TESTING THE TYPOLOGY:

AN ANALYSIS OF CONFEDERATE BLOCKADE RUNNERS (1831-1865)

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Abstract

Historians have examined American Civil War blockade runners from many perspectives. This includes seeing the watercraft as phenomenal works of industrial engineering, ships that made daring escapes, and vessels that either single-handedly saved the Confederate economy – or doomed it. So much research on blockade running has occurred that prior researchers sought to create archetypes to describe these ships' changing dimensions and technologies. A limited array of historical sources has influenced prior work, with a primary focus on the activities of Confederate agent James Bulloch. Bulloch's writing emphasized important anatomical features, and researchers have tended to organize typologies around these traits. Such historical sources take for granted the ships' complexity and wide range of locations where they were built. This thesis challenges assumptions by employing new approaches, specifically a critical examination of traditional blockade runner typologies.

Testing the Typology:
An Analysis of Confederate Blockade Runners (1831-1865)

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Chapter 1: Introduction

In the American Civil War (1861-1865), blockade runners were essential to the wartime economic strategy of the Confederacy. After the closure of several ports by blockading fleets, shallow ports like Wilmington, North Carolina, became centers for blockade-running activity. The Confederate government bought vessels from Britain due to a lack of shipbuilding resources in the South and an inability to convert more ships into blockade runners. According to Scottish historian Eric Graham, the Confederacy was particularly interested in river-class steamers. The river-class were fast and made on the River Clyde, Scotland, or around Liverpool, England (Graham 2006:107). Referred to as Clyde steamers, or simply "Clyde-built," many of were acquired by Anglo-Confederate companies like Fraser Trenholm and Company or by ships captured by the Confederacy (Wise 1989:103; Watts 1997:123). These ships would have their large superstructures removed and would be outfitted with smaller deck houses. Agents such as Confederate Commander James W. Bulloch, were hired to go to the many shipyards in Britain to instruct shipbuilders in designing vessels built for blockade running (Lester 1975:266-7; Wise 1988:104,198). The first purpose-built blockade runners were believed to have been created from this process, prioritizing speed and maintaining the shallow draft necessary to navigate the few shallow water ports left to the Confederacy. Stephen Wise (1988) and Kevin Foster (1991) described these vessels as being part of a typology, distinguishing between the first converted craft and the first purpose-built craft guided by Bulloch. This typology, based on length-to-beam ratios, has successfully identified potential blockade runners, such as *Mary Celestia* in Bermuda (Delgado et al. 2016:25).

Research Questions

This thesis seeks to broaden our understanding of the Confederacy's procurement and use of blockade runners during the American Civil War while critically evaluating typological thinking in maritime historical and maritime archaeological work. The study includes the use of typological thinking to help understand and reconstruct the past. By questioning whether typologies exist and if so whether they help to understand and reconstruct the past, this dialogue has potential relevance to understanding theories of technological change through innovation and conflict. The thesis questions have been divided into a series of secondary research questions designed to help facilitate answering the primary research question.

Primary Question

1. Does statistical analysis and 3D modeling refine, refute, or reinforce the idea that a typology for blockade runner types existed during the period of the American Civil War?

Secondary Questions

1. Were regional traditions a factor in creating a typology used in shipbuilding?
2. What are the economic influences on design?
3. What were the technological influences on design?

Previous Research

This project proposes to critically appraise “typological thinking” in archaeological literature in detail. Archaeological typologies exist explicitly and implicitly in literature. When utilized, researchers rarely communicate their assumptions. Instead, researchers rely on their knowledge of historical definitions without criticisms for how these definitions were created (as noted by Maarleveld 1995:6). Before delving into the intricacies of different theoretical perspectives, it is best to begin with important definitions within typological thinking.

The first term that needs to be defined is *classification*. Classification is best understood as an identification of one attribute. In *Essays on Archaeological Typology* (Whallon and Brown 1982), several writers and archaeologists who sought to use explicit scientific approaches attended the 1977 Kampsville Seminar. Although they disagreed on defining the aspects of an attribute for identifying classification, they agreed that an attribute is a "feature which helps define something against another" (Whallon and Brown 1982:xiv). This explains why red paste pottery differs from black pottery, but also implicitly assumes that other attributes may follow, such as the weight and thickness of said classification. *Typology* is the result of such classifications, where groupings are organized based on their correlation to multiple attributes. As the writers in *Essays on Archaeological Typology* (1982) put it, “type is a group or class of items that was internally cohesive and separated from other groups by one or more discontinuities” (Whallon and Brown 1982:xiv). These *discontinuities*, also known as *dissections* in Whallon’s article, refer to the arbitrary divisions in data made along scales and can be proven true quantitatively as a typology (Whallon and Brown 1982:128).

The main disagreement among researchers is on how to create a typology. One way to create typologies was by utilizing culture-historical methods. Culture-historical archaeology was a movement that utilized ordinal ways to divide cultures, usually based on ethnocultural histories. The belief was that ethnocultural groups derived innovations, which can be seen by dividing artifacts by types associated with periods and cultural groups (Trigger 2005:211-215). It was not until Albert Spaulding's groundbreaking work, "Statistical Techniques for the Discovery of Types*"* (1953), that the use of statistics to discern attributes for types was developed (Spaulding 1953). From this framework, New Archaeologists, some of whom called themselves Processualists, believed all typologies should be crafted this way. New Archaeologists believed that archaeology should move in an explicitly scientific direction. In *Explanation in Archaeology, An Explicitly Scientific Approach* (Watson et al. 1971), Processual archaeologists declared that new and existing typologies should be explicitly testable and that many classifications were cultural constructs (Watson et al. 1971:126-127). Alternative methods, such as "Cultural Evolutionary" approaches, have also been applied to typological thinking. This was done by researchers like Robert Dunnell (1971) who created and examined types based on their taxonomic origin. For Dunnell, types can be created around their difference in inherited traits and newly evolved traits, where each new type is a product of a series of innovations (Dunnell 1971:305).

This thesis uses a specific processual lens based on the perspectives and methods outlined in *Essays on Archaeological Typology* (Whallon and Brown 1982) and one of its authors, Dwight Read's later work, *Artifact Classification: A Conceptual and Methodological Approach* (2007). The authors of *Essays on Archaeological Typology* agreed that typologies could be created and evaluated on more than just taxonomies, as Dunnell did, because they believed that an equal analysis of attributes gives disproportionate representation to certain factors (Whallon and Brown 1982:164). Instead, typologies should be created around testable dissections, which are arbitrary divisions in data made along scales and can be proven true quantitatively as a typology (Whallon and Brown 1982:128).

Structure of Thesis

This thesis starts by defining its goals and research questions in Chapter 1. Chapter 2 details the previous literature on American Civil War blockade running to illustrate how the current typology came to be. Chapter 3 examines the theoretical origins of typology and artifact classification as applied to this research. Chapter 4 details the methodologies used for creating a database for the study and the digital methods employed in later chapters. These include the creation of digital reconstructions of four blockade runners representing each type, GIS analysis to explore spatial and temporal trends, and the use of statistical methods to test the typology. Chapter 5 documents the resulting trends of a database collected from Wise (1988) and other sources. Chapter 6 reviews the multiple avenues of analysis used and describes how future research might be explored.

Chapter 2: Literature Review of Blockade Running Historiography

Introduction

The blockade runners built during the American Civil War had several designs. As such, different interpretations of the hundreds of blockade runners created exist. This chapter aims to examine the historical context of interpretations previous researchers. These are based on each researcher's interest in economic history and the evolution of the various construction characteristics. The first part of this chapter focuses on the original memoirs and narratives of those who worked on blockade runners, including the British captain Hobart-Hampden (1887), the patriotic John Wilkinson (1877), and those who involved themselves in British blockade runners like James Bulloch (1884) and Thomas Taylor (1896). The second section involves the development of blockade running thought in the 20th century, first looking at the examination of narratives by Francis Bradlee (1925). The efficacy of the blockade is then be examined through the contributions of Frank Owsley (1931), Frank Vandiver (1947), and Marcus Price (1948-1955). The 20th-century section continues with a review of Richard Lester's (1975) and Warren F. Spencer's (1983) conclusions on the real role of James Bulloch in acquiring blockade runners. The section ends with the combined work of Stephen Wise (1988), Kevin Foster (1991), and Gordon Watts (1997), who detailed individual construction characteristics that they speculate formulated a functional classification of blockade runners. A third section follows the economic arguments, first exploring Stephen Lebergott's (1981) conclusions on the inefficiency of blockade running, then follows the two camps that either agree or disagree with Lebergott's conclusions. The last segment explores British perspectives, starting with the view of blockade running from Scottish passenger steamers in Williamson (1904) and Davies (1980). Then, the section considers the origin of blockade running as part of the Clyde-built steamer noted by

Graham (2006) and by Joseph McKenna (2019), as well as the Mersey-built perspective offered by Robert Thorpe (2017).

Overview of Blockades and Blockade Runners

Before going into detail on the role of blockade runners and blockades in Civil War literature, it is best to define some terms and concepts related to blockade runners. Firstly, is the doctrine military historians call "the law of the blockade." A blockade is any attempt to restrict trade through maritime means. This can be reflected as a show of force, usually by a government power represented by their navy. The Dutch Navy are credited with the first formal blockade in the modern era. The blockade was called the Dutch *Placaat*, where the Dutch Republic sought to blockade ports of Spanish Flanders to cut off those areas from military support, as well as to economically choke out the government and people (Drew 2017:39). The Dutch benefitted in that the Flemish Ports were within viewshed of their own ports, requiring little effort by the Dutch to maintain convoys. This traditional type of blockade was later described as a "close" blockade, in part because it could be enforced close to existing ports. Formal blockades continued for centuries after the Dutch *Placaat* but the development of commerce raiding is attributed to the British during the first Anglo-Dutch Wars and included an English blockade on Dutch merchant vessels as they tried to enter and leave Dutch ports (Arthur 2011:10). Requiring some effort by the English to seek out Dutch merchant vessels beyond the visibility of English ports, it gave them a more active role in blockading. This difference in disrupting commerce is described as two different stances in warfare. One of which the English adopted in the first Anglo-Dutch War, known as *guerre de course* (raiding commerce). The other stance was one the Dutch took a stance which was battle between fleets, called *guerre d'escadre* (battles between fleets) (Bradford 2016:4). The English and other nations used these stances for different purposes, with the primary reasoning being that *guerre de course* is meant to decimate a country's commercial ability, while *guerre d'escadre* is meant to prevent said decimation and to strike blows militarily.

During the Napoleonic Wars, the British and French used blockades to tear down each other's economies. To strike hard on French ability to conduct commerce, a British Minister of Foreign Relations, Charles James Fox, requested the use of a new form of blockade. Called a commercial blockade, this form restricted all vessels from crossing the blockade, including neutral nations (Dudley 2003:173). This blockade, later called Fox's Blockade, was enacted in 1806 to assist in taking contraband and weaken any relationships with France. The French government, in response, issued the Berlin Decree, which saw the continental blockade of all British goods into Europe and a targeting of British commerce from its colonies. The effects of this blockade were disastrous for American interests. America, still young as a nation in 1806, struggled to maintain its navy, and the blockades restricted commercial traffic into Europe.

Merchant and military ships coming from the United States to France existed in a gray area. While France and Britain sought to blockade each other, American vessels from the Chesapeake Bay Schooners, like *Fly* (1808), were used to break such blockades (Chapelle 1967:195). However, the United States and their ships were not recognized by British fleets, and a blockade in by the British, called Fox's Blockade, sought to block all trade into France, including by neutral nations like the United States (Dudley 2003:173). In 1807, the British fired at and boarded a US Navy frigate, USS *Chesapeake* (1799), off the coast of Norfolk, VA. This affair, known as the Chesapeake-Leopard Affair, heightened tensions including an embargo made by Thomas Jefferson against all British ships in 1808 (Arthur 2011:20-23). These events led to War of 1812, where the British continued their close blockade on all American ports, restricting

America's war effort and economy. The lessons from such a close and large-scale blockade influenced American naval policy into the Civil War. The Union sought to mimic the Fox Blockade success, while the Confederates wished to utilize blockade runners to mitigate its effects on the Confederate war effort.

It was in 1861 that the Union Navy established its blockade strategy in the American Civil War. The Union planned a coordinated blockage of all trade from the secessionist's waters (Wise 1988:13-14). The Confederacy did not have the power to conduct full-scale naval war, *guerre d'escadre,* so it began building commerce raiders for *guerre de course* and ironclads for the defense of forts near key ports (Scharf 1996[1887]:47). In the Union's efforts to block all trade, the Confederacy opened trade to all smugglers and even contracted state agents to build vessels to bring trade in, known later as blockade runners. This name was given for these vessels' perceived ability to escape and pass through the blockade, mostly to bring resources in and out of the Confederacy. One officer of the Confederate Navy, John Thomas Scharf, stated that these were British-built, "were adapted to carry a large [cargo] on a light draft of water…" and "were fitted with steam power to drive them at a [fast] rate of speed" (Scharf 1996[1887]:483). From this description, we can infer the typical characteristics of Civil War blockade runners: British-built, fast, and designed to navigate the Confederacy's shallow ports.

The Age of Narratives

After the Civil War, several captains and sailors, like Scharf, published accounts of their own stories. These books and articles were primarily intended for a southern audience. These sources were usually in the form of narratives that lionized their importance and the crew that was manning these blockade runners. These narratives are important for this thesis because they claim the requirements for such vessels. These requirements could range from acquiring the vessels themselves, to the perceived legal ground it circumvented, thus helping define how later researchers perceived blockade runners.

One book that emphasizes the author's expertise is *Never Caught: A Narrative of a Blockade Runner* by Augustus Charles Hobart-Hampden (1887). This book is an autobiographical account of a British captain's blockade runs in the war. Included in the book were stories of Hobart-Hampden's narrow escapes from Union blockaders while captaining a blockade runner named *Don*. Hobart-Hampden noted that blockade runners were not those vessels manned by men who wanted to fight, stating that the crew believed such an action to be an act of piracy. According to the author, the crews of such blockade runners were mainly British, who were hired on high wages with no bearing on the cause of the war and were easy to desert (Hobart-Hampden 1887:6). His account shows that the crewmen were not serving out of sympathy for the Confederacy, but rather for the wages that blockade running could earn them.

Unlike Hobart-Hampden, John Wilkinson's (1877) blockade-running narrative was more propagandistic. Wilkinson was a captain of the Confederacy with the utmost belief in his cause, seeing it as his responsibility to detail his accounts. Wilkinson stated, "southern people do not stultify themselves by professing to renounce their conviction of their right and duty in having responded to the call to defend their respective States from invasion" (Wilkinson 1877:7). Wilkinson's narrative follow his career as a blockade runner in the Gulf of Mexico to ports like Santo Domingo, Hispaniola. Wilkinson provided important details on the acquisition and conversion of one vessel, *Giraffe*. Wilkinson notes that *Giraffe* was acquired through the Scottish builder, Alexander Collie and Company for the Confederate Government, where it was then converted by having its saloons and cabins removed, with bulkheads built to replace them (Wilkinson 1877:106). According to Wilkinson, the Confederate Navy chose it because it was a "side-wheel of light draft, very strongly built and reputed to be of great speed" (Wilkinson 1877:104-105). Wilkinson notes that *Giraffe* was fast, but that its speed was somewhat exaggerated (Wilkinson 1877:105). He also includes thoughts on the significant points of the war, most importantly, his negative views on the replacement of James D. Bulloch. Wilkinson noted that Bulloch was someone much better at acquiring runners and warships than the "improper agent" that was instead installed by the Confederate Secretary of War (Wilkinson 1877:109-110). This shows that early on, those who wrote from the Southern perspective gave great value to the views and actions of Bulloch.

James Bulloch published his own account of his service in a book titled *The Secret Service of the Confederate States in Europe, or, How the Confederate Cruisers Were Equipped* (1884). This account was more for a political purpose than a clear record of his actions. Bulloch mentions several converted vessels like *Bermuda* and *Fingal*, which ran the blockade in the first year of the war and describes their purpose as disregarding Union authority (Bulloch 1884:51, 99). Bulloch argued that *Bermuda* was an attempt by Fraser, Trenholm, and Company to show that the Union blockade was inefficient. *Bermuda*, which was flagged and operated by British citizens, was seized by the United States steamer, *Mercita*, outside of Nassau, Bahamas on its second voyage. The Union argued that the vessel violated the Law of Blockade, and Bulloch notes that later vessels were chosen on their ability to run the blockade at all costs (Bulloch 1884:70-73). Bulloch also notes that some of the converted craft used at the beginning of the war were intended to be warships, as *Fingal* did when it was turned into the ironclad CSS *Atlanta* (Bulloch 1884:110). Bulloch emphasizes his motivation for the cruisers he meant to acquire. He preferred screw-propelled ships and added several other characteristics to select converted blockade runners with the intention that they could later be converted to warships. Bulloch also notes the detainment of blockade runners like *Alexandra* and *Phantom*, for which he claims he played no part in building. Based on communication with his contemporaries, Bulloch stated that these vessels were blockade runners. However, he denies any role in building them, noting that they were privately owned and that Union agent Thomas Dudley falsified his role in their construction (Bulloch 1884:356).

Thomas E. Taylor's *Running the Blockade: A Personal Narrative of Adventures, Risks, and Escapes During the American Civil War* (1896) and James D. Bulloch's *The Secret Service of the Confederate States in Europe, or, How the Confederate Cruisers Were Equipped* (1884), form the main basis for later research. Taylor's (1896) account focuses on his role as a blockade runner captain who served for much of the war on several different blockade runners. The first vessel was noted was *Despatch*, a Mersey-built blockade runner deemed unfit for blockade running service when it arrived in Nassau because of its deep draft and how slow the vessel was believed to be (Taylor 1896:21). The account then goes into the next command, *Banshee*, a purpose-built vessel famous for its steel-hull construction. Taylor lauds it as a "landmark in the blockade development and marine architecture" (Taylor 1896:33). According to Taylor, *Banshee* required several repairs, including a significant detour to Queenstown, England, while traveling to Bermuda because of structural issues (Taylor 1896:36).

Economic Evaluations

In the 20th century, historians studied the work published by blockade runners, with the intention of studying the role blockade running had on the Confederacy during the war. This led to a greater synthesis of a narrative, which primarily focused on the economic reasons for blockade running and how it directed the war. For this research, however, it is important to note the role of

20^{th} century literature played on the perceived trends of shipbuilding and acquirement for the American Civil War.

The most detailed source for blockade running in early half of the 20^{th} century was Francis Bradlee's book on the subject, *Blockade Running During the Civil War and the Effect of Land and Water Transportation on the Confederacy* (1925). Francis Bradlee was assisted in his research by the grandson of Captain John Maffit, a prominent blockade runner captain, creating a bias towards prominent Confederate figures as opposed to the British crew that often manned them (Bradlee 1925:xii). Bradlee asserted that blockade running maintained the Confederacy's war effort through the support of companies that housed Confederate agents (Bradlee 1925:11-12). Bradlee notes that the steel-built blockade runners were poorly built, which distinguishes them from later ones. Bradlee observes that steel-built vessels like *Banshee*, *Bat*, and *Owl*, were smaller than the later blockade runners like *Colonel Lamb* (Bradlee 1925:116).

In the 1940s, blockade running was reassessed in terms of efficiency. Historians like Frank Owsley, in *King Cotton Diplomacy* (1931), quantified blockade running success from the number of total runs (Owsley 1959[1931]:260). According to Owsley, "in 1861, one runner in ten destroyed or captured; in 1862, one in eight; in 1863, one in four; and by the late spring of 1864, one in three" (Owsley 1959[1931]:262). The conclusion drawn was that blockade running was a lucrative business in part because of failures by the Union to fully execute the naval blockade on the Confederate States. Vandiver's *Bermuda during Blockade Times* (1947) was cited heavily based on archival documents from the Confederacy's Ordinance Bureau, which was based in St. George's, Bermuda (Vandiver 1947:33). Vandiver studied blockade running as a successful venture based on estimations collected between Bermuda and Wilmington, NC. From the initial debate on blockade running efficiency came the argument of Marcus Price's *American*

Neptune article that blockade running, although successful in carrying cargo, was grossly inefficient in dealing with the Union Blockade (Price 1949). Price's greatest contribution was the examination of cargo manifests and details on each suspected voyage of blockade runners, summarized in several articles of *American Neptune* (see Price 1948, 1951, 1952, 1955). This dataset was the basis for subsequent authors, like Wise (1988) to research individual blockade runners beyond the individual narratives of Bulloch (1884) and Taylor (1896). Richard Lester's *The Procurement of Confederate Blockade Runners and Other Vessels in Great Britain During the American Civil War* (1975) details much of the foreign influence that the Confederacy engaged in to obtain blockade runners and, to a greater extent, commerce raiders and ironclads. Lester argued that the organized efforts of James Bulloch, the CSA Ordinance Board, and Fraser, Trenholm, Company. enabled the Confederates to purchase and construct several blockade runners (Lester 1975:255-270). Lester (1975) believes that it was at the direction of Bulloch that blockade runners were best found because he had extensive knowledge of British laws. Great Britain declared neutrality to the American Civil War and British authorities seized ships that were suspected to be warships under the Foreign Enlistment Acts (Lester 1975:95). According to Lester (1975), Bulloch used his knowledge to prevent British authorities from seizing suspected warships based on Britain's stance, with most blockade runners avoiding any appearance as a warship.

Lester noted 13 characteristics, based on Mallory's instruction to Bulloch. In descending order of importance (Lester 1975:92), these include:

1. Speed at Sea
2. Draft not exceeding ten feet
3. Ability to survive heavy sea and wind conditions

4. Carrying capacity of 200 to 250 pounds
5. Deck frames forward, aft, and amidships which are able to carry three 30-pound Whitworths [cannon]
6. Preference to single screw, but twin screw also allowed
7. Prevention of smoke visibility
8. Coal bunkers to protect boilers
9. Boilers large enough to support engines
10. Space if allowed for a berth deck and magazine room
11. Quarters for a crew of 100, but avoiding the appearance of a warship
12. Forward and after sweep for a pivot gun
13. Sails suitable for the vessel

According to Lester, when blockade runners appeared too much like warships, they were at greater risk of being seized. The main example Lester uses is the seizure of *Alexandra*, where in 1863, Union agents claimed that *Alexandra* was a warship outfitted like the CSS *Alabama*, a Confederate commerce raider. According to Lester, *Alexandra*'s description as a warship was contentious. The reasoning he gives was that local newspapers noted that *Alexandra* had "presented an appearance of speed" but had no gun ports (Lester 1975:94). This is still contrary to the owner's intent, who said it was going to be a passenger vessel not exceeding 10 knots. *Alexandra* was returned to its owners in April 1864 and shipped armament to Nassau in December of the same year (Lester 1975:96-97). Lester noted that most blockade runners were built along the Clyde River in Scotland. Lester states that Bulloch saw shipbuilders along the Clyde were best suited to construct vessels along the previously mentioned characteristics

(Lester 1975:105). The Clyde-based companies listed were John and Brown and Company, Denny Brothers of Dumbarton, and Alexander Stephens and Sons (Lester 1975:110-113).

Warren F. Spencer's *Confederate Navy in Europe* (1983) details a perspective similar to Lester's (1975). According to Spencer, beginning in 1861 blockade runners were all privately owned and reflected the buyer's preference for individual designs (Spencer 1983:193). However, Bulloch held some blockade runners and cruisers at the ready, which could be converted for either purpose. The intention was that he was instructed by his superior, Confederate Secretary of the Navy Stephen Mallory, to acquire more blockade runners that could cross the Atlantic. Bulloch, however, chose blockade runners which he thought could best be converted as gunboats, such as *Hercules* and *Ajax* (Spencer 1983:194). According to Spencer, fundraising for this project was facilitated by the Confederate Navy Department's blockade-running ships. By 6 February 1864, Confederate law made it illegal to export cotton except under a presidential permit. The intended effect was to monopolize blockade running activities, stabilize the Confederacy's importation market, and fund the production of more blockade runners and warships from Great Britain (Spencer 1984:193-194).

Later economic historians in the 20th century instead focused on the efficiency of blockade running. Stanley Lebergott (1981) attempted to quantify the blockade and blockade running by their success rate. Lebergott acquired this result using data Marcus Price produced in several issues of *American Neptune* (Lebergott 1981:861). Lebergott also evaluated inflation, citing prices in resources like Hobart-Hampden (1887) and Taylor (1896). He believed that, due to the high costs of operating blockade runners and their high risk of capture, blockade runners were not effective in their purpose of smuggling resources in and out of the Confederacy (Lebergott 1981:877).

Economic historians in recent years have reevaluated the blockade running in completely opposed ways. Two schools of thought exist: those who agree with Lebergott's (1981) conclusions and those who do not. Marc D. Weidenmier agrees with Lebergott's conclusions of blockade running as a failure, adding that blockade runners demanded hard currency instead of Confederate greybacks for their services (Weidenmier 2002:877-888). Weidenmier argues that this is partial proof that blockade running was much more damaging to the Confederate economy than it should be, due to rapid inflation. Ekelund and Thornton (2001) agree with Lebergott (1981) as well. Ekelund and Thornton researched the Confederacy's economic strategies, noting that the government's backing of blockade running was an inadequate solution. Using Lebergott's data on inflation, Ekelund and Thornton concluded that Confederate impressment and mismanagement made blockade running flawed (Ekelund and Thornton 2001:27-29).

Hetherington and Kower (2009) argue that Lebergott's (1981) data was inherently flawed and took issue with his statement "10% of blockade runners succeeded figure" (Hetherington and Kower 2009:530). Hetherington and Kower were critical because Lebergott combined steam and sail ships for the entirety of the war and counted vessels captured at any point as those that failed. Hetherington and Kower argued that instead, they should use Wise's (1988) more in-depth data, including each ship's known attempted and successful runs. They found that blockade runners succeeded more than they failed when using Wise's updated index, as opposed to those collected from Price's (1948, 1949, 1951, 1952, 1955). Not only that, but Hetherington and Kower critiqued Price's examination, and it does not indicate if some of the same blockade runners ran in different years (Hetherington and Kower 2009:530-531).

Stephen Wise's work, *Lifeline of the Confederacy* (1988), was the most encompassing work on blockade running when it was released. It including chapters on various topics regarding Civil

War blockade running, such as the acquisition, construction, and blockade running attempts made during the war. Wise (1988) reiterated Lester's points on foreign influence as a massive factor in blockade-running construction, particularly framing blockade runners as part of a greater pact of Anglo-Confederate relations (Wise 1988:108). Wise was interested in the joint operations of British shipbuilders, Confederate Government authorities, and the business ventures of multinational companies. These companies, such as Anglo-Confederate Company, Crenshaw and Collier Company, and Fraser Trenholm Company, formed the Confederacy's capital to contract, buy, and convert vessels into blockade-running vessels (Wise 1988:212-213). Wise (1988) detailed British crews' role in blockade running and the Confederate companies, Fraser Trenholm Company and the Charleston Importing and Exporting Company, on buying the craft (Wise 1988:212-213). Wise believed that popularizing "Clydeside" ships formed the basis of the first British blockade runners. This was inspired by vessels like *Fingal* and *Bermuda*, which found success in the blockade running trade, and the Confederate government and companies sought to buy more Clyde-built vessels for blockade running. Although blockade runners who were converted Clydeside steamers were sold at all points of the war, Wise also notes that blockade runners which were purpose-built, were designed on the Mersey River, based on the combination of Clydeside characteristics and changes in the technological design of hull form (Wise 1988:180).

Wise (1988) also includes a thorough index, including a comprehensive list of all known steam-propelled blockade runners. The index includes details on each one's propulsion, fate, and successful and attempted runs. In the book, Wise reiterates points on payroll, the governmental infighting between different branches of the Confederacy, and estimates of capital gained by blockade running. Wise rejected that blockade running was a chokehold on the southern economy, noting that the vessels achieved many of the needs of the Army of Northern Virginia until the closures of several ports after 1864, nearing the end of the war (Wise 1988:212-213).

Kevin Foster, acknowledged as a *Lifeline of the Confederacy* contributor, detailed in his M.A. thesis on blockade running the technical innovations that blockade runner shipbuilders utilized (Foster 1991:138). Foster noted several blockade runner types, including New York-built steamers, vessels captured at the beginning of the war, and the gunboats captured in the war and converted for blockade runners. Foster also notes that British converted vessels, primarily built on the Clyde, had their superstructures removed and were selected based on their speed and ability to have a draft of less than 10 feet. Based on the principles of this design, the Confederate government and Jones and Quiggin Company of Liverpool, as argued by Foster, created the first purpose-built blockade runner, *Banshee*. Constructed with newer and more powerful engines, longer and shallower dimensions (a length-to-beam ratio of about 10 to 1), and newly designed foredecks, the vessel was made from thin steel instead of iron (Foster 1991:138). Vessels that *Banshee* inspired were "extremely built"; that is, they were built over the standard 8:1 ratio of the time, used a minimal schooner rig, and utilized side-propelled paddle wheels. Foster notes these characteristics as being a part of the "Extreme type", which he argued were revolutionary but also dangerous. Extreme blockade runners were under stress, both from their engines' increased power and their thin profile compared to their length. Foster argues that a new type was created after experiencing the structural problems resulting in the design flaws of *Banshee* and other Extreme types. As such, the "Mature type", called named the "blockade runner type" by Foster (1991:138), measured from 200 to 240 feet in length, averaged a 9:1 length-to-beam ratio, and sported drafts less than nine feet. Foster noted that over 150 blockade runners were built to this design, partly due to several of them being built from the same template. One design by Jones Quiggin and Company (called the *Owl* class by Foster) featured eleven sister ships, six of which were built as true sisters, being vessels built from the exact blueprint and by the same shipyards (Foster 1991:139). Foster argues that the Mature type was focused on ports like Wilmington, NC, and Charleston, SC.

However, with the fear from the Confederacy that these ports would close, Foster argued that the government, in conjunction with Clyde yards, created a class meant to navigate Gulf of Mexico ports and their inland rivers, which were between 200 to 210 feet in length and which drew less than 5 feet, resulting in a depth of hold of less than 11 feet (Foster 1991:144-146). Blockade running became increasingly risky with the closure of several ports by 1864. Foster argued that this risk resulted in blockade runners being built to carry more cargo than the Mature type, aptly named the "Enlarged type." This type ranged from 250 to 280 feet long but maintained a length-to-beam ratio of 9:1 and draft of less than nine feet.

In his doctoral dissertation, "Phantoms of Anglo-Confederate Commerce, A Historical and Archaeological Investigation of American Civil War Blockade Running" (1997), Gordon Watts suggested that the blockade running design was not the product of technological innovation. Instead, he argued that the design of blockade runners changed based on the application of technologies implemented before the war (Watts 1997:i). This included longer length-to-beam ratios based on the concepts of the shipbuilders from the time, including Scott Russell, a prominent British shipbuilder and engineer (Watts 1997:383). Watts argued that the Confederates bought all available public transport steamers. Watts also stated that purpose-built steamers designs were only minimally adapted to the needs of their Confederate buyers, such as shallower drafts intended for navigating around the shallow inlets of the Atlantic (Watts 1997: 385). He also argues that the engine and propulsion system dictated the hull configuration of blockade runners in the war. Watts noted that the Confederates bought public transport vessels because of the power of their engines and that the length-to-beam ratios of over 8:1 resulted from regional differences in design before the war, which persisted during it (Watts 1997:393-394).

