineteenth century. The climate of its coastal plain is particularly suited for agriculture. Rainfall is relatively heavy, ranging from 44 to 55 inches per year. The winters are mild and short, the average temperature for January being around \(44\) F. The frost-free season is long, averaging between 218 and 270 days.\(^5\) The coastal plain of North Carolina was rich in food production, with corn as the main agricultural product.

Corn was the state's most widely grown crop throughout the eighteenth and nineteenth centuries. It could be raised relatively easily and had many uses. Corn was the main staple for livestock, and an important item in a North Carolinian's diet. Corn whiskey was also a popular trade commodity. From 1840 to 1860 corn production rose from 23,893,000 bushels to 30,000,000 bushels. Wheat was another
important crop. On the coastal plain, wheat was grown north of the Albemarle Sound. It was raised mainly for export rather than for domestic consumption. Wheat was especially popular for export because the geographic characteristics of the northeastern sound region favored wheat growth. In 1840, United States census figures show North Carolina wheat production was 2,130,102 bushels. By 1860 wheat production had risen to 4,743,106 bushels. The proximity of navigable waters made the transportation of bulky products such as wheat easy.6

Tobacco growing in North Carolina began in the late seventeenth century in the Albemarle Sound area. From there its production slowly spread south. Tobacco eventually became North Carolina's most important non-grain crop. It was grown primarily in the Roanoke valley and in the counties along the Virginia border. Tobacco production increased from 16,722,000 pounds in 1840 to 32,853,250 pounds in 1860. Tobacco was often shipped directly from North Carolina ports, but large quantities were shipped over to Virginia for export. Being a labor-intensive crop, tobacco production helped promote the importation of slaves. Cotton, on the other hand, spread much more slowly. It became a major crop by the Civil War, with production rising from 34,617 bales in 1840 to 145,514 bales in 1860. As a whole, cotton replaced tobacco as the South's most valuable crop.7
Eastern North Carolina's vast pine forests were its single greatest economic asset in colonial times. The naval stores, shingles, and sawed lumber industries utilized the area's expansive timber stands. Naval stores is the general term for turpentine, tar, rosin, and pitch produced from pine trees. In 1860 United States naval store production was valued at $7,409,745, of which North Carolina's contribution was $5,311,420. North Carolina led the world in naval store production until 1870.8

Sawed lumber and its derivatives were nearly as valuable to the state as naval stores. Lumbering, which began as a household industry, had assumed commercial proportions by the mid-eighteenth century. Lumber was exported in various forms such as barrel staves, shingles, and planks. The Albemarle region in particular was a major exporter of barrel staves. Between 1850 and 1860 the value of North Carolina lumber rose from $985,073 to $1,073,968, a 9% increase.9

The North Carolina fishing industry began in the late colonial period, and expanded after 1815 when innovative fishermen began to set nets within the sounds rather than in the creeks and rivers. Fishermen also began using huge nets which needed horse-drawn windlasses to haul in the catch. By these means massive fish catches were possible. The North Carolina fishing industry was very profitable, and supported the coastal areas during hard economic times. Commercial fishing grew in significance in the North Carolina sounds
during the antebellum era. In 1840 North Carolina produced 525,797 pounds of smoked fish and 73,350 barrels of pickled fish. By 1860 the North Carolina fishing industry ranked second largest in production in the pre-war southern states.10

The Curlew was among the various North Carolinian watercraft employed to carry the vast amount of produce of the land adjacent to the sounds. As mentioned, however, colonial and antebellum North Carolina commerce as a whole suffered from inadequate transportation routes caused by its regional characteristics.

**Colonial and Antebellum North Carolina Commerce**

Coastal geography was a factor that influenced North Carolina's commercial routes. Its growth hinged on satisfactory lines of communication with other regions. In colonial and antebellum eastern North Carolina the lack of well-developed roads made overland travel slow and difficult. This was a common predicament along the Atlantic Coastal Plain throughout colonial America. A common theme in contemporary travelers' accounts is bad road conditions. In 1842 Governor John Morehead stated that it cost half the farmer's crop "to transport the other [half overland] to market."11 Furthermore, the numerous streams of coastal North Carolina slowed overland commerce, since crossing streams required bridges or ferries, which were expensive to build
and maintain. On the other hand, water travel was a cheap and practical means of transportation.\textsuperscript{12}

Rivers and sounds were, by their nature, instant highways for travel. Shallow draft vessels such as schooners, barges, and steamboats were needed for North Carolina's inland waters. These vessels were important to the economy of the region, transporting goods locally.\textsuperscript{13} Furthermore, the North Carolina sounds provided excellent protection from the action of high waves. The shallow and protected nature of the sounds kept the wave height to a maximum six feet.\textsuperscript{14} Because of the ease of water transportation, farms and plantations naturally set up around rivers and waterways.

The products of the North Carolina coastal plain were collected at landings located on sounds and rivers. These scattered landings created few centers of commerce and tended to spread the population along navigable waterways, that made produce collection time consuming. For example, the brig Joannah left the West Indies in 1768, bound for North Carolina. Cape Hatteras was sighted on 25 February and on 1 March the brig reached Edenton after passing through Ocracoke Inlet. The Joannah then spent two months in the Cashie River stopping at the numerous landings along that river collecting naval stores and barrel staves. By 7 May the Joannah had set sail from Edenton, spending ten days to clear the Outer Banks for London. Forty-five days later the brig reached London.
The time it took to reach London was about one month less than the time it took to collect the cargo in North Carolina. The time-consuming collection process created by scattered landings remained more or less the same during the antebellum period. Reliable transportation provided by steamboats like the Curlew helped alleviate this problem.

North Carolina's five large northeastern navigable rivers (the Chowan, Roanoke, Pamlico-Tar, and Neuse) all had collection points at or near their mouths. However, there was no single location or port that could naturally receive the output of all five rivers. However, none of these ports could rival those of neighboring states. For example, Norfolk, Virginia, located at the mouth of the Elizabeth River on Chesapeake Bay, acted as a terminal for agricultural commodities from a vast inland area and provided a concentrated point of freight for larger ships to export. Handicapped by shallow water and the state's hazardous shoals and inlets, North Carolina seaports were unable to expand like the commercial cities of Charleston, Norfolk, and New York.

Commercial Cities

A commercial city is defined here as an urban area that is a concentration point for a region's commerce. It is a collection and shipment point for local produce, and a point of destination for products from out of state. The Curlew
was employed to carry such products out of the state. A commercial city is a place that provides opportunities for home markets and industries to grow. It is also a place where merchants can buy supplies locally rather than from outside the state.\textsuperscript{17}

Throughout the antebellum period the chief source of paper currency were state-chartered private banks. The paper money from these banks had various degrees of acceptability, and was not always redeemable in specie on demand. Sometimes state banks issued notes with little or no specie backing. Furthermore, a state bank's currency would circulate at a reduced face value outside the state. Under these circumstances bank failure was common, counterfeiting was rampant, and people regularly had to suffer face value loss on the notes they received and held.\textsuperscript{18} In this context the advantages of a home commercial city were evident.

Antebellum North Carolina merchants and businessmen purchasing goods at home, in a commercial center, could keep their debts within the state. State banks would let local merchants give greater stimulus to North Carolina commerce by confining the banks' paper circulation and specie payments within the state. Otherwise North Carolina bank notes would be circulated abroad, where they would be exchanged for North Carolina silver. This meant that the state risked draining its silver reserves, a practice giving rise to financial crises like the Panics of 1819, 1837 and 1857.\textsuperscript{19} A commercial
town would give North Carolina a place of concentrated wealth. However, North Carolina had only one town, Wilmington, that qualified as a major commercial center.

Wilmington is located on the Cape Fear River. This river flows directly into the Atlantic, the only river in North Carolina to do so. This geographical advantage made Wilmington the state's largest port during the antebellum period. It was, however, somewhat handicapped by the presence of Frying Pan Shoals at the mouth of the Cape Fear River, a problem that still exists today. Nevertheless, Wilmington, on the eve of the Civil War was a thriving port, and the only North Carolina port that had a substantial foreign trade. North Carolina also had seven minor ports in the northeastern part of the state. All of them were handicapped by poor ocean access, but were able to establish trading links to other ports. The Curlew would be involved in the trade with Virginia.

The seven minor ports of North Carolina are all located along the east coast near the mouths of the rivers they serve (Figure 2). All of these ports were fully established by 1800. The ports and the rivers or sounds they served were: Edenton (serving the Chowan and Roanoke Rivers, and Albemarle Sound, and the Curlew's home port), Plymouth (serving the Roanoke River), Washington (serving the Tar and Pamlico Rivers and Pamlico Sound), New Bern (serving the Neuse and
Figure 2: Northeastern North Carolina's coastal towns. Adapted from Dunbar's "Historical Geography of the North Carolina Outer Banks."
Trent Rivers), Elizabeth City (serving the Pasquotank River), Ocracoke, and Beaufort. Beaufort was the prime colonial port, and served the North and Newport Rivers. Beaufort’s importance declined by the antebellum period due to insufficient inland access and the ascension of New Bern as the commercial point for the Neuse River. The port of Ocracoke, located on the Outer Banks near Ocracoke Inlet, was also a prime colonial-era port. It functioned primarily as a transshipment area between smaller vessels that could navigate the sounds and rivers, and the large ocean-going vessels that could not (or would not) navigate the sounds. These seven ports had one common problem: they had poor access to the Atlantic Ocean.

Though useful river and sound waterways existed in North Carolina, their shallow depth limited the size of the ships that could use them. In addition, the ever-changing nature of the Outer Banks created problems as inlets unpredictably shoaled up. New inlets that formed tended to be too shallow to improve access to the sounds. Poor inlet access discouraged economic growth in established areas, the prevented growth in parts of the state that were not fortunate enough to be conveniently located near an inlet (Figure 2).

Ocracoke, Currituck, Roanoke, Oregon, and Hatteras were the inlets that served eastern North Carolina. Ocracoke Inlet was the primary inlet for all towns along the eastern
sounds from colonial times until the 1850s. Its location made the water route to the Atlantic circuitous and time consuming for most of northeastern North Carolina. Ocracoke Inlet's usefulness waned when it started shoaling up in the 1840s. Roanoke and Currituck Inlets, which were the closest ocean access points for communities along the Albemarle Sound, closed entirely by 1811 and 1821 respectively.²²

Hatteras and Oregon Inlets were opened up by a storm in 1846. Though these inlets were closer to the communities in northeastern North Carolina, they were only useful to small vessels because of their shallow depth. Hatteras Inlet eventually deepened enough to surpass Ocracoke Inlet in usage by merchant ships, though it was still hazardous, and occasionally ships had to unload some of their cargo in order to pass through.²³ Poor ocean access diverted North Carolina's products to neighboring states. This commercial situation provided incentive for the creation of steamboat companies to carry trade out of North Carolina.

North Carolina's geography as a whole also produced a political sectionalism between eastern and western North Carolina, a sectionalism that did almost as much to hinder economic growth.²⁴

By the early nineteenth century, North Carolina's state government was over-represented by the wealthy conservative residents of eastern North Carolina. The state constitution of 1776 granted the eastern counties greater representation,
and lawmakers from that area tended to block any potential undermining of their authority in the North Carolina General Assembly. Eastern landlords, living on plantations with (for the landlords) reasonably satisfactory trade outlets, mandated that their legislators maintain the status quo. Several of the eastern landlords, such as Nathaniel Macon, were officeholders in the state legislature.25 The result of this political obstructionism was an economically depressed state that held little attraction for many of its own residents, let alone new immigrants.

Many antebellum North Carolina residents, dissatisfied with the stagnant economy and limited opportunities for advancement, moved out of the state. Immigrants, aware of North Carolina's problems, bypassed the state and settled in the lands beyond the Appalachian Mountains.26 North Carolina's population growth subsequently fell off considerably. In 1790 North Carolina's population ranked third in the United States, but by 1860 it ranked twelfth. Property values declined as land was plentiful and buyers few. Slaves left the state as masters sold off those they could not keep busy. The state legislature became concerned over this developing situation, since taxes on land and slaves were the state's main sources of revenue. The problems of eastern over-representation in the state government became so acute and burdensome for the state that
it was addressed by a state constitutional convention in 1835.\textsuperscript{27}

The Convention of 1835 met for one month in Raleigh. After much debate a list of amendments was added to the state constitution. These amendments were ratified later in the year. The convention became a turning point in the history of North Carolina. Though it did not solve all the state's problems, reforms instituted by the convention ultimately helped redistribute legislative power, making conditions favorable for gradual economic development. Eastern state representatives became less powerful in the state government, and couldn't outright stop any internal improvement plan that didn't benefit directly their part of the state.\textsuperscript{28}

After 1835 economic development manifested itself in many ways. Agricultural conditions improved, railroads and factories were established, transportation conditions improved, and the general wealth of the state slowly increased. This growth lasted until 1861.\textsuperscript{29} As a part of the general upward trend in economic development in this period, several transportation systems were created in an attempt to increase the state's commerce.

Initially, private North Carolina transportation companies established or improved commercial routes with neighboring states. Their intentions were to improve North Carolina's economy by opening a broader market for local industry. However, these improvements made it easier for
North Carolina businessmen to import finished products from outside the state, and to export North Carolina's raw materials.\textsuperscript{30} The result was North Carolina's local industries were unable to develop and grow. To help revitalize the economy, various railroad, plank road, canal, and steamboat companies formed during the antebellum period. Each method of transportation met with various degrees of success.

Railroads would eventually aid the economic development of North Carolina. Railroads, however, were not quickly adapted near the sound areas, where the idea of water transportation was too firmly fixed in merchant's minds to be quickly replaced. The residents of some areas had a negative attitude towards railroads, which were considered only beneficial to Virginia or South Carolina. For example, the inhabitants along Albemarle Sound refused to support three separate attempts to build a railroad connecting Edenton with Virginia. In 1835 the \textit{Edenton Gazette} reported a local resolution stating that the re-opening of Roanoke Inlet was the only internal improvement that would meet the needs of the town.\textsuperscript{31} By 1860 there was only one railroad connection directly serving the eastern sounds at New Bern.\textsuperscript{32} Railroads would greatly aid economic development in North Carolina, but not until after the Civil War.

In addition to railroads, plank roads held some promise for improvement of over land trade. The plank road movement was enthusiastically adopted by North Carolinians in the
early 1850s. Between 1849 and 1856 eighty-four plank road companies were incorporated. However, plank roads were only moderately prosperous for a few years due to rapid wear, decay, and costly upkeep. Several financial crises, high maintenance costs, bad crop years, and growing competition from railroads caused plank road building to disappear in North Carolina by 1860.33

Canals were another way to connect North Carolina waterways with local distribution centers in order to compete with Norfolk in Virginia and Charleston in South Carolina. Canals would ultimately prove effective for improving North Carolina navigation through bypassing the hazardous Outer Banks. At the outset canal construction was hindered by many difficulties that prevented their rapid expansion. Short-sighted planning, poor maintenance, bad design, and silting of existing canals impeded canal development. In North Carolina's federal and antebellum periods many canals were planned but only three were completed: the Dismal Swamp Canal, the Clubfoot and Harlow Canal, and the Albemarle and Chesapeake Canal. Of these three, only the Albemarle and Chesapeake Canal was in full operation by 1860. Canals also had the detrimental effect of moving North Carolina produce out of the state to be exported abroad, therefore creating one more outlet for state money. One Edenton newspaper article in 1835 called the Dismal Swamp Canal "a bloodsucker at North Carolina's very vitals." Generally the canals
helped eastern North Carolina's transportation problems but they mostly benefited Virginia.\textsuperscript{34} The canal's existence, and Elizabeth City's prosperity, contributed to the formation of the steamboat company to which the Curlew belonged. The other form of transport affecting economic development was the schooner.

Despite the increase in steamboat usage, schooners were still the main form of commercial transportation in North Carolina. Schooners were the most dominant vessel engaged in foreign and intercoastal trade throughout the nineteenth century, with exception for the years 1876 to 1884. In 1860 a minimum of 168 schooners operated out of the seven minor eastern North Carolina ports. By contrast, a minimum of eighteen steamboats were working in eastern North Carolina in 1860.\textsuperscript{35}

Steam navigation would begin in the confined waters of rivers and sounds due to the low technological level of steam engines. In such areas a breakdown would have less drastic effect than on the open seas. Therefore, the first application of steam technology occurred on the sounds and rivers of North Carolina. The difficulty of land travel made steamboats the only means available for delivery of produce. However, steamboat navigation had a slow start in eastern North Carolina. Yet the decade before the Civil War was prosperous enough to allow the largest expansion of steam
navigation in the state. The Curlew was brought in during this period of prosperity.36

Steamboat travel in North Carolina started in 1819 on the Pamlico Sound. Steam travel had several advantages over other modes of transportation. Ship companies could be started with a small amount of capital, because the rivers and sounds of North Carolina provided public highways that did not require the expense of building a right of way. River improvement is often needed, but this need was minimal in the lower rivers and sounds. Steamboats were not hindered by wind or current, and were much more reliable than sailing vessels for the transportation of goods up rivers and on canals.

Steamboat usage generally grew during the North Carolina antebellum era, especially on the Cape Fear River.37 In 1833 steamboats start to appear in eastern North Carolina in increasing numbers. The panic of 1837 caused a reduction of steamboat demand, but the rich agricultural areas of the Cape Fear and Roanoke Rivers continued to support a minimum of steam navigation activity. Steamboat usage increased after 1850. In that decade twice as many steamboats enrolled as did the previous thirty years. Between 1850 and 1861 a total of thirty steamboats were enrolled or registered in North Carolina, as compared to eighteen steamboats enrolled or registered between 1819 to 1849. The Cape Fear River alone had some forty steamboats operating along its path. The
Weekly North Carolina Standard in 1853 described North Carolina as having roughly 45% of the South’s steamboat tonnage. Overall, the increase in steamboat usage shows the growing role of steamboats to the economic growth of North Carolina. Although the steamboats first economic contribution was in the form of cargo transportation, a growing tourist industry made steamboat excursion trips a profitable venture. The tourist trade will be expanded upon in Chapter 2.

It has been demonstrated that the North Carolina sound areas were vital to the livelihood of antebellum residents. The nature of North Carolina’s land forced merchants to purchase and sell goods outside the state. Its geographic character restricted commerce, raised freight rates, and perpetuated a backwardness in manufacturing, agriculture, and urban development. The geographic nature of North Carolina kept the state from developing a large commercial city on the scale of New York, Norfolk, or Charleston. As a result, South Carolina and Virginia controlled and profited from North Carolina goods. Geography also produced a political sectionalism between east and western North Carolina, a sectionalism that did nearly as much as geography to hinder economic growth. Despite poor deep-water access, the people of North Carolina were able to create a trade network, though mainly through other states. The Curlew was the product of eastern North Carolina residents’ continued reliance on water
transportation as an avenue for prosperity, and the reliance on other state's ports for the export of North Carolina produce.
Endnotes


2Ibid., 12, 13.

3Ibid., 16-18.


8Lefler and Newsome, History of a Southern State, 97, 100; Merrens, Colonial North Carolina, 97, 100-104; U.S. Bureau of the Census, Seventh Census of the United States: 1851, 1 passim; Eighth Census of the United States, 1860, 1 passim.

9Ibid.


11Lefler, History of a Southern State, 316.


14Stanley Riggs, personal communication, July 20, 1996.


20Lefler and Newsome, History of a Southern State, 322; MacGill, Transportation in the United States, 274; Daily Reflector (Greenville, North Carolina) September 10, 1995; Alan D. Watson, Wilmington: Port of North Carolina (Columbia, South Carolina: University of South Carolina Press, 1992), 70.


23Ibid.


26Merrens, Colonial North Carolina, 180.


28Lefler and Newsome, History of a Southern State, 355.

29Ibid.

30Ibid., 397; Weaver, Internal Improvements in North Carolina, 34.

31Weaver, Internal Improvements in North Carolina, 76; Edenton Gazette (Edenton, North Carolina) January 7, 1835.
32 Dunbar, Geography of the North Carolina Outer Banks, 25.