British Perspectives in the 21st Century

Most blockade runners serving in the American Civil War were built in Britain. Before Wise's *Lifeline of the Confederacy* (1988), only a few books were published in Britain about the country's role in building blockade runners. Of those that do exist, two include the role of Scottish shipbuilders who were previously experts in building passenger liners and packet ships. James Williamson, a local historian in Glasgow, detailed his perspective in *The Clyde Passenger Steamers: Its Rise and Progress During the Nineteenth Century: From the 'Comet' of 1812 to the 'King Edward' of 1901* (1904). Williamson describes building blockade runners as a valuable trade for Clyde shipbuilders. Those who partook in building the vessels tried to make them as fast as possible. As a result, Williamson describes the speed tests by Clyde builders as being reckless and causing several accidents to the once peaceful port (Williamson 1904:121). Another British researcher, Kenneth Davies (1980), also wrote that blockade-running sales allowed Scottish shipbuilders to profit more than before. Davies argues in his book, *The Clyde Passenger Steamers* (1980), that this new influx of capital allowed the shipyards to expand, with shipbuilders building railways to industrialize more (Davies 1980:25). Davies also believed that the shallow draft vessels the Confederates needed best fit the Clyde-built ships, allowing the Clyde to be a popular spot for buyers (Davies 1980:21).

One resulting book on the history of the blockade from the British perspective was Eric Graham's *Clydebuilt: The Blockade Runners, Cruisers, and Armoured Rams of the American Civil War* (Graham 2006). The book follows much of Wise's data on shipbuilding of blockade running and reiterates the area's ability to create some of the fastest ships (Graham 2006:179-188). Graham divides blockade runners into two classes: "channel class" and "river class". Channel class refers to deep-laden screw-propelled vessels and asserts that the first blockade runners to cross the Atlantic were of this variety. These vessels served to transport cargo across the Atlantic. The river class, which was sidewheel propelled and shallower in the draft, was preferred by the Confederates for shorter routes and was either converted or designed with thicker hulls to survive a single trans-Atlantic journey (Graham 2006:12-13). Graham follows some of the letters of Bulloch's orders for blockade runners after the disaster of 1862. Graham asserts that Bulloch did play a role and utilized agents to conduct operations. One example was the Scotsman Thomas Begbie, hired by Bulloch, to write recommendations to smaller shipbuilders like Scotts of Greenock (Graham 2006:179-188). Graham argues that larger blockade-running companies like that of Robert Napier were too risky. This was in part because the British Royal Navy directly contracted them to build warships, and the Confederate collaborators feared that contracting with them could result in seizures under the Foreign Enlistment Act (Graham 2006:118). The book *Clydebuilt* also contains a list of Clyde-built blockade runners with some additional details, including newer data collected from the Mitchell Library in Glasgow and the Shipbuilder's lists in the University of Glasgow Archives (Graham 2006:185). The appendix also includes a list of new measurements and details of each vessel's engines.

Joseph McKenna combines both Merseyside and Clydeside perspectives in his book, *British Blockade Runners in the American Civil War* (2019). The book expands on several shipbuilders outside the Clyde and Mersey yards, including shipyards along the Tyne, Tees, and Thames rivers. McKenna asserts that the design of Clydeside ships formed the basis for all purpose-built blockade runners after 1862 (McKenna 2019:203). According to McKenna, these were based on Bulloch and Mallory's characteristics, as noted in Lester (1975). McKenna (2019) argues that these features evolved through blockade-running companies' experiences. For example, ships chosen started with a 6:1 length-to-beam ratio but developed into the 8:1 ratio, which McKenna argues originated from steam packets built on the Clyde River and intended for the Dublin and Glasgow Route (McKenna 2019:81).

In opposition to Graham (2006) and McKenna (2019), Robert Thorpe's *Mersey Built*: *The Role of Merseyside in the American Civil War* (2017) focuses primarily on the role of blockade runner construction near Liverpool, England. Thorpe describes *Banshee*'s construction as the prototype of purpose-built blockade runners. This includes a 10:1 length-to-beam ratio and the inclusion of steel hull construction. According to Thorpe, the cooperation between Edward Lawrence (a British national with ties to the Anglo-Confederate Trading Company) and Jones, Quiggin, and Company led to the first purpose-built blockade runner. Thorpe argues this through the inclusion of features, as described by Thomas Taylor (1896) after the failure of *Despatch*, which motivated Jones, Quiggin, and Company to construct a new type of blockade runner (Thorpe 2017:156-158). However, as Thorpe argues, the poor construction of the vessel by Jones, Quiggin, and Company led the Anglo-American Trading Company to contract with Clyde firms using the basic design of *Banshee* (Thorpe 2017:159).

Conclusion

Although several perspectives exist on the efficacy or design of blockade runners, most historians argue that the influence of Clyde-built steamers inspired the design of blockade runners during the war (Lester 1975; Wise 1988; Watts 1997; Graham 2006; McKenna 2019). However, the extent of this influence is debated. This difference in perspective between blockade runners offers a new area where quantitative and computational techniques from this thesis can be applied. The historical narrative alone is not enough to explain the many different agents, groups, and shipbuilding communities that influenced the designs of these vessels. The historical narrative does provide the necessary context to analyze the data found in later chapters. Classifications, as described in this chapter, reflect a preference towards the direction of converted steamers to the development of a prototype of *Banshee*, as described in Foster (1991) and Thorpe (2017).

Chapter 3: Theory in Typology and Classification

Introduction

The best way to understand blockade runner typology is to understand what typologies are and how typologies are created. Many of the types created in the past were implicit, where their grouping was not evaluated through a process or objective means. By understanding what types are and how types were created in the past, a researcher can evaluate if preexisting types still fit the definition of a typology, thereby "testing" them. This chapter aims to understand typologies and classifications by considering their application history and theory.

Typology has been the subject of much debate in archaeology. Definitions such as classification and typology have been debated at multiple points in the development of archaeological theory. The following sections outline several debates in chronological order to chart the history of the development of these concepts in archaeology. The first debate was amongst culture historical archaeologists, focusing on definitional disagreements between Irving Rouse (1939) and Alex Krieger (1944) to earlier cultural historical archaeologists like Gustaf Kossinna. The chapter moved to a debate between the quantitative methods formed by Albert Spaulding (1953) and the criticisms formed by James Ford (1954). From the Spaulding-Ford Debates, the chapter followed the Kampsville Seminars, which included internal debates between those of F. R. Hodson from Doran and Hodson (1975) and the processualists, like Robert Whallon (1972) and Dwight Read (1974), who were inspired by Albert Spaulding's approach toward explicit types and the importance of attributes. The next section described the criticisms of past approaches through the dialectical approach of William and Ernest Adams (1991) and criticisms posed to maritime classifications by Thijs Maarleveld (1995). The history of these debates end with a discussion of Dwight Read's "Artifact Classification: A Conceptual and Methodological Approach" (2007), which criticized earlier approaches and opted to create a new way to make typologies more culturally salient. The conclusion reiterated points made in earlier sections and seeks to explain the importance to the terms in the context of blockade runners.

Before getting into the debates that have formed the basis of modern typological thought in archaeology, it is best to describe broadly what these terms mean. It is important to define the terms used throughout the chapter, which gives some insight into the vocabulary utilized by the various proponents of the described views (see Table 1). However, it should be noted that every theoretical approach does not share the definitions used here. This thesis uses definitions found in the chapters from the book, *Essays on Archaeological Typology* (Whallon and Brown 1982). Unless otherwise stated, like in later sections where researchers utilize different definitions, refer to the definitions listed below for their terms.

Definition	Description
Variables	A kind of observation on objects.
Attributes	A particular value or range of values within a variable.
Dissections (also known as Discontinuities)	An arbitrary division within attributes, especially in cluster analysis.
Classification	Grouping of artifacts through a mode of identification followed by seriation.
Type	A group or class of items that was internally cohesive and separated from other groups by one or more divisions or decisions.
Typology	The organization of different types created from the conceptual framework(s) based on their creators.

Table 1 Definitions of common terms in typology collated from Whallon and Brown (1982:xvii) and from Read (2007:22).

Origins of Archaeological Typology: Culture Historical Archaeology

Typologies and classifications have been traditionally implicit, meaning that they were not directly defined in historic literature. The implicit nature of early typology could be due to several different factors, including humanity's intuitive ability to differentiate objects, or the naming conventions of a language which require different things to be defined in comparison to other objects (Dunnell 1971:4). This same concept challenged archaeologists in the early 20th century, who wished to argue that the artifacts that were found were conceptually different than those found in other sites of different periods and cultures. As a result, material types were formed. Culture historical archaeology argued that the types should be the result of a conceptual process. This approach focuses on the role human cultures and societies play in the distribution of artifacts, utilizing assumptions by previous researchers and through the limited scope of research at the time. Culture historical archaeology saw trends in assemblies even amongst different geographical locations. Some early culture historical archaeologists, like Gustaf Kossina, had nationalistic aims. Kossinna's explanation of typology was that individual components of artifacts were the results of cultural diffusion of a type through time. His work resulted in the creation of several Germanic pottery types (Trigger 2006:236-240). While earlier culture historical archaeologists made claims on human behavior, with explanations involving war, subjugation, and trade, later practitioners shifted away from behavioral aspects of prior classifications into classifying strictly on how wholly the classifications reflected the entire and specific cultures that were to be studied (Trigger 2006:299-301).

An important researcher of late culture historical archaeology was Irving Rouse. Rouse wanted to study how types existed and believed that the individual choices of the manufacturers of artifacts could be found by studying their individual attributes. Rouse (1939) developed a paradigmatic taxonomic classification and used it to explain why Haitian natives created the Fort Liberté artifacts into a typology based on the kind of lugs they had. From that, a researcher could understand the individual decisions that allowed for different classes to be created (Rouse 1939). To Rouse, each decision, such as material and shape, would leave a different impact on the artifact (see Figure 1). As a result, the artifact could show the existence of modes, which are "community-wide standards which influence behavior of artisans as they make artifacts" (Rouse 1939:17). Decisions such as the material and shape of an artifact were decisions that could result in a type being distinct from other like objects. Archaeologists can identify these by finding what the *determinant* is, that is, the most identifiable and differentiating trait (Rouse 1960:319). This was found by grading how different, similar culturally classified artifacts are from each other. This can be done when comparing all artifacts studied to the *type artifact*, an artifact which, by the researcher, best fits the cultural decisions of researchers (Rouse 1960: 317). Once found, an archaeologist, according to Rouse, can infer what the potential cultural change was that resulted in the determinant being apparent.

In his article, "Typological Concept" (1944), Alex Krieger states that the purpose of typology is to be used as an organizational tool to assist the investigator in providing historical meaning to behavioral patterns (Krieger 1944:272). The typologies, therefore, require a uniform definition, which Krieger argues is best achieved through a comprehensive process. The definition of a type, according to Krieger, is that a type is a "comprehensive combination of features." If one could not be appropriately grouped as a type, the material could be temporarily classified as a subtype (noted as (x) under Step 3 of Figure 2). This role, as described by Krieger, is meant to serve as its own analysis where it can be studied for more context to determine if it, too, should be a newly constructed type.

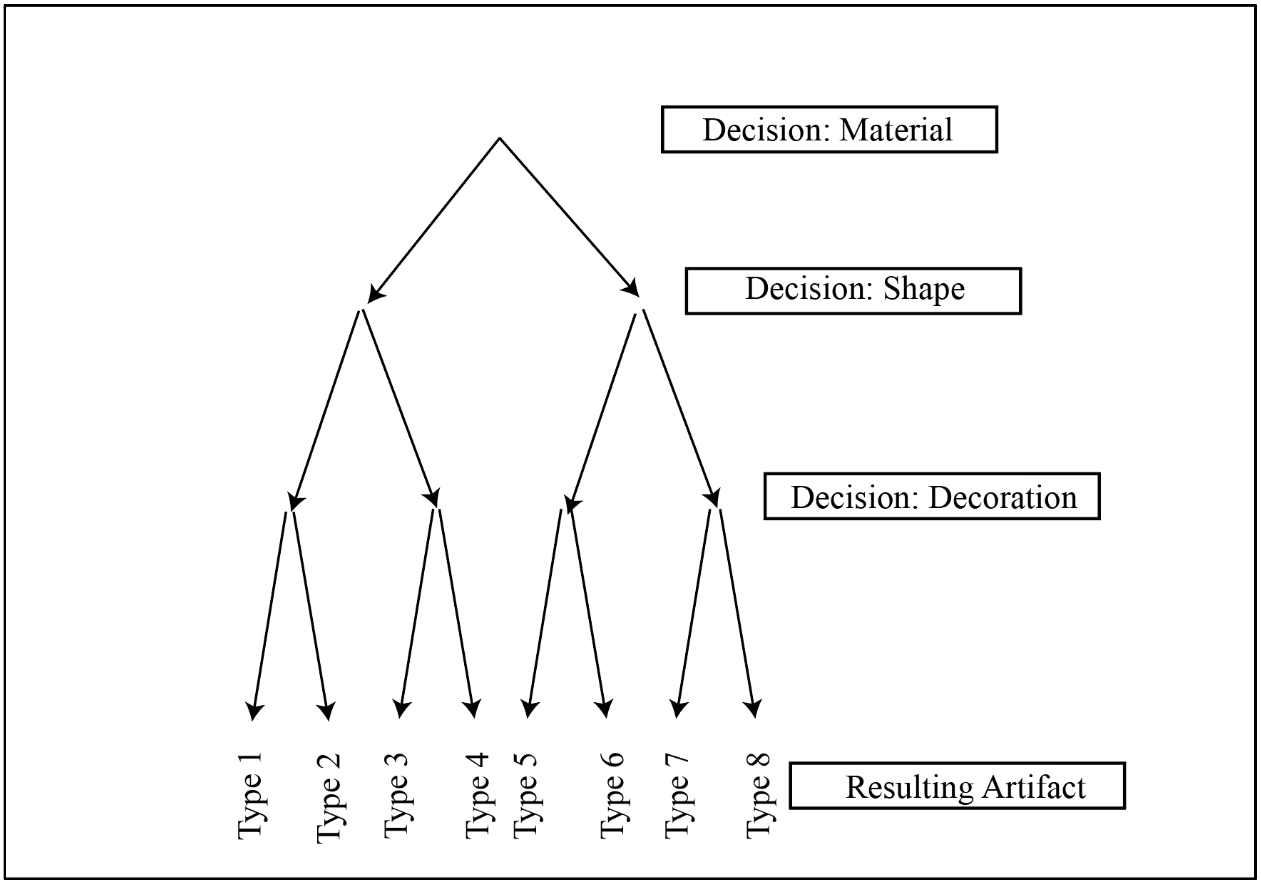


Figure 1. Rouse's taxonomy process based on modes of decisions. Image based on Rouse (1960:316).

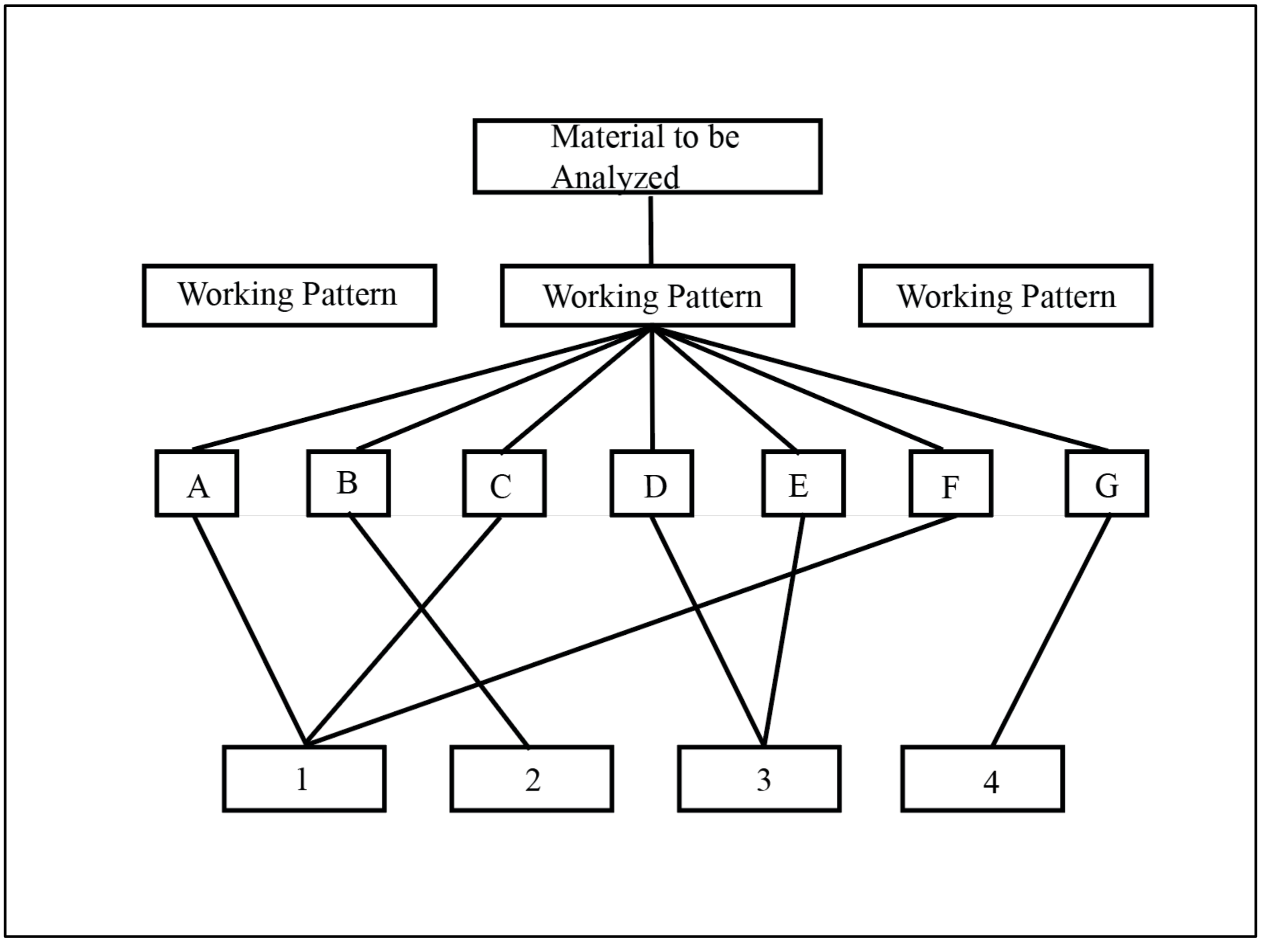


Figure 2. Diagram of Procedure of the Typological Method mentioned in Krieger (1944:279): "Step one includes sorting working patterns of distinct structural plan. Step two is sorting detailed working groups by combining features. Step three shows the subsequent relationship between working groups and the associations of working groups. Step four (not shown) would the consolidation of types through further testing, got form and variation consistency".

The Spaulding-Ford Debates and Development of Processualism

With the creation of a typological process developed by the likes of Krieger (1944) and Rouse (1939), researchers could create their own types based on a broad consideration of attributes believed to be behavioral decisions. However, Albert C. Spaulding's article, "Statistical Techniques for the Discovery of Artifact Types" (1953) caused controversy among culture historical archaeologists on the validity of using quantitative methods to create a typology.

Spaulding viewed nonrandom clustering as an appropriate and exhaustive approach to clustering in opposition to utilizing historical processes led by Krieger in his article, "Typological Concept" (1944). Spaulding also defined types as a "group of artifacts exhibiting a consistent assemblage of attributes whose combined properties give a characteristic pattern" (Spaulding 1953:305). Spaulding did so to reevaluate existing processes of typological concepts, believing that quantitative methods would be a more objective way to construct and recreate typology. Spaulding utilized a simple statistical method, chi-squared (X^2), which measures associations between different attributes.

Spaulding's 1953 article received much criticism, most notably from James Ford. Their disagreements were later known as the Spaulding-Ford Debates. James Ford was a cultural historical archaeologist who studied artifacts from Viru Valley, Peru, and mound builder sites like Poverty Point, Louisiana, and Ocmulgee, Georgia (Ford 1952, 1954b). Ford published a reply to Spaulding in *American Anthropology*, arguing that Spaulding ignored historical processes and had no regard for chronology or spatial patterns. According to James Ford, typologies should be crafted around a user selecting features, which could be used to interpret patterns, not to discover them, as Spaulding asserts (Spaulding 1953:305; Ford and Seward 1954:391). Instead, Ford believed these were just patterns for analysis and did not speak to any objective reality. This assertion was adopted by culture historical archaeologists who used statistical approaches to conceptualize the remains in the narrative of history and innovation. Spaulding's assessments did not consider innovations and used more quantitative data to assert his claims (Ford and Seward 1954:51). These included critically examining quantitative data and explaining how ordinal data was optimized.

Ford imagined that the archaeological landscape should be noted both chronologically and culturally. To refute Spaulding, Ford conceptually tested his theory of crafting an emic point of view through the fictional Gamma-Gamma Village (Ford and Seward 1954:47-48). To do this, Ford utilized an emic view, where the researchers should imagine themselves in a fictional village with the goal of tracking the changes as the village expanded through time and changed in architectural style and height. The village was to represent the material culture through time and its remains. As time progressed, Ford believed that the lines between different styles could best be seen through the periods, and that without it, it became too difficult to examine. Ford believed that this arbitrary division was most important. He believed that statistical techniques need more consideration for the existing chronology, which could fail to address cultural diffusion, where ideas and trends transfer from one culture to another (Ford and Seward 1954:43).

Spaulding's (1954) reply detailed that his method was one of many ways to create a typology. Spaulding believed that quantitative methods created a new context of chronology and geography that Ford believed was missing from the typology. Spaulding refuted Ford's claims by stating that it was the behavioral patterning, discerned from the X^2 tests, which is in itself important, contrary to Ford's conception of it as historically important (Spaulding 1954:392-393).

The results of such debates offered an area by which explicit archaeology could be directed. This approach was defended by Watson et al. (1971) in *Explanation in Archaeology: An Explicitly Scientific Approach*, where the authors defended Spaulding's process of a type as a "process of discovery of combinations of attributes" (Watson et al. 1971:127). Later archaeologists, including Lewis Binford, were inspired by such debates and crafted theories to make the whole of archaeology more anthropological and more explicit. This new theoretical approach was deemed the "New Archaeology" and later recognized as "Processualism". Binford is commonly credited with formulating theoretical concepts central to Processualism. Binford (1972) suggested that changes in cultural assemblies throughout time and space resulted from adaptation in behavior. For example, in Binford's "Proposed Attribute List" from *Miscellaneous Studies in Typology and Classification* (1963), he believes that way in which a projectile point was made is more important for creating a classification system than how it is currently perceived to be. Binford also rejected the taxonomic process in favor of one focusing on examining cultural processes. These ideas were taken into practice where he prioritizes morphological attributes (areas or edges) of projectile points over geometrical attributes (like shape), based on a belief that morphological attributes resulted from a cultural process in creating the projectile point (Binford 1963:185). He created a proposed attribute list based on his work with multiple sites found in the collections of the Museum of Anthropology at the University of Michigan (Binford 1963:221). Lewis Binford used the same ideas in his criticism of other authors in *An Archaeological Perspective* (1972). Lewis Binford particularly denied Rouse's (1939) arguments, as he believes that Rouse's taxonomies had no "guidelines for deciding which traits are generically related and which ones might exhibit similarity" (Binford 1972:84). Many of Binford's claims were argued by contemporary processualists when formulating their methods of creating typologies of assemblies.

Criticisms and Infighting within the New Archaeology

One pivotal researcher was Robert C. Dunnell in his 1971 book, *Systematics in Prehistory*. Dunnell's book detailed several theoretical considerations that were influenced by Rouse's (1939) theory on the taxonomic process. Dunnell's two methods for creating classification were the most important for this chapter. Dunnell stated that paradigmatic class (type) is a class of discrete objects, which themselves are a product of analysis of the attributes of discrete objects (Dunnell 1971:76-77). Taxonomic classification (taxon) was a product of what Dunnell calls dichotomous oppositions, or a set of attributes that differentiate between a prior classification by their absence (Dunnell 1971:190-191). Dunnell articulated that typologies come from inheritance, which could also be described in taxonomic definitions. These were based on a view that differed with processualism, believing that adherents of processualism incorrectly applied Darwinian concepts, and that they should apply these to archaeological remains (Dunnell 1980:35-36).

Another important criticism of the Spaulding approach came from Robert Whallon's 1972 article, "A New Approach to Artifact Typology." In that article, Whallon applied quantitative methods, which he describes as the "Spaulding" approach, to 16 Owasco Pottery Types. According to Robert Whallon, the result was that only two types could be found when applying Krieger's (1944) definitions and Spaulding's (1953) approach. He first defines their theory as paradigmatic typologies, where "attributes must be considered simultaneously in the type definition" (Whallon 1972:15). Whallon offers another way to define typology. Whallon instead suggests a taxonomic approach (which he notes as tree classification) where not all attributes make up distinct classes. This was done through association analysis, where subcategories in a type are defined by the presence or absence of a single attribute, with other attributes deriving in the larger type.

Dwight Read's 1974 article "Comments on Typologies in Archaeology and an Outline of a Methodology" critiques Whallon's (1972) methodology and provides a statistical basis that suggests Whallon's tree classification is instead a different methodology from typology but fails to be different from Whallon's own definition of paradigmatic typology. Read also recognizes that the attributes selected are approximations and that a unique typology could be found only if the observer knows which attributes to measure (Read 1974:225). Instead, the author utilizes definitions of *continuous variables*. Continuous variables are variables utilizing scales of qualitative attributes and nominal attributes. Read gives different methodologies with continuous attributes utilizing cluster analysis and with nominal attributes utilizing a modified X^2 methodology deriving from Spaulding (1953), as well as a careful refinement of Whallon's (1972) methodology, stating that the best way to said association analysis is by knowing first which variables need to be studied to justify the tree classification.

The real controversy among processualists arose with the 1975 publication of *Mathematics and Computers in Archaeology* by James E. Doran and F. R. Hodson. This book primarily used statistical analysis and applied it to issues like classification. The primary criticism it posed was that Spaulding's (1953) approach was wholly wrong. According to the authors, Spaulding's approach failed to be a suitable metric for association and strayed too far from a formal definition of a type (Doran and Hodson 1975:169). Instead, the authors proposed utilizing a method formulated by Gower (1971), for *k*-Means clustering, where similarity is weighed between different attributes, like weight or color, based on their presence or absence (Doran and Hodson 1975:140-142). The authors believed this method was the best way to evaluate qualitative and quantitative variables unbiasedly, but by using a mathematical method of association between any variables.

Breaking Point: The 1975 and 1977 Kampsville Seminars

By 1975, adherents to processualism, like Robert Whallon, Dwight Read, and Frank R. Hodson, failed to make a formal definition of typology or a preferred method to define types and the attributes that created them statistically. In 1975 and 1977, seminars in Kampsville, Illinois, were held between several notable archaeologists, including Albert C. Spaulding, Frank R. Hodson, Robert Whallon, Dwight W. Read, as well as other archaeologists like George L. Cowgill, Robert K. Vienna, and A. Voorips. The results of both seminars became the book, *Essays on Archaeological Typology* (1982), edited by Robert Whallon and James A. Brown. Within that book, some consensus was reached, including the definition of classification, attributes (sometimes described as variables), and the basis for typology, partly based on dissections. In that definition, a type refers to a "group or class of items that was internally cohesive and separated from other groups by one or more discontinuities" (Whallon and Brown 1982:xvii). Classification refers to ordering materials by at least a single attribute. Attribute refers to a "value or range of values in a variable" (Whallon and Brown 1982:xvii). Attributes may be further divided by the type of data gathered from the variables. Nominal variables include variables that are defined only by their strict, mutually exclusive qualities, like name alone. Continuous variables include variables in which the scale is possibly infinite and measures the magnitude, including weight and length (Whallon and Brown 1982:2). Ordinal scales of attributes are only done roughly in order, like shortest to longest, with no exact measurement. Interval scales of attributes are scales that have nonarbitrary divisions, like measurements, or are done with a true starting point, like zero for weight. Dissections refer to an arbitrary division in the data when clustering through scales (Whallon and Brown 1982:xvii). However, the authors of the *Essays on Archaeological Typology* were divided along several issues, including which methodology was best and how to define other terms objectively. According to those at the Kampsville Seminars, the researchers failed to reach any productive discussions partly by infighting between Spaulding and Hodson (Cowgill 1982:31; Read 2007:17). The chapters by Cowgill, Spaulding, Whallon, and Read decried Hodson's similarity coefficient (*k*-Means Clustering) approach, which Hodson defended stating that it was a better approach in part because it reflected that unassociated variables are better at discerning types. The following discussion of chapters from *Essays on Archaeological Typology* detail the opinions of other authors on Hodson's ideas and, by extension, their preferred approaches.

Albert C. Spaulding starts his chapter, "Structure in Archaeological Data: Nominal Variables," defending the value of analyzing nominal variables and denying the use of similarity coefficients because they fail to show any relevance to cultural behaviors in the minds of the people who made the material. Spaulding also argued strongly against the definition of a type as "a discreteness shown by some units relative to each other" (Spaulding 1982:12). Spaulding believes his methods of X^2 do this because there is a natural interrelationship between attributes which could be described as intuitive and that the definition of a type as a combination of attributes is more functional than what Spaulding calls Hodson's similarity approach, as being too formal of a definition.

George L. Cowgill argues mainly against Hodson's methods of object clustering and Hodson's definition of type as "internally cohesive and externally isolated". Cowgill believes this because Hodson's use of similarity coefficients is too arbitrary, and the data sets of Doran and Hodson (1975) are rarely found in archaeological assemblies. Cowgill also stresses that Hodson's dissections bear little relevance compared to Spaulding's approach, where the aim is to discover types from the "culturally imposed order" (Cowgill 1982:52).

Dwight W. Read fundamentally believes that classifications, upon which types result from the classificatory process, are particularly important in understanding cultural behavior. Read disagrees with Dunnell (1971) or Doran and Hodson (1975) in that the definitions of class and groups should be less restrictive. Read does agree with the other members of the Kampsville Seminar, including Spaulding, that the methodologies described by Hodson and others did not qualify as different types but as different ways to analyze types in varied assemblages.

Robert Whallon Jr. believes that type concepts are discovered and not forced upon. His chapter, “Variables and Dimensions: The Critical Step in Quantitative Typology”, details the importance of the relationship between variables and dimensions. To Whallon, variables and dimensions are used to find what scales should be used, describing that “correlation or association between two variables (attributes) implies that one is at least a measure of the other” (Whallon 1982:131). This concept is followed by Whallon’s concept of redundancy in data. This means that the data will repeat in their relationships, and if used properly, could show that a type does in fact exist as patterning consistently along several selected attributes of different variables.

James A. Brown provided a conclusion to the book by evaluating all the prior chapters and concluding that although the authors had different methodologies, they arrived at the same purpose. According to Brown, the act of creating classifications and typologies should be to better group objects, and if a new method is created, then it should stand to reason that it should be utilized. Brown does not state whether these typologies should follow emic or etic perspectives. Instead, he expands on his views by agreeing with Dunnell’s (1971) prior classifications and that those should be a guide for contextualizing future analysis. Stylistic and functional typologies serve as his basis and detail, indicating which methodologies previously written best fit the data being produced.

According to Brown and Hodson, the disagreement wrested on how to apply said methods. Since the archaeologists came from several different backgrounds with vastly different material cultures ranging from ceramics, projectile points, and historical brooches, they disagreed on how best to craft typologies on these differing levels of complexity (Brown 1982:186; Hodson 1982:30).

Other Notable Criticisms

In the decades following *Essays in Archaeological Typology* (1982), several criticisms were raised against the book. The primary one was created by William Adams and Ernest Adams in *Archaeological Typology and Practical Reality* (1991). The authors defend conceptual typologies, which may not be explicitly stated but can nevertheless be helpful in grouping and identifying materials. Adams and Adams' book articulates itself as being "archaeological as it is philosophical," making their assumptions on group based upon conclusions derived by the dialectic approach.

Types as defined by Adams and Adams (1991:91) are:

> … a conceptual system made by partitioning a specified field of entities into a comprehensive set of mutually exclusive types, according to a set of common criteria dictated by the purpose of the archaeologist.

The authors believe that typologies are just tools for analysis of material culture, but are created by the observer, a view that contrasts heavily with Spaulding (1954), who viewed typologies as being part of perceived reality. Adams and Adams (1991) divide types into further groupings to be classified. The first illustrated by them is phenetic (morphological) typologies, which are types "defined by intrinsic attributes that regularly cluster with no influence from external context" (Adams and Adams 1991:218). As described by Adams and Adams, stylistic typologies focus on groupings in classifications between different decorations, whereas functional typologies are the perceived mode of usage of an object (Adams and Adams 1991:219-220). The authors deny the existence of objective classifications and typologies. Instead, the typology they created is nothing more than categories by which they can attempt to understand their assemblage of different Nubian ceramics (Adams and Adams 1991:14-15).

Challenges in Application to Maritime Archaeology?

In his 1995 article, "Type or Technique: Some Thoughts on Boat and Ship Finds as Indicative of Cultural Traditions," Thijs Maarleveld believes that typologies and classifications have little value in underwater archaeology. This is because historical classifications, and by extension types, were identified poorly by archaeologists and historians, with no careful consideration of other characteristics, with Maarleveld's example being the identification of vessels using rigs like carracks or galleons (Maarleveld 1995:6). Maarleveld believes vessels are complex artifacts that should be examined in a limited scope. Maarleveld accepts, however, that the full theoretical examination of a type as stated in *Essays on Archaeological Typology* (Whallon and Brown 1982) or *Artifact Classification* (Read 2007) has not been attempted, with Maarleveld putting his criticism mostly on culture historical methods, not those constructed by processualists. Since Maarleveld's article, types have been created in maritime archaeology. One notable one is by Thomas J. Oertling, who created the Iberian Atlantic Vessel Type. This "type" was created through several construction characteristics, meant to identify Iberian vessels intended for Atlantic usage between the 15th and 16th centuries (Oertling 2004:132-134). However, this type also lacks theoretical consideration or an explicit justification that it fits in the typological framework, as this thesis intends to do so.

Applications of Processual Theory

After the publication of *Essays on Archaeological Typology* (1982), Dwight Read published more information on the construction of typologies and classifications. This thesis examines Dwight Read's contributions to classification and typology.

Dwight Read reiterated the points made in his chapter "Toward a Theory of Archaeological Classification" of *Essays on Archaeological Classification* (Read 1982) in his own book, *Artifact Classification: A Conceptual and Methodological Approach* (Read 2007). In it, Read articulated that classification should also have an explicit process that tries to discover the emic perspective of those who made the artifact. He found that previous New Archaeologists, including Spaulding, failed to address cultural processes on which typologies should be based (Read 2007:23). Read identifies this as the problem with defining types as a combination of attributes where not all possible dimensions of artifact are "culturally salient" and even if they were, the "variation needs to be mapped in an identical way to every artifact" (Read 2007:44, 155). He explains further that, according to previous researchers, the problem arises that there is a mutual interdependence between finding culturally salient types, which require comparative analysis, and the difficulty in identifying which artifacts belong to a culturally salient type until the type is created. Read described this as the 'double bind problem', where statistical analysis alone does not resolve difficulties in identifying artifacts to type which would be made to create a basis for a type (Read 2007:200-202).

To prevent the double bind problem, a researcher must identify what culturally salient variables are found within artifacts. Dwight Read believes this should be done utilizing chaîne opératoire (Read 2007:241). This process is not explored in as detail as does Read, but it is best summarized as a process of material creation, where the creators of said material went from raw material toward production transformation and then to finished product (Read 2007:190-191). After finishing an object, there are usage transformations, which can be seen as potential conversions of its object, which can sometimes change its function or extend its use over time.

Dwight Read also disproved the approach of using patterning in the aggregate with statistical analysis because he believed that the pattern advocated for the inclusion of a hybridized approach by previous researchers like Irving Rouse, who utilized a definition of attributes based on different modes. As Read notes, $mode_1$ refers to the variables of an attribute which exist in the form of the physical object; $mode_2$ refers to variables of an attribute that can be examined as a distinct concept (Read 2007:50). He states that these are the variables for the phenomenological domain (material objects created by people) and the ideational domain (the conceptual and culturally constructed idea of what the object ought to be). Read believes that prior archaeologists can also see this relationship in their definitions of functional and stylistic typology, which he rejects, but states that functional and stylistic classifications provide insight into the potential contexts that would apply to the different domains (Read 2007:269). They are not different typologies, simply different methods in which a type could be identified based on the nature of the data. From there, Read argues that many different statistical methods are valid if they conform to the cultural saliency of variables within their respective domains. Read believes there are no taxonomic or paradigmatic types, as Dunnell (1971) and Whallon (1972) mentioned; instead, taxonomic classifications are a method, not a product, to discern between qualitative variables. Read also posits that paradigmatic classifications are better when using quantitative variables, where each process step is made in an "exhaustive manner" (Read 2007:241). These distinctions have been utilized by those studying statistical analysis when utilizing the chaîne opératoire approach to utilize the X^2 method.

For testing an existing typology, Read (2007) notes that the type must be consistent in its modes and that individual types should have distinct separation from one another. As such, any typology should not have large overlaps in its distribution of attributes. Read described that if there is overlap "then an artifact that falls within the area of overlap cannot be distinguished by the type" (Read 2007: 213). Overlap shows that the individual types are inconsistent and the differences between types are not culturally salient. A lack of cultural saliency between types, using this method, can refute the existing typology entirely. He also stated that artifacts of a type should fit a cohesive spatio-temporally from the assumptions given of the type (Read 2007:118). This means that the artifacts made should have a logical location where they were created which is consistent among those with those inside the type.

Conclusion

Although archaeological theory regarding classification and typology is not uniform, the applied concepts of Read (2007) taken from Rouse (1939), Krieger (1944), Spaulding (1953), and Dunnell (1971) show that typology can be understood through past behavior. The typology of blockade runners in the American Civil War should apply the considerations of variables and attributes. As Spaulding (1953), and Whallon (1972), Read (2007) note, these can be discovered or tested from statistical analysis of said attributes of variables, whether by *k*-Cluster analysis or through X^2, with methods later expanded upon later in the thesis through the Methodology and Analysis chapters.

Chapter 4: Methodologies

Introduction

To understand these potential ship types, several methodologies were employed to reconstruct the vessels and contextualize them. This chapter details those methodologies, which build the foundation for the presentation of results (Chapter 5) and answer research questions (Chapter 6). The methods used include researching both the primary and secondary documentation of blockade runners, as well as the formation of a blockade runner ship datasheet. Once this documentation was collected, other methods could be employed. These include map creation in *ArcGIS Pro,* statistical analysis in *SPSS*, and 3D models constructed in *Rhinoceros* 8 CAD software. Each step is explored below.

Historical Research

Several secondary sources were utilized to frame the contextual basis for the thesis. These sources highlight different perspectives on said vessels' purpose, efficacy, and construction (Bulloch 1884; Williamson 1904; Owlsey 1931; Vandiver 1947; Price 1948; Lester 1975; Davies 1980). For the formation of a spreadsheet of known blockade runners, Stephen Wise's *Lifeline of the Confederacy: Civil War Blockade Runners* (1988) and Eric Graham's *Clyde Built: The Blockade Runners of the American Civil War* (2006) were important and are explained later when discussing the spreadsheet that served as the foundation for analysis.

The most important primary sources utilized were copies of ship plans that formed the basis of 3D model making, noted later in the chapter. The original ship plans of *Will O' Wisp* were gathered from the University of Glasgow Archives (University of Glasgow Archives 1863). The plans first appeared in a blog posted by the University of Glasgow's Preservation and

Conservation Office, which featured the plans as part of their latest conservation efforts. These plans were scanned and transferred for academic use. The Taubman service acquired the *Hope* plans from the David MacGregor collection, now part of the SS *Great Britain* Trust (Taubmann Plans 2025). The plans were purchased from this company to be modeled in this thesis. Smithsonian Institution's Ship Plans Service acquired the plans for *Fergus* and *Florida. Florida's* origins are unknown, but *Fergus's* plans (Phillipe 1885) are labelled as drawn from the builder's plans and include a signature for Howard I. Chapelle (Chapelle 1957).

Datasheet Collation

One of the most important steps for this thesis was the creation of an *Excel* spreadsheet of all known blockade runners (See Appendix A). This information came from three sources. The first was Stephen Wise (1988), *Lifeline of the Confederacy: Civil War Blockade Runners*'s Appendix 22. The second source was Eric Graham's *Clyde Built: The Blockade Runners of the American Civil War* (2006). The third resource was Stephen Wise's private notes, which were graciously given when requested. Wise (1988) was the source that was primarily used for the spreadsheet, with gaps being filled either by Stephen Wise's private notes or by Graham (2006). The spreadsheet was initially created using the available information from Wise (1988), and the appendix was transferred into Excel, with all fields listed on the first page of Appendix 22 (Wise 1988:285). This resulted in fields for Name, Alias, Successful Runs, Attempts, Builder, Build Location, Build Year, Acquirer, Acquirer Company, Length, Breadth, Depth, Burden Tons, Gross Tons, Registered Tons, Deadweight Tons, Frame Type, Hull Classification, and Propulsion Classification. The Name field includes the blockade runner's primary name during its blockade running career. Ex. Name refers to the vessel's other cited names. Successful Runs and Attempts represent the ships that recorded successful voyages at blockade runs and the total reported attempts completed. The Builder field refers to the blockade runner's builder, especially for its hull. The Build Location field refers to the city where the blockade runner was finished being built. The build year records the year the vessel was known to have been built or its launch date. The Acquirer field refers to the individual or way in which the Confederate States initially acquired the vessel. The Acquirer Company represents the company or governmental agency that an individual was represented by. The length of the vessel is recorded as the overall length of the vessel, measured in feet. Breadth refers to the widest dimension in feet recorded on the vessel. Depth is the height of the vessel from its lowest point of the hull to the top of the hull deck, measured in feet. Four types of tonnage were recorded in Wise (1988), including burden tons, gross tons, registered tons, and deadweight tons. Another field was created for hull construction: wooden, steel, iron, or composite, a data classification for mixed construction material vessels. The last field original to Wise (1988) was propulsion class which includes if a vessel was either sidewheel, twin-screw, or single screw.

Gaps found in the data were then partially filled using data from Graham (2006), including updated information on the vessel's build location, builder, and build year. Graham does include some information on boiler and engine types for certain blockade runners; however, since this information is exclusively for Clyde-built ships and is absent in Wise (1988), this information was not included in the spreadsheet. The final number of recorded blockade runners from Wise (1988) and Graham (2006) totaled 350 ships.

Additional fields in the spreadsheet were created for later analysis. These fields included a ratio field for length and breadth, measured in feet to feet, inspired by Kevin Foster's (1991) ratios. Two other fields were created for latitude and longitude based on the approximate locations of the cities noted in the build location field. This information was collected by extracting information from *Google Maps* and collecting the latitude and longitude given by the cities or boroughs listed in the Build Location field. This field aimed to have something *ArcGIS* could use to read locational data. The Build Location field data was also simplified into the Build Region field, representing the regions where blockade runners were created. This simplification was using the regions listed by Joseph McKenna in *British Blockade Runners in the American Civil War* and utilizes new regions in America, which show similar trends (McKenna 2019:81-92).

Density Maps

Density maps from *ArcGIS Pro* were made using the Kernel Density Estimation tool. However, a population field is needed before the tool can be utilized. The basis for this is that kernel density estimation uses a Z-axis, which is a third-dimensional factor, to gather information on proposed densities. For this project, this was the number of ships built in a location. As a result, the data in the original spreadsheet of blockade runners was transferred to a new spreadsheet based on their building location. This utilized a field for cities noted in the Build Location field. Then, a count was collected using the command "=COUNTIF()" and the build location column was selected in *Excel*. Once done, the spreadsheet generates a column with the number of each building location. The data was copied into an entirely new spreadsheet titled Blockade Runner Sites. The latitude and longitude were collected simultaneously as they were in the original spreadsheet and transferred into the existing spreadsheet. This new spreadsheet was then saved as a Comma-Separated Value (CSV) file for reduced storage. Once saved, the CSV was imported into *ArcGIS Pro* 3.3. This is only a table, but the latitude and longitude data can be inserted into ArcGIS using the XY Table to Point tool. The input table was the Sites CSV, the X-field is the Longitude value, the Y Field is the latitude. The Coordinate system utilized was GCS WGS 1984. The Z Axis was chosen as the Number Built Field created for the spreadsheet. The result of the tool is the generation of vector data, which has a z-axis. This forms the basis for the Kernel Density tool.

The kernel density tool used in this thesis is found under "Spatial Analyst Tools." After opening the prompt, an option to select the population was given. The field utilized was the field "Number Built" for the population field of the data (see Figure 3). After which, the area units were selected in square kilometers, with the output cell values being densities. The method option used in the Kernel Density tool was planar so that the values could be more easily discerned. The first map created was of all the British and American data on one map, as seen on Figure 4.

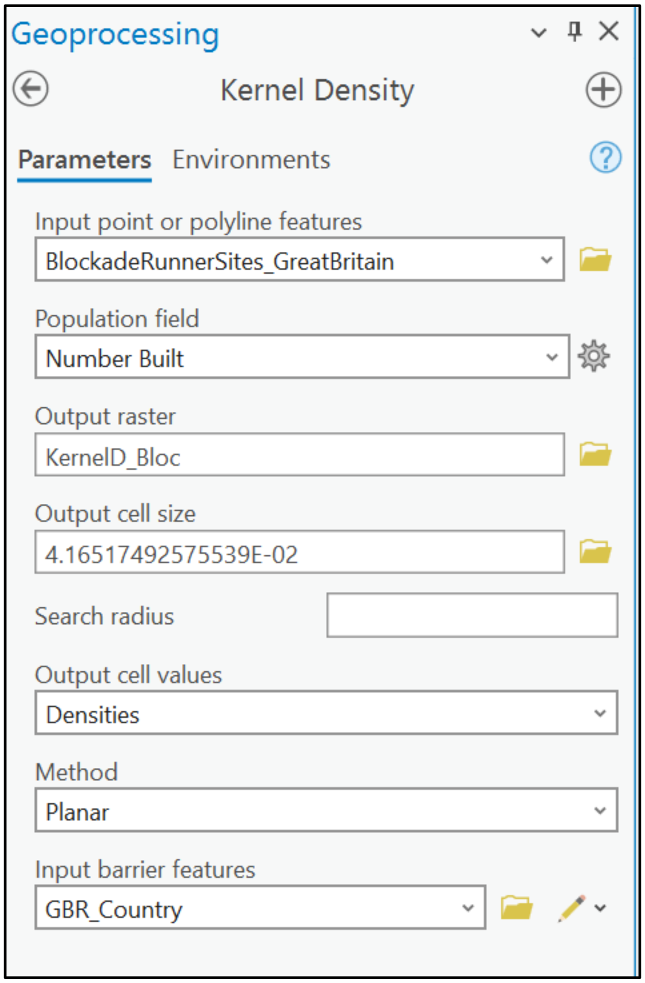
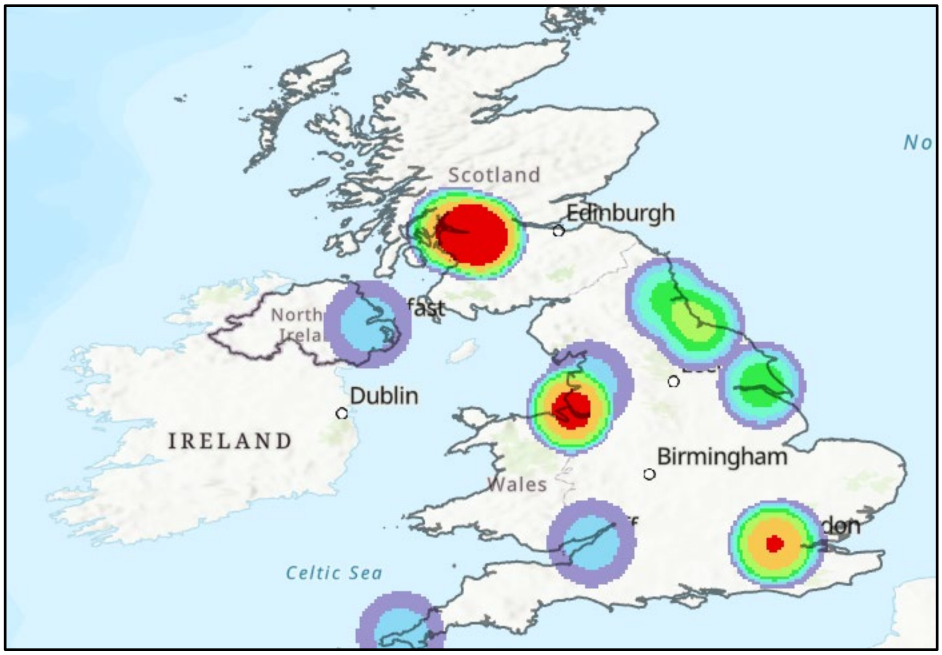


Figure 3. Screen grab of the workflow for using the kernel density tool. (Image by Alexander Owens).



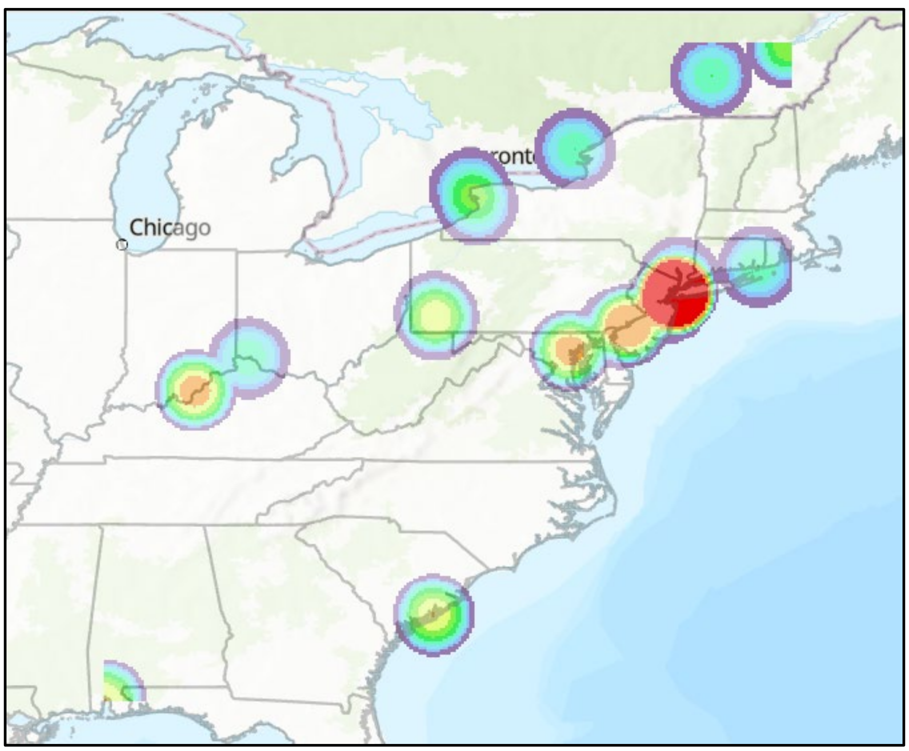


Figure 4. Maps of locations where ships built created by kernel density estimation; top being the British Isles, bottom being American ships. (Image by Alexander Owens).

However, this map was not as helpful for the American data points, as the British produced so much more, that it skewed the generated values towards the British Isles. As a result, separate maps were created. This was done by selecting the points of the XY to Points data in the geographical area of the British Isles and exporting the features as "Blockade Runner Sites Great Britain." Another was created exclusively for American-built ships titled "Blockade Runner Sites America." The Kernel Density tool was used for both data sets, which had different values from each other, but better represented the regional trends of the individual countries.

Three-Dimensional Models

Unlike other artifacts studied with typology and classification, ships in the 19th century could be represented with models. The models were made to represent the full models popular in the period, made from ship plans to demonstrate size ratios and hull forms, and to allow for hull form comparisons. The following section discusses the methodology used to construct the four models with *Rhinoceros* 8 CAD software.

The first step was to have scans of the plans. The images of *Florida*, *Fergus*, and *Hope* were scanned and transferred to high-definition JPEG image files. *Will O'Wisp* was emailed by the University of Glasgow as a JPEG. Once the scans were acquired, they were prepared for insertion into *Rhinoceros* 8 CAD. This was achieved by using File Explorer to make copies of the scans, and keeping the original. These JPEGS were then cropped into their sections, selected "Save As" and given the name of the section they were used in. This is to separate the ship plan into sections that can be modeled into the different windows in *Rhinoceros*. The sections include the plan, half breadth, and profile views. The plan view was scaled in the right window, the half breadth in the top window, and the profile in the front window. The intention behind this is to have a uniform orientation on all blockade runners and an easier way to utilize the default perspective window, which gives a more three-dimensional look of the curves and surfaces created later.

With the plans divided into sections, the project could be used for 3D CAD (computer-aided design) work using *Rhinoceros* Version 8. After opening *Rhinoceros* 8, the first step was selecting the "Feet- Inches and Feet," as all the plans are drawn in feet and inches. Then, several lines were made, which gave a line for each plane view. A layer titled "lines" was created and lines were made by making a single line straight and longer than the grid in one two-dimensional view. To make the other lines, a user needs to switch to perspective view, select the line made, and use the curves on the Gumball CPlane to rotate the line by 90 degrees.

Once completed, the scans of the plans were inserted. This was done by writing the command "Picture," selecting the file, and inserting the plan in its associated view. A layer was also created for pictures, with a sublayer made to label which image was which and so later the images can be turned on and off. The image inserted into the view is initially unscaled, so a scale must be applied to set it to real-world dimensions. Some of the plans had a built-in scale inside the image. When this happened, a new layer was created to organize it, and a vector line was drawn straight. Before pressing Enter, change the line's length to the length of the scale or the length of the intended dimension. Once done, press Enter and select the line again to confirm that the line is the proper length. Now, a scale is created; if it is not on the top of the image, it can be brought forward by the "SendFront" or "SendForward" command. For plans without a built-in scale, use the Length Overall measurement for the line in the top view, and the Beam Measurement for the Right view. After scale lines are created the pictures inserted need to be scaled. The scale line and the image need to be straight for the following step. The image was shifted to where the scale line was, where one edge met the edge of the scale line. This is done by writing the command “ScalePicture” into the prompt and selecting the image to be scaled. Try to have the first point of the “scale picture to be the edge of the drawn object in the image and the edge of the scale line. Then drag the cursor so that the other edge of the drawn object in the image meets the other edge of the scale line. The image often needs to be rotated so that it is aligned correctly. Use the “rotate” command at on edge of the image until the other edge meets straight with the scale line. This was not done perfectly, partly because the scans were imperfect, and also because the objects being modeled are based on hand-drawn instruments with some level of fault. For *Will O' Wisp*, there was also the factor of its preservation treatments, which considered the patches made and a level of finesse in drafting lines, often not recommended for fully scaled and detailed models. However, for the methodology of this project, where 3D models serve as a context, it was deemed unnecessary for the research goals.

After the image was scaled and inserted, curves could be traced over the scaled plans. There are several ways to draft these, including wave lines, bowlines, diagonals, and frame stations. However, for simplicity and time, two methods were used, each for two series of plans. *Florida*, *Fergus*, and *Hope* first used frame stations on the body plan. The curves were done using the Control Point Curve tool, which uses several points that match a point. Frame station curves include several numbered curves as they would appear from the bow and represent the ship's curvature along the vessel's length. When drawing these curves in, a layer of frame stations with sublayers of each frame station digit, either a numeral or alphabetical, was drafted in that layer. The sublayers were organized by number or by alphabetical digit because of how they were written. The basis for this is so that they can turn on and off and be distinguished as drafting several curves, preventing mistakes in their identification later. Turning on “End” and “Point” on the Osnap tool is best for using these curves. Once done, the individual can draft the top line for the frame stations. This would be removed later, but a general height can keep it accurately connected. Once all lines are drafted and labeled in the layers tab, the top line can be removed, and the frame stations can be appropriately placed. This is done by looking at the frame stations numbered on the starboard profile. Each curve drawn has a placement noted in the starboard profile, and each sublayer of the frame station can be matched with its line in the profile plan. When examined in detail, *Florida's* plans were the most poorly scaled; the 3D model forgoes using its waterlines instead of frame stations and bowlines. The model for *Will O' Wisp* used wave lines from the half-breath plan and placed them as they appeared in both the body plan and the starboard profile. This is because *Will O' Wisp's* scans were missing from the body plan. Once all the curves were made, the rail and the edge of the keel needed to be drawn. This was done by carefully using the Control Point Curve tool to the endpoint of the existing curves.

Once the curves are created, a surface can be created. The two tools used were the Network Surface Tool and the Loft Tool. The Network Surface Tool makes a polyline surface mesh from closed curves that meet at points and don't overextend on the edges. Typing "NetworkSrf" into the command prompt, allows the user to select intersecting curves, and then surface creation can start from the foremost curve moving to the aftmost curve. This tool was too difficult for *Florida*, as it was the first attempt and had lines that overextended at cross points. This is where the Loft tool utilizes open curves that do not always meet. This tool required that the order of the curves be correctly selected, which was done by properly selecting the curves from the perspective view. The tolerance used by lofting was 1000 points. This number of points requires time and CPU usage but proved effective.

After all the models had surfaces, they could be added to a single project in *Rhinoceros*. Like before, a new project was created, “Feet: Feet Inches, Large Objects,” because they are all scaled in Imperial Units. It is very simple to add the surfaces created, copy the surfaces using the command Control + C, and paste them into the project using the command Control + V. This will copy the surfaces and how they appear in the Layer Window. The surface layer was renamed, and the vessel was pasted into the document. Using the measure tool, the models were measured to confirm that they kept the same length and breadth dimensions from their original 3DM files. This process was repeated for the remaining three vessel surfaces. *Florida’s* was the only one with a third feature, the stem, which was copied and pasted into the document to represent its construction better. Each model was oriented by their year of construction, with *Florida* first, followed by *Fergus*, *Will O’ Wisp*, and *Hope* (see Figure 5). Once placed, each vessel was color-coded to represent the approximate paint styles of the hulls in those periods (see Chapter 5: Speed and Stealth: Identifying Trends in Civil War Blockade Runners).

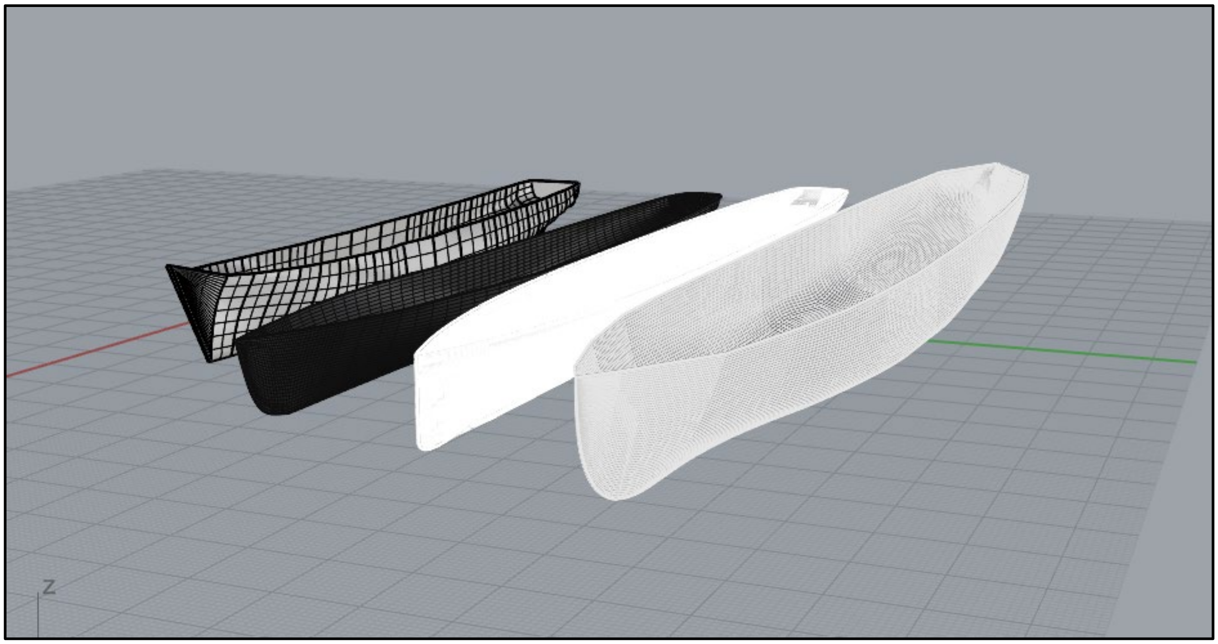


Figure 5. Screen grab of the four models lined up after attaching them to one file (Image by Alexander Owens).

Statistical Methodology

Both methods of *k*-means cluster and X^2 test of independence were done using IBM's *SPSS* Statistics Version 29.02. The methods described below followed the instructions found in Dwight Read's *Artifact Classification: A Conceptual and Methodological Approach* (2007).

The method used for X^2 tests of independence utilizes a tool found in *SPSS*, which is found using the Analysis Tab, under which Descriptive Statistics is found (then the Crosstabs function is selected). One selects the row and column of the crosstab that needs to be filled in. Those used for "Row" section were the Ratio field from the spreadsheet, and the Column field selected was the Depth field. The reasoning behind this was that, according to Read, differing dimensions or other attributes quantified can be compared to test overlap (Read 2007:134-135). Once done, the statistics tab was opened in the in the Crosstab window to select the "chi-square" option and applied the nominal Contingency Coefficient option (see Figure 6 and Figure 7). This showed how relevant the total data is, which is explored in detail in the Analysis Chapter. After applying the statistical options, the Expected and Observed cell units were selected so that the X^2 ratios and amounts could be visible and later analyzed (see Figure 8). The section for Adjusted Standardized residuals was selected so that the X^2 can be adjusted to utilize the entirety of the section and not just divided by its column or row alone. Initially, the Bonferroni Correction option was chosen. The Bonferroni Correction is intended to test each category's statistical significance when adjusted, giving an updated p-value to test. However, utilizing this method with smaller datasets may allow for data negation. Just as X^2 test of independence could spark a false positive, the Bonferroni Correction could have created a false negative.

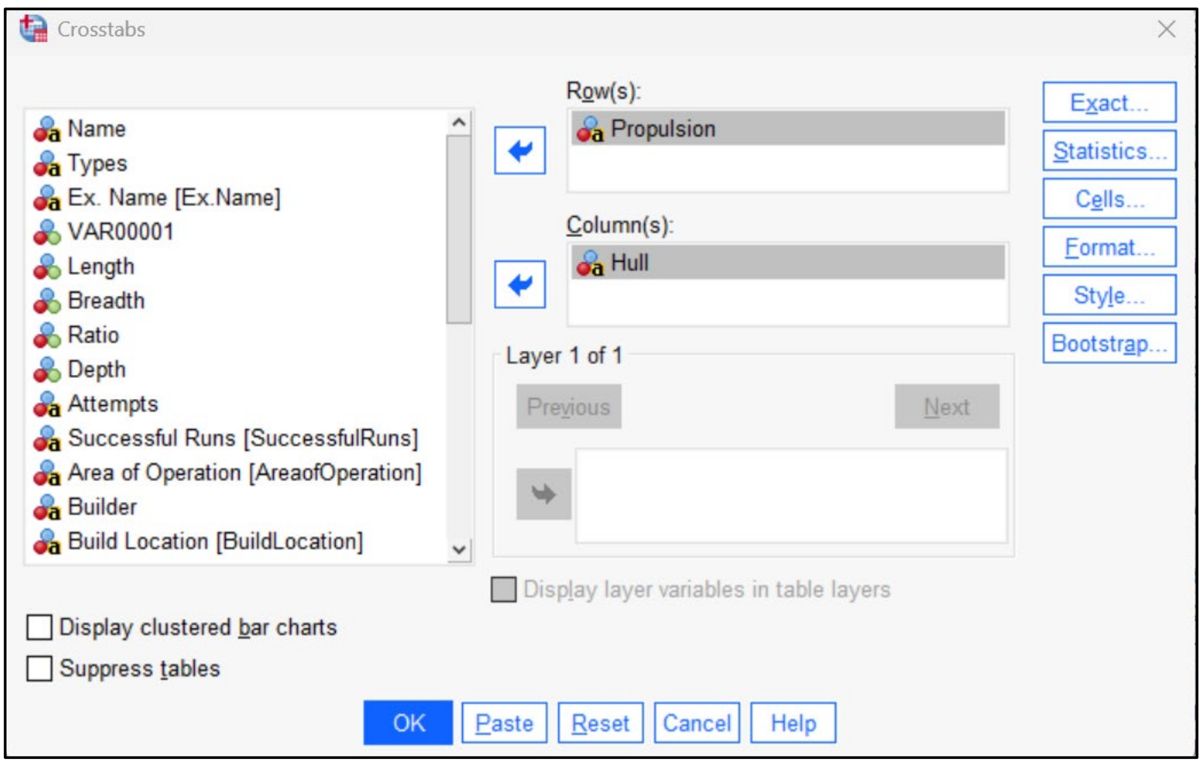


Figure 6. Crosstabs Tool in SPSS. Note that Row was filled for Propulsion and Column was filled for the Hull field. (Image by Alexander Owens).