33 Lefler and Newsome, History of a Southern State, 381-383.


Chapter 2: Prewar History of the Curlew

Introduction

The history of the steamboat Curlew is linked to the history of American iron shipbuilding and the economic development of northeastern North Carolina. The Curlew was built during the early stages of iron shipbuilding in the United States by Harlan & Hollingsworth, one of the preeminent builders of iron ships before the Civil War. The Curlew was brought to North Carolina to carry freight on the Chowan, Roanoke, and Blackwater Rivers, and for transporting excursionists to and from Nag's Head. It would operate profitably in this capacity until the Civil War.

Historical Background of Iron Ship Construction

The point when iron first came into use for ship construction is unknown. Great Britain led other countries in iron-working in the 1780s after Englishman Henry Cort developed the puddling process, that economically refined large quantities of wrought iron. Cort also invented grooved rollers, which facilitated the production of iron plate. Grooved rollers were a significant improvement over previous iron-working methods, which employed less efficient trip hammers to fashion iron plates. Grooved rollers made plates sufficiently uniform to be used for watertight or pressure tight containers. By 1786 iron was used to build boilers in
Britain, and the next year iron barges appeared on British canals.¹

Steam power as a method of ship propulsion was adopted by the early nineteenth century in both the United States and Britain. In 1818 British entrepreneurs experimented with adapting steam engines to a small iron-hulled craft called the Vulcan, and by 1821 British shipbuilders had gained enough experience to construct the first iron steam vessel capable of coastal travel. This vessel, the Aaron Manby, was originally fabricated in sections that were shipped to London for assembly. In 1828 the Aaron Manby steamed to France, where it operated until 1855.²

Iron shipbuilding expanded in Britain during the 1820s and 1830s with the exportation of iron hulls to foreign customers, including the United States. In the 1840s iron shipbuilding was well past the fledgling experimental phase in Britain, with insurance companies setting specifications for iron construction. Lloyd's of London began classifying irons ships by 1837, and by 1855 Lloyd's had issued the first rules governing the basic construction characteristics of iron vessels. By contrast, American iron shipbuilding would remain marginal until the 1870s.³ Both Britain and the United States both experienced problems early on using iron as a material for ship construction.
Problems with Iron

In 1842, English maritime engineer John Grantham identified six problems with iron ships: compass deviation, leeward drift and steering difficulties, prejudice against a new material, high insurance rates, barnacle growth in seawater, and stiffness of hull. One of these problems, barnacle growth, was particularly troublesome.

Barnacle growth, or bottom fouling, was a major problem for iron ships in the open sea. Various attempts at solving this problem were tried, though a final solution (in the form of anti-fouling paint) would not be found until the late nineteenth century. Bottom fouling was less a problem in brackish waters and non-existent in fresh water.

Another drawback of iron use in ship construction was that it required precise mechanical drawings and patterns, and did not rely on the "shipbuilder's eye." Furthermore, construction mistakes on iron ships were not easily fixed, whereas mistakes on wooden ships could be corrected by applying the plane or adz. Iron shipbuilding also required heavy machinery for moving, shaping, and cutting plates. All this equipment required a considerable outlay of capital. For example, it was estimated by 1880 that a wooden shipyard could be opened with a capital of $500 to $20,000, whereas iron shipyards required at least $60,000 in capital. It is little wonder that United States shipyards using wood
resisted the changeover to iron. Only one American shipyard, Cramp's of Philadelphia, successfully made the changeover from wood to iron.6

Iron Shipbuilding in the United States

The main reason for America's delay in adopting iron for shipbuilding was economic and cultural. America's abundant timber resources provided cheap materials for wooden shipbuilding, while iron remained expensive to purchase and produce during the early nineteenth century. Furthermore, the specialized machinery involved in the production of iron and the high cost of labor ensured a late start for the use of iron in American shipbuilding. This situation changed in the 1840s.7

The United State's first steam-propelled iron ship, the Codorus, was built in 1825 at York, Pennsylvania. A lapse in iron hull steamboat building existed until the 1840s. Before then iron shipbuilding consisted of building small unpowered iron barges. There were two reasons for this sudden interest in iron shipbuilding: a drop in the United State's iron prices and an increase in importation of inexpensive, low-quality iron from Britain. The domestic price drop was due to use of the abundant reserves of anthracite coal, which was cheaper to use for iron smelting than the traditional fuel, charcoal. United States pig iron production doubled from 1840 to 1847, reaching a peak that would be almost unmatched
until the Civil War. The drop in iron prices in 1842 probably gave initial stimulus to the iron shipbuilding industry. However, the average price of United State's iron rose from $24 per ton in 1842 to $43 per ton in 1860.⁸

Despite this, iron hulls were estimated to be equal to or at worst slightly more expensive than wooden hulls. However, iron hulls were lighter and stronger, which meant they could carry a greater cargo than wooden ships of similar dimensions. This increase was due to the smaller size of supporting iron frames compared to wood ones. It was estimated that an iron hull could carry up to twenty percent more cargo than a wooden hull. The pioneer iron steamship Great Britain is a good example of this. By being built of iron it gained by 24,000 cubic feet of hull space. The ship also weighed approximately 600 tons less, leaving more weight that could be used for cargo, passengers, or fuel.⁹

Furthermore, iron hulls were more cost effective due to their longer life span. As one 1856 trade magazine noted:

After ten years in a wooden ship, and half that time in a sea steamer, the frames, planking, etc, become so decayed as to be a constant source of expense, and I am informed that our insurance offices consider eleven years as the average duration of timber built ships. We have but two iron vessels, that I am aware of, constructed for sea service -- the coast survey steamer Walker, and the revenue cutter Polk. These vessels had been in use for eight years, and a recent examination of ..[the Walker] did not exhibit any symptoms of decay beyond a very slight rust...all that portion of the hull made of iron was in good condition, while the wooden decks and waterways were very nearly worn out.¹⁰
By the 1850s, iron as a material for ship construction was gradually gaining acceptance in the United States, particularly in the private sector.\textsuperscript{11}

Since ironworking required specialized equipment and skill, United States ironworking was suited to the boilermakers and engine mechanics who were experienced in working with it. In terms of plate bending, riveting and water tightness, an iron vessel was comparable to a steam boiler. Boilermakers and mechanics first experimented with ship building through iron barge design and construction, learning to develop plans and follow them accurately. However, these builders did not publish descriptions of the vessels they built. The lack of publishing may have been due to the negative attitude of the people of the day. The public, the wooden shipyard owners, and even the iron workers themselves seemed to perpetuate an impression that functional iron ships could ever be anything but ugly, nor could iron ever replace wood in shipbuilding.\textsuperscript{12}

Experienced shipwrights were employed to assist ironworkers in all that pertained to the shipwright profession. Work such as making a model to work by, the "laying down" of lines, making moulds of frames, superintending the bending and raising of frames, laying the deck, building the cabins, and launching the vessel were initially contracted out to wooden shipyards. Eventually engineers and boilermakers purchased waterfront property and
employed journeyman shipwrights in order to begin shipbuilding work themselves. 13

The first American iron steamboat was the 60-foot Codorus, built in 1825 by Pennsylvania nail cutter John Elgar. Afterward iron vessel construction focused on iron barges, most of which were constructed in Pittsburgh for use on Pennsylvania canals. By 1840 over a hundred iron barges had been built. The few iron steamboats operating during this period were, aside from the Codorus, imported from Britain with U.S. built engines. U.S.-built iron steamships appeared again in 1838. Because United States shipyards’ were so inefficient, and British shipbuilding industry so well established, British-built iron ships dominated U.S. waters. 14

In the 1840s, shipyards specializing in iron shipbuilding began to emerge. In 1844, two ironworking firms, Penn Steam Engine and Boiler Works in Philadelphia and Harlan & Hollingsworth in Delaware, started producing both iron ships and steam engines. By 1860 there were nine cities in the United States with iron shipyards. Only six of these shipyards, however, built vessels of five hundred tons or more: three yards on the Delaware River, two in New York, and one at Boston. Wilmington, Delaware was by far the largest producer of iron hulls. Between 1840 and 1861 Wilmington yards produced eighty-one iron hulls. The next largest iron shipyard in Philadelphia built only thirty-nine
vessels in the same period. By 1860 the most prolific iron shipyard in Wilmington was the firm of Harlan & Hollingsworth, the builder of the Curlew.  

**Harlan & Hollingsworth**

The Harlan & Hollingsworth Company established its business in Wilmington, Delaware in 1836. The company was one of the first American ironworking businesses to establish shipbuilding as a regular part of its business. Two metal workers, Mahlon Betts and Samuel Pusey, originally founded the company as a railroad car manufacturer. Samuel Harlan joined the company in 1837, and was responsible for leading the firm into steam engine building and repair. Between 1836 and 1843 the firm confined itself to the construction of railroad cars, with occasional building or repair work on industrial steam engines and locomotives. By 1840, as a result of expanding demand for machine work, the firm hired Elijah Hollingsworth, a Baldwin Locomotive Works foreman who became a business partner after buying Samuel Pusey's interest in 1841. The company also expanded its workspace. The Harlan & Hollingsworth Company soon engaged in iron shipbuilding.  

The replacement of the cylinder from the steamboat Sun in 1843 marked the beginning of its marine operations. The firm, now called Betts, Harlan, and Hollingsworth, shortly afterwards leased a launching berth next to the Christina
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River. In 1844 the firm made its first iron vessels, the Ocean and the Ashland. A Delaware newspaper described the development of the new ironworks:

Our enterprising fellow citizens, Messrs Betts, Harlan and Hollingsworth, have now an unusual number of hands employed and seem determined to keep pace with similar establishments throughout our country...They are now engaged in making two iron steamboats, of one hundred feet each, and upon the Erickson plan. We understand that they are for a New York company, and to ply between that city and Philadelphia and Baltimore. The advantages which Wilmington possesses over other cities need only to be known to make her the "work shop" for all surrounding states.

To accomplish this shipbuilding venture the firm acquired the services of a local wooden shipyard, W & A Thatcher, to help with the design, carpentry work, and launching of the vessels. The launching site was leased from the Wilmington Whaling Company, located along the Christina River. The Ocean and the Ashland worked in the canal trade between New York and Philadelphia before being sold to the United States Government for service in the Mexican War. In 1845 Harlan's fourth iron vessel, the Bangor, was launched. (Figure 3) Building the Bangor took nineteen months from the laying of the keel to the launching. This ship is noted for being the first iron merchant ship in America built for deep sea use. This vessel had a varied career, starting with a near-disastrous launch. Support timbers broke as the ship reached water, but it was able to right itself with no significant damage. On its second voyage to Bangor, India
the ship caught fire and was run ashore in Maine. Shortly afterwards it was rebuilt and sold to the United States government, which then renamed it the *Scourge*. The *Scourge* saw service off the coast of Mexico. In 1848 it was sold to a private individual in Louisiana, after which its fate is unknown.\(^{19}\)

The period between 1841 to 1851 was a time of growth for Betts, Harlan & Hollingsworth, although only nine ships were built. The railroad car business and general repair work took most of the company's time. Harlan & Hollingsworth also completed a number of jobs for their large woodworking department. One such order was for three thousand hardwood doors for the Astoria Hotel in New York. On 8 May 1849 Mahlon Betts retired, and the company's name was changed to Messrs. Harlan & Hollingsworth. The shipbuilding business was growing, and in the 1850s Harlan & Hollingsworth would greatly expand.\(^{20}\)

In the early 1850s the company began to rely less on wood shipbuilding concerns for assistance. By 1851 the company had expanded its property with the acquisition of land adjacent to the Christina River, relinquishing their lease on the whaling wharf. Harlan & Hollingsworth built a pair of wooden shears for masting vessels and a set of launch ways on its new riverfront property.\(^{21}\)

Harlan & Hollingsworth had grown in its gross value, and in the size of its workforce. In 1841 the company was worth
$40,531, and employed 120 people. In 1850 the gross value was $159,742 with 225 employees. The 1850s became a period of brisk expansion for the company. Machine shops, office buildings, wharves, carpenter sheds, boiler shops, blacksmith shops and cranes were added within the first five years of the decade. A mould loft, store house, millwright's shop, and employee houses were added later in the decade.

By 1860 Harlan & Hollingsworth had more than doubled in value and in number of employees. The company's gross worth was $580,426 with 630 people employed. At this point railroad cars were no longer Harlan's chief product. The following figures show how much shipbuilding had become the primary concern:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General repair and sundry work</td>
<td>$22,108</td>
</tr>
<tr>
<td>Railroad car work</td>
<td>$101,792</td>
</tr>
<tr>
<td>Shipbuilding</td>
<td>$456,523</td>
</tr>
</tbody>
</table>

Between 1844 and 1860 Harlan & Hollingsworth produced seventy-one iron hulls and five unpowered water craft. By 1860 the Company was the major producer of iron ships in America, and had established a reputation for quality shipbuilding.

In the 1856 the Curlew was bought for service in the sounds of North Carolina. At this time North Carolina was experiencing a period of slow economic growth. To better understand how and why the Curlew was purchased for service in North Carolina, a historical overview of steamboat operation in northeastern North Carolina must be developed.
Steamboat activity in North Carolina focused on the Roanoke River Valley in the northeast and Cape Fear River Valley in the southeast because these areas were the richest in terms of produce. The land along the Roanoke River and its tributaries in particular were recognized as an agricultural area that rivaled New York's Hudson River valley in terms of fertility and size.\textsuperscript{27} Northeast of the Roanoke River, the Chowan River and its feeder rivers, the Blackwater, Nottoway, and Meherrin, led into the rich agricultural areas of North Carolina and Virginia. By using the Cape Fear, Roanoke, and Chowan river systems, ship owners could expect a high return on their capital investment. A steamboat's inherent reliability in maintaining sailing schedules, however, did not guarantee success if owners exercised poor judgment on the direction of their routes.\textsuperscript{28} The more successful North Carolina steamboat lines were connected with the markets in Virginia via the Dismal Swamp Canal, or with Wilmington through the Cape Fear River. (Figure 2)

Efforts to establish steamboat navigation in North Carolina had begun early in 1812 when John Stevens of New Jersey presented a petitioned to the North Carolina State Legislature. He solicited for the creation of several steamboat lines in North Carolina waters, after unsuccessfully attempting to challenge the steam navigation monopoly in New York waters held by steamboat inventor Robert
Fulton and his partners. Stevens proposed to the North Carolina General Assembly the establishment of a steamboat line running from Chesapeake Bay through North Carolina to Charleston.  

The General Assembly granted Stevens the right to navigate and maintain all the waters within the state's jurisdiction for a term of twenty years. In turn Stevens was obligated to have two steamboats operating in North Carolina waters within two years of the passage of the act. A series of legal challenges by Robert Fulton and Robert Livingston, coupled with the effects of the British blockade during the War of 1812, kept Stevens from bringing from Delaware his steamboat, the Phoenix. Since Stevens' monopoly had failed to meet the two-year deadline set by the North Carolina General Assembly, it rejected his bid for monopoly. 

Between 1816 and 1829 at least five other steamboat companies attempted to establish themselves in northeastern North Carolina. These lines were the Pamlico Steamboat Company (1816), the Newbern Steamboat Company (1818), the Edenton and Plymouth Steamboat Company (1819), the "Codorus Steamboat Company" (1829-1830), and an unnamed steamboat company (1828). These companies all failed within one year of their founding. Lack of state aide, poor patronage and economic panics in 1819, 1837, and 1857 were partly to blame. In the case of the Neuse River Navigation Company, disputes between the stockholders stopped any progress. The companies
that failed had all their steamboat routes running within North Carolina boundaries. A connection with a commercial city such as Norfolk would have aided these steamboat companies. The Albemarle Sound area, which was connected to the commercial center of Norfolk via the Dismal Swamp Canal, retained Norfolk-based steamboat service despite periods of economic decline.\textsuperscript{32}

North Carolina's economy, sluggish in the 1820s, experienced a revival in the 1830s. A sign of this growth is shown in North Carolina steamboat operations. The number of steamboats enrolled or registered in North Carolina also increased dramatically. In order to trade legally within United States waters, a vessel had to be enrolled or registered. Enrollments and registrations were forms of waterborne commercial regulation designed to provide revenue for upkeep of lighthouses and other related expenses. It was also hoped that these regulations would encourage American shipbuilding, agricultural production, and the consumption of domestic goods. The regulatory laws imposed a tax on American built and owned vessels and foreign vessels. A certificate of enrollment was issued for vessels engaged in coastal trade in United States waters, while certificates of registration were required for vessels conducting overseas trade. The regulatory laws first went into effect in 1789. These laws required record keeping that can provide the historian with useful information on ship usage.\textsuperscript{33}
Between 1819 and 1833 only three steamboats, the Albemarle, Norfolk, and the Codorus operated in the northeastern sounds area. These boats, however, did not last long. A lack of patronage stopped the Norfolk and Codorus, and a broken crankshaft ended the service of the Albemarle.\textsuperscript{34} North Carolina enrollment records, however, show a dramatic increase in steamboat enrollments after 1833. Between 1833 and 1860 a total of forty-six steamboats were enrolled. Of this number, twenty had renewed enrollments, meaning the same vessel was re-enrolled if changes were made to its home port, master, owner, type of trade, or changes to the vessel’s dimensions. In short, before 1833 at least two steamboats navigated northeastern North Carolina waters, while after 1833 at least twenty-six individual steamboats were operating in northeastern North Carolina. It should be emphasized that these numbers refer to North Carolina-based steamboats only, and not to out-of-state steamboats that probably used the sounds.\textsuperscript{35}

A number of steamboats from other states used the eastern North Carolina sounds. Virginia, because of its proximity, was closely tied with northeastern North Carolina’s economy. In fact, some Virginians considered the produce of the Roanoke River as vital for Norfolk’s economic growth.\textsuperscript{36} This interest resulted in the first northeastern North Carolina navigation company to operate for more than one year.
The Virginia and North Carolina Transportation Company was established in 1828. This Virginia-based company, which was an offshoot of the Dismal Swamp Canal Company, provided transport service between Norfolk, Virginia, and Weldon, North Carolina. The company had ordered steamboats and barges constructed specifically for use on the Dismal Swamp Canal, the Roanoke River, and the Chowan River. The company, however, encountered financial hard times in 1832. The difficulties encountered included low starting capital coupled with problems operating the two steamboats it used in North Carolina. The deep draft and low power of the Company's first steamboat, the Petersburg, led to the purchase of the shallow-drafted steamboat North Carolina in 1829. It was discovered that this vessel was also too large to navigate the upper Roanoke River during low water periods. The steamboat Lady of the Lake replaced the North Carolina, but it too was unprofitable. By 1833 the Virginia and North Carolina Transportation Company had ceased its steamboat operations in North Carolina.\(^{37}\)

Other out-of-state steamboats that used the North Carolina sounds at that time included the Hope, Pennsylvania, Mohawk Chief, and Lady of the Lake. The Oregon gained notoriety by becoming, in 1848, the first steamboat to enter the North Carolina inlet that bears its name.\(^{38}\) The United States' first iron steamboat, the Codorus, operated in the northeastern North Carolina sounds in 1829. Intended to run
between Beaufort and New Bern, the Codorus ceased operations within one year due to lack of patronage.\textsuperscript{39}

After the abortive operation of the North Carolina and Virginia Transportation Company, steamboat operations in the Albemarle Sound area slowed until 1836, when the steamboats Bravo and Fox began operating along the Chowan River and its tributaries, the Blackwater, Nottoway, and Meherrin Rivers. These rivers flowed into the Albemarle Sound from the agricultural areas of northeastern North Carolina and southeastern Virginia. The steamboat Fox was a 103-foot long, 83-ton vessel which connected travelers and cargo with the Bravo, at Edenton. The Bravo operated between Edenton and Plymouth on the Roanoke River. The Bravo, a converted schooner, was in service only in 1836. In that time the steamboat was snagged, sunk, raised, and accidentally burned.\textsuperscript{40} The Fox, however, operated without competition for sixteen years, being replaced by a larger steamboat, the Stag, in 1851 (Figure 4).\textsuperscript{41} In the same year the steamboat A. H. Schultz was placed by its fifty-four North Carolina and Virginia partners along the Roanoke and Chowan route to Norfolk.\textsuperscript{42} These boats engaged in carrying cargo and passengers. Later on these boats came to be used for the excursion industry, which grew rapidly in the 1850s.