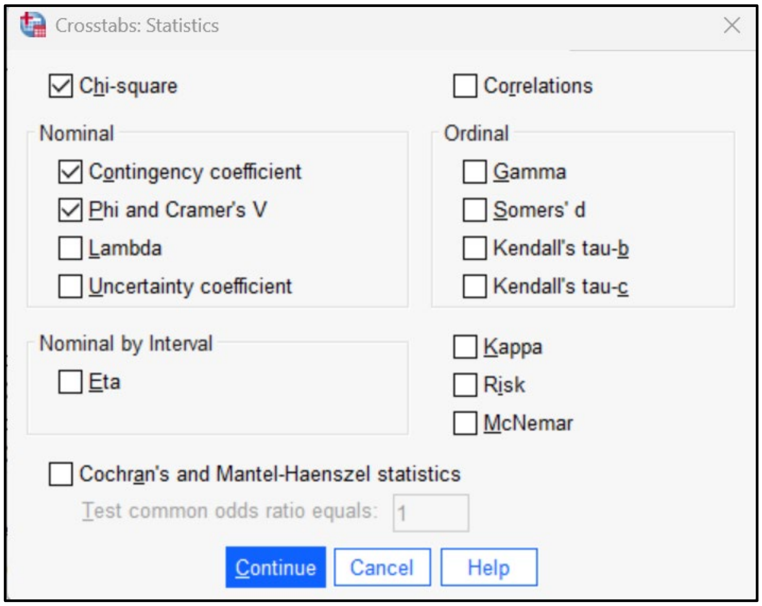


Figure 7. Crosstabs Statistics tool in SPSS. The nominal fields of Chi-square, Contingency coefficient and Phi and Cramer's V were used in this study. (Image by Alexander Owens).

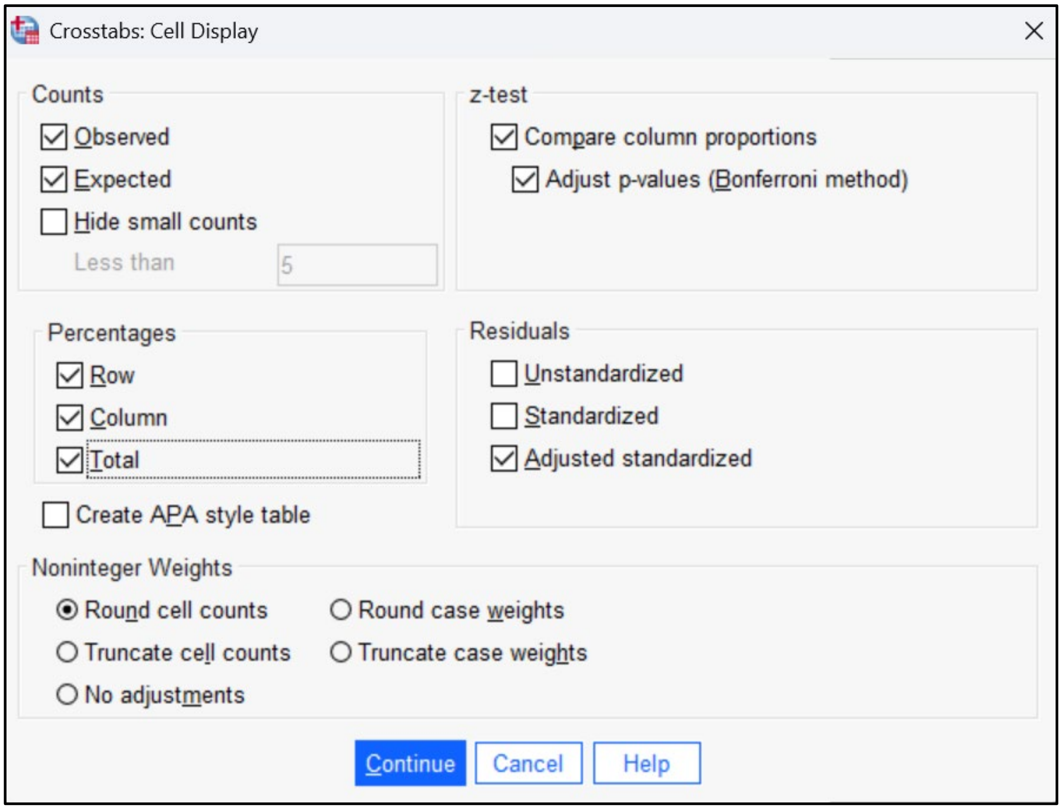


Figure 8. Crosstabs Cell Display tool in SPSS. The Percentages, and Z test were filled, with Observed and Expected filled in as well. The Residual was set to Adjusted standardized and the no integer weights were set to default. (Image by Alexander Owens).

Once the Cluster centers were found, a scatterplot could be created. This was done in a similar way to how the main scatterplot was created, but with the filter being the new field created from the *k*-Means cluster (see Figure 9). This classifies each data point based on its distance to the final cluster center. This distance was determined in part by the iterations shown in Figure 10, which utilized the Euclidean Distance to assess the strength and relevance of each cluster center. One scatterplot was used for the expected cluster number determined by four types tested ($k = 4$), and another based on Read's perception method, where this graph had a triangular shape ($k =3$) (Read 2007:217). The clusters were classified by the number associated with the cluster center, whose color and legend can be visually identified on the scatterplot. To better visualize the results, a perceived convex hull of each type inside the graph was created to show the significant level of overlap.

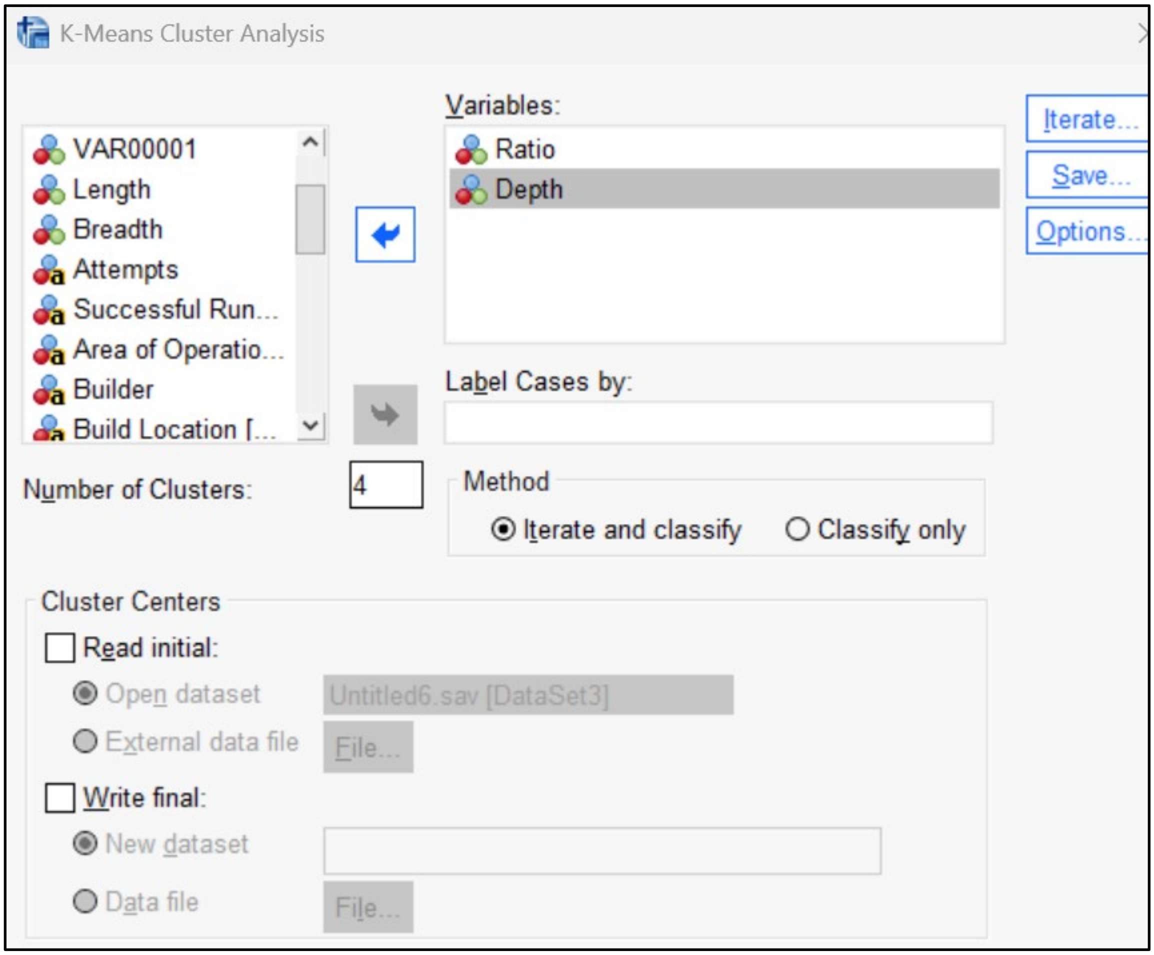


Figure 9. *k*-Means Cluster Analysis Tool in SPSS. The variables chosen were Ratio and Depth, taken from spreadsheet of blockade runner database. Note that this was where there are 4 clusters. (Image by Alexander Owens).

Initial Cluster Centers

	Cluster 1	2	3	4
Ratio	7	7	6	16
Depth	5	24	15	10

Iteration History[a]

Iteration	Change in Cluster Centers 1	2	3	4
1	3.537	2.064	2.225	4.307
2	.472	1.947	.147	1.378
3	.563	.544	.169	.770
4	.299	.100	.185	.331
5	.132	.000	.075	.140
6	.086	.000	.061	.105
7	.029	.000	.040	.049
8	.034	.000	.020	.033
9	.064	.000	.000	.039
10	.000	.000	.019	.017

a. Iterations stopped because the maximum number of iterations was performed. Iterations failed to converge. The maximum absolute coordinate change for any center is .016. The current iteration is 10. The minimum distance between initial centers is 9.351.

Final Cluster Centers

	Cluster 1	2	3	4
Ratio	6	7	8	9
Depth	8	19	14	10

Figure 10. The *k*-means cluster results in SPSS. This tool found the centers of the clusters which were then used to classify the dataset into the *k*-means scatterplots found in Chapter 6. Note that this was the result of 4 clusters being classified. (Image by Alexander Owens).

A scatterplot was created using SPSS, but the convex hulls of each type were created within Adobe *Illustrator* due to difficulties in using scripts to accurately measure each type and its overlaps in SPSS. To rectify this, polygons were manually drawn between the different vessels in the scatterplot and the area of each was measured using JavaScript code to calculate the area. Instead of the area being measured in feet (ft^2), the script measured in pixels (px^2). Once completed, an area was drawn of the overlap and the total area. These were measured, and the results were compared to each type, reflecting the percentage of overlap, such as the type area divided by the total area.

Conclusion

This chapter has detailed the multiple methodologies that provide context to the work presented in later chapters. Each section created a tangible component to aid in classifying and typing the vessels considered in the study. These include a spreadsheet of 350 vessels with important details, maps of the density of blockade runner construction, and four models that depict the vessels as they were perceived. The intended goal of these items is to give perspective and data to the objects that need to be classified.

Chapter 5: Speed and Stealth: Identifying Trends in Civil War Blockade Runners

Introduction

This chapter presented the contents of a database of blockade runners collected according to the parameters outlined in the previous chapter. In total, 350 blockade runners were recorded through historical research. Each record of a blockade runner included several variables, including build locations and technical specifications. This chapter described these attributes and present spatial distribution maps. Included in the spatial distribution maps are the locations of the build sites of blockade runners in both North America and Great Britain, as well as the areas of operation where vessels were active in blockade running. Another subsection included the builders and build years of the blockade runners. The builders are the listed companies that constructed the vessel, with the build years being those of the prewar and those built in each year of the American Civil War. Following that is a section that provides the range of dimensions of vessels, including the length, breadth, length-to-breadth ratio, and depth. The material of blockade runners is also listed, as are their construction types. The propulsion of each blockade runner is represented. In each subsection, where no data on the variables were identified, they are listed as unknown.

The sections of the chapter are organized first by describing the nature of the entire dataset, then subdivided by the previously discussed typological classifications of Converted, Extreme, Mature, and Enlarged blockade runners. These are noted as classifications as their typology is yet to be verified. Within each section are the results representing each technical variable (characteristic of construction), which includes the frequencies described based on the representation from highest to lowest in proportion.

Overview of the Dataset

The dataset used in this chapter came mainly from three sources: Stephen Wise's *Lifeline of the Confederacy: Civil War Blockade Runners* (1988) Appendix 22, Eric Graham's *Clydebuilt: The Blockade Runners, Cruisers, and Armoured Rams of the American Civil War* (2006), and Stephen Wise's own notes received electronically (Wise 2024). The intention of this dataset is to collate all information pertaining to potential classifications and the existing typology. This section follows these fields in this order: build location, build years, areas of operation, build material, and propulsion.

The dataset shows that blockade runners were mostly built in Great Britain (see Figure 11). This includes 34% of which were built on the River Clyde, 12% on the River Mersey, 7% on the River Thames, 4% in Northeastern England, and 2% from other places across Great Britain. Those with no data on their build location are the second highest proportion of the dataset, at 20%. The smallest continental proportion was those built in North America. Within that, 12% were built in the greater New York area, 3% were built in the southern United States, and 6% were built in several other places in North America, including some built in US states of Indiana and Pennsylvania, and others in Canada.

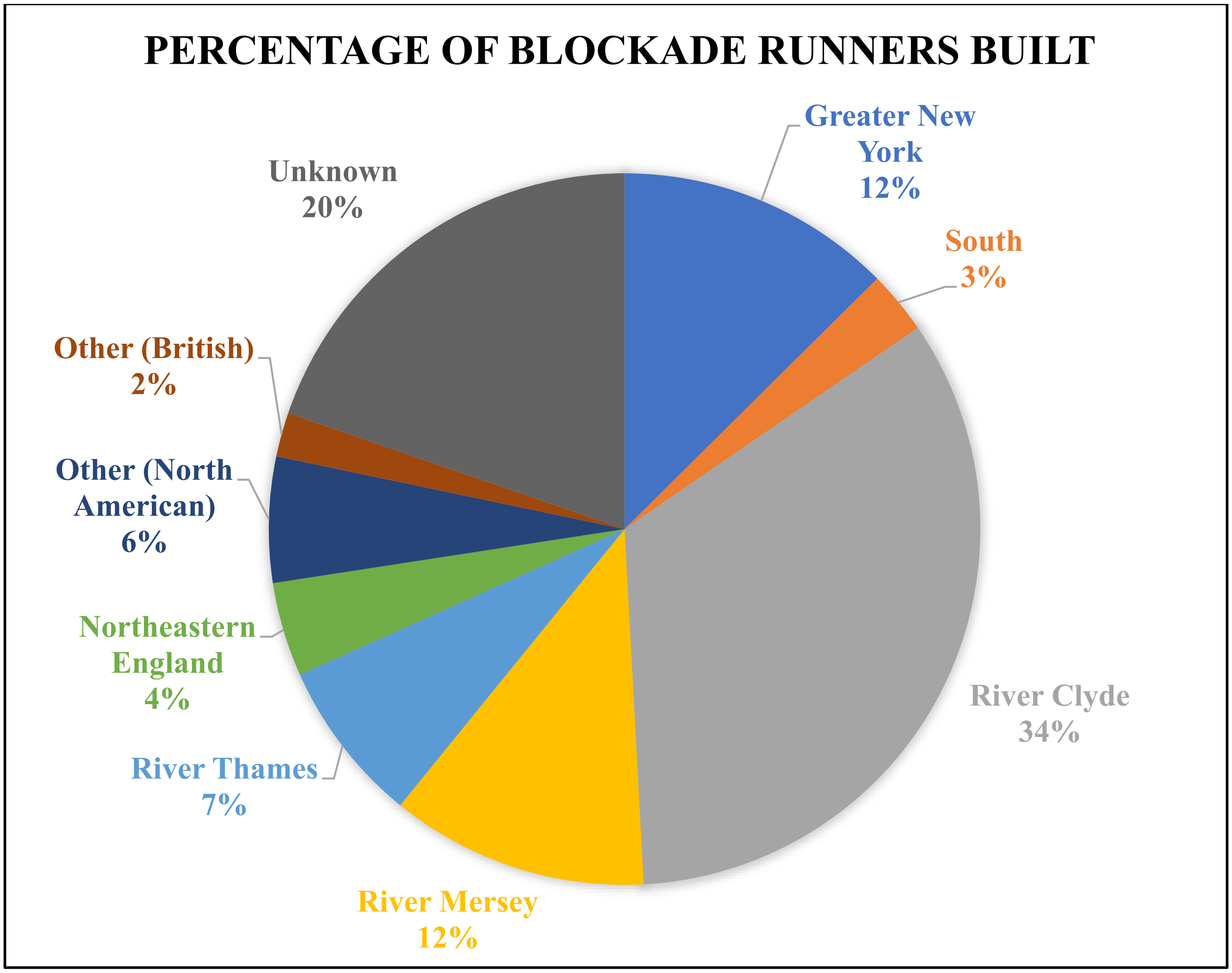


Figure 11. Blockade runner build areas (*n* = 350). (Image by Alexander Owens).

This information is supported by the maps of both North America and Great Britain (see Figure 12 and Figure 13). Among those in Great Britain, there are significant clusters along the River Clyde with areas like Dumbarton, Glasgow, and Greenock. The second-largest cluster is along the River Mersey, with cities like Liverpool and Birkenhead. The third largest cluster in Great Britain is along the River Thames, which mainly includes blockade runners built in and around London. Northeastern England has some less centralized clusters, including Stockton-on-Tees, Newcastle Upon Tyne, and Hull.

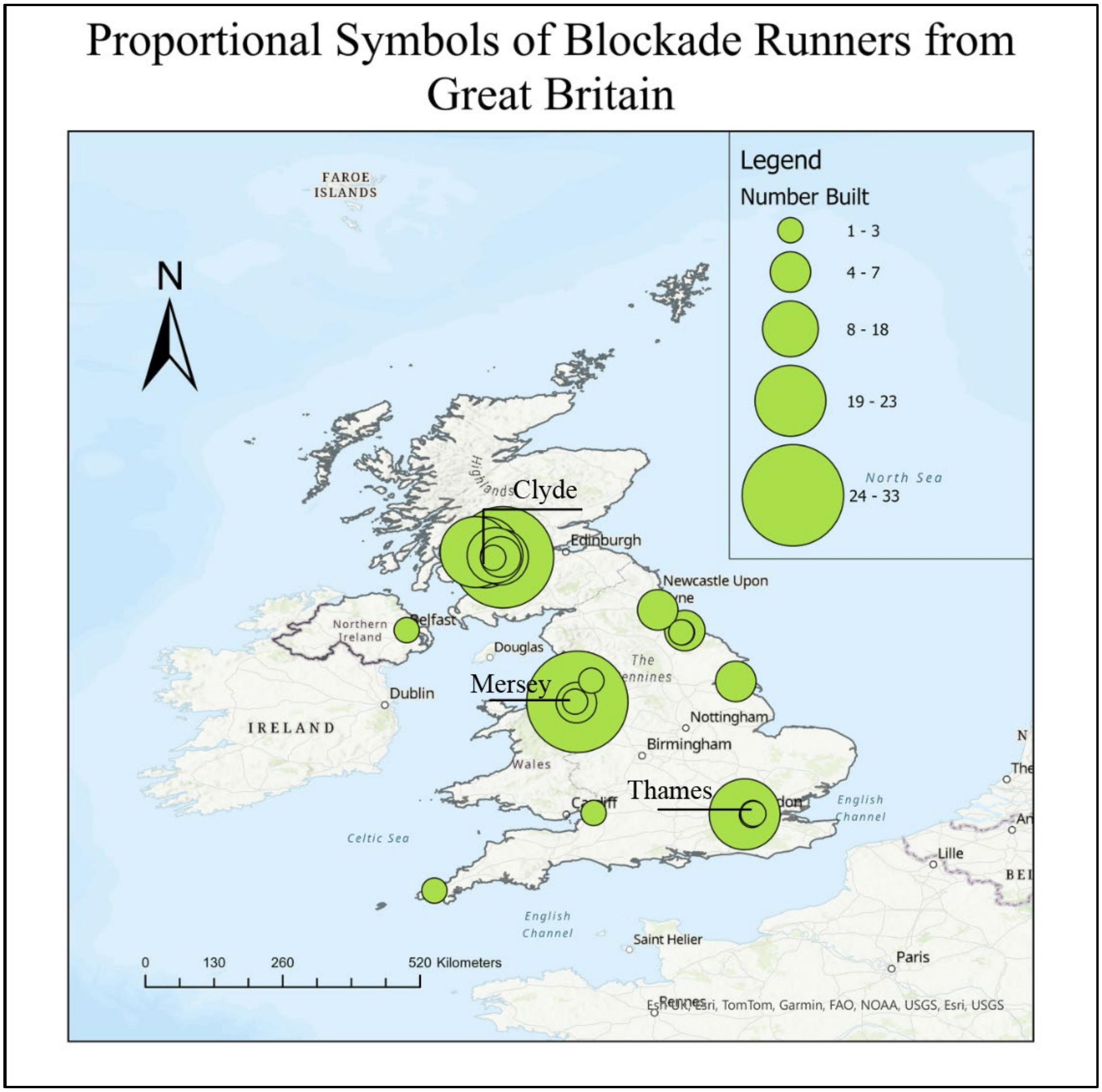


Figure 12. Map depicting the distribution of blockade runner construction in Great Britain. (Image by Alexander Owens).

In Figure 13, similar trends appear as Figure 12. The predominant cluster in North America is around New York. After that, there are small pockets all over North America, including several cities in Canada. Within the United States, pockets exist in Baltimore, Louisville, Cincinnati, and western Pennsylvania, as well as small pockets around Charleston and Mobile.

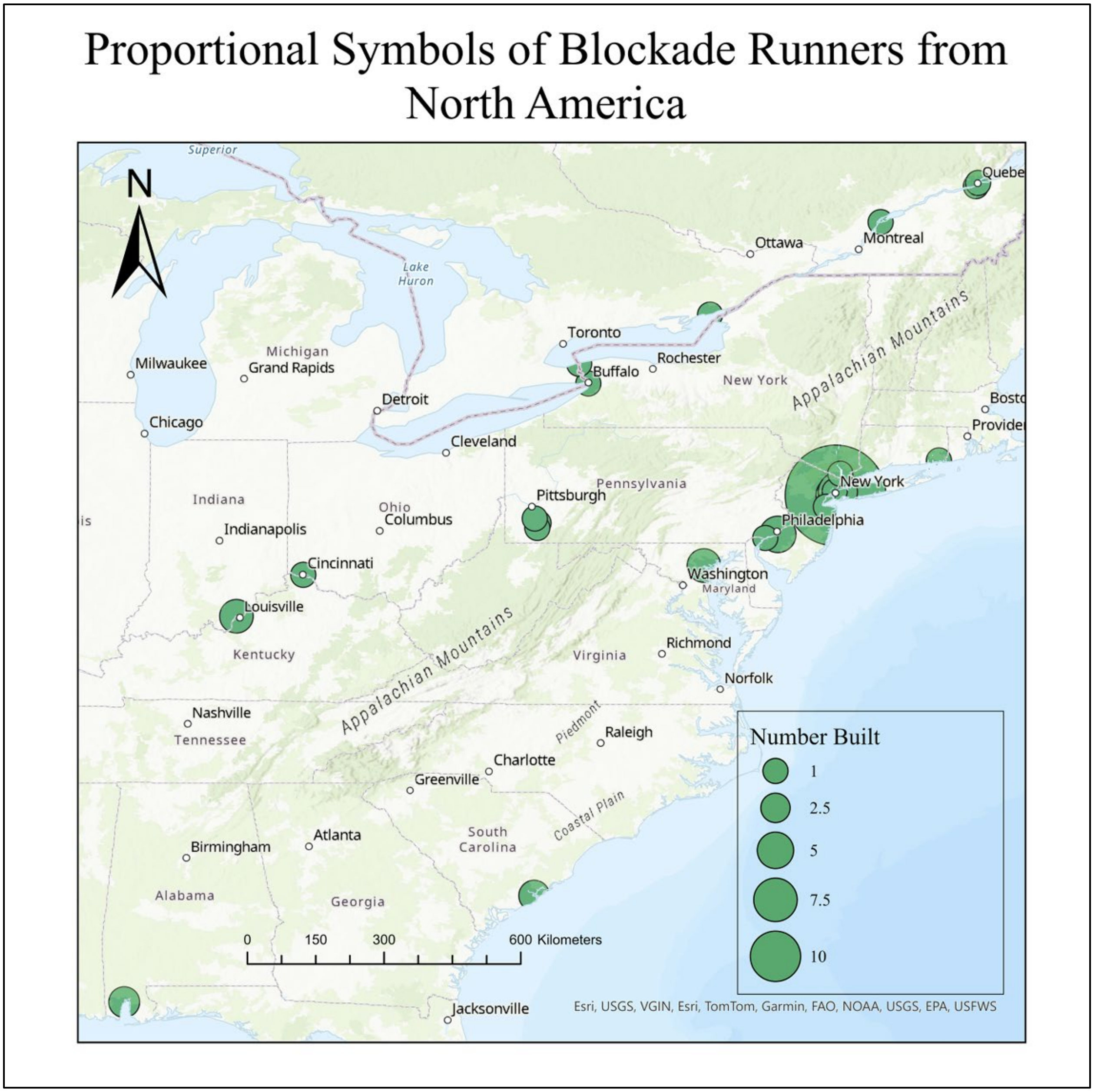


Figure 13. Map depicting the distribution of blockade runner constructed in North America. (Image by Alexander Owens).

The build years for the whole data range from 1831 to 1865. Of those in the prewar period (defined as before 1861), 38% of all blockade runners were built before the war. Of the rest, 4% were built in 1861, 6% in 1862, 12% in 1863, 20% in 1864, 7% in 1865. And 13% of all blockade runners have an unknown build date (see Figure 14).

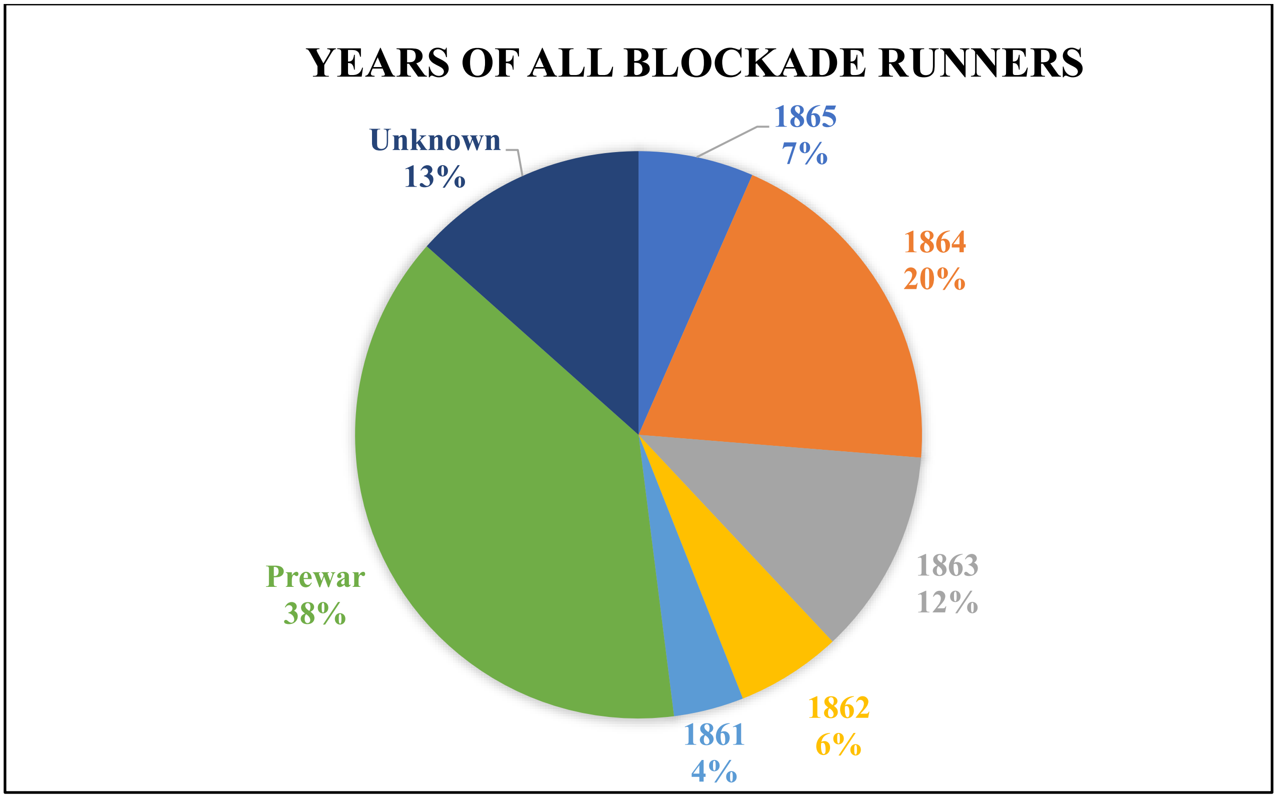


Figure 14. Different years of blockade runners (*n* = 350). (Image by Alexander Owens).

Nearly half (48%) of all blockade runners were recorded as exclusively operating in the Atlantic blockade region. There is an equal representation of those with no data and those serving only the Gulf region, both being 23% of the total dataset. Of the remaining propulsion, 5% were recorded as serving both the Atlantic and Gulf regions, and 1% only performing trans-Atlantic voyages (Figure 15).

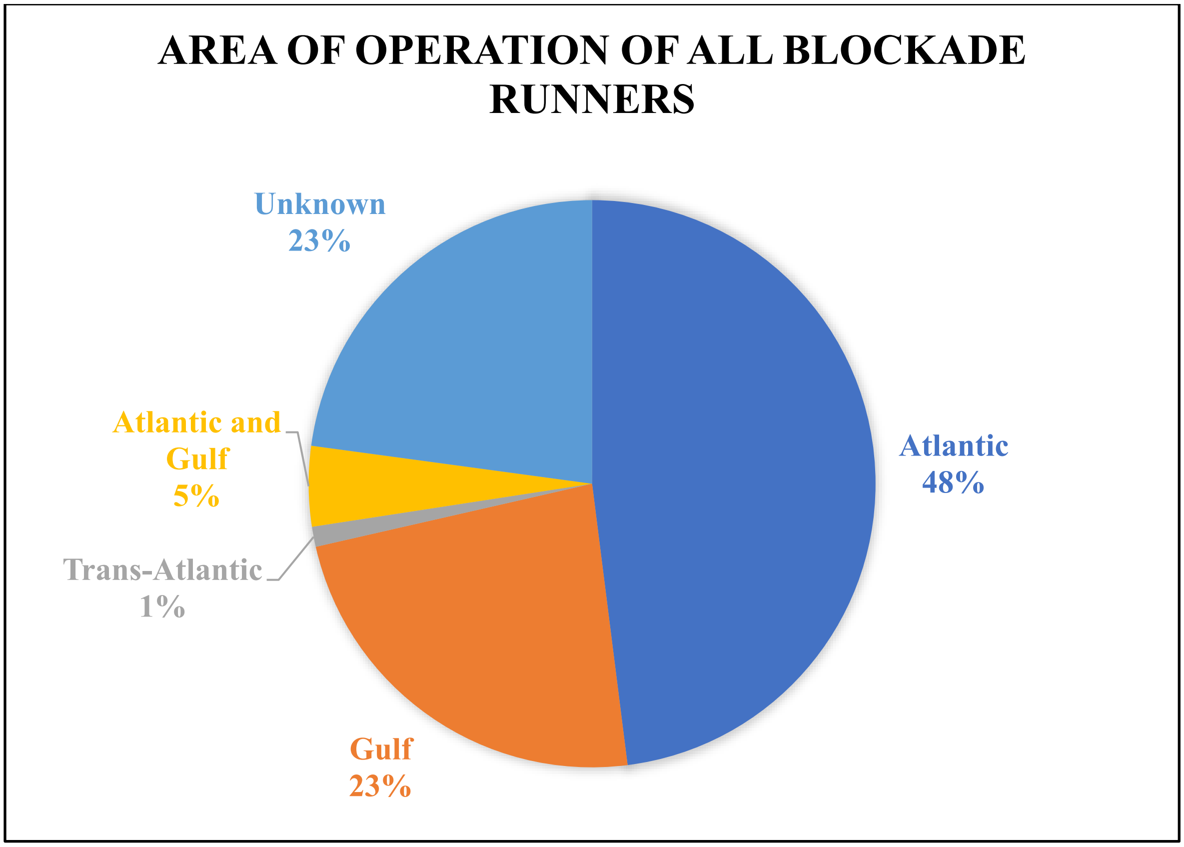


Figure 15. Pie chart depicting the different areas in which the blockade runners operated (*n* = 350). (Image by Alexander Owens).

Among all the blockade runners in the dataset, their hull depths range from 4.75 ft to 25 ft. The lengths of all blockade runners range from 70 ft to 295 ft, and the breadth ranges from 15.5 ft to 40 ft. Just as the lengths and breadths vary, so do the length-to-breadth ratios, ranging from 4:1 to 14:1. Of the blockade runner hull shapes that were modeled (seen in Figure 16), the Enlarged blockade runner *Hope* (1864) was by far the largest. *Hope* (1864) along with Extreme *Will O' Wisp* (1863) and Mature *Fergus* (1864) also have rounded hulls of similar shape. Interestingly, *Will O' Wisp* (1863) and *Fergus* (1864) have very similar dimensions with an overall length of 210 feet and a breadth of 23 feet, and neither vessel employed a bowsprit. *Florida* (1859) instead is the most different of all the blockade runners modeled, as it is shorter in length overall, at 180 feet, and has a larger breadth at 31 feet (see Figure 17).

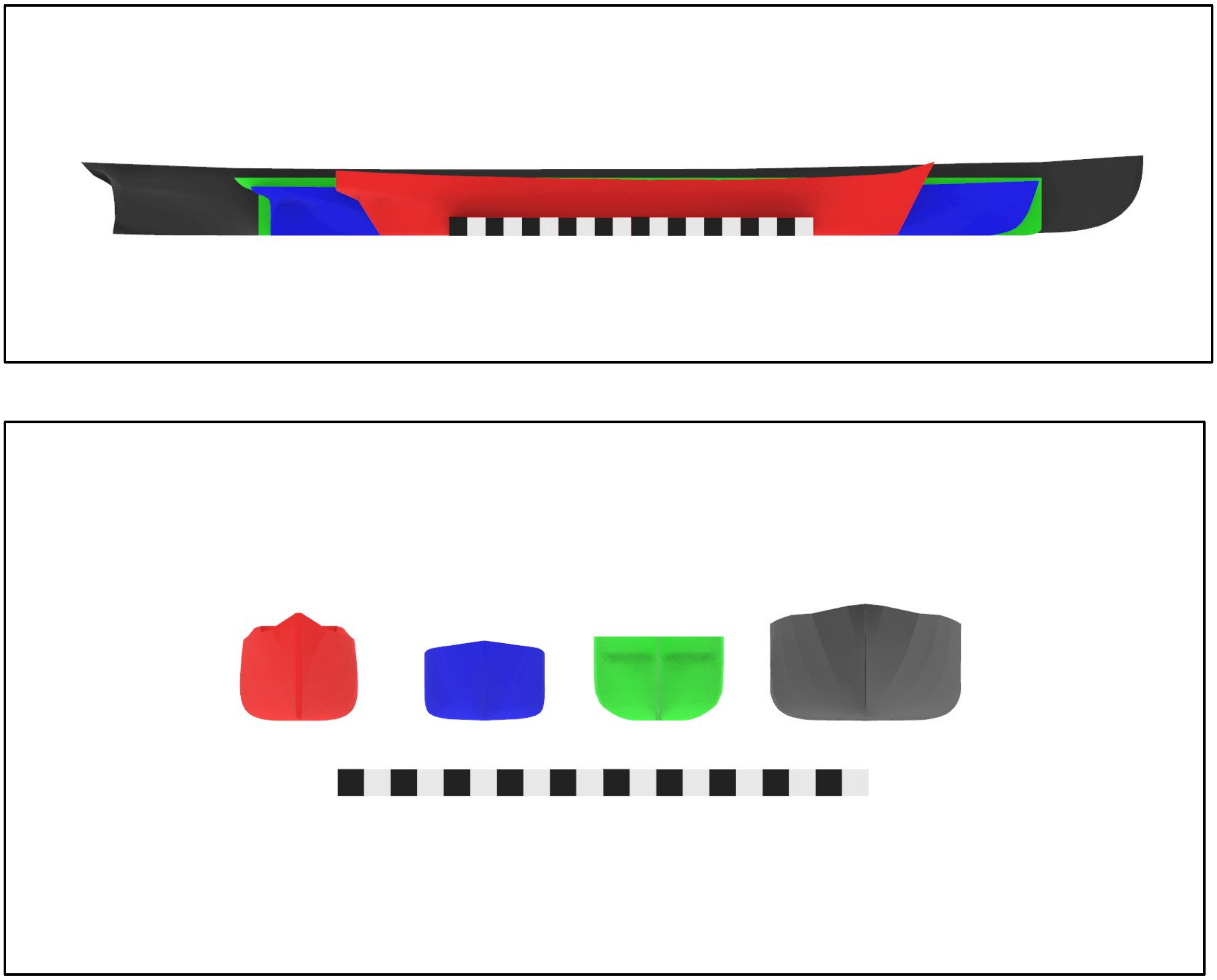


Figure 16. (Top image, From Front to Back) *Florida* (1859), *Will O' Wisp* (1863), *Fergus* (1864), *Hope* (1864). The hull shape of all four types of blockade runners. Note the difference in hull shape *Florida* (1859) has over all the others and the immense size of *Hope* (1864). Scale represents 100 feet. (Image by Alexander Owens).

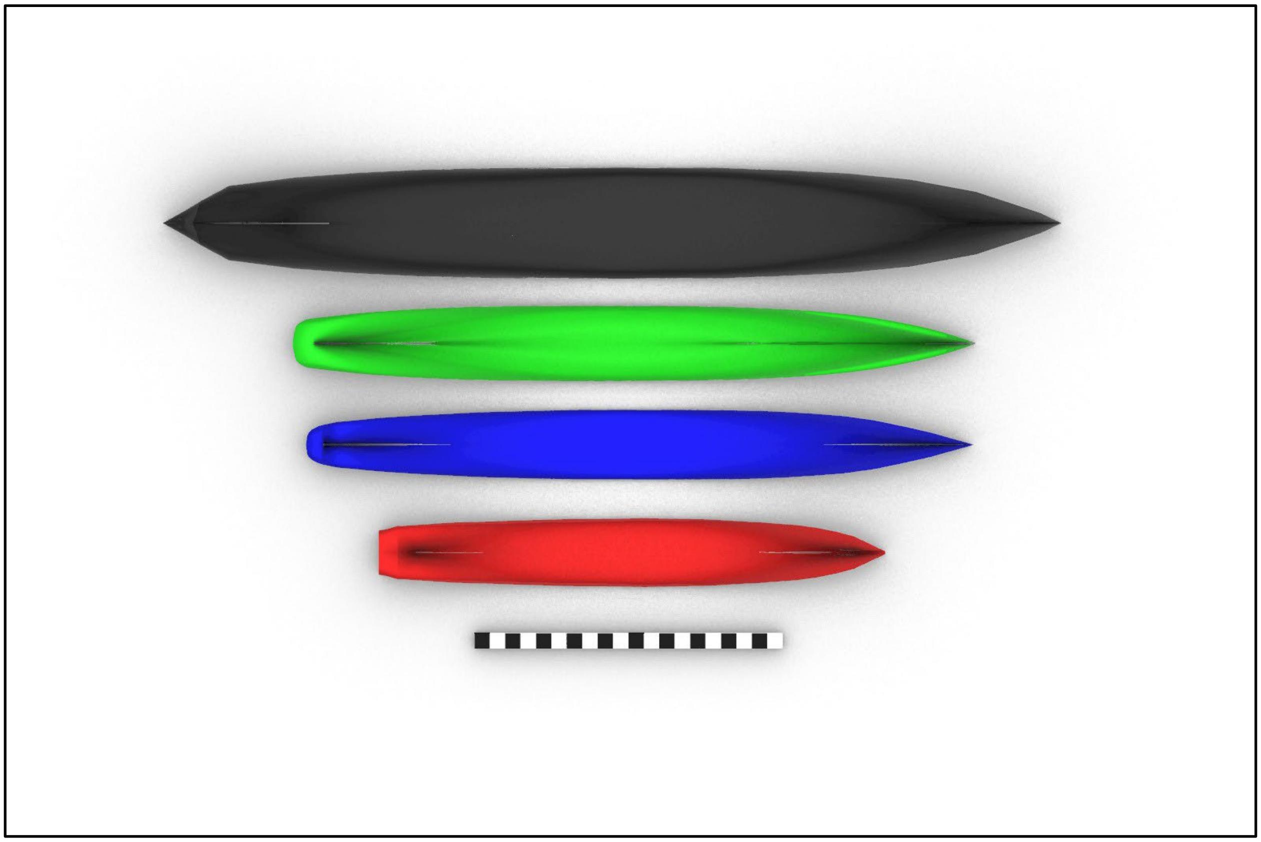


Figure 17 Top view of all four types. Note the difference in sizes of *Hope* (1864; topmost) and *Florida* (1859; bottommost) and the similarity of *Fergus* (1863; top-middle) and *Will O' Wisp* (1864; bottom-middle). (Image by Alexander Owens).

The largest percentage of blockade runners in the dataset had iron construction, 54%. The second largest proportion of the dataset is those with unknown construction, making 19% of their construction material unknown. The third most significant proportion of blockade runners, representing 15% of the dataset, was for those with wooden construction. Steel and composite construction were the least represented in the dataset, 9% and 3%, respectively (see Figure 18).

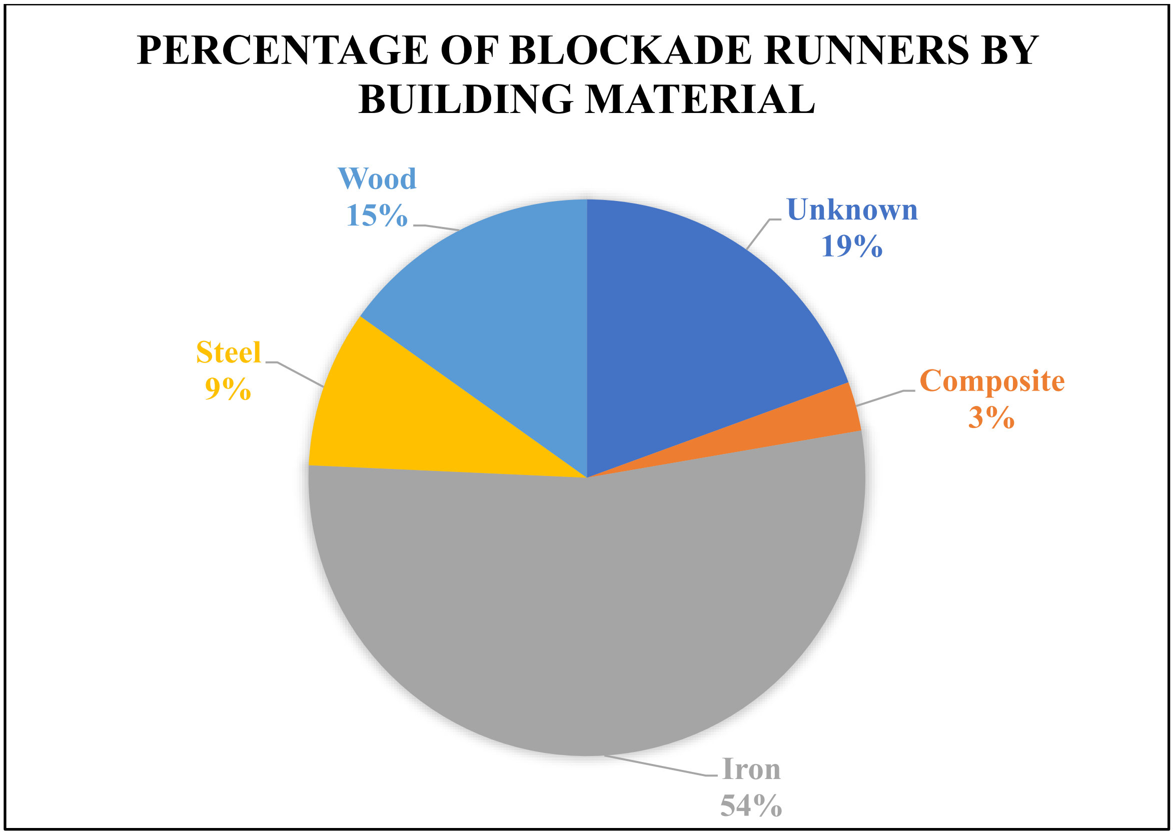


Figure 18 Pie chart depicting the different construction types by the material of blockade runners (n = 350). (Image by Alexander Owens)

The largest proportion of blockade runners by propulsion type is overwhelmingly those with sidewheels, 68% of the dataset. Of those that had some form of screw propulsion, 24% are represented in the dataset. 18% of the whole dataset is single screw, whereas twin screw propulsion was 6% of the dataset. And 8% of vessels in the dataset had no known propulsion type (Figure 19).

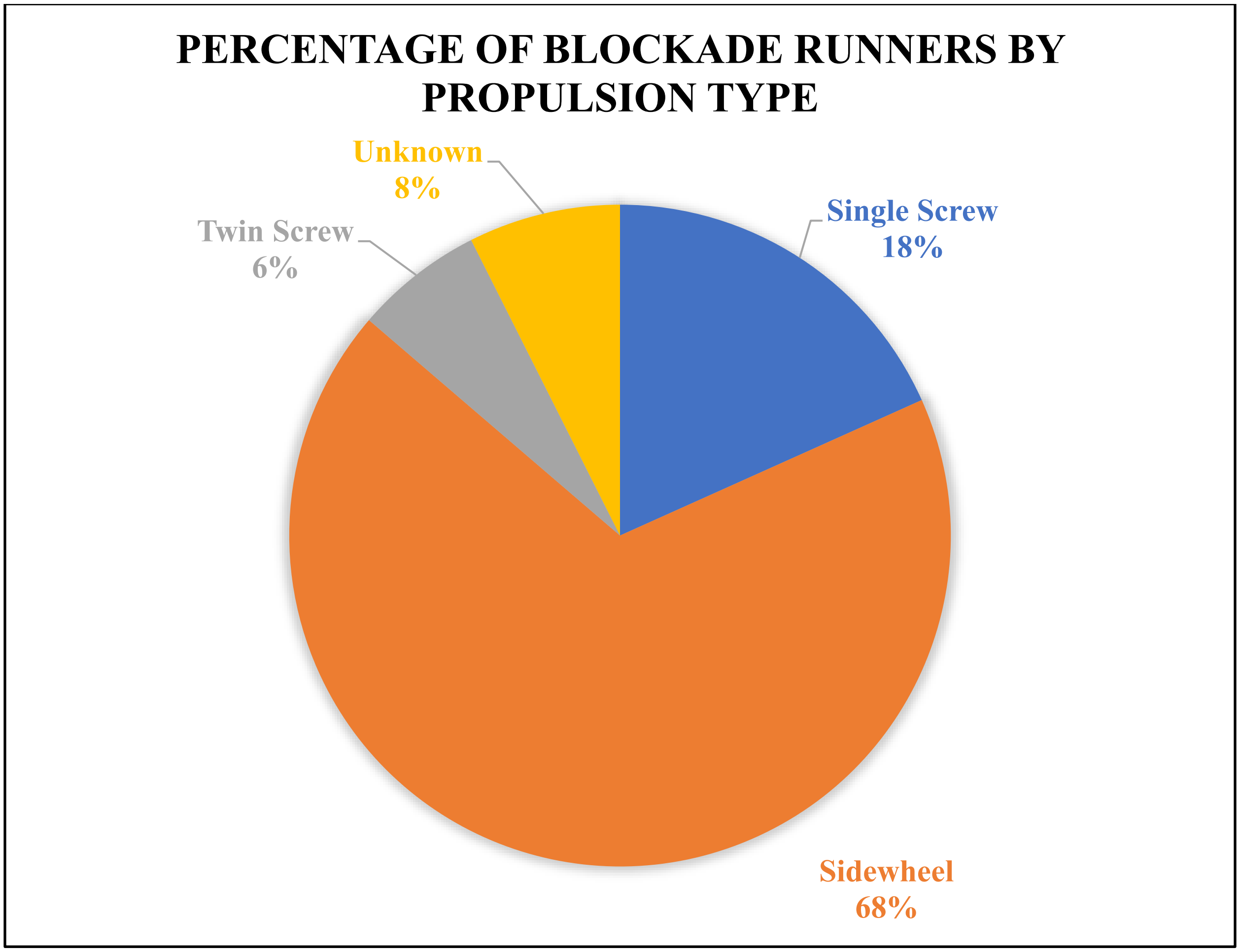


Figure 19. Blockade runners divided by propulsion type (n = 350). (Image made by Alexander Owens)

When divided by the types, the largest section of the whole dataset was classified as Extreme, making up 159 vessels. The second largest by classification were those that were "Converted," at 152 vessels. After those defined as Converted, the next number of vessels identified was the Mature, numbering 118, followed by those classified as Enlarged, numbering only 39. These numbers suggest a significant overlap because only 350 vessels are represented. The following sections examine the data among the previously mentioned variables.

Converted Types

The Converted type is defined by not being built initially for blockade running. This definition is based on prior data describing these vessels as converted during the war or those built before the war, and was created to simplify blockade runners, which were not purpose-built. This single definition allows several classifications to be used. This includes New York-built blockaders captured during the war by the Confederates, Mississippi River steamers, Clyde River steamers, and Confederate commerce raiders that were used to run goods into the Confederacy. Other vessels, like *Florida* (1859), for example, were built before the war and served the southern United States until being pressed into service. *Florida* (1859), like many New York vessels built at the time, was single screw propelled and featured a bowsprit, and was wooden hulled (see Figure 20). Paddlewheel steamers were also present, especially British blockade runners. Vessels, like *Advance* (1862), also have a bowsprit but were built of iron (see Figure 21). Some vessels, but not all, were built during the war. They were originally intended to be passenger steamers until they were acquired by Anglo-Confederate companies.

The Converted type vessels are split between those built in North America (54%) and those built in Britain (43%). The greater New York area built the most of this type (30%), followed by the River Clyde at 27%. The "Other (North American)" category represents 20% of the total dataset, which includes vessels made in places like Indiana and Pennsylvania and those built in Canada. In order of the rest of the dataset is Northeastern England (7%), British Other (5%), American South (4%), River Thames (3%), Unknown (3%), and River Mersey (1%) (see

Figure 22).

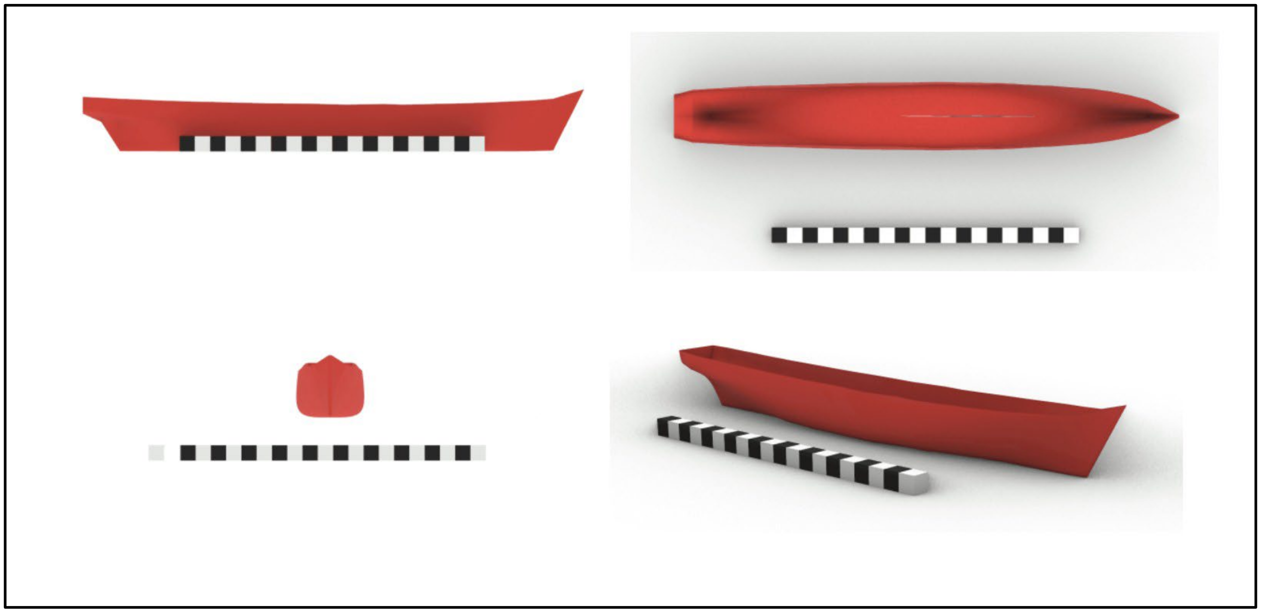


Figure 20 Profile of *Florida* (1859), an example of a New York-built, Converted blockade runner, constructed using the Smithsonian plans. (Image by Alexander Owens).

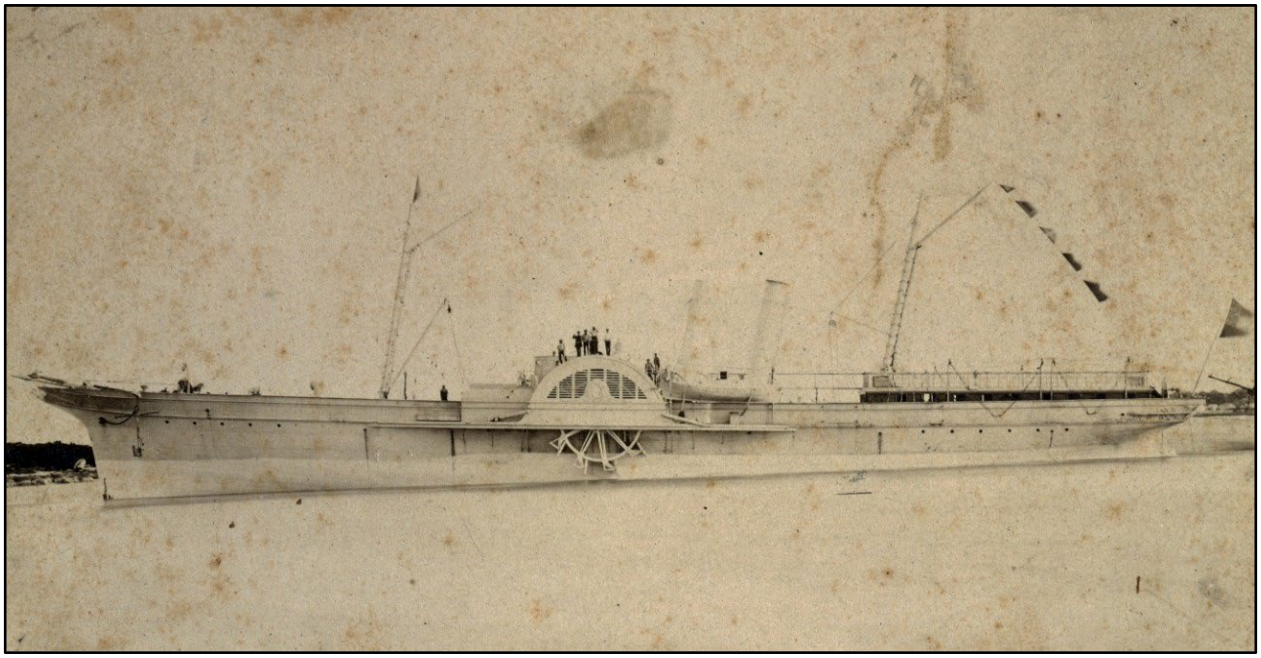


Figure 21 Historic photograph depicting the Clyde-built Converted blockade runner, *Advance* (1862). (Image Courtesy of Naval History and Heritage Command).

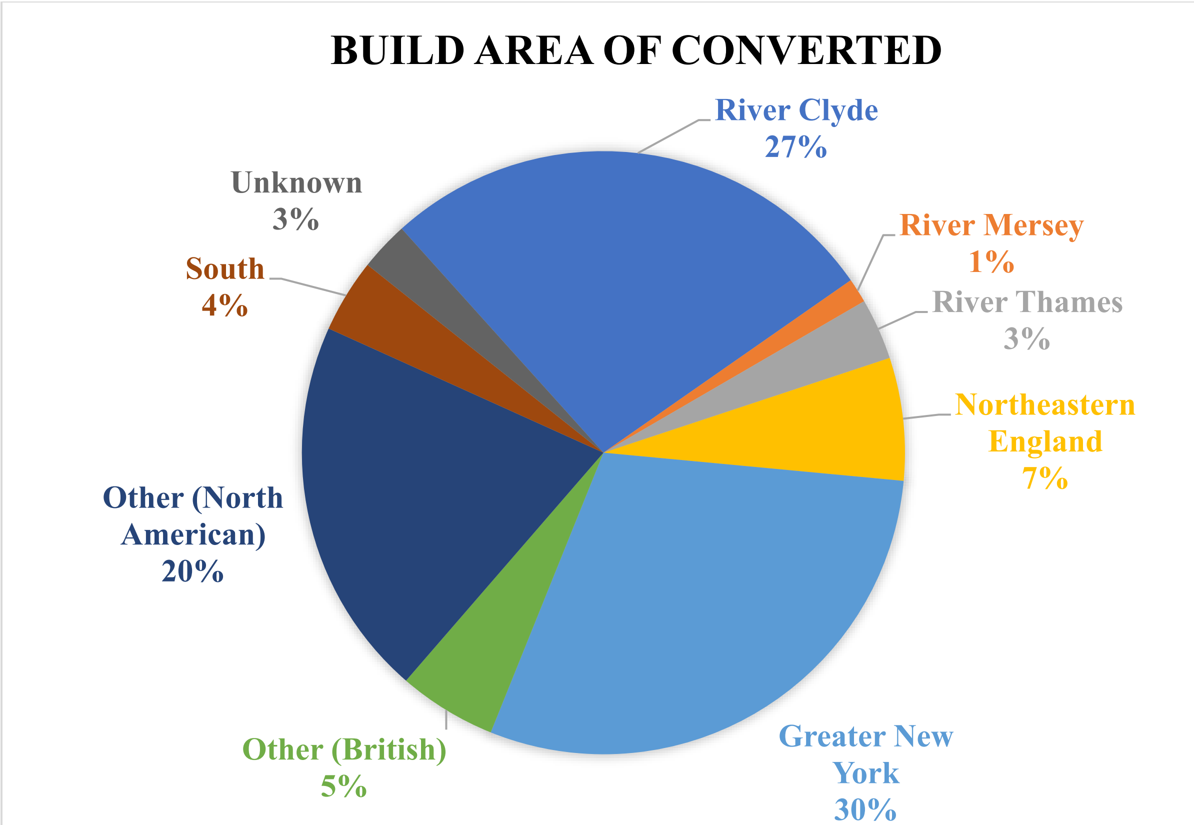


Figure 22. The different build areas of Converted blockade runners (*n* = 152). (Image by Alexander Owens).

The builders of the Converted classification are largely unknown, with those with no data on their builder at 34%. The largest percentage for a known builder of Converted vessels in this dataset is Clyde builder, Tod and Macgregor, at 7%. After this are Harlan and Hollingsworth of Wilmington, Delaware (5%), and Scottish builder Denny and Company (5%). The New York builders William H. Webb, Jeremiah Simonson, Sneden (Family) Company, and Thomas Collyer are the next largest proportion, each builder being 3% of the Converted dataset. The remaining 47% is shared with 40 different companies.

The build years for the Converted type data range from 1831 to 1864. An overwhelming 89% of all Converted types were built before the war. During the war years, 4% were built in

1861, 2% in 1862, 2% in 1863, 2% in 1864, and 0% in 1865. And 3% of Converted type blockade runners have an unknown build date (see Figure 23).

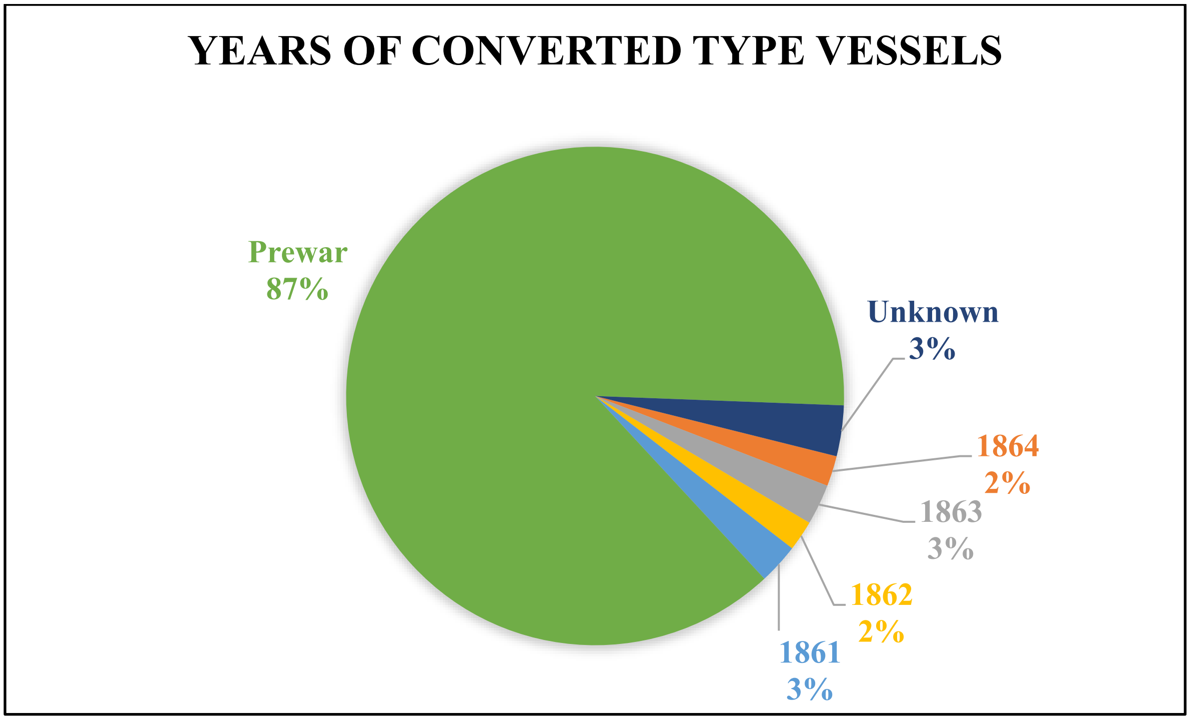


Figure 23. Different build years of Converted blockade runners (n = 152). (Image by Alexander Owens).