Steamboat excursion trips were popular in the antebellum period. They were used for family fishing trips, vacations,
Figure 4: The deck of the Stag, Blackwater River, 1856. Harper's New Monthly Magazine 14, (April 1857) 434.
and as a way to meet prominent people such as Henry Clay. One such celebrity excursion in 1851 featured presidential candidate General Winfield Scott traveling along the Chowan River on the steamboat *A.H. Schultz*. Scott was forced to cut short his trip to attend to urgent business in Washington. As a joke, some enterprising passengers then outfitted one of their number to impersonate the general at the next stop in Edenton. The impostor thoroughly fooled the welcoming crowd, and nearly got himself lynched when he was found out.\textsuperscript{43}

Probably the most popular form of excursions were trips to the Outer Banks. Since the late colonial period, the seaside location and beautiful scenery had inspired planters and merchants to bring their families to the coast for health and relaxation. By the 1830s summer steamboat excursion routes were established from the mainland to Roanoke Island and Nag's Head. A hotel built at Nag's Head in 1838 saw constant patronage by summer vacationers. In 1850 the hotel changed hands. The new owners, A.J. Bateman and Abram Riddick, realized they could increase hotel patronage by facilitating better access to Nags Head. Therefore, in 1851 they made arrangements for the *A.H. Schultz* to make regular trips. The owners provided a small railroad and boardwalks for access between the hotel and wharf. In 1857 a refurbished hotel and a brass band with singers were new features at Nag's Head.\textsuperscript{44} Excursion trips were a profitable use for steamboats, especially during this period when
railroads posed little competition. The Curlew was eventually brought in to operate to Nag's Head. Its owner, wealthy area planter Thomas Warren, apparently decided to involve himself with what was becoming a profitable commercial transportation business.

Dr. Thomas D. Warren was a man whose wealth was inherited rather than achieved through personal work, and a man who had many occupations. He was born in Toano, Virginia in 1819 and moved to Edenton in the mid-1830s. There he gained a considerable amount of property and wealth through two marriages. In 1840 he married Penelope Johnston Dawson Skinner, the only daughter of wealthy lawyer Joseph Skinner. Skinner was also a man of many occupations, being a planter, merchant, and fisherman. The marriage ended tragically when Penelope Warren died during childbirth in the following year. Two years later in 1843 Warren married Margaret Coffield, the fifteen-year-old daughter of wealthy planter James Coffield, who had died two weeks before his daughter's wedding. Through these two marriages Warren obtained a considerable amount of property and wealth.45

In 1850 Warren likely resided at his late father-in-law's house until the completion of his new mansion in Edenton (Figure 5). His listed occupation in 1850 was that of doctor, though he farmed his inherited lands. During the 1850s Warren expanded his assets by purchasing a saw and grist mill on the west side of Edenton. In 1854 his second
Figure 5: Thomas D. Warren's mansion, 1997 (Photo by Ann Merriman).
wife died, leaving six children. Warren would marry one more time, in 1863 to Elizabeth Collins.\textsuperscript{46}

By 1860 Warren was the wealthiest man in Edenton, and one of the wealthiest in North Carolina. The 1860 census listed his real and personal estate at $957,000. He owned twenty-two slaves in Edenton, and 120 slaves in the countryside. Though Warren listed his occupation as farmer, he may have worked occasionally as a doctor.\textsuperscript{47} As a wealthy farmer, he doubtlessly had need for water transportation of goods from his lands. Earlier in the decade Warren probably had contacts with the various steamboats operating along the Albemarle Sound and its tributaries. He likely used the steamboats \textit{Fox}, \textit{Schultz}, and \textit{Stag} for transportation of products from his vast farm holdings. By 1856 Warren was wealthy enough to purchase an iron steamer and establish a steamboat company partnership for transportation along the northeastern North Carolina sounds and rivers.\textsuperscript{48} Warren and four partners found it more useful to operate their own steamboat company rather than patronize other carriers.

The Albemarle Steamboat Company was an un-incorporated steamboat line that began operation by the mid-1850s. There is little pre-Civil War documentation of the Albemarle Steamboat Company. The earliest reference to this company is the 8 July 1856 registration of the \textit{Curlew}. A later enrollment names Thomas Warren as the company's president. There were a total of four other company members. Robert
Dixon of Portsmouth, Virginia, was the company's treasurer. The other three company members were Abram Riddick, from Hertford; S.D. Skinner of Chowan County; and Augustine Holley of Bertie County. These men were wealthy farmers, none of whom had a total property value of less than $150,000. Abram Riddick contributed a steamboat wharf in Edenton for use by the Company. Since the state laws of North Carolina for the 1850s do not record any articles of incorporation for this company it suggests that there was little formality in the organization.49

The Curlew was not the only steamboat to operate for the Albemarle Steamboat Company. Warren went on to obtain whole or partial ownership of another steamboat for the company, the Stag. The Stag had operated in the Albemarle area since 1851, and is known to have been used by the Albemarle Steamboat Company, under Captain Thomas Bernard, by 1858. The steamboat A. H. Schultz also may have been run by the Company though the relationship is unclear. It is known that Robert Dixon had partial ownership of that steamboat by 1858.50 Another small steamboat, the Leonora, possibly operated as part of the company in 1860 and was owned by Abram Riddick. The Leonora was used between Murfreesboro and Winton on the upper Chowan River, and was wrecked sometime in 1861. The Albemarle Steamboat Company operated successfully until 1862, when its last steamboat, the Stag, was scuttled in the Blackwater River.51
Warren purchased the Curlew from Harlan & Hollingsworth in 1856. The process of purchasing a Harlan steamboat involved a period of negotiation between Warren and the shipbuilding company. The initial inquiry by Warren likely involved his giving a general description and the desired dimensions of the ship to the builder, who then worked out the hull shape and superstructure layout.

Harlan & Hollingsworth used a procedure for boat design that was different from the normal practice in Great Britain. The American firm used the freehand or mould-loft style. After receiving the desired displacement from the customer, the company shipwrights would shape out a block of wood into a model of the approximate form and size as required by the desired displacement. Past experience and "seamen's eye" played a part in this stage of design. After a detailed analysis of the shape required for stability and body balance, and of the weights involved, the model's shape was further refined until the desired displacement was reached. Thus the mould-loft style relied more on shaping by eye, tempered with practical experience. It was different from the "mathematical" style used in Britain. The mathematical style involved working out problems of displacement and waterlines on paper, and having the model built from the mathematical results. The result of each method, according to Harlan & Hollingsworth, was precisely the same. The company shipwright worked out the details and sent the ship
plans and model to the prospective buyer for his examination and approval. The shipbuilding work started once the dimensions, payment schedule, interior layout, and other details were agreed upon.53

With the design approved, the model was then taken to the pattern shop and mould loft, a large building with broad, open floor space. The vertical and horizontal lines drawn on the scale model were reproduced on the mould loft floor at full size. The frames and other structural members were also mapped out in full size and shape on the floor. Patterns were then made out of thin strips of wood, using the full-size drawings on the mould loft floor. The patterns were then taken to a smithing shed, which had a furnace and a perforated iron floor. Outlines of the patterns were traced on the floor with chalk. Iron spikes were placed in the holes along the pattern indicated by the chalk lines. The furnaces heated the bar iron to a soft consistency. The bar iron was brought out with tongs, laid on the floor, and pushed against the curving row of spikes to the required shape.54

The keel plates, frames, hull plating, engines, and superstructure of the vessel were then erected on the launch ways. Flat iron plate, used for building the hull, would be delivered from the rolling mill in various shapes and sizes as determined by the model. The iron pieces were fastened together by riveting, a labor-intensive process involving
gangs of at least four men: a riveter, a holder-on, a passer, and a heater. Rivets were heated, then given to the passer who inserted the rivet into its proper hole, where the holder-on gripped it in place with a heavy hammer. The riveter then shaped the opposite end with his hammer. When the rivet cooled it contracted and bound the plates together. Caulkers came and chiseled the edges close to improve watertightness. The entire process, from design to launch, took place in about eight months.

The Curlew was the thirty-eighth vessel built by the Harlan & Hollingsworth Company. A side-wheel steamer, the Curlew measured 135 feet long, 23 feet wide, 8 foot depth of hold, and registered at 236 tons. The Curlew's paddle wheels were 18 feet in diameter, and 8 feet wide, and its average draft was 5 feet. The Curlew had no figurehead, a round stern, and no mast.

The new steamer was powered by a walking beam engine with a 29 inch diameter cylinder and a 9 foot stroke (Figure 6). Though obsolete in other countries, the walking-beam engine was the best suited engine for east coast river navigation. It was cheap to construct, lightweight, easy to operate, cheap to repair, durable, and well suited for high speed.

For improved efficiency, the Curlew's engine was equipped with the Sickle's patented cutoff valve. A cutoff valve stopped steam from entering the cylinder before the
Figure 6: "Engine plan for Dr. Warren's boat." May 22, 1856. Courtesy of the Mariner's Museum, Newport News, Virginia.
piston rod completed its stroke, allowing the steam admitted to finish the stroke through expansion. A prompt cutoff valve improved the efficiency of the steam engine. Sickle's valve was the first successful drop-cutoff valve invented. It eliminated wasteful steam seepage that plagued earlier designs, and greatly improved fuel and steam efficiency. The Sickle's cutoff valve was widely adopted by steamers in the eastern United State's rivers and coastal waters, and its use continued into the twentieth century.59

Steam was provided by a return-flue boiler 18 feet long, 7.5 feet high, and 8 feet 4 inches wide. The boiler had two furnaces, and could provide 30 pounds of pressure.60 Warren initially had scheduled the Curlew to begin operating from Edenton on July 7, 1856.61 However, there appear to have been some delays.

The Curlew initially was registered on July 8, 1856 at Wilmington, Delaware. The reason for this registration is obscure. A vessel used exclusively in United States waters would normally receive a certificate of enrollment for the coastal trade, whereas registrations were used for vessels visiting foreign ports. Edenton resident John Thompson is listed as the vessel's owner. Thompson, an engineer and miller by occupation, for a time owned the only steam-powered industry in Edenton.62 He probably acted as an agent and observer for the Albemarle Steamboat Company. His expertise in steam engines probably explains his presence at Harlan &
Hollingsworth. Richard Halsey is named as her captain. Between July 8 and July 21 the Curlew steamed from Delaware out into the Atlantic and into North Carolina via Hatteras or Oregon Inlet. A safer route would have been through the Dismal Swamp Canal, but the Curlew was too wide.\textsuperscript{63}

On July 21, 1856 the Curlew was enrolled at Edenton. Thomas Warren is mentioned for the first time, as the president of the Albemarle Steamboat Company. The Curlew initially operated as a passenger and freight carrier between Edenton, Hertford, Elizabeth City, and Nag's Head. An 1856 advertisement for the Curlew promoted trips every day of the week at a fare of $1.50 to $2.00 (Figure 7).\textsuperscript{64} These summer seasons were especially profitable due to high demand for transportation to the Outer Banks resorts.

The Curlew's trips to the Outer Banks were extremely popular. The proprietor of the Nag's Head Hotel in particular benefited from the tourist trade that the Curlew brought in. A newspaper article from 1856 praised the proprietor for his work at making lodgers comfortable, adding that a new and larger hotel would be helpful in accommodating the crowd of three or four hundred tourists who could always be found at Nag's Head. The newspaper noted: "We have a splendid new steamer, the Curlew, why not have a stock company build a new hotel?"\textsuperscript{65} Next year the same newspaper advertised that the Nag's Head Hotel was now open after a thorough repairing and refitting.\textsuperscript{66} This refitting was probably inspired by the
FOR NAG'S HEAD
The New and Splendid Steamer

SCHEDULE:

Leaves Edenton for Nag's Head every Monday and Thursday at 9 A.M.,

Leaves Wakefield for Nag's Head every Tuesday at 10 A.M.,

Leaves Edgefield for Nag's Head every Wednesday at 11 A.M.,

Leaves Hartford for Nag's Head every Thursday at 7 A.M.

Fare to or from Nag's Head:

From Edenton, 
Edenton City, 
Hertford, WAKE COUNTY,

$3.00
$1.50
$2.50

Fodder or hay, or any other combustible matter will not be received on board unless packed according to law.

Ships are required to have a written permit from their owners.

Should any alteration in the above schedule be found necessary due notice will be given.

T. D. WARREN, Prop.

Edenton June 11th, 1856.

Pioneer and Sentinel of E. City and Norfolk
Herald copy for two months.

Figure 7: Advertisement from American Banner (Edenton, North Carolina), August 7, 1856
business brought by the *Curlew*.

During its career, the *Curlew* expanded its role by visiting ports along the Roanoke and Chowan Rivers. The only known changes in routine occurred in 1857 and 1859. In 1857 the *Curlew* changed captains. Robert Halsey was replaced by Thomas Burbage (Figure 8), a resident of Franklin, Virginia. Burbage and his wife received from the Albemarle Steamboat Company partners free lodgings in Franklin as long as Burbage remained employed by the company. He carried on as captain of the *Curlew* for the rest of its peace-time career. That year the *Curlew* was also placed on the Blackwater River run between Franklin, Virginia and Edenton. In 1859 the *Curlew* received a new enrollment.

The reason for this new enrollment is not clear. Reasons for issuing a new shipping document include a change of trade from coastal to foreign trade or vice versa, a change of owner, home port, master, vessel name, company name, or tonnage. None of these is evident at the time of the *Curlew*’s new enrollment. The *Curlew* did change its steaming schedule slightly, but this isn't a reason to renew enrollment papers. There is evidence that the *Curlew* itself became an offshoot of the Albemarle Steamboat Company. The reasoning for this is after 1859 there are references to the *Curlew* Steamboat Company in various letters and land deeds of Edenton resident Edward Wood. One of the few surviving
Figure 8: Captain Thomas Burbage (with X over his head) and steamboat crew. From Parramore, *Southampton County*, 135.
freight receipts for the Albemarle Steamboat Company was made out to the Curlew, and not to the company. On the other hand it is possible that local people confused the terms "Albemarle Steamboat Company" with the "Curlew Steamboat Company," since the Curlew was probably the company's prominent steamboat. By 1859 the Albemarle Steamboat Company had two steamboats operating, the Curlew and the slightly smaller Stag. The Stag, definitely in the company's possession by 1858, may have operated in the company in 1852 as it was partially owned by Robert Dixon.68

The Curlew underwent a route change in 1859. Steamboat service no longer included Hertford, on Saturdays two trips to Nag's Head were made, and no operations were listed for Sundays.69 The Curlew's crew had a reputation for efficient operation. In 1859 Harper's Magazine contributor and artist Edward Bruce took a trip to Roanoke Island on the Curlew. The previous year Bruce had visited the construction site of the Albemarle and Chesapeake Canal. Now he was visiting the same region, researching material for another Harper's article. Bruce mentions that the Curlew had "double duty" to perform, duty that required day and night operation. Despite this increased work load, Bruce was impressed by the efficiency of the captain and crew. He singled out Captain Burbage as a good-humored seaman deserving high praise for his courtesy:

We never saw him rave. Always at his post, and always
quiet, everything went on like clockwork. No traveler accustomed to the privileged usage on many similar craft would have imagined that one of them could be so well managed with so little damage to the Third Commandment.\textsuperscript{70}

Correspondence indicates some dissatisfaction among the employees of the Albemarle Steamboat Company. On 22 September 1860 the Curlew's engineer, Thomas Gurney, wrote a letter to a newly-established competing steamboat company, the Albemarle Steam Packet Company. In this letter Gurney expressed a desire to be hired as an engineer for their new vessel, though he did not explain why. Later correspondence indicated that Gurney was in fact hired as the engineer. Early in 1861 another crew member, Joseph Gregory, wrote to the same company about working as a steward on their new boat. Gregory asked if he could have the same wage that was paid to him on the Curlew ($18 per month).\textsuperscript{71} There is no indication that he was hired by the Albemarle Steam Packet Company. On 17 January 1861, Captain Thomas Bernard of the steamboat \textit{Stag} also wrote a letter to the Albemarle Steam Packet Company expressing a desire to be hired by them:

\ldots not as captain but as mate and clerk. I do not want the captaincy\ldots The Curlew Company and myself cannot agree and in fact I do not feel like working for them. They have treated me badly and I cannot forget them.\textsuperscript{72} Despite these problems, the Curlew continued to operate profitably along the northeastern North Carolina rivers.

At least two other steamboat lines attempted to tap into the trade that the Curlew was exploiting: the aforementioned
Albemarle Steam Packet Company and the Seabird Company. In 1860 the Albemarle Steam Packet Company was founded by twenty-four area residents. Its president, Edenton resident Edward Wood, ordered from Harlan & Hollingsworth an iron steamboat to be called the Virginia Dare. (See Chapter 4, Figure 24) In his correspondences to Harlan concerning possible design changes, he specifically emphasizes his desire for speed:

But we will say to you that speed is paramount to all other things to us, and if her speed is to be diminished one iota by the change we do not wish the change made as it is the general sentiment of the stockholders that they would rather sink the $4,000 we have paid and give up the whole matter than to have a boat that could come out here and...beat her [Virginia Dare] in speed...It has been said that the speed of the Curlew has been decreased by her bow being too bluff, and they propose to make her 20 feet longer (the length our boat will be) to increase her speed. This would give her our length with 5 feet less beam.73

Not being familiar with the attributes of ship design, Wood was worried that these changes would make the Curlew as fast as the Virginia Dare. Harlan's response letter assured Wood that the new boat would have better lines than the Curlew. The letter also advised the use of Sickle's steam cut-off valve for the engine:

Dr. Warren paid $250 for the right to use Sickle's cutoff in the Curlew. It will be a fair and just charge for you to pay on your boat. We put in the most approved cutoff in our contract, but the right to use it rests between you and the patentee[sic] You must not object to this, as we consider you will be benefited greatly in using it over any other cutoff we know of.74

Ironically, despite the interest by stockholders and potential employees, the Albemarle Steam Packet Company did
not get to start operations. The Civil War broke out before the Virginia Dare was delivered, and Wood stopped the final payment for fear that his steamboat would be seized by the federal government. Eventually the ship was purchased by the U.S. Navy, entering service as the USS Delaware.75

Another competitor of the Curlew formed in 26 October of 1860. Two businessmen from Virginia, Lindsey and Delk, placed the steamboat Seabird on the Chowan River trade. It connected at the mouth of the Albemarle and Chesapeake Canal with the steamboat Currituck. The Currituck in turn would connect to Baltimore, Maryland. During the summer season the Seabird was used for the tourist trade to Nag's Head. The Seabird had an operational life of less than one year, working along the Chowan River until the Civil War.76 The Albemarle Steam Packet Company and the Seabird company never seriously challenged the Albemarle Steamboat Company, for operations with both ceased within a year due to the start of the Civil War. It is ironic that soon all three competing companies steamboats would soon be involved in the battle for Roanoke Island.

The Curlew was a product of developments in early American iron shipbuilding. It was built during the formative years of the iron shipbuilding industry, when wooden ships dominated the shipping lanes. The Curlew was an example of the role steamboats played in the economic development of North Carolina's Albemarle Sound area, and was
brought in to tap the trade of a rich agricultural area. It provided access to Nag's Head for excursionists and acquired a reputation for prompt and efficient service along the Roanoke, Chowan, and Blackwater Rivers. The Curlew is also an example of the transition of plantation owners to middle-class businessmen. Soon the Curlew's career as a freight and passenger carrier would soon be cut short with the comming of the Civil War.
Endnotes


4Rodgers, Guardian, 35; Grantham, Iron as a Material for Ship- Building, 48-66.

5Rodgers, Guardian, 35, 36; Greenhill, "Steam before the Screw," 23.