The area of operation of Converted-type vessels has no category, with an overwhelming majority. Nearly half (47%) of those vessels that were converted for the purpose of blockade running served exclusively in the Atlantic region. The second largest blockade area was the Gulf region, representing 32% of the Converted vessels. Only 1% of the Converted vessels acted as trans-Atlantic vessels, and 4% served both the Atlantic and Gulf blockades (see Figure 24).

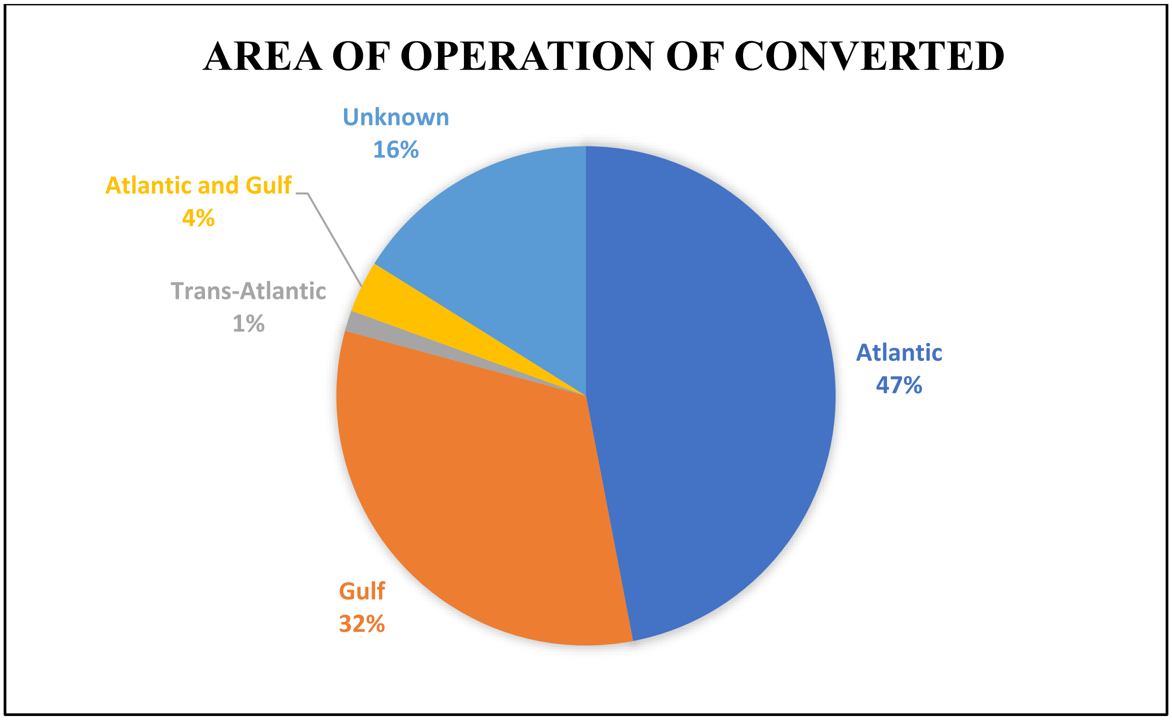


Figure 24. Different areas where Converted blockade runners operated (*n* = 152). (Image by Alexander Owens).

The depths, which were primarily collected by Wise (1988), range greatly between 4.75 feet and 24 feet. The lengths and breadths of known Converted vessels also range widely, with lengths between 92 and 268 feet and breadths from 15.9 to 40 feet. The length to beam ratios also have a wide range, between 4:1 and 11:1.

Converted type blockade runners in the dataset were overwhelmingly sidewheel steamers, at 76% of Converted blockade runners. Single screw steamers were 17% of the Converted type, with no twin screw steamers recorded in the spreadsheet. And 7% of the recorded Converted blockade runners had no data on their propulsion (see Figure 25).

The Converted type vessels were divided into 37% wooden and 42% iron construction. Only 3% were made of composite construction, and 18% of those found to be Converted had no data on the details of the material used in their construction (see Figure 26).

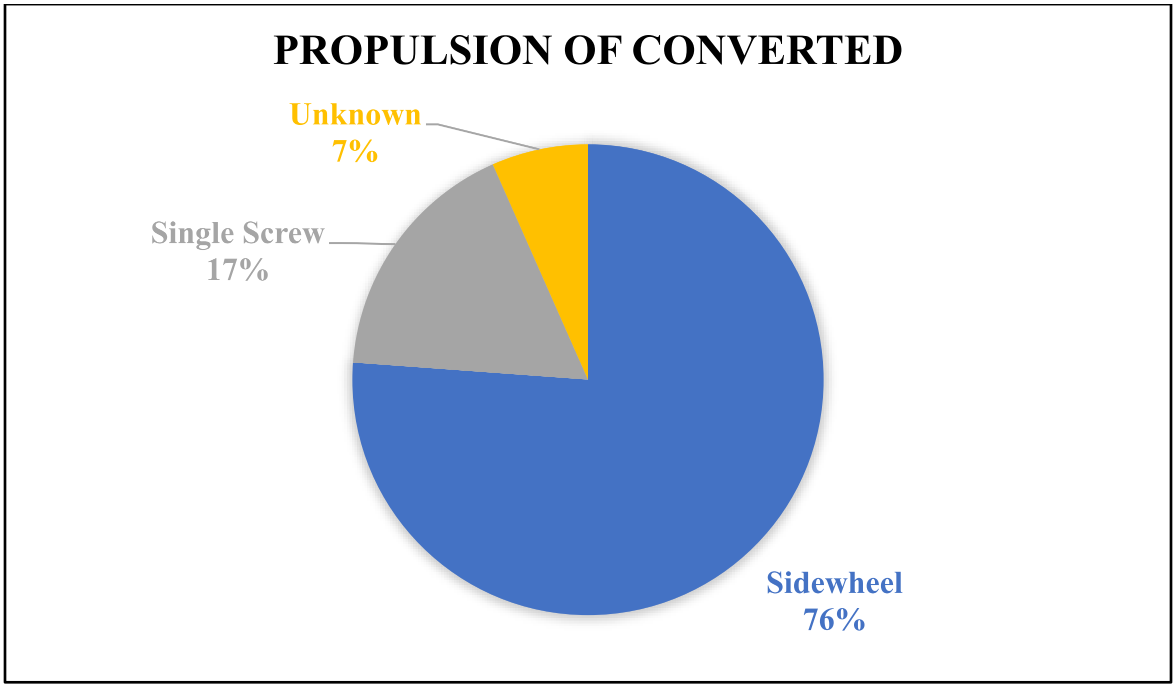


Figure 25. Different propulsion types of Converted blockade runners (n = 152). (Image by Alexander Owens).

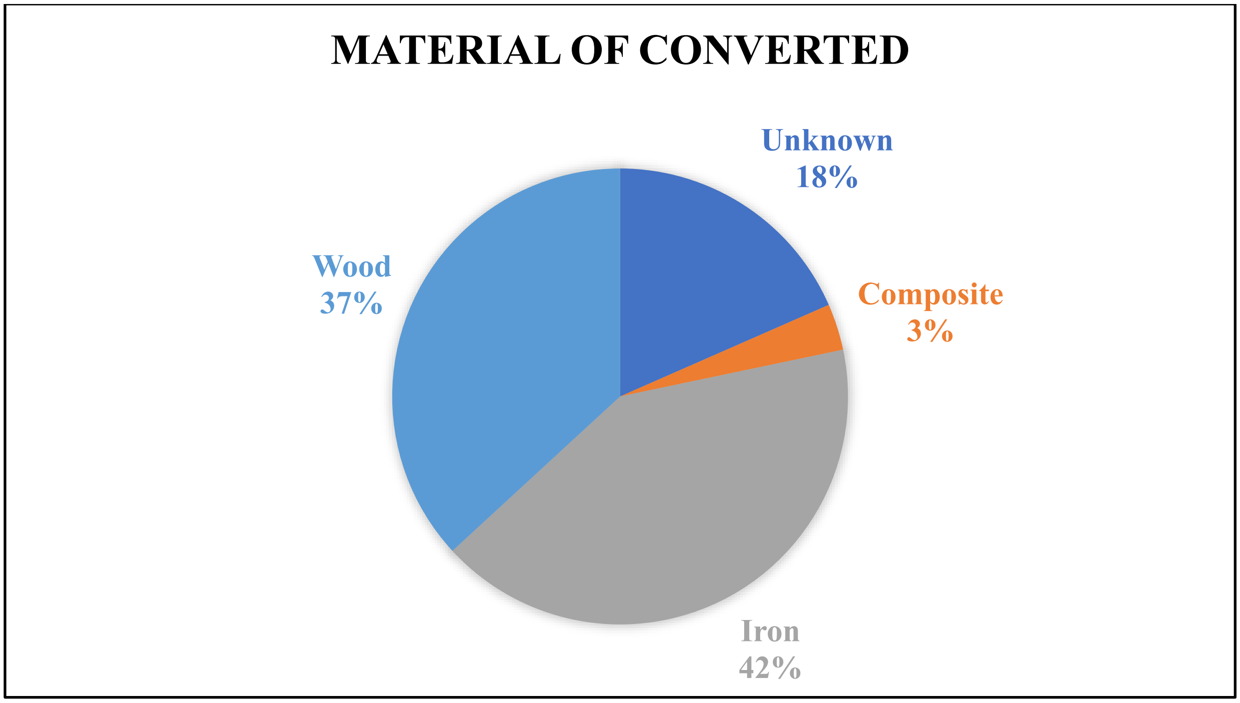


Figure 26. Different construction types of Converted blockade runners (*n* = 152). (Image by Alexander Owens).

The smallest Converted blockade runner recorded is *Mariner* (unknown build date). *Mariner* had an overall length of 92 feet and a smaller-than-average breadth of 20 feet. The vessel's construction details are unknown, but it was notably recorded as a privateer and one of five Converted vessels built in Philadelphia, PA (Wise 1988:311).

Extreme Type

Extreme blockade runners are identified as vessels with over 8:1 in length to breadth ratio. Their drafts are very shallow, with some described as being less than 8 feet; however, with the dataset collecting depths, it is hard to verify this. These blockade runners, as shown by *Fergus* (1863) in Figure 27, can have a spoon-shaped bow and are typically sidewheel steamers.

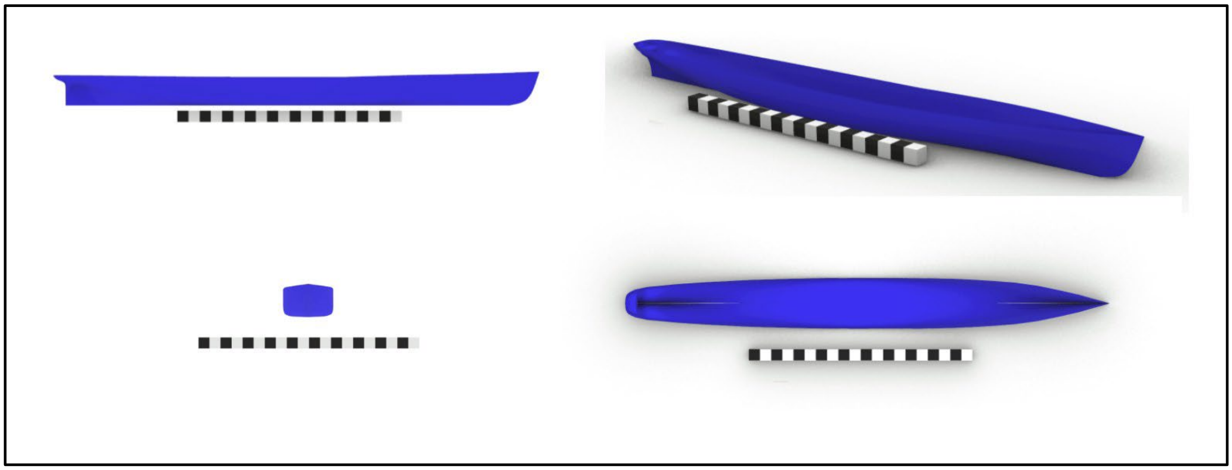


Figure 27. Profile view of *Fergus* (1863), an example of an Extreme blockade runner. (Image by Alexander Owens).

The largest proportion of Extreme blockade runners was built along the River Clyde, at (57%), and the second largest percentage were built on the River Mersey (23%). British locations are well represented, such as the River Thames at 7%, Northeastern England at 4%, and other British areas 3%. The smallest proportion among Extreme blockade runners is those built near New York, at 2%. Extreme vessels with no data on their build locations are at 4% (see Figure 28).

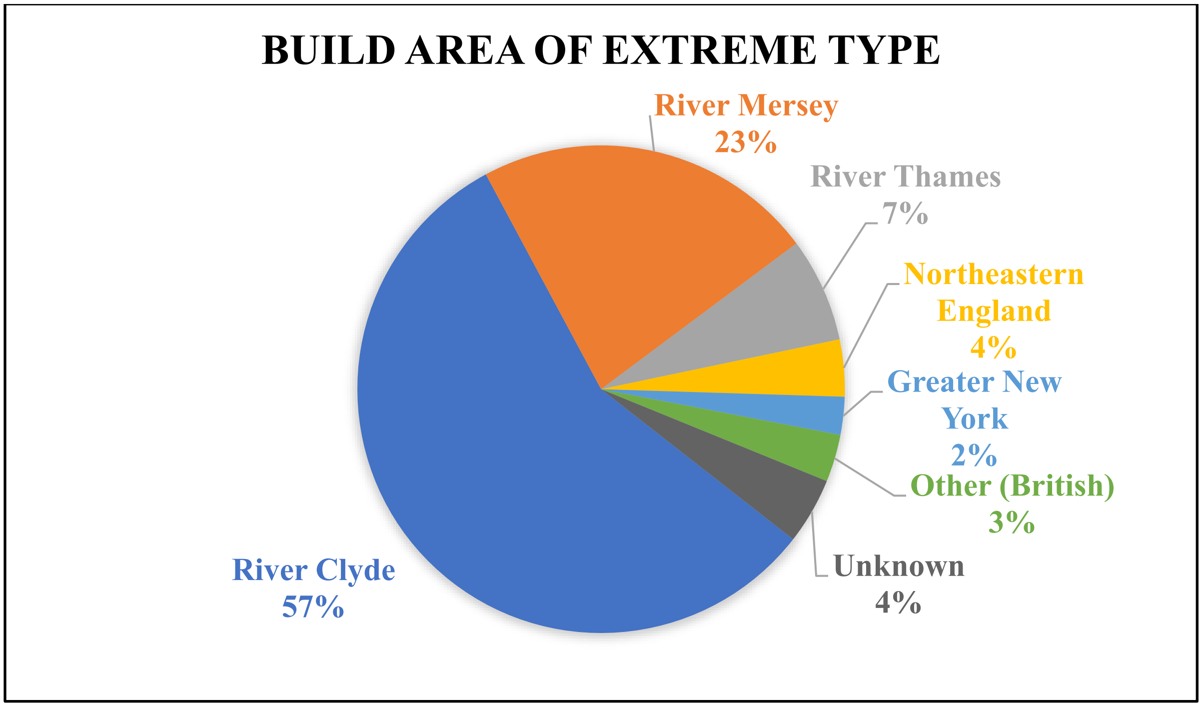


Figure 28. The different build areas of Extreme blockade runners (*n* = 159). (Image by Alexander Owens).

The most prominent builder represented in the Extreme type is Mersey builder Jones, Quiggin, and Company, at 12%. This is followed by Clyde builder Denny, at 8%, and then Caird and J. & G. Thomson, each at 6%. All other builders represent less than 5% of the dataset individually, with 13% of the dataset have an undesignated builder.

The build years for the Extreme type data range from 1838 to 1865. Of those, 27% of all blockade runners were built before the war. For 1861 to 1865, 1% of those were built in 1861, 4% in 1862, 13% in 1863, 38% in 1864, and 11% in 1865. And 6% of Extreme type blockade runners have an unlisted build date (see Figure 29).

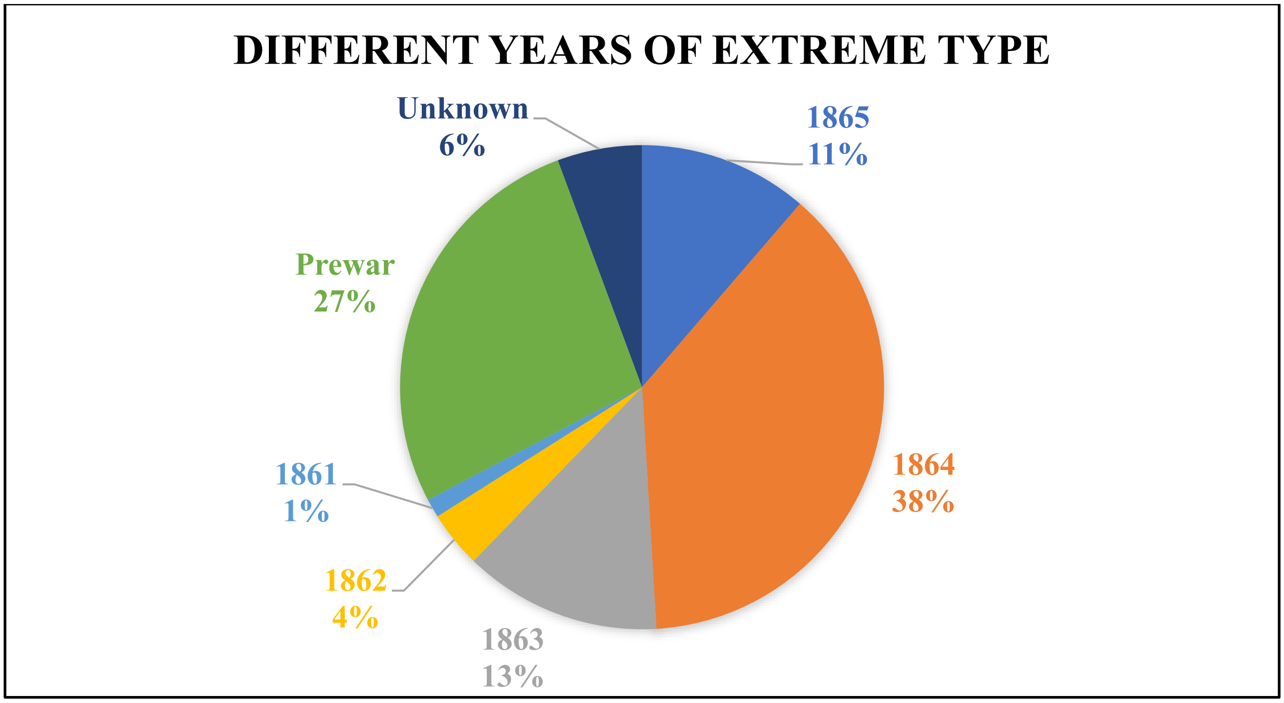


Figure 29. The build years of Extreme blockade runners (*n* = 159). (Image by Alexander Owens).

Among those of the Extreme type, 55% of blockade runners were solely serving in the Atlantic region. 8% of Extreme types are served only in the Gulf region, with 1% serving only in the Trans-Atlantic region. 6% fulfilled duties in both the Atlantic and Gulf regions, but 30% of the Extreme types have no data on their area of operation (see Figure 30).

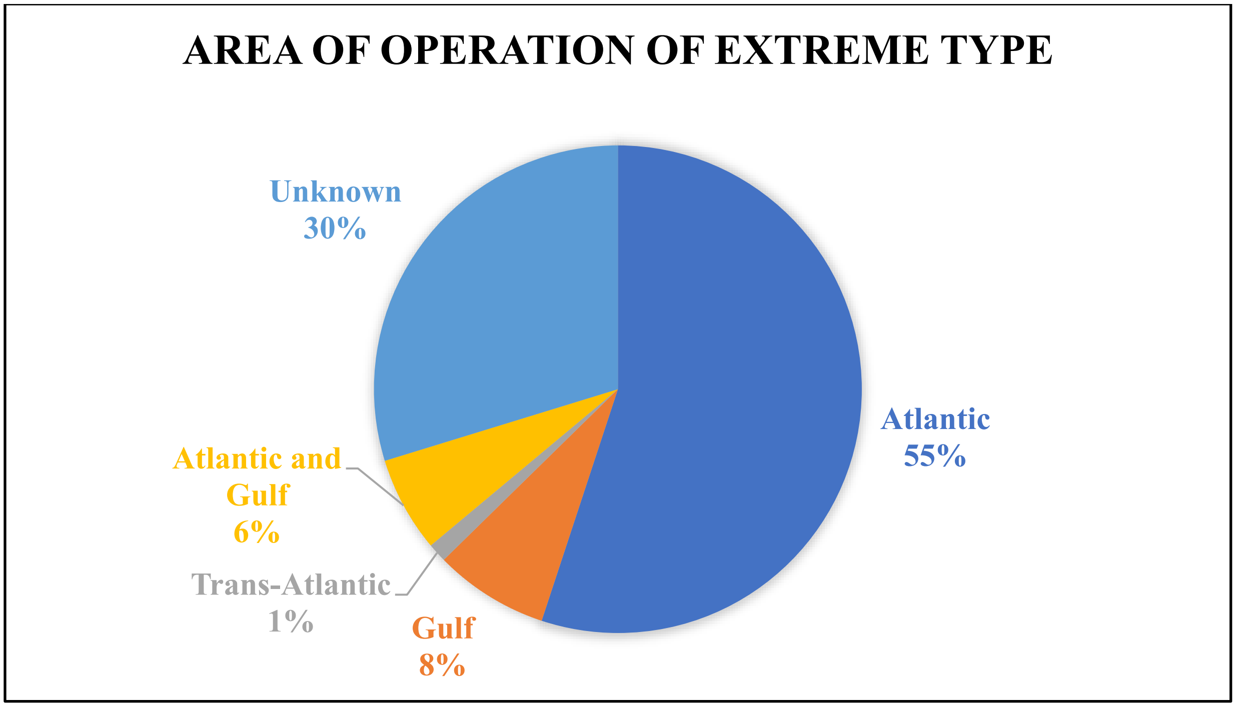


Figure 30. Extreme blockade runners' locations (n = 159). (Image by Alexander Owens).

The depths of the Extreme types range from 7 feet to 23.5 feet. The length-to-beam ratios of the Extreme type range from 7.75 to 11.25. The Extreme type's lengths vary widely, between 138 feet and 281 feet in length, and their breadths also range between 16 and 36 feet wide.

The Extreme type's hulls were predominantly ferrous, with 67% built from solely iron, 21% steel construction, and 3% from composite iron and wood construction. Only 2% of all Extreme types were recorded as being constructed from wood, and 7% had no data on their building materials (see Figure 31).

The propulsion system for the Extreme blockade runners was mostly sidewheel steam engine, with 82% of this type in this category. Only 14% of recorded Extreme types had screw propulsion, with 9% of Extreme types being propelled with single screws and 5% of those being twin screws (Figure 32).

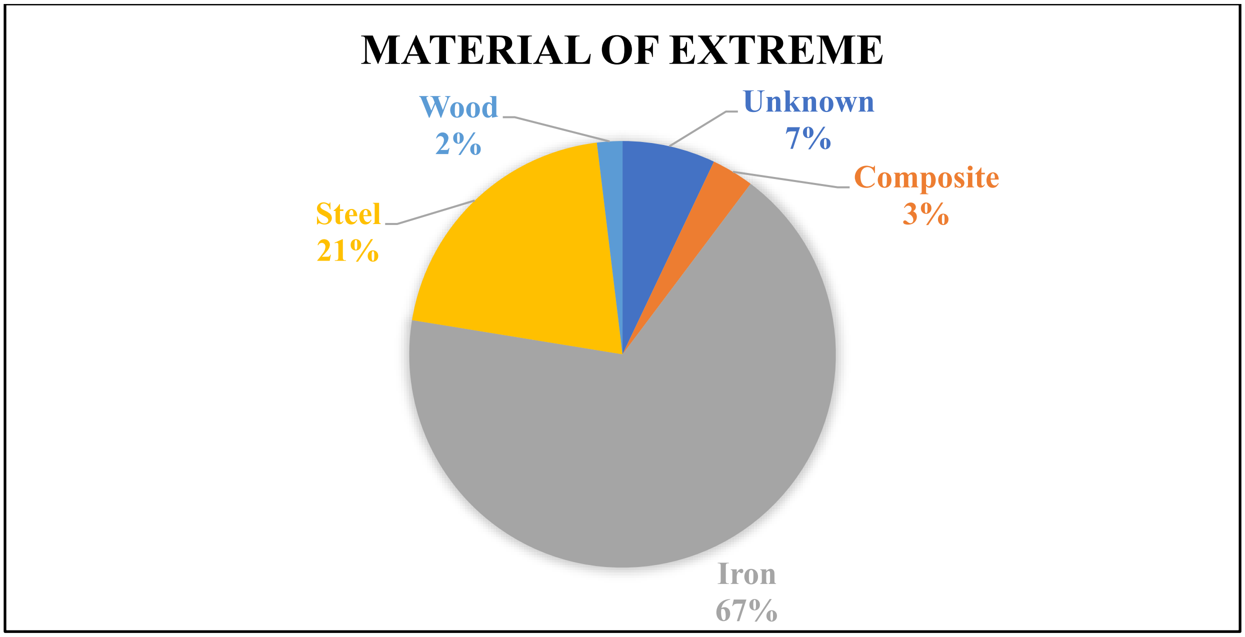


Figure 31. The different construction types of Extreme blockade runners (n = 159). (Image by Alexander Owens).

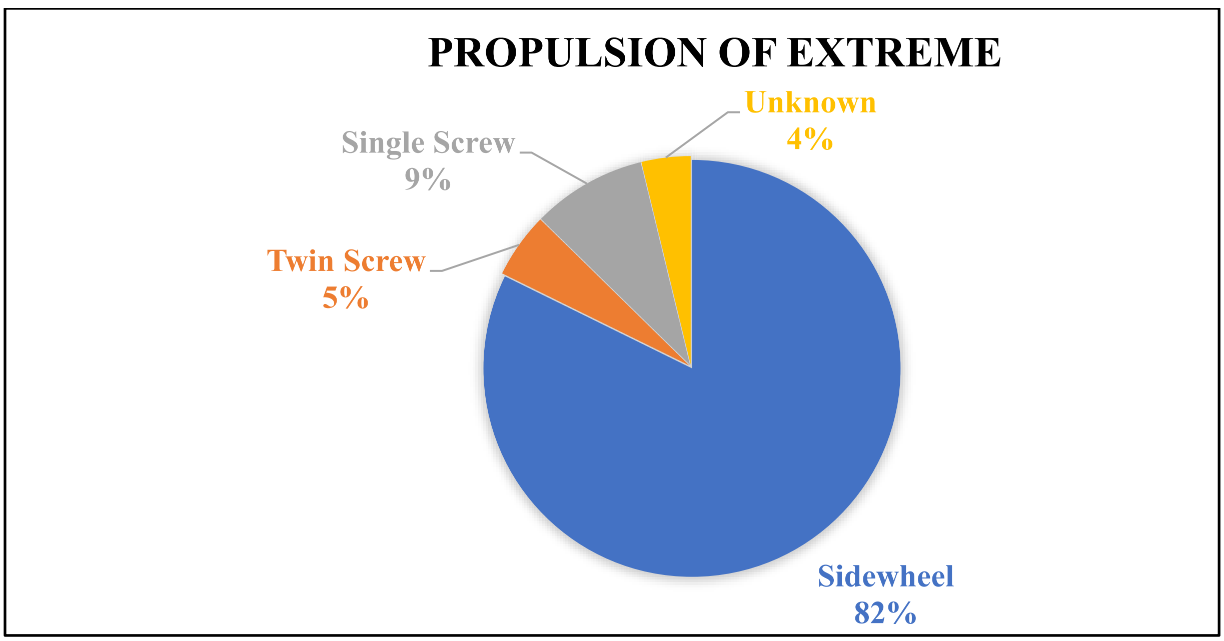


Figure 32. The different propulsion types of Extreme blockade runners (n = 159). (Image by Alexander Owens).

There were some notable outliers of the Extreme type. For instance, *Prince Albert* (1849) was significant in its size and age. This blockade runner maintained a length-to-breadth ratio of over 8:1, but its length overall is 138.1 feet, and breadth recorded as 16.7 feet. One other outlier, *Hawk* (1864), was atypical due to its propulsion and hull. While most Extreme blockade runners being made with some ferrous material type and were sidewheel steamers, *Hawk* (1864) was instead built with wooden hull construction and with single screw propulsion. These outliers are discussed in detail in the next chapter, as their existence poses a problem for the original classifications proposed by Watts (1997), Foster (1991), and Wise (1988).

Mature Types

Mature blockade runners fall between 210 to 240 feet in length overall. They typically had a length-to-breadth ratio of 9:1. One example, *Will O' Wisp* (1864), appears to have a plumb, or a very vertical bow (see Figure 33). As seen with *Bat* (1864), in Figure 34, these vessels typically had two funnels (smokestacks), a turtleback foredeck (a covered section over the deck and bow of the ship), and two wooden schooner-rigged masts. Vessels like *Will O' Wisp* and *Bat* were also equipped with sidewheel engines.

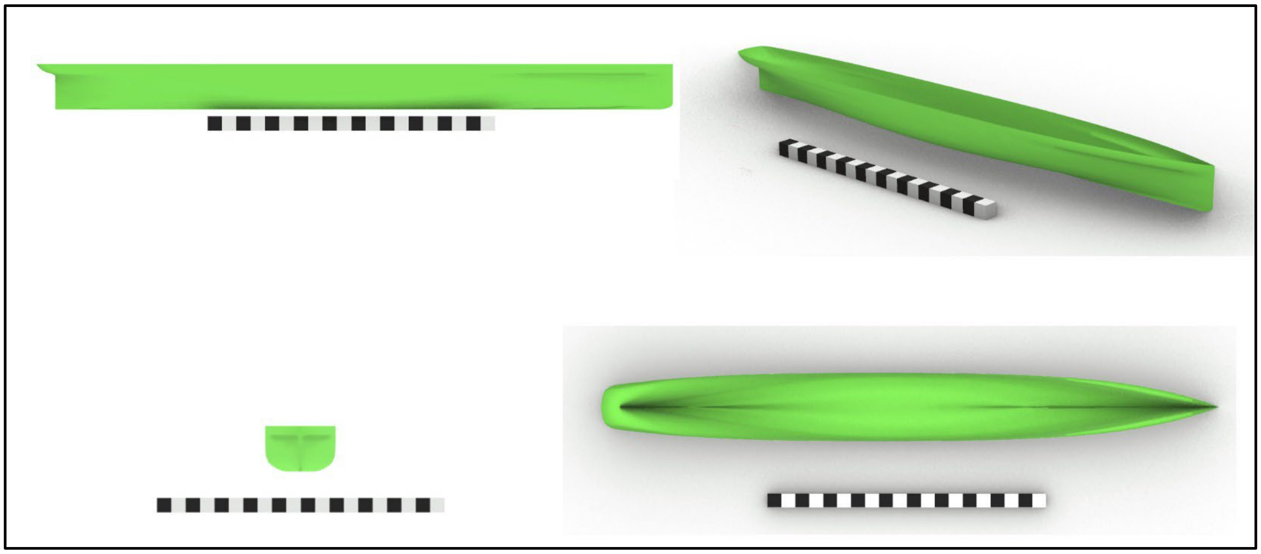


Figure 33. The profile of *Will O' Wisp* (1864) is an example of a Mature blockade runner. (Image created by Alexander Owens).