8Tyler, American Clyde, 6; Peter Temin, Iron and Steel in Nineteenth Century America: An Economic Inquiry, (Cambridge, Massachusetts: MIT Press, 1964), 21, 22, 64, 242, 245.


10"Iron Ships," JFI, 123.

11Rodgers, Guardian, 10.


13Cramp, "60 years of Shipbuilding," 180-182.

14Tyler, American Clyde, 4, 5, 18; Rodgers, Guardian, 9.
15 Tyler, American Clyde, 6-7; Brown, "Origins of Iron Shipbuilding," 232-239;


17 Gause, Harlan and Hollingsworth, 212; William Collins, "History of Bethlehem's Wilmington Plant," Society of Naval Architects and Marine Engineers (1943), 1.

18 Delaware Gazette (Wilmington, Delaware), April 26, 1844


21 Gause, Semi-Centennial Memoir, 235-238

22 Ibid., 233.

23 Ibid., 238-240.

24 Ibid., 234.


26 Tyler, American Clyde, 13-15, 42.


30 Ibid., 2-6.

31 Ibid., 47-56.


36 American Beacon (Norfolk, Virginia), September 2, 1829.


40 Norfolk & Portsmouth Herald, (Norfolk, Virginia), February 29, 1836; R. Crawford Barrett, "Franklin, Virginia," TMs [photocopy], Ruth Campbell Memorial Library, Franklin, Virginia. (hereinafter called the Barrett Manuscript)

41 Barrett Manuscript, 5; Thomas C. Parramore, Southampton County, Virginia (Charlottesville, Virginia: University Press, 1978), 129.

42 Parramore, Southampton County, 129; American Beacon (Norfolk), January 28, 1851; American Banner (Edenton, North Carolina), May 15, 1856; Enrollments #16, Nat.Arch., 1858.

43 Sloan, "Inland Steam Navigation," 37; Parramore, Southampton County, 129, 130.


46Ibid., 202, 214, 215; American Banner (Edenton, North Carolina), May 15, 1856.


48Gause, Semi-Centennial Memoir, 378.

49Land deed for steamboat landing, Franklin, Virginia, April 13, 1858; Registration 1, July 8, 1856, Wilmington, Delaware, Records of the Bureau of Marine Inspection and Navigation, Certificate of Registration, Record Group 41, National Archives, Washington D.C.; Tax list, Edenton District, 1856 (Raleigh, North Carolina: State Archives) passim; Abram Riddick to Henry T. Clark, February 6, 1862, State Archives, Raleigh, North Carolina; Sixth Census, Chowan County, North Carolina, 1860. passim.


53This section is based on the negotiations between Edward Wood and Harlan & Hollingsworth for a large, fast steamboat. The negotiations and shipbuilding progress letters survive in the Wood Family Papers in Hayes Collection, Southern Historical Collection, Chapel Hill, North Carolina.


56U.S built ships of this period used the Old Custom House Measurement for tonnage, which had more to do with volume than actual weight. See John Lyman, "Register Tonnage and its Measurement," American Neptune, 5 (Salem, Massachusetts: The American Neptune Inc., 1945), 223-234.
Enrollment # 6, Edenton, North Carolina, July 21, 1856; Frank Smallman to Richard Lawrence, June 19, 1888, Underwater Archaeology Unit, Kure Beach, North Carolina.

58Tyler, American Clyde, 38.


61American Banner (Edenton, North Carolina), 7 August 1856.

62Registration 14, July 8, 1856, Wilmington, Delaware; Butchko, Edenton, 21 note, Eighth census, 1860.

63Curlew was 23 feet wide, not including the width of the spars and the Dismal Swamp Canal in 1860 was 22 feet wide; Alexander Crosby Brown, The Dismal Swamp Canal (Norfolk, Virginia: Norfolk County Historical Society, 1970), 77.

64American Banner, 7 August 1856.

65Ibid.

66Democratic Pioneer, (Elizabeth City) 22 September, 1857.

67Enrollment 14, August 5, 1857, Edenton, North Carolina; Democratic Pioneer, (Elizabeth City), 15 September, 1857; Land deed, July 2, 1858, Courtland, Virginia; Barrett Manuscript, 5.

68Land deed, April 13, 1858, Courtland, Virginia; Enrollment 28, May 5, 1852, Norfolk, Virginia; Merriman, "North Carolina Schooners," 19.

69The Citizen (Murphreesboro, North Carolina), August 3, 1859.


71Joseph Gregory to Edward Wood, 1861, Hayes Collection, Southern Historical Collection, University of North Carolina, Chapel Hill, North Carolina.

72Thomas Bernard to Edward Wood, January 17, 1861, Hayes Collection.

73Land deed, October 23, 1860; Edward Wood to Harlan & Hollingsworth, February 2, 1861, Hayes Collection.
74 Harlan & Hollingsworth to Edward Wood, February 8, 1861, Hayes Collection.


Chapter 3: The Curlew in the Civil War

Introduction

The Civil War added new significance to northeastern North Carolina's sounds and rivers. The coastal plain, which relied on tributaries and sounds to move products, was a source of foodstuffs, naval stores, and other supplies that the industrial-poor south needed to conduct war. The North Carolina sounds were also useful as a base for privateering and a shelter for blockade runners. Thus, the sounds were important for the survival of the Confederacy, which took steps to defend them.

At the start of the Civil War the Confederacy lacked a navy. The acquisition of small, shallow-drafted steamers armed with one or two cannon were considered by Confederate and state government officials as a cheap and rapid way of forming an effective coastal navy.¹ In theory, these gunboats could make an effective defense against a larger opponent. The Curlew is an example of the gunboat defense of the North Carolina coastal area, and its destruction while resisting Federal occupation of Roanoke Island demonstrates the effectiveness of this Confederate philosophy.

With the federal government opposed to secession, it became essential for the Confederate states to obtain warships quickly for defense of the coast. There were many handicaps to be overcome. In the south, shipwrights, materials and shipbuilding sites were scarce. No regular
United States Navy ships came over to the Confederacy, despite pleas by the Confederate government for native southern captains to do so. Of the U.S. Navy ships located in southern harbors at the war’s outbreak, only one was captured by the Confederacy. Yet by February 1861 the Confederacy had obtained ten gunboats through purchase or seizure. The Confederate Navy grew as more states seceded and added their navies.²

A gunboat by definition is a small armed ship with a shallow draft. Former United States Navy commodore and oceanographer Matthew F. Maury supported the idea of a gunboat fleet as an inexpensive and quick means to build a navy. Maury believed that Confederate flotillas of highly mobile, steam-powered gunboats, each armed with one or two rifled cannon, would be, gun for gun, superior to larger opponents. Maury theorized that in a naval engagement, larger-sized opponents were easier to hit. A big vessel would also have greater numbers of crew members, which would create more potential for casualties. He also believed that large ships were more susceptible to the effects of shellfire due to the nature of their construction. Maury reasoned that a small gunboat was light enough for a shell to pass through, rather than embed itself in the hull and explode. He also believed the few guns carried by small gunboats would produce less smoke, enabling them to direct their fire better than a large ship which would become obscured by the smoke of its
own broadsides. As supporting evidence of a gunboat's effectiveness, Maury used the example of the steamer *Harmony*.³

On 30 August 1861 the small Confederate tugboat *Harmony* attacked the 20-gun USS *Savannah* in Hampton Roads with its rifled bow cannon. The *Harmony* inflicted major damage to the *Savannah*'s mainmast and minor damage to the hull. The return fire of the *Savannah*'s smoothbore cannon, however, was completely ineffective. After the engagement the *Savannah*'s captain wrote:

> This instance shows how much a vessel armed like this ship [Savannah] is exposed to attacks of this kind when several gunboats could act together with perfect immunity to themselves.⁴

Another gunboat, the *Beaufort*, also demonstrated the potential effectiveness of a gunboat navy. On 22 July 1861 the North Carolina Navy gunboat *Beaufort* engaged the Federal warship USS *Albatross* near Ocracoke Inlet. The *Albatross* was unable to hit the small, maneuverable *Beaufort*.⁵ Although the action was inconclusive, it seemed to show that under the right circumstances a superior-armed warship could not outright defeat a small gunboat.

The Confederacy acquired many 32-pound smoothbore cannon with the capture of Norfolk Navy Yard. Most of these were reinforced with wrought iron band at the breech-end, and rifled for accuracy. The superior range and accuracy of the rifled cannon gave small gunboats an advantage when faced with a larger foe armed with smoothbore cannon. Gunboats,
therefore, became an attractive route of rapidly forming a navy. Ultimately, gunboats (including purpose-built and converted steamers) made up approximately two-thirds of all warships in the Confederate Navy. Ironclad warships would make up the remaining third.⁶

The Civil War in North Carolina Sounds

North Carolina was the last state to secede from the Union. This hesitation to join the Confederacy was mainly due to North Carolina’s indifferent sentiments towards secession. However, North Carolinians were opposed by the federal government’s use of coercion to preserve the Union. North Carolina's anti-Union sentiment was aided by two events: The bombardment of Fort Sumter on 13 April 1861, and Lincoln’s call for troops to put down the rebellion. President Lincoln’s call for troops, followed by a declaration of a blockade, essentially meant that a state of war existed between the United States and the seceding states.⁷

After Virginia’s secession on 17 April 1861, the North Carolina Board of Military and Naval Affairs was formed to coordinate the building a military and naval establishment for North Carolina defense.⁸ One of the board’s objectives was to build defenses for the sounds (Figure 9). Successful defense of the sounds would ensure the security of a large
Figure 9: Coastline of North Carolina during the Civil War (From Parker, Recollections of a Navy Officer).
agricultural area and keep any Confederate army in northern Virginia free to mount an offensive without having to leave large numbers of men behind as flank security.⁹

The pattern for North Carolina's coastal defense was set by William H. Whiting. Whiting, a former U.S. Army engineer, was appointed Inspector General in charge of the defenses of North Carolina. He instituted two systems of sound defense: coastal fortifications and a gunboat fleet. He also advocated a flotilla defense employing all available coastal schooners and steamers. This two-tiered defensive system became the standard method for coastal defense of North Carolina throughout the Civil War.¹⁰

Agents for North Carolina's military services searched the state for material that could be used for defense. The Curlew, however, was not purchased immediately despite the obvious need for ships. On 9 May 1861 Marshall Parks, the president of the Albemarle & Chesapeake Canal Company and acting naval agent for the North Carolina Military Board, notified Governor John W. Ellis that many steamers were being sent to North Carolina from Virginia to prevent their seizure. Parks made a list of steamboats in the Albemarle Sound area that were suitable for conversion to gunboats or army transports and narrow enough to travel to Norfolk via the Dismal Swamp and Albemarle & Chesapeake Canals. Among the eighteen steamboats listed were four Harlan & Hollingsworth-built iron hull steamboats, one of which was
the Curlew. North Carolina quickly obtained four steamers, the Winslow (ex. Joseph E. Coffee), Ellis (ex-Fairfield), Raleigh (ex-Roanoke), and Beaufort (ex-Caledonia) as state navy ships. Because of the small size of the North Carolina ships, it was nicknamed the "Mosquito Fleet." Two of these state navy ships, the Winslow and Beaufort, established reputations for themselves in early actions against federal forces.

As the war progressed, the North Carolina sounds became an ideal haven for privateers. As one U.S. Navy officer reported:

Hatteras inlet seems to be the principal privateer rendezvous. Here they have a fortification that protects them from assault. A lookout at the lighthouse proclaims the coast clear, and a merchantman in sight; they dash out and are back again in a day with their prize....in the bad weather of the coming season, cruisers can not always keep their station off these inlets without great risk of going ashore.

By June of 1861 the North Carolina Navy had at least two war-steamers patrolling the sounds, or engaging in privateering of northern shipping near Cape Hatteras. These first steamboats of the North Carolina Navy were each armed with one gun. The steamers Gordon and Winslow began a series of commerce raiding voyages near Cape Hatteras. The Winslow was particularly successful, bringing in eight prizes. The Winslow and Gordon were joined by the Beaufort in July.

The costs for the mobilization of forces and defensive works construction severely taxed North Carolinian financial
resources, and the burden of raising and equipping troops was enormous. Partial relief occurred when North Carolina adopted the Confederate States Constitution on 27 June 1861. On that day the state government began to transfer its military forces to the Confederacy. The process of shifting the naval forces took time, and the last North Carolina navy vessels, the Beaufort and Winslow, were transferred on 20 August 1861.¹⁵

Steamboats not involved with coastal defense or privateering were now used for transportation of military goods. The lack of road and rail access meant that steamboats and schooners were the only form of transportation that could effectively supply the coastal defense works. The Curlew, still in the private ownership of Thomas Warren, was involved with the usual passenger and freight carrying duties. Eventually by June 1861 it became involved with transporting troops and supplies to the Outer Banks. Apparently this service was done for the Confederacy as a patriotic endeavor by Thomas Warren. On 18 June 1861 the Curlew took the Hertford Light Infantry from Winton to Edenton, where they sailed to Ocracoke on a schooner. On 22 June the Newbern Daily Progress reported that the Curlew had just arrived in Newbern from Hertford County with 70 men of the Perquiman’s Beauregards. Furthermore, the newspaper stated that the Curlew, "a fine steamer," ought to become a privateer.¹⁶
The Confederate Navy continued to search for eligible steamships. On 25 July 1861 Flag Officer Samuel Barron, commander of the Confederate Naval defenses of Virginia and North Carolina, wrote to Secretary of Navy Stephen Mallory and asked his permission to purchase two steamers: the propeller-driven Kahuahua and the side-wheel steamer Curlew. Barron wrote that the Curlew's purchase price was $35,000, and advised that the steamboat had eight to ten days steaming endurance and a speed of ten to fourteen miles per hour. 17 Nothing appears to have come of this suggestion, and the Curlew continued operating as part of the Albemarle Steamboat Company.

Thomas Warren had become an active participant in the North Carolina war effort. Besides donating the Curlew's services as a troop transport, Warren helped organize the construction of coastal fortifications before North Carolina entered the Confederacy. He also was involved with recruiting efforts, and worked as an unofficial inspector of the Roanoke Island defenses. 18 To help alleviate supply shortages, Warren planned a blockade-running scheme. He wrote to the Confederate Secretary of War L. P. Walker in August 1861 to suggest a solution to the supply problem:

Owing to the peculiar character of the sea-coast of North Carolina, with its numerous inlets, which cannot be effectually guarded,...I think it would be no difficult task to get arms, etc., from Europe, provided the arms can be sent to one of the West India Islands and there met by small-class vessels sent from our waters to receive and continue the transportation. I am willing to render any aid,
and without any remuneration. I have three steamers which, at any time that such an enterprise might demand, could be commanded, and at any time I have it in my power to engage schooners of light draft that might, under skillful navigators, reach, I think, in safety one of the West India Islands, and return, bringing arms, etc. 19

Walker responded by forwarding Warren's suggestion to Confederate agents in London. 20 Nothing appears to have come of Warren's offer.

The event which encouraged the Confederate acquisition of the Curlew was the invasion of Hatteras Inlet by Union forces. The federal government wanted control of Hatteras Inlet and the surrounding barrier islands to stop Confederate privateering in the area. The Union strategy involved the capture of the forts guarding the inlets, Forts Hatteras and Clark, and the closing of the entrances to the sounds by sinking blockships. Occupation of Hatteras Island was not considered an option at this time. 21

A fleet of seven Union warships and transports with 880 men under Gen. Benjamin Butler attacked Hatteras Inlet on 28 August 1861 (Figure 10). The Confederate gunboats Ellis and Winslow were present, but could only assist the defense by running men and ammunition to the forts. Fort Clark surrendered late in the day, and Fort Hatteras capitulated the next morning after a short but intense bombardment. General Butler, realizing the importance of holding Hatteras Island, left an occupation force in place under Col. Rush Hawkins at the forts. On 29 August the Confederacy abandoned
Figure 10: Plan of the U.S.Navy’s attack on Hatteras Inlet, August 28, 1861 (Adapted from A Naval History of the Civil War).
the forts guarding Oregon and Ocracoke Inlet, since it would be difficult to hold those secondary inlets with the main inlet in Federal possession. Thomas Warren sent his company's steamboat, the *Stag*, to the coast immediately after receiving news of the fall of Hatteras Inlet. The steamboat arrived in a timely manner, helping the Oregon Inlet garrison move its equipment to Roanoke Island. The Confederate withdrawal meant Union forces now controlled all entrances to Pamlico Sound. As a result of the fall of Hatteras Inlet, the Confederacy started to fortify Roanoke Island.²²

Roanoke Island's defenses were constructed almost entirely by the Third Georgia Regiment under Col. Ambrose Wright. This regiment was in transit from Norfolk to Hatteras Inlet when news reached it of the fort's capitulation. It landed instead on Roanoke Island on 1 September, and proceeded to construct defensive works.²³

The Confederate army and naval defense of Roanoke Island were organized in this manner (Figure 11). Roanoke Island is bordered by Croatan Sound on the west and Roanoke Sound to the east. Albemarle Sound and Pamlico Sound border the north and south side of the island respectively. The Confederate land fortifications concentrated on the northern half of the island. The three forts situated on the west side of the island were, from north to south, Forts Huger, Blanchard, and Bartow. A two-gun emplacement guarded the east side of the island along Roanoke Sound, while a three-gun redoubt
Figure 11: Land defenses of Roanoke Island (Adapted from Official Records of the Union and Confederate Navies).
called Fort Defiance guarded the middle of the island. Fort
Forrest, mounting seven guns, was located at Redstone Point
on the mainland side of Croatan Sound.24 The land defenses
for the southern half of the island relied on three pieces of
field artillery. The southern entrance to Croatan Sound in
1862 was called Roanoke Marshes. This marshland had a narrow
channel permitting passage through this area.25

Building defensive works at the marshland was considered
by Colonel Wright and by Flag Officer William Lynch, the
commander of the North Carolina gunboat fleet. Any federal
invasion fleet had to come via Croatan Sound, since Roanoke
Sound was too shallow for steamboat transit. The narrow main
channel through the marshes into Croatan Sound favored a
defensive strategy of some kind. A system of floating
batteries stationed at the marshes channel was considered,
but careful soundings revealed the existence of additional
channels, which made effective coverage impossible. In the
end, the defense of Roanoke Island relied on the four island
forts, one mainland fort, the infantry stationed on the
island, the gunboat fleet, and obstructions placed across
Croatan Sound.26

The Confederate Navy acquired the Curlew by 4 September
1861, most likely as a response to the occupation of Hatteras
Island. It was outfitted for military service in Edenton,
requiring about 25 days of work.27 These preparations likely
consisted of the removal of the stern area superstructure to
accommodate a cannon, and the strengthening of the decks. Commodore Lynch requested various supplies from Norfolk, including a rifled cannon for the Curlew. On 23 September 1861 the commandant of the Norfolk Navy Yard replied:

I received your letter today from Edenton. I am glad to hear that the Curlew is nearly ready for service...You have four rifled guns, one of which you will have to put on the Curlew, as the demand for rifled guns is so great that we can not supply them fast enough....

One rifled and one smoothbore cannon were eventually installed on the Curlew at Roanoke Island in a last-minute, hasty effort to get the steamer ready for action.

A payroll drawn up for the Curlew in 1861 shows twenty-two crew members, of whom six where listed as able-bodied seamen, and twenty listed as ordinary (less experienced) seamen. The number of crew members was probably less than what was considered a full complement, as naval recruits were in short supply. Commodore Lynch considered manpower shortages his most pressing problem. The gun crews were initially drawn from infantry regiments because of the lack of naval personnel. The engineer of the Curlew was Thomas Gurney, the Curlew's prewar engineer who returned to his old ship as a member of the Confederate Navy. The Curlew's pilot was Eli Williamson, a slave who served as a pilot in the Albemarle Steamboat Company. The captain of the Curlew was Thomas T. Hunter. Hunter, formerly of the United States Navy, commanded the defenses at Norfolk after it was occupied by the Confederacy. After the fall of Hatteras Inlet, he led
Confederate reinforcements to Roanoke Island, and for a brief period commanded the Confederate Navy forces in North Carolina. He was assigned to the Curlew in late September 1861.  

In September Federal forces under Colonel Hawkins staged out of Hatteras Island and mounted search and destroy expeditions along Pamlico Sound. Through these actions, Hawkins became aware of the fortification effort on Roanoke Island. Hawkins' main concern was that the Confederates could stage out of Roanoke, land on the northern part of Hatteras Island, march south, and destroy the Cape Hatteras Lighthouse. He also feared a possible effort to retake Fort Hatteras. To prevent this from happening, Hawkins sent the Twentieth Indiana regiment to Chicamacomico Inlet on 29 September. Chicamacomico was a shallow inlet twenty-five miles north of the Hatteras lighthouse that separated Hatteras Island with the northern Outer Banks islands.  

Meanwhile, Confederate commanders in North Carolina plotted to harass and possibly recapture Hatteras Inlet. Colonel Wright, in collaboration with the commander of Confederate Naval forces in North Carolina, Commodore Lynch, planned a reconnaissance raid on Hatteras Island. If the opportunity presented itself, the Confederates would attack Hatteras Inlet. Further Federal incursions in September to destroy the abandoned Confederate fort at Ocracoke Inlet, and
subsequent patrols of the area impressed on the Confederate forces that action was imminent against Roanoke Island.\textsuperscript{31}

By the end of September, the Confederate fleet had only three vessels available for a raid: the Raleigh, Junaluska, and Curlew. At that time, the Raleigh was the only vessel that was armed. As mentioned above the Curlew was hastily outfitted with a long navy 32-pound cannon, rifled and reinforced with a steel band. The cannon was removed from one of the Roanoke Island forts, and installed on the bow of the Curlew overnight. In addition, a 12-pound smooth-bore gun, mounted on a field carriage was placed on the stern. The Junaluska had one 6-pound field cannon mounted. The gun crews of all the vessels consisted of men drawn from the Third Georgia Regiment stationed on Roanoke Island. These men, unfamiliar with serving artillery, had previously engaged in two days of gunnery training using the cannon of Fort Bartow.\textsuperscript{32} A raiding opportunity soon presented itself.

On 1 October word of a Federal steamer's appearance near Hatteras lighthouse reached the Confederate commanders at Roanoke Island. After loading 150 men of the Third Georgia Regiment on the steamers, the fleet sailed against the Federal steamship.\textsuperscript{33} At about 1:00 P.M. on 1 October the Federal army gunboat Fanny arrived at Chicamacomico Inlet with supplies. The Confederate fleet surprised the Fanny at anchor at 4:00 P.M. (Figure 12). The Curlew arrived first, and
Figure 12: Union tug Fanny engaged by Raliegh, Curlew, and Junaluska, 1 October 1861 (From Harper’s Weekly).
steered to cutoff any escape attempt. The Federals had not
begun unloading supplies from the Fanny to the Federal
garrison, and at first thought the Curlew was a flag of truce
boat. Once the Raleigh and Jungalaska arrived, the Curlew
headed directly for the Fanny and opened fire. The Roanoke
and the Junalaska followed with the intent of grappling and
boarding. A 30-minute engagement followed, where the
Confederate ships fired numerous shots, possibly scoring one
hit on the Fanny. The crew of the Fanny resisted briefly,
firing eight or nine projectiles, one of which may have hit
the bow of one of the Confederate gunboats. Another of the
Fanny’s shots accidentally blew off a stanchion on the Union
gunboat. The senior Federal officer present decided to run
the gunboat aground and surrender.34

This victory was important for several reasons. First,
it was one of the first Confederate captures of a Federal
warship. Furthermore, a large quantity of stores fell into
Confederate possession, valuable intelligence was gained
concerning the strength of the Union regiment encamped at
Chicamacomico and Hatteras Inlet. Due to this information it
was decided to initiate an assault on Hatteras Island.35

Colonel Wright and Commodore Lynch immediately
formulated a plan for an attack on the Federal outpost at
Chicamacomico. The 3rd Georgia and the 8th North Carolina
infantry regiments were to land above and below the
Chicamacomico encampment and encircle the 20th Indiana. The
Confederate forces would then take the lighthouse at Cape Hatteras, and attempt to recapture Forts Hatteras and Clark. This expedition would require all available vessels of the Confederate Navy in North Carolina.

The expedition took three days to prepare. On 5 October 1861 the Confederate force left Roanoke Island, passing south through Croatan Sound and into Pamlico Sound. The ships in the expedition consisted of the steamers Curlew, Raleigh, Junaluska, Fanny, Appomattox (ex-Empire), and Cotton Plant towing three troop-carrying barges.

Federal lookouts at the Chicamacomico outpost spotted the Confederate ships as they came over the horizon. The steamers took position about three miles from shore (the nearest they could approach) and proceeded to shell the Union encampment. The outpost commander perceived the enemy's intentions and ordered a retreat, leaving everything except their firearms. The 3rd Georgia Regiment landed in small boats and closely pursued the Federal troops along the Outer Banks sands, taking twenty-nine prisoners. The chase in the sun and over soft sand ended at nightfall with both sides exhausted. The North Carolina troops were unable to land because the Georgia troops had used the expedition’s small boats to get ashore, forcing the North Carolina troops to operate without them. The troops tried to wade ashore, but encountered deep water closer to the beach. The Georgia troops retreated the next morning back to Chicamacomico
Inlet. The 9th New York Regiment marched north from Fort Hatteras and pursued the Georgia troops. Further adding to their troubles, a Federal warship positioned offshore shelled the retreating Confederate soldiers. The Confederate troops reboarded their transports and steamed back to Roanoke Island. The Federals also abandoned their advance base and returned to Hatteras Inlet.37

In late October of 1861 the Confederate Navy in North Carolina undertook several reconnaissance and patrol voyages around Pamlico Sound. Steamers of the Confederate gunboat fleet were sighted almost daily by Union forces at Hatteras, often in groups of two or more. On one of these patrols, Captain Hunter took the Curlew on a reconnaissance of Ocracoke and Beacon Islands. Finding no enemy activity, he proceeded to Hatteras Inlet, arriving on 28 October 1861. Hunter found the Coastal Survey steamer Corwin, the USS Stars and Stripes, a "small steamer," and a merchant vessel at anchor. The Curlew approached within four miles of the anchorage and opened fire. The steamers Corwin and Stars and Stripes returned fire, but neither side sustained any damage. Captain Hunter later reported:

Feeling I had carried out the spirit of your instructions I withdrew and waited within half a mile of the buoy [marking the channel to the anchorage], hoping to draw the small steamer outside. When we fired the stern gun, the fort returned the shot. We stood back, fired another shell, and took our departure....38
The commander of the *Stars and Stripes* reported that the rebel steamer's gun outranged any of the Union cannons at the Inlet.\(^{39}\)

A gale on 2 November prevented any activity by the gunboat fleet, but on 3 November the *Curlew, Seabird, Ellis, Forrest, Fanny* and possibly *Winslow* went on patrol of Pamlico Sound. The patrol's purpose was to determine if the storm had done any damage to the forts at Hatteras Inlet. Upon arrival at 3:00 P.M., the *Seabird* fired three shots from out of range of the Federal forts’ cannon. The *Seabird*, however, failed to provoke a response. The Confederate Fleet then steamed to Washington, North Carolina. That same day, in an uncoordinated move, a force of five hundred Confederate infantrymen under a Colonel Singletary departed from New Bern on the schooner *Napoleon* and the steamboat *Albemarle* to reconnoiter the Hatteras Inlet forts.\(^{40}\)

Arriving on 4 November, this force determined that the Hatteras forts were not damaged by the gale, and instead reconnoitered Ocracoke Inlet. The next day the *Albemarle* and *Napoleon* discovered a steam warship aground outside Ocracoke Inlet. Thinking it was a Union warship, the *Albemarle* opened fire. The warship raised a French flag, and sent over a boat. The wreck turned out to be the French warship *Prony*, sailing with embassy dispatches from Charleston to New York. Colonel Singletary offered to assist the *Prony* after sending the *Napoleon* back to New Bern. The *Albemarle* stood by the
Prouy, but rough water and the presence of Federal warships prevented further assistance. A total of six Federal ships appeared, but were unable to render any assistance to the Prouy due to the rough weather. On 6 November more ships of the Confederate gunboat squadron arrived, and the Curlew, Ellis, Beaufort and Winslow were sent to assist in saving the Prouy’s crew. One hundred and forty French sailors were saved, mostly by efforts of the Curlew and the Albemarle. They were taken to New Bern and temporarily housed at the sailor’s shelter there. During the rescue, however, the steamboat Winslow hit an obstruction and was wrecked. On November 7 the Curlew set fire to the wreckage of the Prouy, and the next day transported the French survivors to the gunboat Ellis for passage to Norfolk.\

On 14 November 1861 the Curlew returned to reconnoiter and harass the forts at Hatteras Inlet. The Corwin was again at anchor near the forts. The Curlew closed with the Corwin and opened fire, but stayed out of range of Forts Hatteras and Clark. Despite being armed with light cannon, the Corwin returned fire accurately, having its second shot fall within a few yards of the Curlew. The Curlew retreated up Pamlico Sound a short ways, turned around, and returned for a second attack. After having three shots pass over it, the Curlew again retreated. As Charles Johnson of the 9th Zouaves wrote in his diary:

Our gunboats are all outside on some business or other,
and, as usual, when such is the case, the enemy is "snooking" around. As I write, a gunboat of theirs is disappearing on the horizon, evidently reconnoitering. She came within five miles of us and sent one of her compliments at Hatteras in general, for it seemed to be designed for no place in particular. "Tom Corbin" [The Corwin] replied with a couple of shots, but they were as compliments returned.42

By December of 1861 the Confederate North Carolina Fleet had six operational steamers: the Raleigh, Seabird, Appomattox, Ellis, Fanny, Beaufort, Forrest (ex. Edwards), and the Curlew.43 Between December 1861 and February 1862, these steamers patrolled the sounds and towed supply ships to Roanoke Island. On 5 December the Fanny and one other gunboat, possibly the Curlew, initiated a morning attack on the Hatteras Inlet anchorage. The Confederate gunboats, discovered at daylight about five miles distant, closed to about three miles before opening fire. As Charles Johnson noted:

As many as fifty shots were exchanged and the enemy came nearer than ever before, without being able to induce ours to move from under the guns of the fort. It may be obeying orders, but it looks to me as if orders were too strictly obeyed on board these vessels of ours.44

Captain Reed Werden of the USS Stars and Stripes reported that the Union gunfire had no effect, and that only one of the Confederate shells had reached the anchorage.45

During this active period the Confederate fleet also had to also find time for maintenance and repair. Two canals connected Norfolk with the North Carolina sounds, enabling easy access for repairs. The Forrest had earlier spent part of September repairing at the Norfolk Navy yard. The Forrest
apparently was not in good shape, having been described by its first Confederate navy captain as being "entirely worthless," with the boilers worn out and the timbers rotted. Furthermore, the gunboat frequently displaced its propeller shaft. On 30 December the Curlew had to tow the Forrest to Edenton for repairs. The Forrest's mechanical unreliability would lead to its demise. The Seabird, Beaufort, and Ellis underwent repairs at Norfolk for most of December. The Beaufort had its 32-pound smoothbore replaced by a 32-pound rifled cannon.47

In January and February of 1862 the Confederate fleet's actions focused on the Croatan and Pamlico Sound. The Mosquito Fleet settled into a routine, alternately patrolling and towing supply schooners. Most of these schooners were turned into blockships and sunk with pilings across the northern third of Croatan Sound. The object of this obstruction was to force vessels to pass on either side of the barricade, close to the guns of Fort Forrest or the three Roanoke Island forts. Unfortunately, the barricade was not completed in time.48

The Confederate defensive works of Roanoke Island were slow in building. Part of the problem was the constant changes in the North Carolina area command structure. The responsibility for Roanoke Island defenses passed between six Confederate generals before the Federal invasion in February 1862. This constant division of command created questions of
jurisdiction, which delayed the supply efforts. The Roanoke Island defenses still showed a lack of preparation six months into the war.49

Union Offensive Preparations

Though the Union controlled Hatteras, it did not control the supply network of the inland sounds and rivers. By early in September 1861 the United States War Department began organizing a "Coast Division" to attack strategic points along Chesapeake Bay. The division was eventually organized into another naval expedition to occupy the North Carolina sounds. The expedition was ordered officially to Roanoke Island on 7 January 1862.50 The Union fleet of seventeen steam warships assembled at Fort Monroe, Virginia. These gunboats were an assortment of barges, tugs, ferry boats, and small steamers hurriedly strengthened to carry four 'to six guns. One of the gunboats, the Delaware, was formerly the Virginia Dare, the potential rival to the Curlew's peacetime trade.

These vessels were not purpose-built warships, and had many deficiencies. The fleet had a wide range of drafts that made navigation of the sounds and inlets hazardous. What the vessels lacked in solid construction they made up in firepower. The Union gunboat fleet mounted a total of forty-eight guns. An army of seventeen thousand men assembled on transports at Fort Monroe. Gen. Ambrose Burnside commanded
the army division, and Flag Officer Louis Goldsborough commanded the naval division. The fleet sailed on 11 January 1862, and arrived off Hatteras Inlet the next day. Stormy weather greatly complicated passage through Hatteras Inlet, and the fleet lost three ships in the process.\textsuperscript{51}

The Confederate forces in North Carolina were aware of the impending invasion by the Burnside fleet as it struggled through storms off Cape Hatteras. Federal ships congregating within the Sound caused some apprehension among coastal inhabitants. However, the general belief was that the Hatteras storm had weakened the Federal Fleet to the point of ineffectiveness.\textsuperscript{52}

On 20 January Commodore Lynch took the Raleigh and the Seabird on another reconnaissance of Hatteras Inlet. The Confederate steamers appeared off the inlet in the early afternoon of the 21 January. Lynch counted twenty-one Union steamers inside the anchorage, and two more outside the inlet preparing to enter. The Confederates were sighted by a patrolling Federal steamer, which alerted others and gave chase. However, the Confederate gunboats escaped and returned to Roanoke Island. Another reconnaissance was made by the Seabird, Appomattox and possibly the Curlew on 1 February. This reconnaissance apparently went unnoticed by the Federal ships, but the Confederates determined that the Federals were preparing to move out into Pamlico Sound.\textsuperscript{53}
Roanoke Island's infantry defenses at the end of 1861 consisted of two entire North Carolina regiments, the 8th and 31st, and three companies of the 17th North Carolina Regiment. The total number of troops available on Roanoke Island was 1,914 men. Manning the forts reduced the infantry forces to 1,024 men, of whom 200 were on the sick list. A few reinforcements of the Wise Legion were stationed at Nag's Head.\textsuperscript{54} Morale was a problem. The North Carolina troops stationed at Roanoke Island were dispirited and disorganized. The Curlew's captain, Thomas Hunter, commented that "the maintenance of Roanoke Island is possible only so long as it is defended by troops from another state, or from a more loyal part of North Carolina."\textsuperscript{55}

By January of 1862 Thomas Warren volunteered to be the aide for the newly appointed area commander, Gen. Henry Wise. Warren oversaw the delivery of pilings from Edenton for the construction of a barrier across Croatan Sound. If pilings were unavailable, Warren supervised the purchasing of schooners to be sunk as blockships.\textsuperscript{56}

The Burnside fleet left Hatteras Inlet on the morning of 5 February 1862. The expedition anchored ten miles south of Roanoke Island by evening. The next day the weather turned poor with heavy rain and fog. The Federal fleet remained anchored except for two gunboats which scouted the channel into Croatan Sound. At their appearance the Confederate gunboats formed line abreast behind the barrier in
anticipation of an attack. The Confederate gunboat captains had agreed upon this defensive position at an earlier council of war. Some captains wanted to make a stand at the narrow marsh channel at the southern part of Croatan Sound, but they were overruled. Later in the afternoon the Appomattox reconnoitered and made an accurate count of the Union gunboats. The Appomattox was not attacked, as it was Flag Officer Goldsboro’s wish that the Confederates know what they were up against.  

The Federal fleet passed with some trepidation through the narrow channel in the Roanoke Marshes on the morning of 7 February. The narrowness of the channel prevented much maneuverability, and if a Confederate battery was placed there the passage would have been a difficult if not impossible task. The battle opened at about 11:30 A.M. (Figure 13)

**The Battle of Roanoke Island**

A Federal gunboat, the Underwriter, steamed north into Croatan Sound until it came within range of Fort Bartow and opened fire. The fort opened the battle by returning fire. The Federal gunboat fleet was divided into two squadrons. One engaged the Confederate gunboats while the other squadron attacked Fort Bartow, which was the fort closest to the landing site at Ashby's Harbor.
Figure 13: Battle of Roanoke Island (From Official Records of the Union and Confederate Navies).
The Confederate fleet at the start of the battle consisted of the *Raleigh*, *Seabird*, *Ellis*, *Fanny*, *Beaufort*, *Forrest*, and the *Curlew*. One sailing vessel, the 2-gun schooner *Black Warrior*, was anchored on the mainland side north of Fort Forrest. The *Appomattox* was dispatched to Edenton for an unspecified reason, and did not return until sunset. The Confederates were outnumbered and outgunned. The total amount of firepower available to the fleet was eleven cannon, as opposed to forty-eight guns on the Union fleet.  

By hugging to the Roanoke shoreline below Fort Bartow, the Union fleet nullified the fire from all but three of the fort’s guns. The Union fleet’s gunboats concentrated their attention on Fort Bartow, and periodically engaged the Confederate fleet. The Confederate fleet congregated in line abreast formation north of the Croatan Sound obstructions. By repeatedly advancing up to the barrier and falling back, the Confederate fleet tried to lure the Union gunboats into range of the northernmost forts. The Union ships, however, concentrated on Fort Bartow, which ultimately received seven hours of cannon fire from the Federal gunboats.  

Early in the battle the *Forrest* became disabled “by the displacement of her propeller,” though it is unclear if this was battle related. Given the past history of the mechanical unreliability of the vessel, chances are that the
Figure 14: Battle of Roanoke Island (Valentine Papers, University of North Carolina).
gunboat broke down once more. The gunboat also suffered a
hit which wounded its captain. The Forrest managed to anchor
under the guns of Fort Forrest. 61

Periodically during the afternoon, the Confederate fleet
attempted to flank the Federal fleet by advancing past the
western side of the barrier towards the fleet. However,
counter-advances by Union gunboats quickly put an end to this
threat. The Confederate gunboats would retreat north past
the barrier and continue their long-range shelling.
Meanwhile, the Federal transports were making their way
through the Roanoke Marshes into Croatan Sound. At
approximately 4:00, Federal soldiers landed at Ashby's
Harbor. Opposition at the landing site consisted of a
contingent of about two hundred Confederates who were quickly
routed by fleet shellfire from the USS Delaware and the USS
Picket. In twenty minutes about four thousand men landed,
and by midnight, about ten thousand Federal troops had made
it ashore. 62

The Confederate fleet made at least two advances up to
the obstructions at this time, once at about 4 P.M. and again
at about 5:10 P.M. The purpose was to divert fire from Fort
Bartow. 63 The first attempt, however, resulted in the loss of
the Curlew.

The Curlew sustained at least two hits. One hit was
near the pilot house, resulting in the wounding of pilot Eli
Williamson in the right arm. This hit may have been scored
by the *Southfield*, which reportedly struck the *Curlew*'s deck with a Parrott shell\(^6\). The second hit was more serious, as it resulted in the disabling and near-sinking of the *Curlew*.