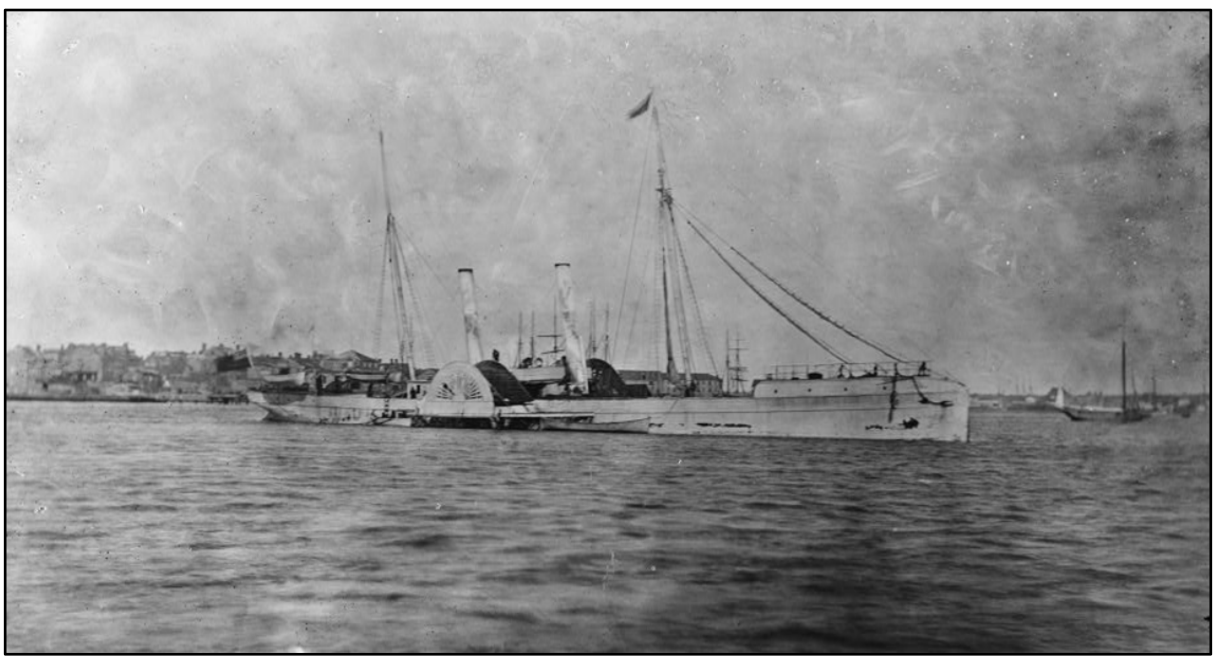


Figure 34. Glass negative image of the Mature blockade runner, *Bat* (1864). (Image courtesy of Library of Congress).

Most of the Mature type was built in Britain, totaling 74% of the Mature dataset. Mature types built in North America, in comparison, only represented 20% of this dataset. The largest individual build area among the Mature type was the River Clyde, representing 39% of the Mature dataset. The second largest were those built on the River Mersey at 20%, followed by the greater New York area at 14%. Then, from the order of proportion: River Thames (8%), Northeastern England (6%), Unknown (6%), North American Other (4%), American South (2%), British Other (1%) (Figure 35).

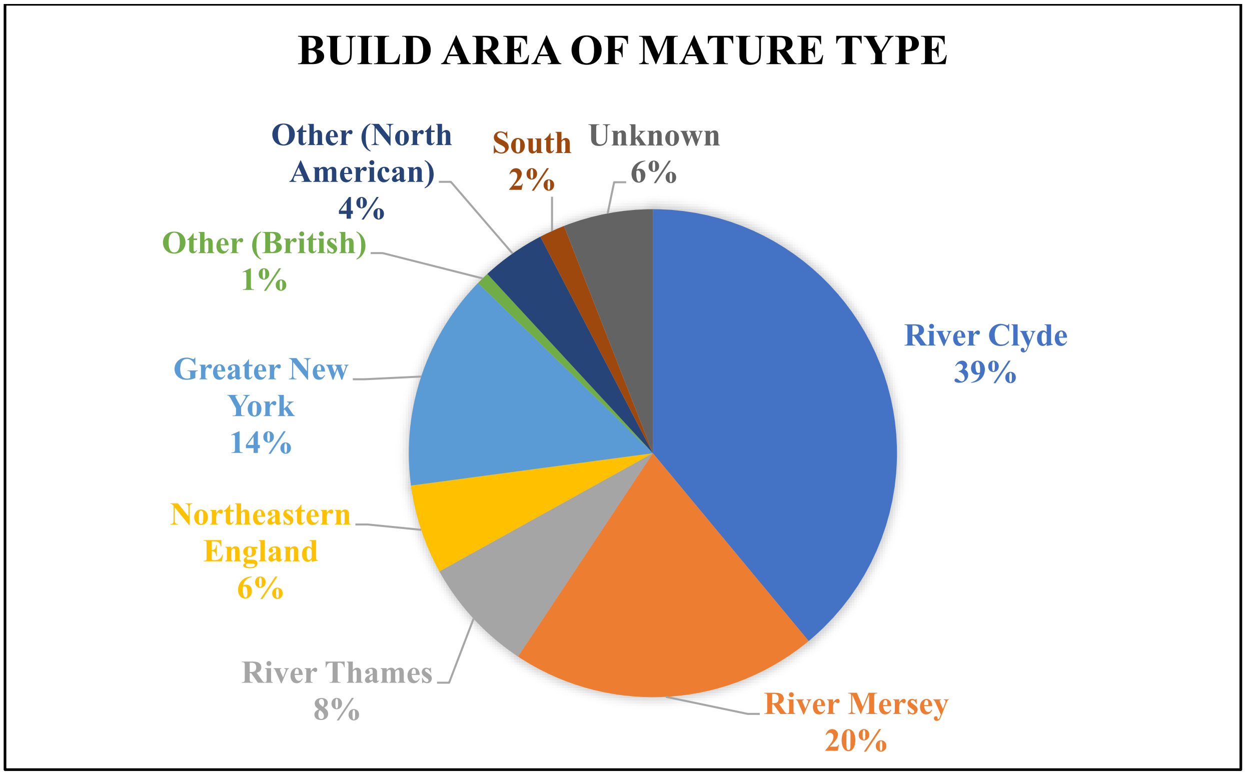


Figure 35. The build area of Mature blockade runners (*n* = 118). (Image by Alexander Owens).

Among those in the Mature dataset with known builders, Jones, Quiggin, and Company have the largest proportion, at around 10%. The second largest proportion is shared by Denny and Caird, each representing 8% respectively. After that, J. & G. Thomson comprised 5% of the Mature dataset, followed by the Dudgeon Brothers at 4%. All other builders represent less than 4% of the dataset, with 14% having an unknown builder.

The build years for the Mature type data range from 1838 to 1865. Of those, 27% of all blockade runners were built before the war. For 1861 to 1865, 3% were built in 1861, 4% in 1862, 14% in 1863, 36% in 1864, and 8% in 1865. Only 8% of Mature type blockade runners have an unknown build date (see Figure 36).

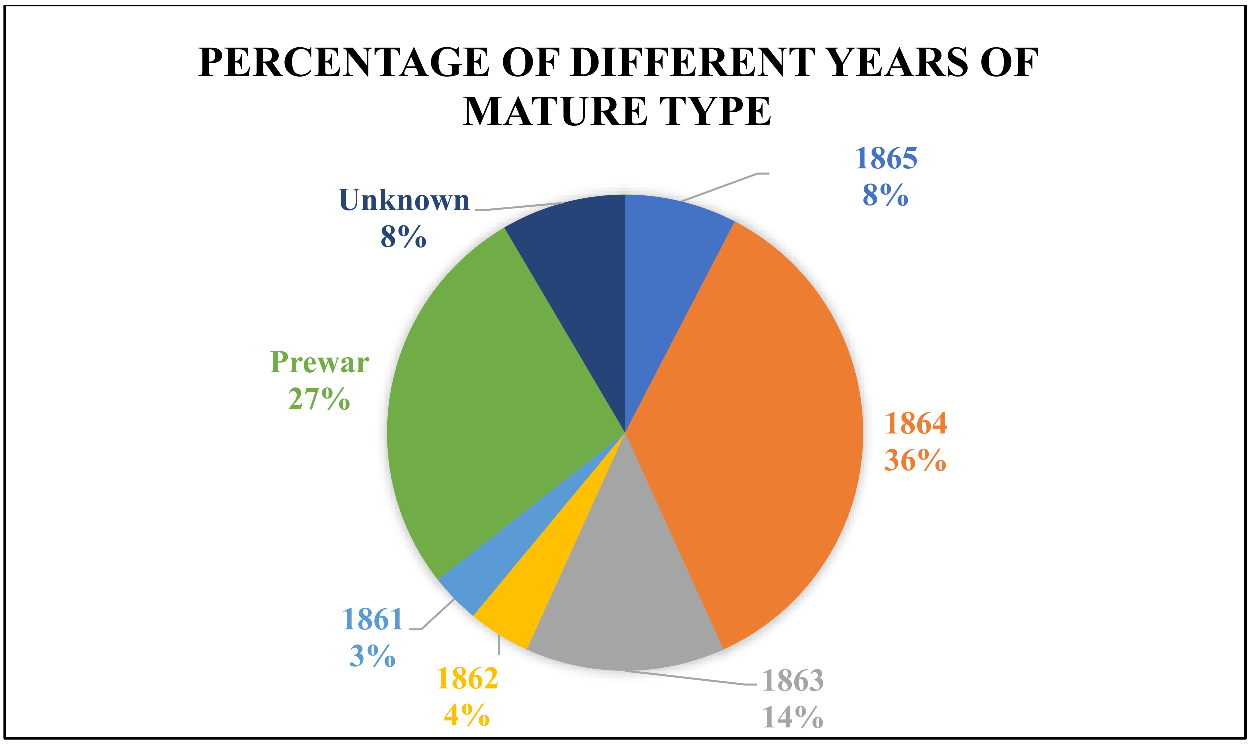


Figure 36. The different years of Mature blockade runners (n = 118). (Image by Alexander Owens).

Half of the Mature type blockade runners operated exclusively in the Atlantic region (see Figure 37). The second-largest category was those with no known area of operation, at 32%, followed by those that operated only in the Gulf, at 11%. Those that were recorded as operating in both the Atlantic and Gulf regions were 5% of the Mature dataset. The smallest section of the dataset recorded was that of the Trans-Atlantic at 2%.

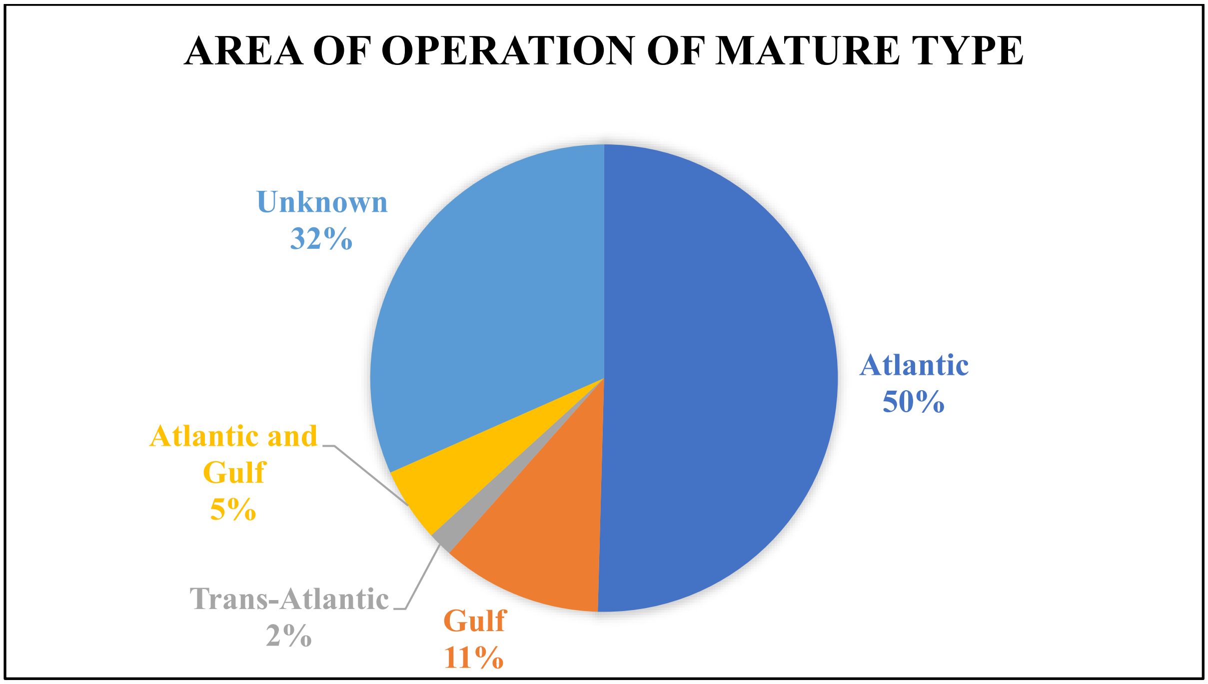


Figure 37. Areas where Mature blockade runners operated (n = 118). (Image by Alexander Owens).

Mature blockade runners' length was between 205 and about 244 feet and their he breadth ranged from 20 to 40 feet. The length-to-breadth ratios of Mature vessels range from 5.25:1 to 11:1. The depths vary widely, with Mature vessels between 6.25 feet and 24 feet.

The largest of the length-to-breadth ratios belongs to *Iona I* (1855) at 11:1. This Clyde-built blockade runner never attempted a blockade but was typical in that it was constructed of iron and had sidewheel engines. Unlike the other British steamers, it was built before 1860 and had a smaller breadth of 20.4 feet compared to its 225.2 feet length. A notable outlier to this dataset is the New York-built *Clifton* (1861). This vessel fits the parameters for a Mature blockade runner but has a larger breadth than most, at 40 feet. However, it has a lower length typical of Mature blockade runners at 210 feet, making its length-to-breadth ratio the lowest at 5.5:1.

The construction material for most Mature blockade runners is iron hull and frame, representing 66% of the Mature dataset. The second largest material of the Mature dataset is steel, at 17%. Following steel, the next largest proportion of Mature blockade runners are those made entirely of wood, at 8%. Of those with data, the smallest proportion of Mature blockade runners are those with composite construction, at 5%. Mature blockade runners with no data on their construction material are 4% of this dataset (see Figure 38).

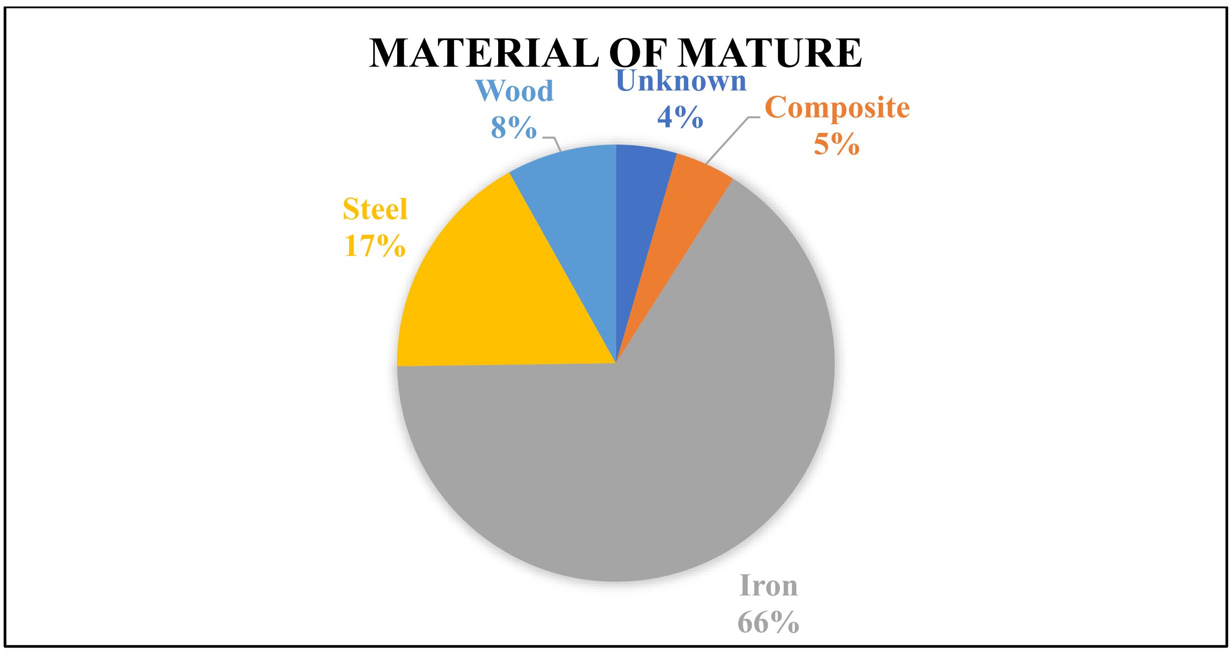


Figure 38. Different construction types of Mature blockade runners (n = 118). (Image by Alexander Owens).

The majority of the propulsion of the Mature blockade runners recorded was that of the sidewheel, at 82 % (see Figure 39). Single screw and twin screw represented 11% and 4% respectively. Three percent of the Mature type included no data on their propulsion.

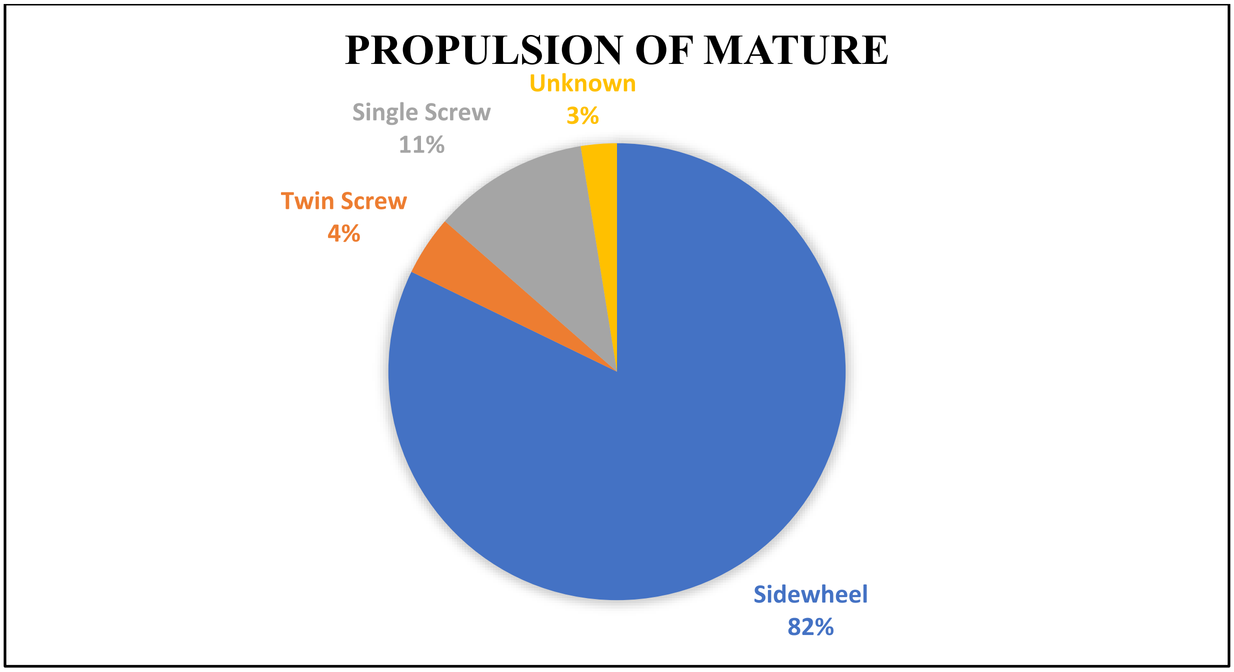


Figure 39. Different propulsion types of Mature blockade runners (n = 118). (Image by Alexander Owens).

Enlarged Types

Enlarged blockade runners were vessels identified as being between 250 and 280 feet in length overall. Most focus on the Enlarged blockade runners is on their size and late construction during the war. Vessels like *Hope* (1864; Figure 40) and *Banshee II* (1864; Figure 41) were built with two funnels, a turtleback foredeck, and two wooden schooner-rigged masts. Most mentions of enlarged blockade runners are those with sidewheel steam engines.

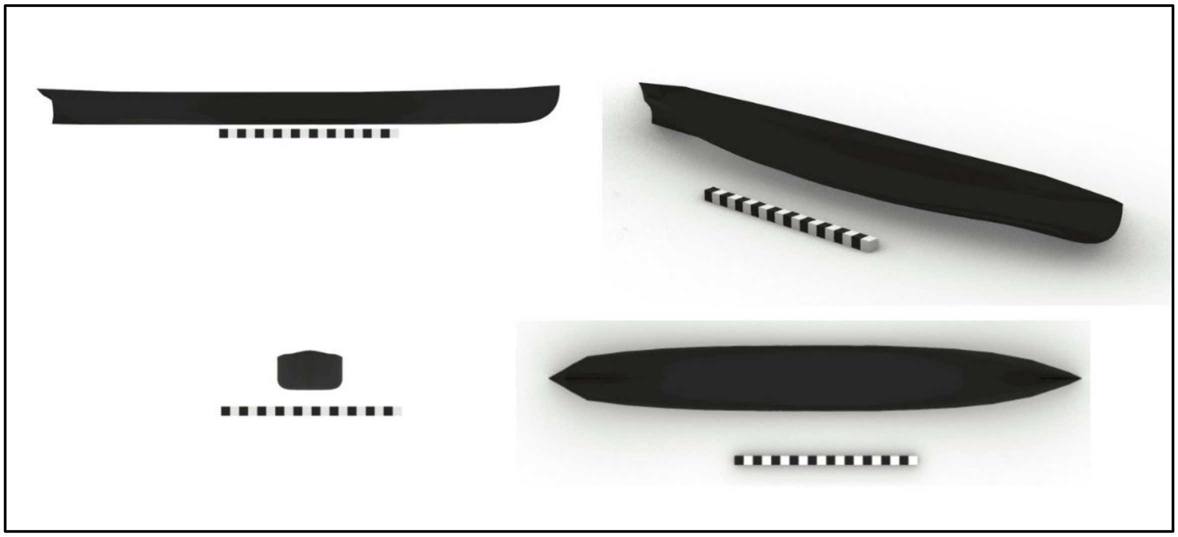


Figure 40. Profile of *Hope* (1864), an example of an Enlarged blockade runner. (Image by Alexander Owens).

Figure 41. Samuel Walter's Painting of Enlarged blockade runner, *Banshee II* (1864) (Image Courtesy of Merseyside Maritime Museum).

The most significant proportion of Enlarged type vessels by build area was by the River Clyde at 40%. The second largest proportion was those built on the River Mersey, representing 25% of Enlarged type vessels. In order of representation of this section, greater New York represented 17%, River Thames at 10%, Unknown and British Other at 3%, and the smallest proportion was Northeastern England at 2% (see Figure 42).

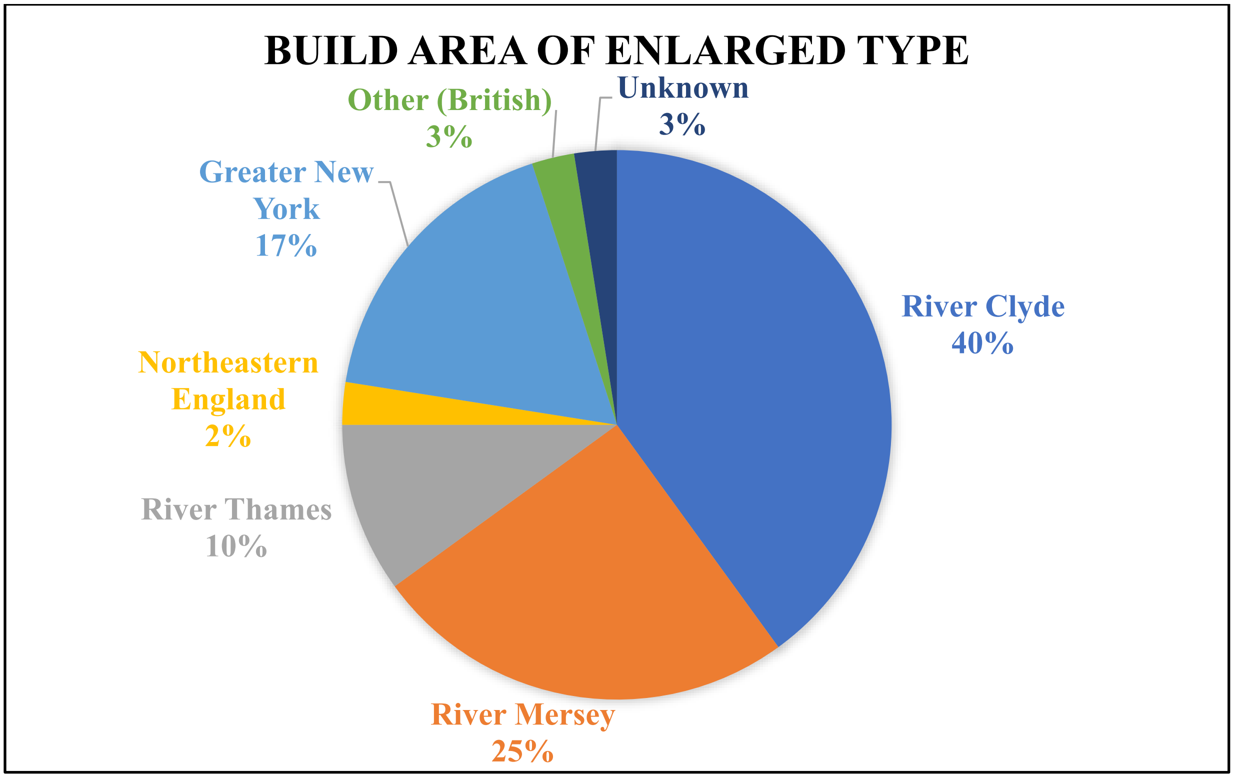


Figure 42. Pie chart depicting the different build areas of Enlarged blockade runners (*n* = 39). (Image by Alexander Owens).

Among the builders most represented, the Mersey-based company Jones, Quiggin, and Company represented at around 18%. This is followed by the Clyde companies Randolph, Elder, and Company at approximately 13%, and Aitken and Manswell at around 10%. This is followed by those affiliated with Clyde builder Denny Bros at 8%, Clyde builder J. & G. Thomson at 8%, and Mersey builder William C. Miller at 5%. The remaining builders only have one vessel represented in the Enlarged dataset. Vessels with no data on their builder were 15% of the

Enlarged dataset, with three labeled as built in greater New York, two built on the River Thames, and one with no locational or build data.

The Enlarged blockade runner data build years range from 1841 to 1865. Of the Enlarged blockade runner data set, 25% were built before the war. For 1861 to 1865, 3% were built in 1861, 0% in 1862, 5% in 1863, 42% in 1864, and 25% in 1865. All the Enlarged blockade runners had data on the build date, so 0% were unknown on their build year (see Figure 43).

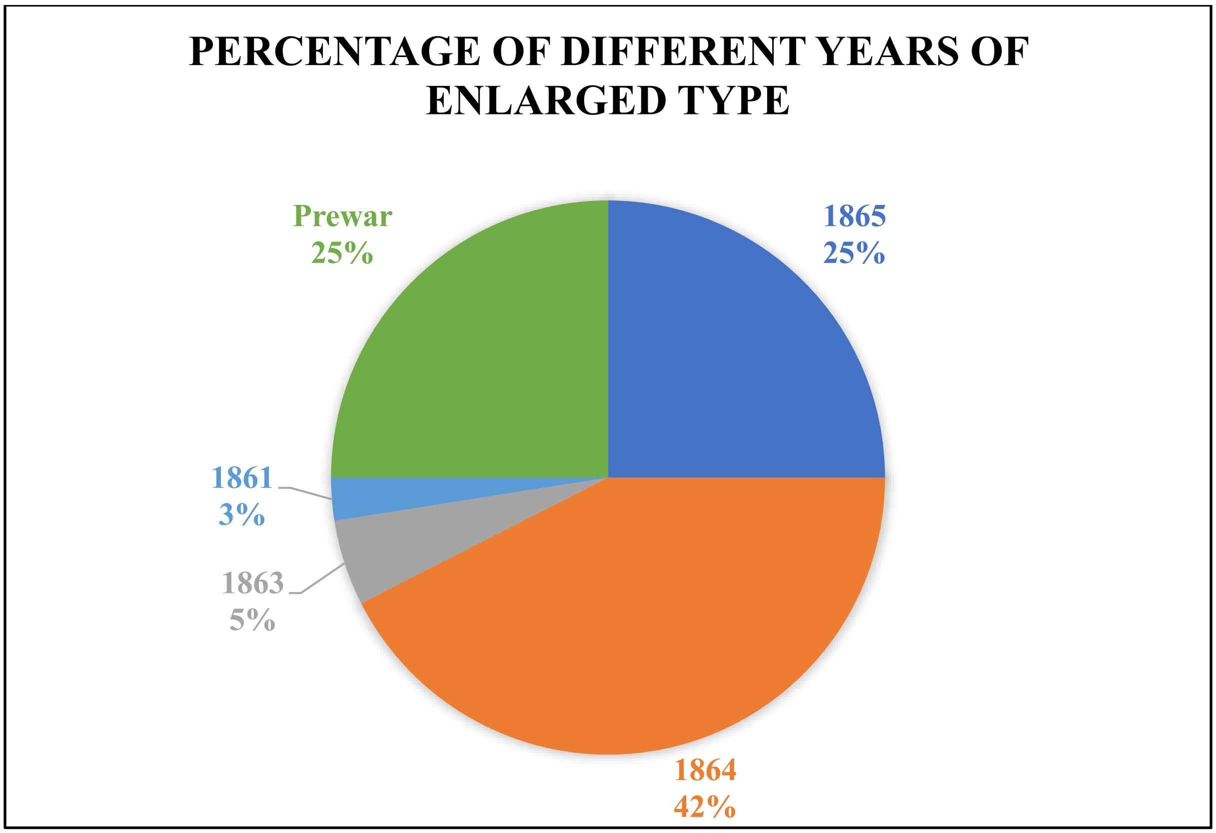


Figure 43. Pie chart depicting the different build years of Enlarged blockade runners (n = 39). (Image by Alexander Owens).

Most Enlarged blockade runners have no data pertaining to area of operation, partially due them not being active by war's end. The second largest percentage for Enlarged vessels served in the Atlantic at 22%, followed by the Gulf region at 15%. Of those Enlarged blockade runners that operated against the Atlantic and Gulf Blockade Squadrons, 10% are represented in this dataset (Figure 44).