At about 4 P.M., the *Curlew* was struck by a heavy shell that passed through its magazine and displaced a hull plate. Captain Hunter immediately turned towards Fort Forrest with the intention of running aground. Captain Parker of the *Beaufort* later wrote:

> 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 Johnston 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.\(^6\)

Parker also related this story, possibly apocryphal:

> To show what an excitable fellow Hunter was: he told me afterward that during the fight this day he found to his surprise that he had no trousers on. He said he could never understand it, as he had certainly put on a pair in the morning.\(^6\)

The remaining gunboats of the Confederate gunboat fleet continued the action. At about 5:00 Confederate reinforcements from Nag's Head approached in several towed barges to a landing site near Fort Huger. This move brought them to within range of the Federal fleet's guns. Unfortunately, at the same time the Confederate gunboats moved further back behind the obstructions in another attempt at luring the Union gunboats into closer range of the northernmost forts. This move left the barges as the closest
targets for hostile gunfire. The reinforcement barges were subjected to intense shellfire, and were forced to retreat. The barges retired to the northernmost point of Roanoke Island to land the troops there instead. The Confederate gunboats moved back in a second attempt to divert fire from Fort Bartow, and to cover the withdrawal of the barges.67

By sunset the Confederate boats had exhausted most their ammunition. Commodore Lynch ordered a retreat north to Elizabeth City with the intention of replenishing ammunition and return to Roanoke Island. The Ellis was ordered to salvage the Curlew’s cannon and other items. The Ellis used the schooner Black Warrior to carry these items to Elizabeth City.68 The Curlew’s captain and crew were probably rescued by the Ellis.

The battle for Roanoke Island was renewed the next day. Fort Bartow reopened fire at daylight, but by 9:30 had ceased fire. The Federal troops overran the inland battery, Fort Defiance, by noon. By 1:00 P.M. the Union fleet moved forward to penetrate the Croatan Sound obstructions. The only Confederate steamer present was the Curlew, aground in front of Fort Forrest. Though the Curlew was out of action, its condition was not obvious to the Federal fleet. When several Federal ships approached to penetrate the obstructions, they treated the Curlew as a potential threat. The Curlew’s presence caused concern when the Federal steamer Putman temporarily grounded near it.69 By this time the
Confederate troops were being pursued to the northern part of Roanoke Island. The commander of the Confederate land forces, Colonel Shaw, realized that resistance was futile. He ordered the cannon spiked and the fort's magazines fired. The Confederate forces surrendered shortly thereafter.  

At 4:00 the Croatan Sound obstructions had been penetrated, and by 5:30 P.M. the Federal fleet received news that Roanoke Island had fallen. As Federal steamers penetrated the barrier, the Confederate garrison in Fort Forrest set fire to their fort and the Curlew before departing inland. Captains White and Godwin supervised both the burning of the Curlew and of Fort Forrest. Various accounts state that the magazine on the Curlew exploded at sundown on 8 February.  

Casualties on both sides were light. Burnside's expedition lost 37 men, with 214 wounded, and 13 reported missing. Confederate forces reported 23 men killed, 58 wounded, 62 missing, and approximately 2500 captured.  

After retracting to Elizabeth City on the night of 7 February, Commodore Lynch ordered Captain Hunter to Norfolk on board the Raleigh to secure more ammunition. Combining his remaining ammunition resources, Lynch left for Roanoke Island on 9 February with the Seabird and the Appomattox. Informed of Roanoke Island's surrender, Lynch continued on in hopes of rescuing the Fort Forrest garrison. However, his ships were sighted and pursued. Lynch retreated back to Elizabeth City and organized a defense. On 10 February
thirteen gunboats of the Federal fleet came to Elizabeth City with the purpose of destroying the rest of the Mosquito Fleet. In a short action, the Confederate gunboat fleet in northeastern North Carolina was destroyed, and Elizabeth City captured.\footnote{73}

Only two Confederate steamers escaped: the \textit{Raleigh} and the \textit{Beaufort}. As mentioned before, the \textit{Raleigh} was sent with Captain Hunter to Norfolk. The \textit{Beaufort} was sent to Norfolk after most of its crew were taken off to man a fort at Elizabeth City. The other gunboats were less fortunate. The \textit{Forrest}, on the ways in Elizabeth City undergoing repairs, was burned by its crew. The \textit{Seabird}, \textit{Fanny}, and \textit{Black Warrior} were destroyed, and the \textit{Ellis} was captured. The \textit{Appomattox} tried to escape to Norfolk on the Dismal Swamp Canal, but had to be scuttled when it was discovered to be two inches too wide for the canal locks. As Hunter escaped north on board the \textit{Raleigh}, he paused long enough to scuttle a dredge across the canal.\footnote{74}

With the capture of Roanoke Island, Federal gunboats were able to secure the waterways of eastern North Carolina for the Union. This made the capture of New Bern, Plymouth, Washington, and other coastal towns much easier. Union control of the sounds and the inland waterways influenced the eventual Confederate evacuation of Norfolk. Furthermore, a major food producing area was lost to the Confederacy, and the many North Carolina ports in which a blockade runner
could seek refuge was reduced to one, Wilmington.\textsuperscript{75} This Union opportunity to shorten the war, however, was squandered. Soldiers allotted to the Burnside Expedition were diverted to support General McClellan's war effort in Virginia. A major Federal offensive in North Carolina was thus averted, though not in the way imagined by its defenders.

Dr. Thomas Warren was an indirect victim of the Burnside expedition. He lost his fortune and most of his possessions. The \textit{Leonora} apparently wrecked in mid-December of 1861, and the loss of the \textit{Curlew} simply added to his misfortune. The last company steamboat, the \textit{Stag}, was scuttled in the Blackwater River near Franklin in mid-1862. Warren's outspoken anti-Union sentiments finally ruined him. The Federals "captured" Edenton on 12 February. This capture was little more than a visit by three Federal gunboats to an unfortified town. Although most Edenton residents pledged non-resistance, Warren continued to agitate opposition to the Federals. On 12 June 1862 the commander of the Union naval forces in North Carolina, S.C. Rowan, reported:

\begin{quote}
I had a very satisfactory interview with the authorities at Edenton. The Union and conservative people of that town have been annoyed by the threats and bluster of Dr. Warren, a wealthy citizen and owner of large estates in the vicinity. I sent him word I should arrest him if he did not keep quiet. He has left for parts unknown.\textsuperscript{76}
\end{quote}

Warren left Edenton for Virginia. Nearly bankrupt, he returned after the war and was forced to sell his mansion to
John Williams of New York. Williams moved to Edenton, but allowed Warren and his family to share the mansion. Warren spent the rest of his days practicing medicine until his death in 1878.77

The Curlew was a typical gunboat of the Confederate Navy. The Confederacy started the war with no navy, and lacked the facilities to build large warships. One possible solution to this problem was the gunboat navy. Matthew F. Maury believed that numerous small gunboats, cheaply and rapidly built, could defeat larger opponents. Although conversion of merchant steamers into gunboats was a fast and inexpensive way of forming a navy, the North Carolina gunboat fleet was unable to accomplish its mission. The Confederate Navy in North Carolina was hindered by a shortage of gunboats and a lack of time to acquire more. Furthermore, gunboats were only effective in certain situations, mainly when they outnumbered or outranged their foe. A case in point is the capture of the Fanny. This situation, however, did not occur regularly. The best defense the North Carolina Sounds had against the ships of the Union navy was the shallowness of the sounds themselves. The shallow sounds prevented the larger, heavier armed ships of the Federal Navy from entering. Although North Carolina gunboats controlled the sounds for a time, the fleet was quickly overwhelmed when the Union brought in its own gunboats in superior numbers with heavier armament. The term "Mosquito Fleet" was indeed an
apt nickname for the Confederate gunboat fleet in North Carolina. It was unable to do more than annoy the Union effort to capture the North Carolina coastline.
Endnotes


2Still, Confederate Shipbuilding, x, 6, 76-81.

3Still, Confederate Shipbuilding, 8, 12; M.F Maury to William Preston, October 22, 1861, Area File 625, Record Group 45, National Archives, Washington, D.C.


6Still, Confederate Shipbuilding, 80.


11Marshall Parks to Gov. Ellis, Norfolk, April 16 & May 9, 1861, Ellis Papers, 614, 733.

12Barrett, Civil War in North Carolina, 35.

13ORN 6: 72.


16R. T. Barnes Diary, June 18, 1861, North Carolina Department of Archives and History, Raleigh, North Carolina, found in Iobst, "North
Carolina Mobilizes," 616; Albemarle Steamboat Company receipts, 1860-
1861, Josiah Collins Papers, North Carolina Department of Archives and
History, Raleigh, North Carolina; Newbern Daily Progress (New Bern,
North Carolina), July 22, 1861.

17ORN 6: 712.

18Warren to L.P. Walker, August 31, 1861, and William Lynch to
unknown, January 10, 1862, Area File 625, Record Group 45, National
Archives, Washington, D.C.; J.N. Floyd to Ellis, June 24, 1861, Ellis
Papers, 870.

19Official Records of the Armies of the War of Rebellion,
cited as OR.)

20OR, 4: 577-578.


22William Parker, Recollections of a Naval Officer, 1841-1864
(Annapolis, Maryland: Naval Institute Press, 1985), 231; Sauers,
"Burnside's North Carolina Campaign," 82; OR, 4: 577-578; Warren to
Secretary of War Walker, August 31, 1861, "Citizens File," Record Group
109, National Archives, Washington, D.C.

23Sauers, "Burnside's North Carolina Campaign," 82-84.

24Ibid., 83f

25ORN 6: 552. The entrance was wide enough for only two vessels
sailing abreast.

26ORN 6: 729; OR 4: 655.

27"C.S. Steamer Curlew off Roanoke Island," October 3, 1861,
"Vessel Papers," Record Group 109, National Archives, Washington D.C;
ORN 6: 722.

28ORN 6: 732.

29Parker, Recollections, 228, 231; ORN: 6, 719, 722, 761; Franklin
Tidewater News (Franklin, Virginia), March 19, 1915; "Crew voucher,"
Record Group 109, National Archives, Washington D.C.

30Rush Hawkins, "Early Coast Operations in North Carolina,"
Battles and Leaders (New York: Century Co., 1887), 635, 637; OR, 4: 623;

31Barrett, Civil War in North Carolina, 49f; Scharf, Confederate
States Navy, 378.

32Scharf, Confederate States Navy, 378; ORN 6: 278.
Ibid; ORN 6: 275f.


Scharf, Confederate States Navy, 380; E. C. Yellowly to J. B. Yellowly, October 2, 1861, E.C. Yellowly Papers, Southern Historical Collection, Chapel Hill, North Carolina, in Barrett, Civil War in North Carolina, 52.

OR 4: 596f.


Richmond Examiner (Richmond, Virginia), November 11, 1861.

ORN 6: 377f.

Newbern Weekly Progress (New Bern, North Carolina), November 12, 1861; ORN 6: 389, 784f.

Ibid; ORN 6: 401, 785.


ORN 6: 785-789.


ORN 6: 464.

Ibid, 786, 795.

Parker, Recollections, 232, 240; ORN 6: 752, 785-789.


Ibid, 23f, 117.

Scharf, Confederate States Navy, 386; Sauers, "Burnside's North Carolina Campaign," 35f; OR 9: 352f; Parramore, Southampton County, 134.

David D. Porter, The Naval History of the Civil War, (Secaucus, New Jersey: Castle Publishers, 1984), 110f; ORN 6: 526f, 788f; Parker, Recollections, 244.


ORN 6: 725, 785f.

OR 9: 139.

ORN 6: 552, 587, 789.

ORN 6: 552f, 588f, 594; Parker, Recollections, 245.

ORN 6: 588, 596; Parker, Recollections, 247; Sauers, "North Carolina Campaign," 35f.

Parker, Recollections, 248; ORN 6: 553f, 588, 594f.

Parker, Recollections, 248; ORN 6: 553f, 588, 594f.

ORN 6: 563, 553; OR 9: 76.

ORN 6: 553, 589; Frank Moore ed., The Rebellion Record: A Diary of American Events (New York: Putman, 1863), 100.

ORN 6: 594; Franklin Tidewater News (Franklin, Virginia), March 19, 1915; Rebellion Record, 100f.

Parker, Recollections, 248.

Ibid., 249.

Rebellion Record, 112-114.

ORN 6: 594-597.

ORN 6: 554, 589, 562.

ORN 6: 599f.

ORN 6: 554, 574, 589f, 599f; Raleigh State Journal, April 2, 1862; George Driver to father, February 17(?), 1862, George S. Driver Papers, East Carolina Manuscript Collection, J.Y. Joyner Library, East Carolina University, Greenville, North Carolina.

Barrett, Civil War in North Carolina, 84; Confederate States of America, "Message of the President," North Carolina Collection, Rare Books, East Carolina University, North Carolina.

Parker, Recollections, 253-259; ORN 6: 595f.
74 Parker, Recollections, 253-259; ORN 6: 595f; "Message of the President," North Carolina Collection, ECU, North Carolina.

75 Porter, Naval History, 110f.

76 ORN 7: 476.

Chapter 4: The Archaeological Record of the Curlew

Introduction

The Curlew wreck site is located in the northwestern section of Croatan Sound, near Redstone Point on the mainland side of the sound. Its precise location was unknown until a search team under the guidance of the North Carolina Underwater Archaeology Unit (NCUAU) located the Curlew's remains in 1988. The iron construction of the wreck, along with the discovery of the builder's plate, positively identified this wreck as the Curlew. In 1994 the NCUAU and graduate students from East Carolina University's Maritime Studies Program conducted a survey of the wreck. The purpose of this survey was to obtain as much data on the wreck site as time, equipment, and personnel resources would allow. This chapter documents the findings of the fieldwork, and describes the design of east coast steamboats and the techniques of keeper-on-frame construction in early American iron shipbuilding.

Research Design

The Curlew warranted archaeological investigation for several reasons. The Curlew is a rare extant example of early American iron shipbuilding. The Curlew is one of only four iron hull wrecks in the United States that predate the Civil War that are known to have undergone archaeological documentation, the others being the Hatteras, Thomas Sparks,
and *Picket*. The *Curlew* is also a rare example of the work of Harlan & Hollingsworth, one of the first iron shipyards in the United States.

Historically, few details of private sector pre-Civil War iron ship construction exist, although occasional construction details of new vessels can be found in period trade magazines such as the *Journal of the Franklin Institute* (JFI) and *Hunt's Merchants Magazine*. Ten of the eleven antebellum Government-built iron vessels for Naval and Revenue Cutter Service have poorly documented construction details.¹ Furthermore, no detailed survey of any Harlan wrecks have been done to date. The *Curlew*'s construction can provide insights to early developments in American iron shipbuilding.

Preliminary suppositions of the construction characteristics of the *Curlew* suggest that it would be an angle-iron framed ship. Briefly, angle iron is a bar that is formed into one of several distinct cross-sections (Figure 15). Angle iron will be discussed later, but it is sufficient to say here that it is a fairly advanced form of ship frame construction. There are several reasons for this reasoning. In 1822 British private enterprise had built the first iron steamship, the *Aaron Manby*, using angle iron frames. At least seven British-built iron steamboats were
Figure 15: Various shapes of bar iron (Adapted from Shipfitters Manual, 30).
imported to America in the 1830s. As the world leader in iron ship construction, Britain had American imitators of its iron construction techniques. Information on British iron shipbuilding technology was certainly available and accessible.\textsuperscript{2}

Trade magazines such as the JPI carried descriptions of newly-built British iron ships. Furthermore, the first British iron warship, the Nemesis, was inspected in person by U.S. Naval Constructor Samuel Hartt in 1842, and at least two American shipyards used angle-iron framing in the 1840s.\textsuperscript{3} Further evidence of American use of angle iron for ship construction is found in early iron barges. The Thomas Winslow, an iron barge built in New York in 1845, is one existing example. It was converted to the gunboat Picket and sank in 1863 at Washington, North Carolina. Examination of the wreck site shows that the wreck had angle iron frames.\textsuperscript{4} Evidence of the early use of angle iron by British shipyards and various ironworks in the United States, points to the idea that the more recent Curlew would also be angle iron framed.

\textbf{Description of Site}

The wreck site is located in the Croatan Sound of North Carolina (Figure 16). The Croatan Sound is a small body of water located within the outer barrier islands that border the North Carolina coastline. The sound connects the
Figure 16: Modern day Croatan Sound (U.S. Geological Survey, Corp. of Engineers, Washington D.C., 1957).
Albemarle Sound to the north and the Pamlico Sound to the south. Croatan Sound separates the North Carolina mainland to the west, and Roanoke Island to the east. It is about twelve miles long running north to south, and four miles wide. The sound consists of brackish water, with salt content ranging between 17.6 and .03 parts per thousand. It has an average depth of nine feet. A ten foot deep channel runs through its center, and the southern part of the sound has areas that reach twenty-three feet deep. The bottom of the sound area around the wreck site consists of bands of fine to medium grade sand. The main shipping channel between the Albemarle and Pamlico Sounds passed through the Croatan Sound. Roanoke Sound, on the eastern side of Roanoke Island, has an average depth of five feet, which is too shallow for easy transit by coastal commercial craft.\(^5\)

**Site Formation Process**

The size and shape of Croatan Sound has changed considerably since the area was first recorded in 1524 by Spanish explorers. In prehistoric times the south entrance to the Sound was covered by swampland. By colonial times erosion had gradually transformed the area into a small, swampy archipelago about two miles wide. This area, called the Roanoke Marshes, had a narrow channel about sixty feet wide through the area. The marshes have undergone gradual erosion due to several events. The majority of the storm and
tidal flow passes through Roanoke Sound, although the filling in of Roanoke Inlet by 1815 forced Croatan Sound to receive more water flow from Albemarle Sound. More significantly, a slow rise in sea level resulted in major inundation and erosion of the area. In 1861 the channel through the marsh was wide enough for two steamers to pass through abreast, and by 1990 this area had eroded to its current width of approximately four miles. Other parts of the sound have also eroded away, though not quite as dramatically as the southern end. The United States Army Corps of Engineers maintains a channel through the center of Croatan Sound as an alternate Intercoastal Waterway route.

The Curlew wreck site is approximately nine hundred feet offshore, at a place called Redstone Point. The present day Croatan Sound bridge spans the sound from Redstone Point, and is about a thousand feet north of the wreck site. (Figure 17) The wreck is under twelve feet of water. The wind-driven current over the site is rarely over two knots. Historical records state the Curlew masked the guns of Fort Forrest when it ran aground, and that the Curlew wasn’t burned immediately because it was feared the fire would spread to the fort. The wreck’s position offshore suggests that Redstone Point has eroded considerably. The wreck itself has undergone both salvage and archaeological work.

The Curlew underwent salvage from the moment it sank. The Confederate gunboats Ellis and Black Warrior took its
Figure 17: Redstone Point and Curlew wrecksite.
guns and ammunition shortly after the Curlew was disabled. The Curlew was then set afire by the Fort Forrest garrison on 8 February 1862. In 1863 the Curlew's steam machinery was salvaged by Underdown and Company and taken to New Bern. As time passed all signs of the wreck disappeared from the surface of the sound. The Army Corps of Engineers did a survey of the area in 1872, and although the Curlew is not specifically mentioned, the survey reported the existence of seven stone-filled wrecks sunk during the Civil War. These wrecks are likely the schooner blockships sunk by the Confederates before the battle. The report also mentions that the position and depth of the wrecks were plotted on a map. This map, however, has not been found.

In 1899 the federal government funded a project to improve coastal navigation between Norfolk, Virginia and Pamlico Sound. The improvements included dredging a channel two hundred feet wide and twelve feet deep in the middle of Croatan Sound. The improvements were completed by 1907. Records do not indicate if any wreck debris were encountered. The later construction of the Intercoastal Waterway through North Carolina bypassed Croatan Sound. Despite this, the sound channel is maintained along the same 1862 channel route. The bridge connecting Roanoke Island to the mainland was built in 1953. The mainland end of the bridge went through the middle of Redstone Point, passing close to the Curlew's wreck site.
On 9 September 1988 the Curlew became the focus of a search by Operation Raleigh. Operation Raleigh was a youth leadership program consisting of international students engaged in North Carolina archaeological projects in cooperation with the North Carolina Underwater Archaeological Unit. The group's objectives were to spend five days searching for the Curlew and for the blockships used in the Croatan Sound barrier. The search for the Curlew was conducted around Redstone Point using a magnetometer. Local informants indicated that the supposed location of the wreck was north of the Croatan Sound bridge. However, both the north and south sides of the bridge were searched, revealing several magnetic targets. A tentatively identified ships stanchion and hull section was located south of the bridge. The next day a larger area of iron hull wreckage was discovered nearby. It soon became apparent that the wreck was virtually undisturbed by sport divers. From the main wreckage area a sample of artifacts were recovered, including twenty-four cannonballs of the 32-pound size. Two ceramic shards, two portholes, and a bottle were also collected. Positive identification of the Curlew was made when a Japanese diver, Takafumi Yamaguchi, located the builder's plate. (Figure 18) The engraved plate read:
A rough sketch of the wreck site was made before the end of the fieldwork.\textsuperscript{12}

In 1988 a New York sport diver, Glen Williams, contacted the UAU and received a permit to dive on the Curlew. Working between November 1988 and January 1989, he created a recreational diver's map of the wreck, along with a short popular history of the Curlew. Among the features he noted were a large area of wreckage, three smaller hull sections off the main wreckage area, some intact decking, a rigging eyelet, and a brass bushing. The map's purpose was merely to give sport divers an abstract idea of the wreck's layout. It is lacking in detail and incorrectly identifies some hull features. No further work was done on the wreck until 1994.\textsuperscript{13}

\textbf{1994 Fieldwork: Method of Recording}

In October 1994 graduate students and faculty of East Carolina University's Maritime History and Nautical Archaeology Program and members of the North Carolina Underwater Archaeological Unit returned to the Curlew to construct a Phase II pre-disturbance site plan. The purpose was to document the layout of the wreckage, and to provide a base for future work. Over a 5 day period a better
understanding of the layout of the wreckage was achieved. A 180-foot baseline was laid out continuously across three major areas of the wreck. The hull wreckage was plotted using trilateration, which is a method of mapping using any two established points along the baseline. The baseline, in a sense, became the foundation from which any part of the wreck could be accurately plotted. The wreck's outline was plotted in first, then the position of each frame as it protruded out from the edge of the hull. Some interior features of the hull were also mapped as time permitted. These features included frame shapes, keepers, keel, butt straps, iron knees, and a few unidentified features. (Figure 19)

Line searches were used as time permitted. The results of these searches included the portion of hull wreckage that was re-identified as the location of the cannonballs recovered in 1988. One cannonball remained in situ. Closer examination of this wreckage resulted in the discovery of the sternpost and rudder. Line searches south of the wreck also relocated the stanchion found in 1988. Closer examination showed this feature to be a piston guide for a steam engine. Another portion of hull plating was located farther out from the main wreckage area. Its position was recorded but it was not drawn due to lack of time. During these line searches a cannon ball was located east of the main wreckage. The cannonball was recovered for conservation by the NCUAU.
Site Description

Salvage, time and the elements had taken their toll on the Curlew. Explosives appear to have been used during the engine salvage in 1863. Some further dynamiting may have been done by local fishermen to destroy the Curlew as a navigation hazard. The wreck appears as a pile of encrusted scrap metal that had been dumped into Croatan Sound a long time ago. The encrusted state of the wreckage obscures many details. By using the baseline and trilateration for mapping some sense is made from this underwater junkyard. Perhaps the best way to describe the current condition of the Curlew is to conduct an imaginary swim from the north to the south area of wreckage (Figure 19). The north area contains wreckage associated with the stern of the steamboat.

The rudder is located on the north end of the wreck, attached to a section of the sternpost. The rudder had a vertical post fastened to the top aft edge of the rudder. The purpose of this post, called a monkey head, is for the attachment of the steering ropes. The sternpost is two inch by four inch moulded bar iron. The sternpost is still attached to a fragment of the keel. Four feet south is a separated section of keel and hull plating. This section, which contains both a starboard and a port hull fragment, is "V" shaped in cross section. Due to its shape and provenience it likely came from the after end of the hull
near the rudder. It was this area, over the keel, where the twenty-four cannonballs were recovered in 1988. One cannonball remains in situ inside the hull fragment.

The main wreckage area consists of two components: a 48-foot hull section resting in a north-south direction, and a 40-foot hull section butted up to and laying perpendicular to the north-south section. These hull sections consist of a keel with extant hull plating on both port and starboard sides of the hull. On both sections of the wreck, the starboard side of the hull is intact up to the turn of the bilge, with sections variously collapsed inward. The port side is less intact. In both sections of the wreck the port side is broken off two feet or less from the keel. The wreckage on the southeast area has several sections of hull siding collapsed in layers over onto the starboard side.

A hull section on the southwest edge of the main wreckage area is identified as the port hull plating of the bow. Its surface is slightly curved, and is laying with the frames underneath the plating. The shape of the gunwale and stem is visible. The starboard side was not visible, nor was it attached at the stem. The gunwale still exists for fourteen feet aft from the bow. The stempost itself was not attached to this section. Dredging along the stem uncovered the curve of the bow cutwater, and a section tentatively identified as a stempost. This stempost was a small iron
bar, 2.5 by 1.75 inches with approximately six inches exposed.

About ninety feet of the keel was located in the wreckage area, leaving approximately forty-five feet of keel unaccounted for. The keel's cross section is U-shaped, known as a hollow keel. The effect is a trough that runs the length of the ship and is useful for collecting bilge water. It also seals the seam between the garboard strakes. The lack of deadrise up to the turn of the bilge shows that the Curlew was flat-bottomed. Five longitudinal strengtheners are extant, two on the port side and three on the starboard. These strengtheners ran the length of the ship, and measured .25 inch wide by 6 inches moulded. The strengtheners are notched to allow passage of the frames. The concretions accumulated on the wreck prevented verification of how these strengtheners were attached to the hull.

The ship's frames are regular bar iron, .75 inch sided by 3 inch molded. The frame spacing on the main section of wreckage is 1 foot 4 inches, measured on the center. The bow wreckage area of the ship is too broken up to determine frame spacing. The stern wreckage area fragments suggest the spacing is the same as in the main hull area.

The frames are held to the hull plating with keepers. Keepers are small wrought iron straps, 2 1/2 inches wide by 6 inches long, and 1/4 inch thick. (Figure 20) Keepers are fitted over the frames and fastened directly to the hull
plating with two rivets on either side of the frame. On the main hull section, the keepers are spaced one every foot along a frame. The hull plates at the turn of the bilge are .625 inch thick and 14 inches wide. The extensive encrustation of the hull made it difficult to determine an average plate's length.\textsuperscript{15}

The method of attachment of hull plates to each other was also difficult to ascertain. On the vertical seams, the plates are butted up against each other and fastened by rectangular wrought iron plates called butt straps or ribands. These ribands were 2 feet by 4 inches, and were fastened on the inside of the hull plating by two rows of 12 rivets. Hull plates were attached to each other horizontally with one row of rivets. Rivets were 5/8 inch in diameter, spaced 2 inches apart on center. Again, heavy hull encrustation prevented the determination of whether the hull plates were lapped-strake built or alternating-plate built. (i.e. "in and out" system). Records of other prewar Harlan ships suggest that both styles were used.\textsuperscript{16}

Forty feet south of the main wreckage area is another large hull fragment, approximately ten feet by twelve feet. This hull section is relatively flat, with the frames lying underneath the hull plating. There is no identifiable features to indicate what part of the Curlew this section is from. (Figure 21)
Figure 21: Hull section located forty feet south of main wreckage.
The stanchion and a hull plate section were located further south, but were too far out to be included in the main baseline. Their positions, however, were plotted by the survey station on shore. As stated earlier, closer examination of the stanchion showed that it was a piston guide for a steam engine. (Figure 22) The piston guide was one of two that existed in the engine room. The purpose of these guides was to keep the piston rod moving up and down in a vertical alignment. Its length corresponds with historical accounts of the length of piston stroke for the Curlew. Furthermore, fragments of the support beams for the piston guide are extant. The position of the support beams correspond with the beams shown in the engine room plan for the Curlew.

Another engine fragment appears to be the throttle valve for the steam chest. Dredging along the gunwale uncovered the top of a small cylinder. (Figure 19-4) This cylinder is four inches in diameter, with four bolts along the outer edge of the cover. A rod sticks out of the center of the cover. According to surviving engine plans its diameter matches a cylinder that was part of the throttle assembly. The rod would come to a small hand wheel at the engineer's operating station between the boiler and the piston cylinder. However, its position outside the wreck and near the bow, makes it
Figure 22: Piston Guide from Curlew's engine.

KEY
1 Concretion
2 Support strut fragments
3 Hole

Cross Section

Piston guide on the Curlew engine drawing.
unclear if the cylinder is engine-related or part of some other equipment in the ship.

Additional miscellaneous features found were two iron knees and a brass porthole. Two rectangular-shaped objects, 3 feet by 1.5 feet, lay on top of the keel. These objects have one concave side and the purpose of these objects remains unclear.

The broken up nature of the wreck and the absence of any superstructure prevents one from getting a clear idea of what the wreck looked like before it was destroyed. In this case the historical record and the archaeological record can complement each other.

Reconstruction

Other contemporary steamboats documented in historical, archaeological, and photographic records can give a basic idea concerning the appearance of the Curlew. The hull and superstructure design of the Curlew would be comparable to similar-sized wood and iron hull steamboats on the east coast. Adoption of iron instead of wood for hull construction did not mean a radical departure from the general layout of similar sized steamboats. There are certain differences, however, between the hull forms of iron and wooden vessels.
General Hull Appearance

Nineteenth-century American steamboat design can be divided into two distinct classes: east coast and western river designs. Briefly stated, the western river steamboats had no keel, a shallow depth of hold, open sides, and tall superstructure. They were designed to combat the swift currents and changing river levels characteristic of the western rivers. In contrast, the basic east coast steamboat had characteristics of a deep water ship. East coast steamboat hulls were much sturdier than western river steamboats because of the rougher conditions encountered on the east coast sounds and bays. The east coast steamboat tended to have enclosed sides, higher freeboard, projecting keels, and deep-draft hulls. Enclosed sides and higher freeboard protected passengers and cargo from the elements, and projecting keels helped counteract the effect wind would have on a steamboat in the open sounds. The deeper water of eastern areas, unaffected by seasonal flooding, meant less chance of damage from grounding. The economy and easy maintenance of the low pressure engine made it a common feature on the east coast. The average life of an east coast wooden steamboat was fifteen years, while western river vessels served an average of five years. Iron hull steamboats along the rivers and coasts of the United States were known to survive up to fifty years or more.17 The
steamboat hull form varied along regions of the east coast including the North Carolina sounds.

The North Carolina-based steamboats probably followed the layout of the northern states steamboat designs. This is not surprising, for the majority of North Carolina steamboats were, in fact, built out of state. For example, out of twenty-six steamboats enrolled in North Carolina between 1819 and 1860, only four were North Carolina built. Over half of the remaining twenty-two were built in the northern states.\footnote{18}

North Carolina sound steamboats, like their northern counterparts, had to be built more robustly than the classic western riverboat designs. Its main area of operation, Albemarle Sound, is large but shallow with an average depth of eleven feet. At that depth water can support a maximum wave height of five feet. A chop of three feet can be expected anywhere except in the rivers and bays. Therefore, North Carolina sound steamboats needed deep hulls, enclosed sides, and high freeboard to counter the rougher conditions on the wide rivers and sounds. A flat bottom was also needed to navigate the shallower sections of the sounds and rivers. A further advantage of a flat bottom was it could negate excessive rolling.\footnote{19}

The Curlew's iron hull construction gave it several advantages. Iron hulls were lighter, weighing as little as one-third of a wooden hull of similar dimensions. Its flat bottom and sharp turn of the bilge were hard to duplicate in
wood without loss of strength. Although the initial cost of an iron hull may be equal to if not more than that of a wooden hull in America, the increase in capacity and durability would offset the initial cost of an iron vessel. The inherent strength of iron hulls allowed them to resist hogging (sagging of the ends), therefore the Curlew did not need external structural supports such as hogging trusses.\textsuperscript{20}

**Superstructure**

Typically, nineteenth-century wood or iron east coast steamboats of approximately the Curlew’s size had two decks, the main deck and the spar deck (Figure 23). The main deck, sometimes called the freight deck, extended without interruption from the bow to the stern. The main deck sometimes extended over the sides of the hull, forming sponsons. Sponsons were common on most east coast paddle wheel steamboats.

Sponsons are side extensions of the main deck, and initially came into use on early Hudson River steamboats as paddle wheel protection. Eventually they were enlarged and used as main deck space, and on some larger east coast steamboats, the guards were used as platforms for boilers or used for storage of freight. Sponsons often had a rubbing rail placed along the outside edge for protection against
Figure 23: Coastal steamboats of similar dimensions to the Curlew: Top: C.W. Thomas (1863); Bottom: Carribean (1870).
docks. The deck, superstructure, and sponsons were of wood construction, as was most of the superstructure.\textsuperscript{21}

On east coast steamboats a large cabin structure took up most of the space on the main deck (Figure 23). Sometimes it covered the entire main deck, but often it began about one-fourth of the ship's length aft of the stem, leaving an open foredeck. The main deck cabins had saloons, storage spaces, galley, or passenger cabins. The part of the guard that wraps around the stern was often kept open for use as a walkway.\textsuperscript{22}

Above the main deck was the spar deck, which was the uppermost deck on a vessel. It was not designed to support large structures. Other than the pilot house, there were few if any cabin structures on the spar deck. The Curlew, being a small steamboat, may not have had any cabins above the main deck. Some coastal steamboats had a small structure surrounding the walking beam, plus a canopy of some sort over the spar deck at the stern. The only illustration of the Curlew does not depict any cabins on the spar deck.

The Civil War illustration from Harper's Weekly is the only extant illustration of the Curlew (Figure 12). This illustration shows the Curlew, Raleigh, and Junaluska engaging the Union tugboat Fanny. Though one should suspect the complete accuracy of such newspaper illustrations, the artist did correctly portray the types of ships involved: The Raleigh, Junaluska, and Fanny are correctly portrayed as
propeller boats, and the Curlew is correctly depicted as a side-wheeler. A walking beam mount is also shown. The superstructure is shown as having only one large main deck cabin area with a pilot house on top. The bow and stern are devoid of cabin superstructures. The twenty-five days spent outfitting the Curlew for Confederate service probably involved the removal of cabin structures, especially in the stern where a 12-pound cannon was installed.

The hypothetical small size of the Curlew’s superstructure may reflect the kind of operation it was expected to undertake. The Curlew’s main purpose when constructed was to be a passenger and freight carrier. Surviving advertisements for the Curlew did not suggest it was a luxurious boat. No distinctions were made in passenger fare for first or second class, the only difference being whether meals were provided. Another reason the Curlew would have a smaller superstructure would be the type of rivers it would have to navigate. For the most part, the Chowan and Roanoke Rivers were broad enough to allow passage without hindrance from overhanging trees. The Blackwater River, however, was different. This river can get rather narrow with overhanging trees, and a steamboat with a tall superstructure would be at a disadvantage.

Evidence for the lack of a substantial passenger deck structure on the Curlew may be seen in the Harpers New Monthly Magazine illustration of the Stag (Figure 4). The Stag
belonged to the same company as the Curlew, and both steamers used the Blackwater River route. The Stag, slightly smaller than the Curlew, was 122 feet long and 18 feet wide with a 7 feet depth of hold. The illustration shows the passenger deck as viewed from the stern looking forward. It shows a lifeboat, walking beam, smokestack, and the pilot house. More significantly, the illustration shows low-hanging branches along the Blackwater River. A steamboat with a larger superstructure could not navigate these stretches without damage from these branches. The Curlew probably had a similar low superstructure.

Further evidence of the Curlew's basic design can be found in documentation of other steamboats operating in the same area. An obvious example is the design for what eventually became the steamboat Virginia Dare (Figure 24). This vessel, initially named Edenton, is a Harlan & Hollingsworth-built steamboat ordered by Edenton resident Edward Wood in 1860 for trade and passenger service in the Albemarle Sound. It was intended to compete with the Curlew. Although the Virginia Dare was longer and wider, its superstructure would likely be similar to the Curlew.

On the main deck level, the Virginia Dare's bow was open for about one-fourth of its length. Aft of the open bow was a superstructure that held various cabins and the engine room. From the paddle wheels aft to the stern, the cabins were surrounded by a walkway formed by the sponson. Over
Figure 24: Harlan & Hollingsworth drawing of the Edenton (Virginia Dare); Hayes Collection, UNC Chapel Hill.
these cabins was the spar deck which held the pilot house, plus a structure that surrounded the walking beam itself. The Curlew probably had an identical superstructure layout. Being slightly smaller, however, the Curlew may not have had any other significant structure on the spar deck.²⁵

**Site Interpretation**

One interesting discovery at the Curlew wreck site was the crude method used in attaching frames to the hull plating (Figure 20). The Curlew used bar iron for frames, which were attached to the hull plating by use of small iron straps called keepers. Keepers were bent over the bar forming a flange on either side. The flanges were then riveted to the hull plates. The keepers were spaced 12 to 18 inches apart on the frames. This system of framing, which will be called keeper framing in this thesis, is in contrast to the simultaneous use of angle iron for ship's frames by other builders.

Typically, a bar of angle iron is a block of iron material that is formed into one of several distinct cross-sections (Figure 15). All these cross-section shapes have similar advantages over an iron bar of the same weight with a rectangular cross-section. Tensile and compressive stresses on an iron bar are low along the center axis and very high in the portion farthest away from the center axis. To make an iron bar stronger it is important to concentrate material
along the outer edges. Angle iron by its very nature does this, making a stronger bar with the same weight or a lighter bar with the same strength.26

In shipbuilding, angle iron bars are uses as framing for the ships hull. Angle iron frames have the advantage of distributing hull plate tension evenly along the entire frame. In contrast, keeper frames could only take tension on the attachment points of the keeper’s flanges and not along the whole bar frame. Keepers have very little resistance to vertical flexing of the hull plating. Vertical support would come mainly from the hull plates. Furthermore, the bar frame with its rectangular cross-section, was inferior to angle iron in strength.

Keeper Origins

It is hard to determine the origin of keepers, and why the use of keeper frames for ship construction existed alongside angle iron frame construction in nineteenth-century America. Harlan & Hollingsworth was not the only iron shipbuilding company to use keepers. Reaney, Neafie, and Company of Philadelphia, J. S. Underhill of New York, and the Starrs of Camden, New Jersey, also used keepers on some if not all of their iron vessels. Furthermore, it is difficult to pinpoint the exact time frame that keepers came into use.

The earliest reference to their use found thus far is 1844, and the latest date is 1862. The Harlan steamer Bangor
used keepers in 1844, and two steamships built in 1862, the tugboat Lookout and the Civil War ironclad Keokuk (sunk in Charleston in 1863) used keepers in their construction.\textsuperscript{27} The Lookout was still afloat until 1995, when it was scuttled near Oregon Inlet, North Carolina.\textsuperscript{28} Angle iron use in ship construction was possibly introduced in the Unites States with the Codorus in 1825. The importation of at least seven British iron hulls during the 1830s probably brought angle iron use to the attention of American shipbuilders. Angle iron was definitely used in the USS Michigan in 1844.\textsuperscript{29} In considering the origin of keepers and why they coexisted with angle iron, there are several sides of the question to consider: unfamiliarity towards iron shipbuilding technique, basic economics, and technical capabilities.

One reason for the origin of keeper framing construction may be the unfamiliarity of nineteenth-century shipbuilders with iron shipbuilding. Keeper frames may have been the result of wood shipbuilders using iron, a material with which they were unfamiliar. This inexperience possibly inhibited the advancement of iron shipbuilding technique. Evidence of this attitude is readily apparent, though it is hard to determine specifically if it was responsible for the origins of keeper construction, or its longevity.

Centuries of wood ship construction created a strong sense of pride and tradition among shipbuilders. As a result, "the thoroughbred professional shipbuilder could
never be convinced that the rough and uncouth production of iron would replace wood." Shipbuilders and engineers felt that crude construction was an essential characteristic of iron shipbuilding, and a well-designed ship could not carry significant amounts of cargo. Traditional shipwrights thus neglected to familiarize themselves with changes that iron construction brought, and were unwilling to advance iron ship design beyond its crude beginnings. Even some of the terminology used in wood construction was applied to iron. For example, in the description of the materials used in the Virgina Dare, one can find reference to "timbers of bar iron" used in the framing. Most early iron ships were designed and built by shipwrights who were contracted whenever ironworkers needed a barge built. The shipwrights probably used keepers as a kind of copy of wood construction, since they were unfamiliar with the advantages of angle iron over flat bar iron. Thus keeper frames were possibly conceptualized as the best means to attach frames to plates.

In addition to tradition, keeper framing may have been a cheaper form of construction for an iron ship. It used fewer rivets than a comparable iron ship using angle iron frames. For example: the 1843 U.S. paddle steamer Michigan had its frame rivets spaced every 2.25 inches. On the Curlew, Virginia Dare, William G. Hewes, and likely other Harlan vessels the rivets were placed through the keepers in pairs twelve inches apart. Along one foot of iron framing, the
Curlew's keeper framing used two less rivets when compared to equal-length angle iron framing of the Michigan. Considering the vast number of rivets used on iron vessels, this indicates a considerable savings in materials, cost, weight, and assembly time. As a modern example of weight saving, some Washington Treaty-era British cruiser designs were able to subtract forty tons in weight by using a smaller rivet head.  

Bending bar iron into frame shapes was also less labor intensive as was angle iron.

Another reason Harlan used keeper framing was that it was a simpler form of construction and perhaps more within the company's technical capabilities. Angle iron was typically bent into frames in the same manner outlined for bar iron in Chapter 2. The only difference was that it was rolled to the basic angle iron "L" shape. Tongs and hammers are then used to bend the angle iron into the necessary shape. Angle iron, throughout its formation, had to be constantly checked and braced to prevent splitting and warping of its flanges as the frame took shape. Harlan employees may have lacked the skill or means to bend angle iron. Further complications arose if the angle iron had rivet holes punched in it before being bent into a frame. Bending frames would distort rivet holes, making it difficult to obtain a tight seal between the rivets, frames, and the hull during the riveting stage.
Despite their extensive use of keeper framing, Harlan & Hollingsworth did use angle iron in some areas of a ship's hull. For example, the *Louisiana, William G. Hewes, and James Requea* used angle or "T" shaped iron for its cross floors and keelsons. The company was located along the Christina River, which was too small to launch transatlantic steamships. Thus the majority of the Harlan & Hollingsworth ships were built for coastal and river work. Coastal and river ships out of necessity were shallow drafted and flat bottomed. Since flat bottoms would require little bending of the angle iron on the cross floors and keelsons, perhaps it is a further indication that Harlan & Hollingsworth though it unnecessary to bend angle iron to shape for frames.

Angle iron frames also needed to be beveled to the proper angle as they progressed towards the bow and stern. Bevels are a type of angle iron where the flanges are bent more or less than 90 degrees. This was an added complication that was made easier with keepers. It was easier to bend a small keeper strap to the proper angle than to bend an entire frame. Overall, keeper framing, with its use of the uncomplicated bar iron, may have been a cheaper and faster method of ship construction for Harlan & Hollingsworth.

The co-existence of keeper framing and angle iron methods may have been due to Harlan's basic refusal or inability to update its technology unless it was absolutely
necessary. According to the company history, Harlan & Hollingsworth had a complete shipyard by 1852. However, it was deficient in "suitable tools and sheds for the proper preparation of the materials used in the hulls." Though the company history goes on to detail the later shipyard improvements, it is possible that the machinery needed to roll angle iron was not acquired by 1860. That year the largest iron vessel yet built in the United States, the *William Hewes*, was launched by Harlan. The Hewes used keeper frames in its construction.\(^{38}\)

Despite the inherent weakness of the keeper framing system, Harlan & Hollingsworth were able to prosper as a shipyard. This was due in part to federal law, which placed a heavier tax on foreign-built vessels used in American coastal and river shipping.\(^{39}\) Harlan had little competition from foreign-built vessels for the American coastal shipping market. Harlan was also able to compete successfully with British builders for the Central and South American markets. Harlan had the advantage of high quality workmanship and of being able to deliver a coastal vessel under its own power.\(^{40}\) Diversification into the railroad car building business also helped keep the company in business during times of low shipbuilding demand.

The Civil War may have provided Harlan & Hollingsworth the opportunity to upgrade their shipyard. It was customary, in building large ships, to add the purchase of large tools
and appliances to the estimate of the hull costs. The three monitors that the U.S. government contracted Harlan to build probably gave that company the financial ability to retool its machine shops. These monitors had angle iron framing, and it is interesting to note that angle iron frames start appearing on Harlan-built ships after the Civil War.

The Curlew is important to our understanding of the history of iron ship construction in the United States. To briefly reiterate this chapter, the wreck site was located in 1988. The iron hull remains and builder's plate identify this wreck as the Curlew. The archaeological record shows that this vessel has the following features: flat bottom, iron construction, and vertical stempost and sternpost. The wreck also has iron bar frames riveted to the hull plates by means of wrought iron straps called keepers. The Curlew has a hollow U-shaped keel, with additional longitudinal reinforcement provided by six intercostal girders, five of which are extant. The Curlew's rudder is typical of the steamboat period, with the steering tackle attached to the rudder by a vertical post located towards the aft edge of the rudder. Cannonballs provide evidence of the Curlew's Civil War service. Historical records show that the ship was originally 135 feet long, 23 feet wide with an 8-foot depth of hold, a 5-foot draft, and a displacement of 350 tons. The Curlew's paddle wheels were 18 feet in diameter, and 8 feet
wide. It had two decks, three bulkheads, and one return-flue boiler with two furnaces which provided steam for a walking beam engine. The Curlew had no figurehead, a round stern, and no mast. Although the hull and superstructure is either greatly deteriorated or gone entirely, the basic design was probably comparable to other east coast steamboats constructed for sounds and bays (Figure 22).

The Curlew wreck site greatly aids our understanding of the slow development of iron shipbuilding in the United States. It does, however, raise questions as to why the United States iron shipbuilding industry developed the way it did. Some features of the Curlew appear rather primitive for the 1850s. The use of wrought-iron keepers to attach the hull plates to the frames depict the backwardness of some early American iron shipyards. This crudeness cannot be explained through ignorance of the latest iron shipbuilding techniques. This technology was not a state or military secret. Period engineering journals give descriptions of many iron steamboats. Furthermore, Great Britain’s iron shipyards had used angle iron early in the 1830s. Moreover, the U.S. Navy’s first iron ship used angle iron for framing in 1843. It is puzzling then why this retrograde iron shipbuilding technique existed alongside more modern techniques in the United States. There are several possible reasons why this situation existed: unfamiliarity with iron shipbuilding technique, basic economics, and technical
capabilities. Based on historical and archaeological research, the Curlew is an archtypical example of early iron ship construction in America.
Endnotes


2Rodgers, Guardian, 10.


6ORN 6: 552

7Dunbar, Geography of the North Carolina Outer Banks, 109, 136-137; ORN 6: 552; Evans, "The Late Quaternary Seismic Stratigraphy,...Dare County, North Carolina," 55.

8William Parker, Recollections of a Naval Officer, 1841-1864 (Annapolis, Maryland: Naval Institute Press, 1985), 248.

9ORN 6: 597; Raleigh State Journal, April 2, 1862.


11Wilson Angley to Richard Lawrence, 16 March 1988, copy in hand of Wilson Angley, N.C. Division of Archives and History; David Stick, Dare County: A History (Raleigh: Archives and History, 1970), 55.
Curlew field notes, September 9 through 13, 1988, on file at the North Carolina Underwater Archaeological Unit (NCUAU), Kure Beach, North Carolina.

NCUAU Curlew file, Kure Beach, North Carolina.

The wrecks location does not pose a significant navigation hazard to vessels traveling the Croatan Sound channel.

Plate length would vary depending on its location on the hull. A hull plate could be anywhere from five to ten feet long. See Corlett, The Iron Ship, 30; Rodgers, Guardian, 22.

Henry T. Gause, Semi-Centennial Memoir of the Harlan and Hollingsworth Company. (Wilmington, Delaware: n.p, 1886), 230; Canney, Coast Guard and Revenue Cutters, 36.


JFI, 1856, 122; Rodgers, Guardian, 20.

Hunter, Steamboats on the Western Rivers, 91-93; Holley, Steamboat on the Chesapeake, 40.

Holley, Steamboat on the Chesapeake, 201.

See Curlew advertisement in American Banner (Edenton, North Carolina), August 7, 1856.

Gause, Semi-Centennial Memoir, 267.

Furthermore, the description given by F. Smallman used the term spar deck instead of passenger deck. Spar deck by definition does not have any significant structures on it.


Gause, Semi-Centennial Memoir, 215f; Brown, "Notes on the Origins of Iron Shipbuilding ", 235; Illustration of Keokuk courtesy of

28Author's personal communication with North Carolina Marine Fisheries, May 16, 1995.

29Rodgers, Guardian, 22f.


31Harlan & Hollingsworth to Edward Wood, Memorandum of Agreement for the building of the Virginia Dare, January 7, 1861, Wood Family series of Hayes Collection, Southern Historical Collection, Chapel Hill, North Carolina.


34E. J. Reed, Shipbuilding in Iron and Steel (London: John Murray, Albemarle Street, 1869), 430; A. Campbell Holms, Practical Shipbuilding (London: Longmans, Green, and Co., 1904), 461.


38Gause, Semi-Centennial Memoir, 238f; Nautical Intelligence, (1860) 359.


Conclusion

Reflections on the Curlew

To explore general topics of the nineteenth century is relatively easy, but to examine a micro-section of that same period can be more challenging. The iron steamboat Curlew represents such a topic. This steamboat provided passenger service in North Carolina sounds in the late 1850s, and served as a Confederate Navy gunboat before being sunk during the invasion of Roanoke Island in 1862. In this work this one vessel has become a case study of the progress of economic development in North Carolina, as well as a study of the role of the gunboat in the Confederate Navy and an archaeological site. The vessel serves as an indicator of the state of iron shipbuilding technology in America during the 1850s, for it remains a rare extant example of early American iron shipbuilding. This thesis, therefore, attempts to fill a gap in the historical record on a segment of mid-nineteenth century America.

The Curlew operated during a period characterized by slow economic growth in North Carolina. The state's geographic environment restricted commerce and generally kept it in poor, rural, and undeveloped. This geographic situation supported a conservative, politically dominant and wealthy eastern minority worked to keep North Carolina economically undeveloped. The Curlew was a consequence of eastern North Carolina's continued reliance on water
transportation by which the wealthy eastern minority maintained its wealth.

The Curlew also existed as a result of one wealthy eastern North Carolina resident's desire to expand his wealth. In this light the Curlew's owner, Thomas Warren, is illustrative of the social change from the old-style plantation gentleman to a middle-class modern businessman who inherited his wealth.

At the unwelcome arrival of the Civil War, the North Carolina sounds were vitally important to the Confederacy. They were a haven for Confederate privateers and blockade runners, and provided a transportation route for goods. The North Carolina sounds were also a source of foodstuffs, naval stores, and other supplies that the industrial-poor south needed to conduct a war. The Confederacy made considerable efforts to defend the sounds, building coastal fortifications and a navy. However, the South's general lack of shipbuilding facilities forced the its Navy to find other means to acquire a fleet. As a result, the Confederate Navy consisted of a conglomerate of ironclads, commerce raiders, steamboats and sailing vessels. The bulk of this Navy revolved around converted, unarmored, lightly armed gunboats.\(^1\) Initially there were high hopes for the ability of these gunboats to hold off Federal incursions. The Curlew is a typical example of a converted Confederate gunboat's experience in North Carolina, more or less helpless in the
face of purpose-built warships and the Federal invasion of North Carolina's coast.

The Curlew is also a case study on early American iron shipbuilding. American iron shipbuilding was slow to be accepted in the United States as compared to Britain. By the 1840s iron ship construction was well developed in Britain but relatively new to the United States.² This slow start is probably due to several factors: the lack of a market for iron hulls in a heavily forested nation, the initial high iron prices, the expensive retooling required for shipyards, the perceived fouling problem for iron, and the general conservative nature of shipbuilders. In addition, early American ironworkers were boilermakers and steam engine builders who probably were not interested in advancing iron shipbuilding technology.³

Yet it is still somewhat surprising that the remains of the Curlew show a style of frame attachment, called keeper framing, that appears well out of date for its 1850s time period, even for the U.S. Keeper frame construction may in fact have been invented by wood shipbuilders who were unfamiliar with iron working. A case in point is the builder of the Curlew, the Harlan & Hollingsworth Company.

Harlan & Hollingsworth specialized in railroad car building and steam engine repair. When its directors decided to go into iron shipbuilding, the company had first to employ wooden ship designers who knew little about the capabilities
of iron. However, between 1844 and 1861 Harlan & Hollingsworth had constructed 73 iron vessels, making them the leading iron shipbuilder in the United States. These vessels used the same outdated keeper frame method of construction in 1844 as they did in 1860. There may be several explanations for the continuation of this type of hull construction. It may be that Harlan & Hollingsworth did not acquire the technical skill to advance iron construction beyond its crude beginnings. Or perhaps the keeper frames were a cheaper method of construction that remained satisfactory for the company until it could afford better tools. Further study of this company may explain why iron shipbuilding technology was slow to develop in America.

The non-proliferation of technical experience by American iron ship builders may partially explain why such primitive construction technique existed at Harlan & Hollingsworth. There are examples of other early iron shipyards, such as Stackhouse and Tomlinson (located in Pennsylvania), that used more advanced techniques in its iron ship construction. Moreover, it is interesting to note that the U.S. Navy's first iron warship, built in 1843, used the more effective "T"-beam frame construction as mentioned earlier. A year after this modern construction technique demonstrated its usefulness in the USS Michigan, Harlan & Hollingsworth built its first steamboat using keeper frame construction.
Recommendations

These recommendations address two areas of interest to future investigators: scientific research of iron ship construction and the monitoring of site degradation through natural or man-made forces. Scientific research will be addressed first.

Scientific research should concentrate on completing the pre-disturbance site map. Features that were missed by the 1994 field season should be documented. Details such as horizontal plate attachment method, longitudinal strengthener attachment, average hull plate size, and plotting the location of various hull debris should be done before any excavation of the hull interior were to take place. These details can probably be recorded without any major excavation within the hull. The location of such features as boiler or engine foundations would be useful in determining exactly what part of the Curlew's hull is extant. Overall, there is little need for removing any sand within the wreck unless it allows for identification of interior hull features. If any dredging has to be done it should be around the bow section. The dredging along the bow section in the 1994 season has shown the existence of a possible stempost and a fragment of the steam engine. Future work should concentrate on confirming the identity of these features. Some dredging may
be useful around the sternpost in order to better determine its attachment to the keel.

Periodic dives on the site should be done to monitor the condition of the hull. The site is not in immediate physical danger, however, natural elements such as storms, hurricanes and normal wave action may further break up the wreck. It is also conceivable that potential man-made dangers including bridge improvements, fishermen, and sport divers, could impact the site.

The pile of encrusted, broken metal that is the Curlew did not look very attractive when I dove on it in 1994. Its significance looked as though it would remain an enigma. This work was started with only a vague perception on my part of North Carolina history and this state's participation in the Civil War. I was also totally ignorant of the history of iron ship construction in the United States, with the majority of my ship construction knowledge centered on wood construction techniques. However, this ship, whose history had not been given proper attention, opened avenues of exploration previously unknown. The wreck took on a new life when put into the "big picture" of its time period. Being able to associate names (and sometimes faces), places, and important events to that underwater scrap pile show how the Curlew participated in the affairs that shaped a nation, albeit in a small way. I hope that the research on the Curlew may in some way fill a gap in the maritime and Civil
War history of North Carolina, and constitute a step toward understanding the place of iron ship construction in America.
Endnotes


4Tyler, American Clyde, 7, 8.

5Scientific American, May 4, 1861, 275.

6Gause, Harlan and Hollingsworth, 216, 376; Rodgers, Guardian, 16, 22-23.
Bibliography

Primary Sources: Unpublished

Manuscript Collections

Confederate States of America, "Message of the President," North Carolina Collection, Rare Books, East Carolina University, North Carolina.

Curlew File, North Carolina Underwater Archaeological Unit, Kure Beach, North Carolina.

George S. Driver Papers, East Carolina Manuscript Collection, J.Y. Joyner Library, East Carolina University, Greenville, North Carolina.


Josiah Collins Papers, North Carolina Division of Archives and History, Raleigh, North Carolina.

R. T. Barnes Diary, North Carolina Division of Archives and History, Raleigh, North Carolina.

Valentine Papers, Southern Historical Collection, Chapel Hill, North Carolina.

Wood Family Papers in Hayes Collection, Southern Historical Collection, Chapel Hill, North Carolina.

Government Documents

Naval Records Collection, Office of Naval Records and Library. Area files 625, "Confederate Navy Department." Record Group 45.9, National Archives, Washington D.C.


Certificates of Registry issued at Edenton, North Carolina. Record Group 41. National Archives, Washington, D.C.

Certificates of Enrollment issued at Portsmouth, Virginia. Record Group 41. National Archives, Washington, D.C.

Certificates of Registry issued at Wilmington, Delaware. Record Group 41. National Archives, Washington, D.C.

Tax list of Edenton residents (1856, 1858, 1859, 1860), State Archives, Raleigh, North Carolina.

Register of Deeds. Southampton County, Franklin, Virginia.

Register of Deeds. Chowan County, Edenton, Virginia.

War Department Collection of Confederate Records, "Records of the Confederate Navy Department." Record Group 109.12, National Archives, Washington, D.C.

War Department Collection of Confederate Records, "Citizens File," Record Group 109, National Archives, Washington, D.C.

Published Government Documents


**General Histories**


The Harlan & Hollingsworth Company, Pennsylvania: Armstrong and Fears, 1890.


Reed, E.J. *Shipbuilding in Iron and Steel*. London: John Murray, Albemarle Street, 1869.


**Newspapers**


*American Beacon* (Norfolk, Virginia), 28 January 1851

Citizen, Murphreesboro, North Carolina, 3 August 1859.

Daily Express, Petersburg, Virginia, 15 January 1859.


Delaware Gazette, Wilmington, Delaware, 30 April 1858.

Democratic Pioneer, Elizabeth City, 15, 22 September 1857.

Edenton Gazette, Edenton, North Carolina, 21 & 27 February 1830; 7 January 1835.

Elizabeth City Democratic Pioneer, Elizabeth City, North Carolina, 23 June, 21 July 1857.

Franklin Tidewater News, Franklin, Virginia, 19 March 1915.


Newbern Weekly Progress, New Bern, North Carolina, 12 November 1861.

Norfolk and Portsmouth Herald, Norfolk, Virginia, 26 July 1830.


Richmond Examiner, Richmond, Virginia, November 11, 1861.

Raleigh State Journal, Raleigh, North Carolina, 2 April 1862.


Journals


Cramp, Charles H. "60 years of Shipbuilding on the Delaware," Proceedings of the Humanistic and Antiquitarian Society of Philadelphia (April 1906): 175-188. This is one of the few sources that describes keeper framing.


"Lloyd's Rules for Construction of Iron Ships." U.S. Nautical Magazine and Naval Journal 3 (June 1855): 239-244.


"Nautical Intelligence: American Naval Architecture." Hunt's Merchants Magazine 44 (May 1861): 359-360. This journal article is a description of the William G. Hewes. It is one of the few sources that describe keeper framing.


"Particulars of a New English Iron Steamer, Alma." Journal of the Franklin Institute 60 (1855): 269;


"Wear and Tear of Steamships." Hunt's Merchants Magazine. 43 (June 1860): 137.
**Theses**


Evans, Gary B. "The Late Quaternary seismic Stratigraphy, Lithostratigraphy, and Geologic History of a Shelf-barrier Estuary system, Dare County, North Carolina." M.S. Geology Thesis, East Carolina University, 1983.


**Dissertations**


Reports


Misc.