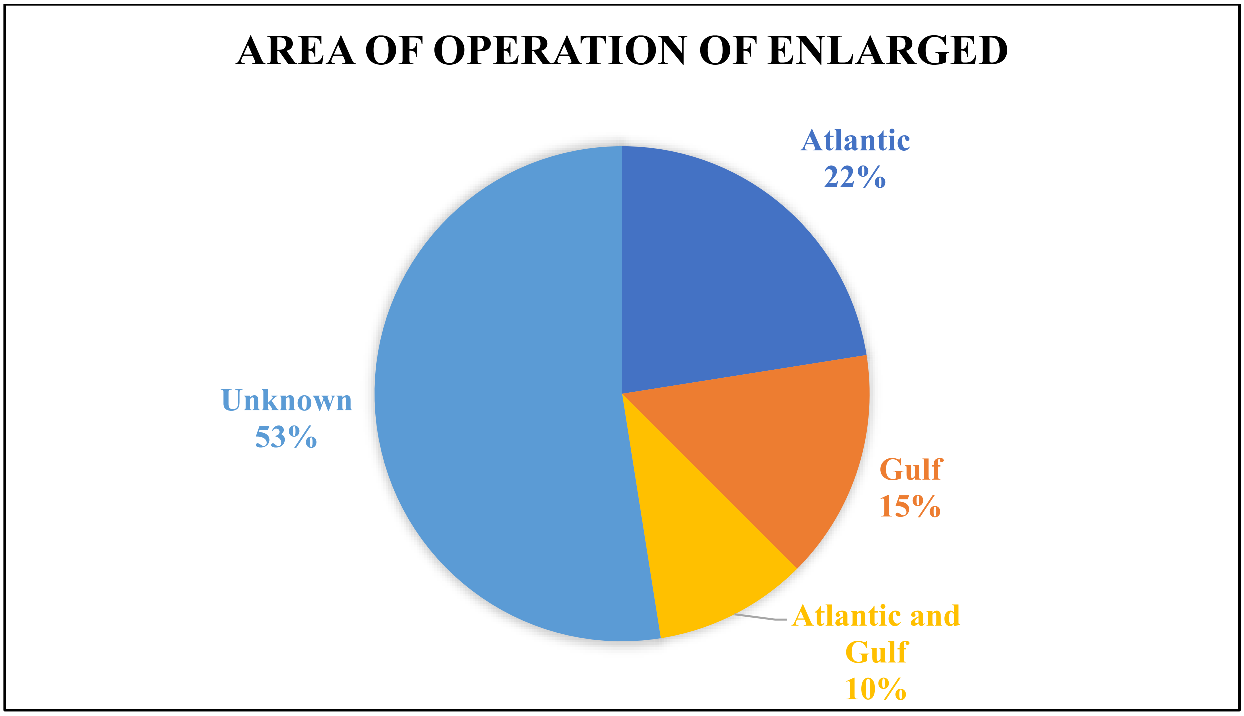


Figure 44. Pie chart depicting the different areas in which Enlarged blockade runners operated (*n* = 39). (Image by Alexander Owens).

The Enlarged blockade runner lengths range from 241 feet to 281 feet, with breadths ranging from 15.5 feet to 36 feet. The depths of Enlarged blockade runners range from 9 feet to 24 feet. The length-to-breadth ratios range from 6.65:1 to 16:1.

The material used to build Enlarged blockade runners is largely iron, at 55%. After iron-built blockade runners, in proportion, are steel, representing 30% of all Enlarged blockade runners. Wood is only 8% of the Enlarged dataset, with 7% of the Enlarged dataset had no data on its build type (see Figure 45).

The largest proportion of Enlarged blockade runners are those with sidewheel propulsion. Following sidewheel propulsion in Enlarged blockade runners are those equipped with twin screws at 10%, then those that have single screw propulsion at 8%. The Enlarged blockade runner dataset included 5% with no data on their propulsion (Figure 46).

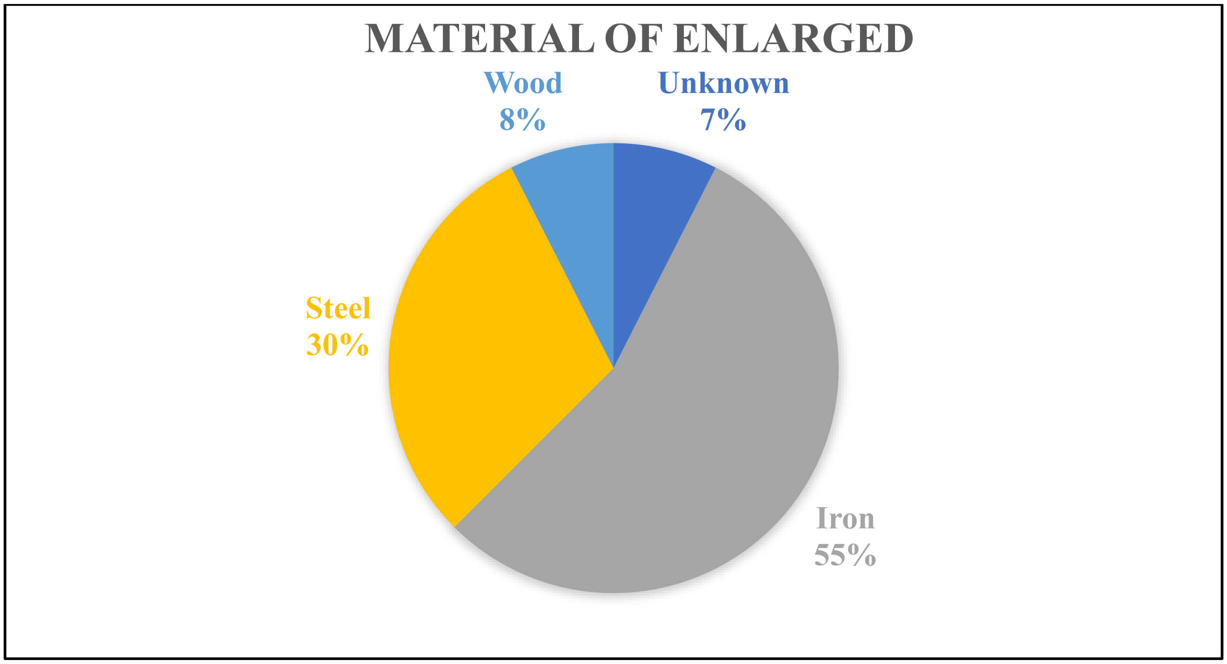


Figure 45. A pie chart depicting the different construction types of Enlarged blockade runners (*n* = 39). (Image by Alexander Owens).

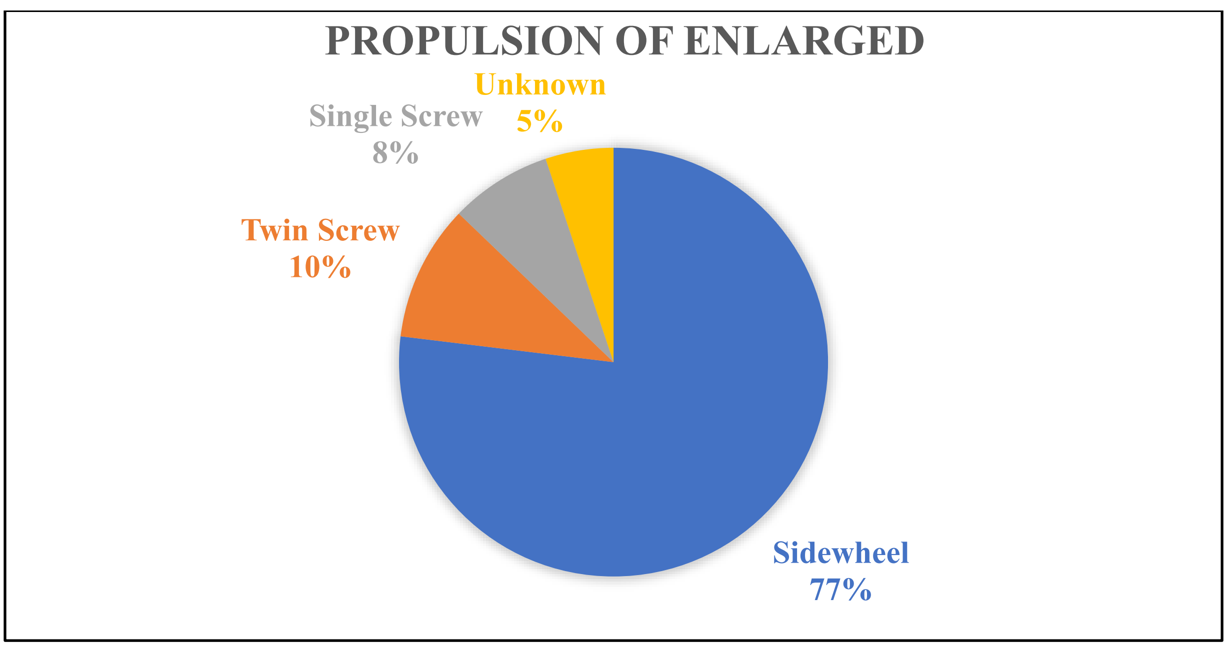


Figure 46. Pie chart depicting the different propulsion types of Enlarged blockade runners (*n* = 39). (Image by Alexander Owens).

A notable exception to this dataset is the northeastern English vessel *Southerner* (1863). This vessel had a larger length and breadth, with an overall length of 294.75 ft and a breadth of 38 ft. And while its length-to-breadth ratio aligns with the Enlarged type, it was 7.7:1. If it were included in this section, it would be the only composite hull of the Enlarged type and one of four Enlarged blockade runners with single screw propulsion.

Conclusion

This chapter described the multiple variables of each classification as defined previous researchers. 350 blockade runners were organized into a dataset, with their classification divided into Converted, Extreme, Mature, and Enlarged types. The classification identifiers are described briefly in Chapter 3 and in more detail in Chapter 4. The variables presented were divided into several subsections.

Each section described how the classifications differed in the proportion of their ordinal data by variable. The variables shown in each subsection reflect each blockade runner classification's significant trends. This also highlights the outliers described in the dataset, which could suggest a revision in the classifications found.

This chapter examined the proportion of variables such as blockade runners' builders and operating area. It also explored the spatial trends of different classifications of blockade runners. The charts provided offer context for further examination of the classifications in the next chapter, which aims to explore the existence of the classifications as types, presented by previous researchers. This ultimately grows the understanding of different blockade runners used in the American Civil War and the trends of blockade runner acquisition.

Chapter 6: Is it a Typology? An Analysis Regarding the Blockade Runner Dataset

Introduction

The basic computing found in Chapter 5 casts doubt on the presented classifications of past authors regarding a typology. This is because of three problems Dwight Read addressed: incoherence in creation, considerable dataset overlap, and incoherence in spatio-temporal data (Read 2007:118,223). The section relating to the problem with creating types criticized how the blockade runner classifications were made and applied. The section on dataset overlap addressed the large pattern of individual blockade runners existing as several different types simultaneously. The section on the spatio-temporal problem critiqued how the types are inconsistent concerning space and time. Each section included subsections which analyzed the theoretical considerations by Whallon and Brown (1984) and Read (2007), consider how the historical analysis makes little sense, this chapter analyzed each problem by how it is inconsistent in type, and illustrated how the problems are addressed.

The chapter also considered the alternative statistical means to further test the typology and the efficacy of the datatypes present in the database. By utilizing the *k*-means cluster to test if the length-to-breadth ratio and depth, both were found to have similar results in the dataset. That section also explored whether the X^2 test of independence could provide an alternative to *k*-means cluster analysis. Each section provided an overview of the intended method and analyzed the results from said method. A final section of this chapter presented the study's conclusions and suggested applying these ideas to other historical case studies.

Several things need to be considered for an existing type to be valid. The first is that the current typology needs to be derived from a set of two or more attributes in opposition to another classification. The existing types also need to maintain several factors as a type, including cultural salience, coherence to space and time, discernability (precise dissections), and a lack of overlap with others. In all three ways, the existing Converted, Extreme, Mature, and Enlarged types are flawed due to their lack of cultural saliency, incoherence with space in time, and major overlap, preventing dissections.

Problem 1: How Were the Types Made?

The purported types fail because they are constructed with several broad underlying assumptions. The types were created to better understand the ships that "ran the blockade." However, the function of blockade running is not discrete. In particular, a blockade runner is defined as any vessel that defies another nation's blockade (Wise 1988:3). This can take many forms. One of which is a private urge to take advantage of the lack of commerce by creating an profitable alternative. Other motivations include the ability to bring war goods into the nation affected by the blockade, or to evade the fleets that seek to have contact with nations with which they are at war.

During the War of 1812, the distinction between blockade running and privateering was heavily blurred, with vessel classifications like Chesapeake Bay schooners being described as both used for privateering and blockade running (Gillmer 1992:27-28). No matter its form, blockade running seems primarily suited to evading other vessels. Maritime historian Howard I. Chapelle mentioned that the purpose-built blockade runners built along Chesapeake Bay were built in an "extreme" way to maneuver better and catch speed against the British blockading squadrons of that time (Chapelle 1967:201-203, 222). There is a focus on the relatively small displacement and wide beam compared to its length for its time, a language which appears to inspire the Baltimore Clipper in the early 1800s as well as the Extreme type of blockade runners in the American Civil War.

Blockade runners were viewed in the vein of their opposition, being a term that has been used to oppose the activity of blockading (Wise 1988:12). The definition of blockade runner itself, however, is flawed. The term, blockade runner, is a purely functional classification that implies that if a vessel defies a Union Blockade Squadron, it was a blockade runner. However, this classification is too inclusive. These blockades did not just seek to block trade; they also blocked warships purchased for the Confederacy. The blockades were intended to stop the Confederate's capacity to wage a war of secession. Although some blockade runners were unarmed, many others were not. Several blockade runners were described as commerce raiders, and even one Converted vessel, *Nashville* (1853) was intended to be outfitted as a privateer (Wise 1988:29). Not all blockade runners were acquired for private entities, and not all exclusively ran the blockade. Converted blockade runners are an issue too, since Watts indicated that blockade runners were minimally converted (Watts 1997:385).

When Wise (1988) and Foster (1991) saw that the first generation of blockade runners were captured or run aground, they assumed a concentrated effort was made to prevent this, based on the research of scholars like Wilkinson (1877:33). This choice of less Extreme blockade runners is the basis of the Mature type. However, alternative explanations have also been provided, suggesting that the blockade runners' developments resulted from the builders who used their own regional trends to build vessels (Graham 2006:102). One of these is that the dominance of Clyde steamers led to the emergence of Clyde styles as the primary influence of blockade runner design, regardless of where they were built and whether they were built outside of Scotland. This key to identifying the agents involved making conscious choices regarding blockade runner design.

Theoretically, there is some interplay between those who bought and those who built vessels. This could be what Read described as the relationship of the ideational domain, what an object is imagined to be, and the phenomenological domain, the culturally constructed idea of what an object should be (Read 2007:81). The ideational domain for blockade runners could be the expectations of Confederate consumers for how these vessels might outrun the blockade. The phenomenological domain could be dominated by the builders who, through experience, imagine a vessel design that is fast and maintains a low profile (Read 2007:91). However, for this dataset, the attributes or factors are unclear because not enough information is known about what features the builders favored. Not enough data is in the dataset to test the preferences of the Confederate consumer base. The current typology assumes that blockade runners differ based on dimension trends, leading to there being distinct blockade runner types. This is not the case, as reflected in the next problem: dataset overlap.

Problem 2: Dataset Overlap

Large datasets overlap in the results of their attributes, as stated by Read (2007), and can dismiss a typology of distinct types. Types instead should be consistent and limited in their overlap. Overlaps between types can exist, but they should not exceed those that rest exclusively as that type. Archaeologists in the Kampsville Seminars described that for a type to be accurate, it must have precise dissections (Whallon and Brown 1982:xvii). When the classifications are divided, they should be discernible from their variables. If a type is defined by its measurements, then it should be a separation where a Mature is not Extreme and not Enlarged. This, however, is not true of the current dataset. Significant overlaps exist throughout the dataset and fail to provide any discernibility to the types. The most apparent problem with the dataset is its significant overlap. This issue is shown in Figure 47, where the classified groups were situated using a Venn diagram of the Converted (shown as A), Extreme (as B), Mature (as C), and Enlarged (as D). That would mean that a blockade runner that is ABCD could be classified as being of every type mentioned. Another category was created, N, or blockade runners, with sufficient evidence to say they are none of the other blockade runners.

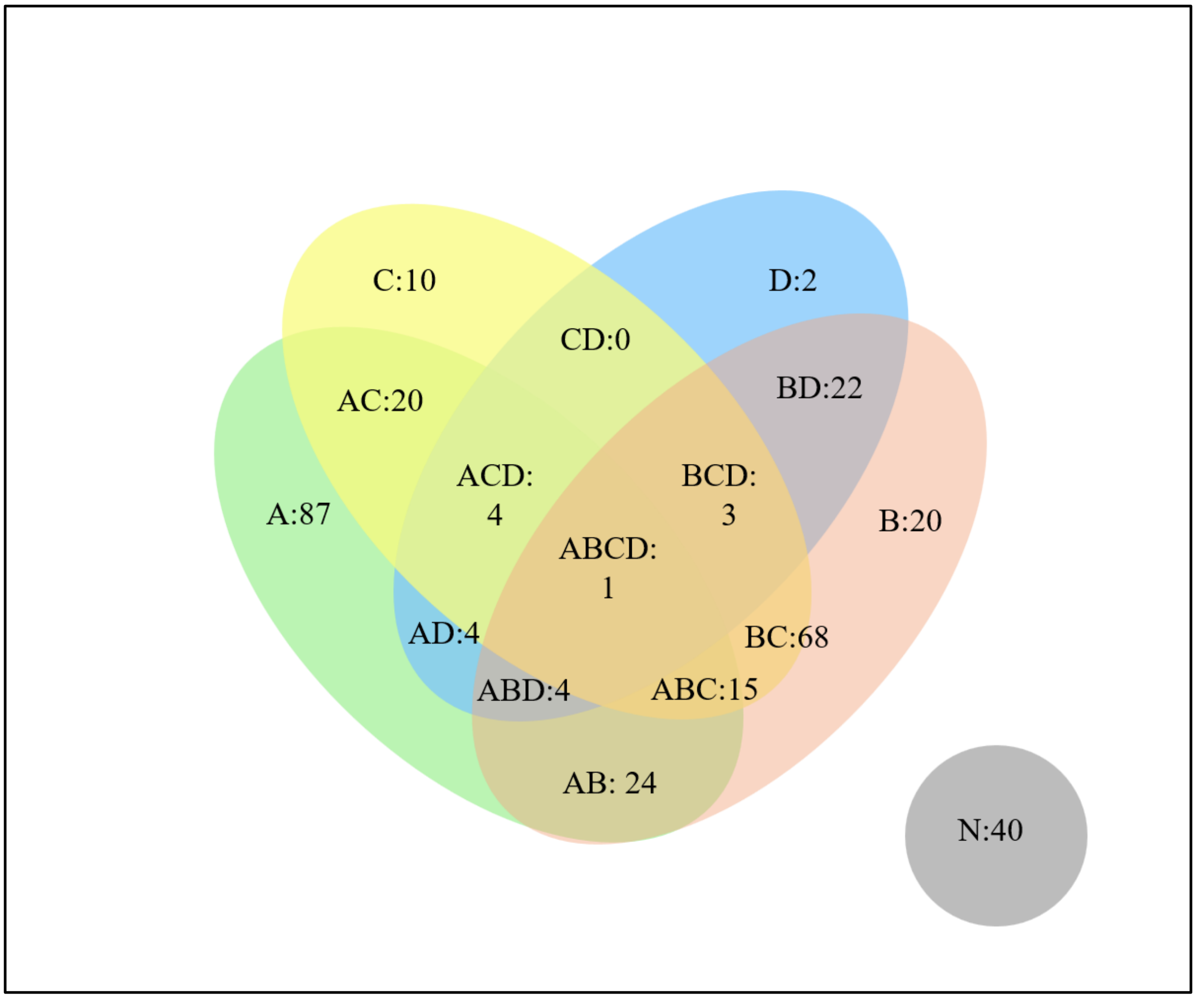


Figure 47 Venn diagram displays the blockade runners' different types and overlaps (n = 324). Counts found inside each ellipsoid represent the count of each subsection. The main sections of A, B, C, and D represent the four main types with no overlap. A. Converted blockade runners are represented in green. B. Extreme blockade runners are represented in light red. C. Mature blockade runners are represented in yellow. D. Enlarged blockade runners are represented in

blue. N. Blockade runners represent none of the previously mentioned types and are gray. Each subsection represents an overlap of the previously mentioned types, such as ABCD, which overlaps all four main types. (Image by Alexander Owens).

As stated previously, the issue of why the dataset overlap is high is because of how the typology and classifications were created. Unlike processual types, which typically identify, categorize, classify, and typologize, this typology was constructed differently. It is assumed that historical moments influenced the design of the blockade runner. This evolution seems to be imagined as some form of taxonomy without discernible attributes. Each type had a different method that was defined. Converted was defined by one attribute only, a proposed previous function. The Extreme type was defined by its large proportionality using length-to-breadth ratios. The Mature and Enlarged types were defined by their range of values, with the Mature being 210 to 240 feet in length overall and the Enlarged being 250 to 270 feet in length overall. This difference in data types is uncommon in creating types and explains the significant overlap in the set.

There are also large areas of overlap within the dataset. Where each blockade runner type is represented by a letter, the largest category is that of the Converted category (A). After which is the most considerable overlap, the overlap between the Extreme and Mature types (BC). This is followed by the N category, representing all blockade runners with data on their dimensions but could not be discerned in any of the ascribed types. Among the smallest of the categories were those which were only of the Extreme (B) and the Enlarged (D) types. Only one blockade runner, *Circassian* (1856), fits all types simultaneously. Of those with criteria to fit the four types (n = 284), 165 show an overlap between the types. That means that of the 284 ships classified as types, 58% of ships were identified as being in two or more types. Of those which 3 or more types, 9.5% of those in the typology. This large area of overlap casts doubts on whether the three purpose-built types: Extreme, Mature, and Enlarged, are discernible enough to be considered types. This was expected from the results where the 3D representation of *Fergus* and *Will O' Wisp* were of similar dimensions and shape (refer back to Figure 17).

Another problem within the dataset is its limitations as constructed. Maritime researcher, Kevin Foster (1991), focused his types on distinctions found either in the length-to-breadth ratio or the scales of the lengths (Foster 1991:133, 138, and 149). If there were more data on construction features (for instance, the presence of turtleback foredecks), an alternative typology might be possible. Furthermore, the definition of purpose-built blockade runners and blockade runners themselves is inaccurate. The types described by Foster were assumed to be purpose-built based on a narrative that, with the different stages of the war, came different evolutions of the purpose-built blockade (Foster 1991:138). Although some British shipbuilders were given instructions on desired features, it is unlikely that these added features were revolutionary (Kane and Gillian 2012:39). For example, steel construction for transatlantic steamers was tried before, with the creation of *Little Lucy* in 1859 (Watts 1997:310).

The overlap problem is also found in graphical representations. When utilizing a scatterplot of length-to-breadth ratio and depth, the dataset shows a large overlap between the different types. This method is based on the modal graph (Read 2007:271), which utilizes a scatterplot with two or more quantitative variables tested. This should show that independent types are discernible spatially when two attributes are correctly shown to be culturally salient.

The first scatterplot, see Figure 48, utilized only the length (x-axis) and the breadth (y-axis) fields of known blockade runners. The whole dataset shows a positive yet weak correlation between all blockade runners using length and breadth. The symbology found in the legend for

Figure 48 and all subsequent scatterplots, follows that described in Figure 47. When displaying all blockade runners, there is more spatial coherence of subtypes, resulting in overlaps, with classifications like AB, a combination of Extreme and Converted blockade runners, being very close to each other.

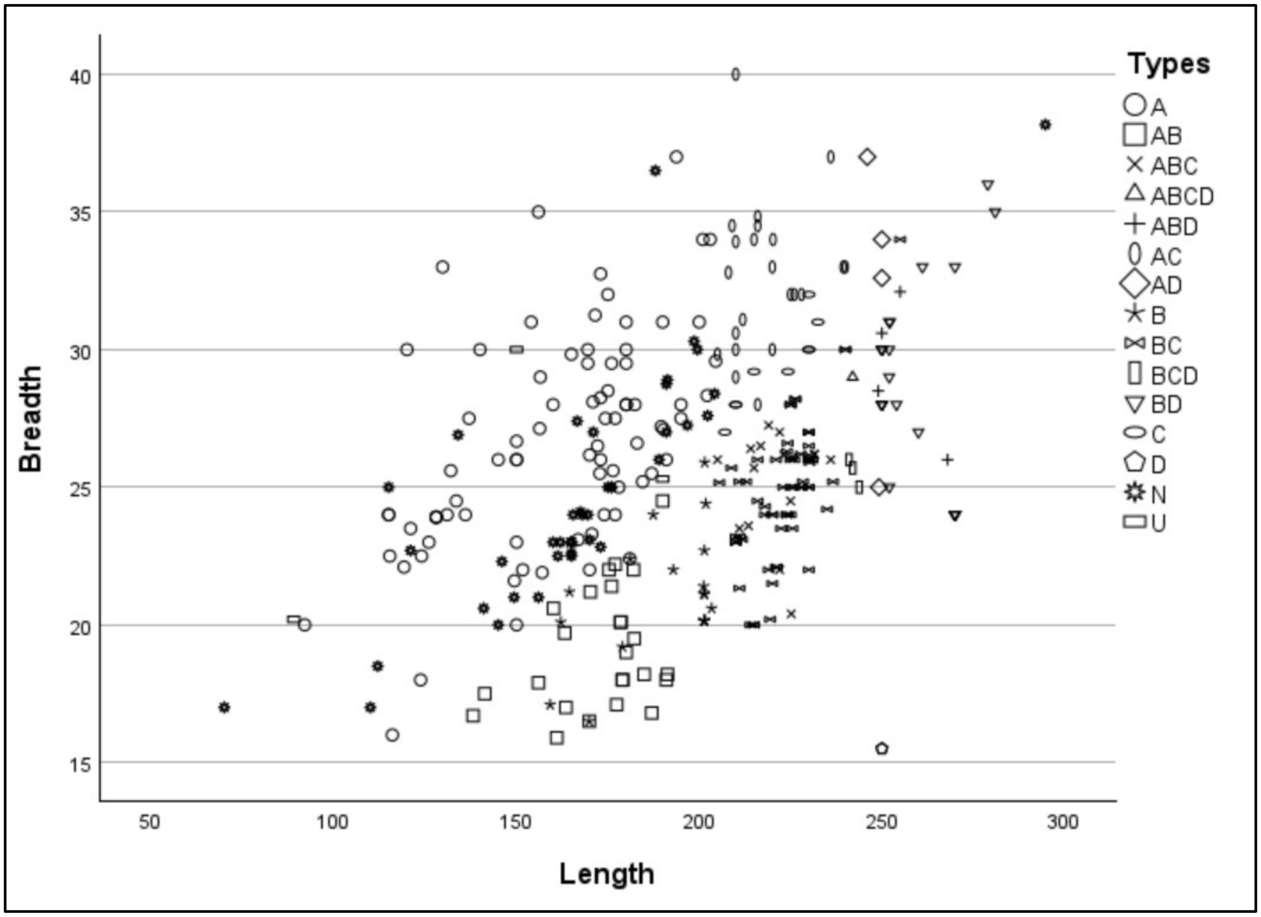


Figure 48. Scatterplot of length-to-breadth of blockade runners; (*n* = 319). Both length and breadth were measured in feet. (Image by Alexander Owens).

A different result is found when displaying the scatterplot with length-to-breadth ratios as the y-axis and reported depth on the x-axis (Figure 49). Instead, the shape indicates a strong correlation between the two. The pattern is, however, triangular in form, which may be interpreted as both simultaneously being positive and negative, or having no directional correlation based on similarity.

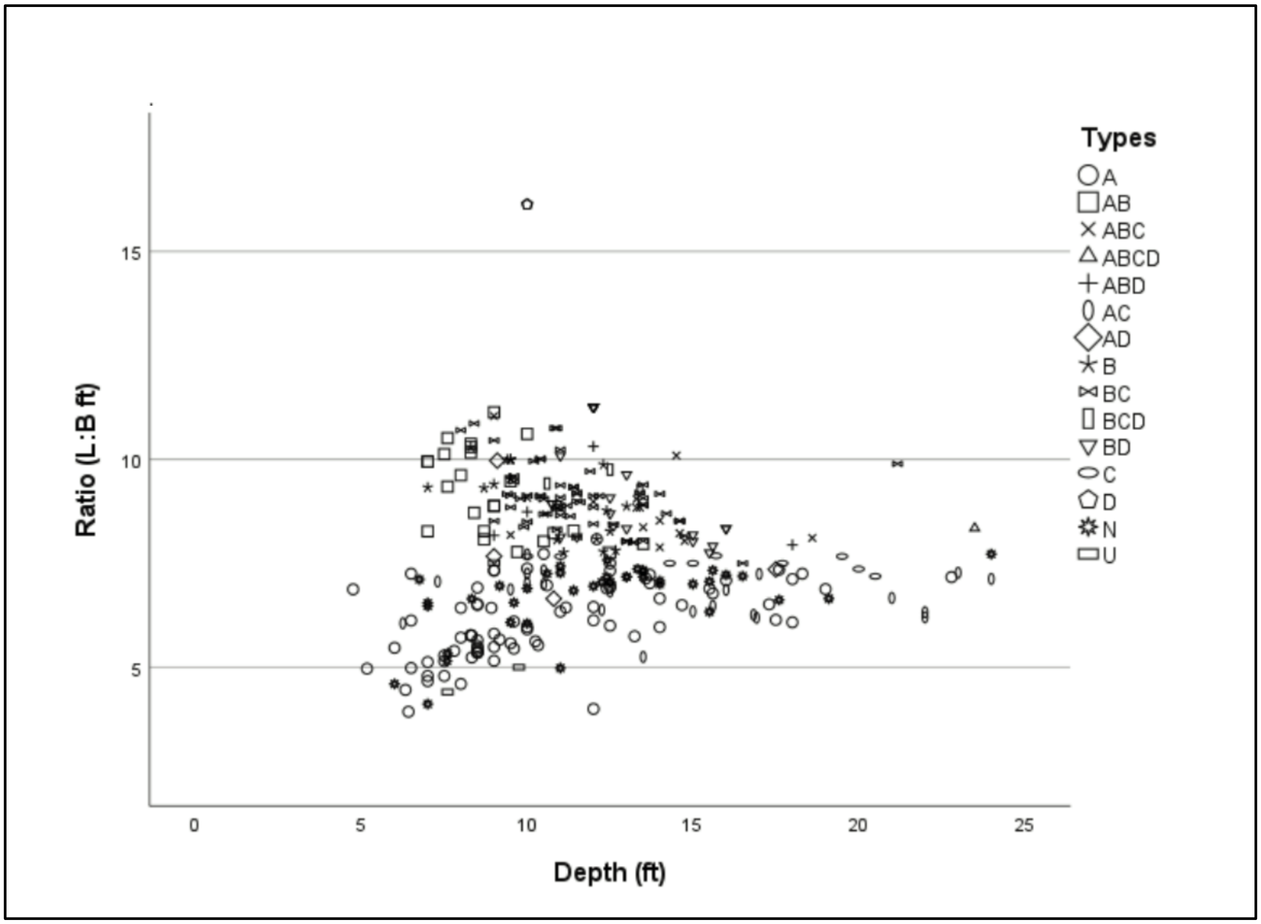


Figure 49. Scatterplot of length-to-breadth ratio and vessel depth (*n* = 319). (Image by Alexander Owens).

When viewed as a convex hull of each type, the visible overlaps became apparent. A convex hull method, was used to measure the pixels of the graph to give an idea to the scale of the overlap. When measured, it found that the area for the entire data set was 27933.8 pixels squared (px²). Starting with the Converted type (see Figure 50), it seemed to cover most of the triangular shape and when measured was 20608.2px² in area. Converted subgroups represent the largest combined category, and this is reflected in the wide spatial distribution along the scatterplot and the largest section of area, covering 73.8% of the total area of the dataset.

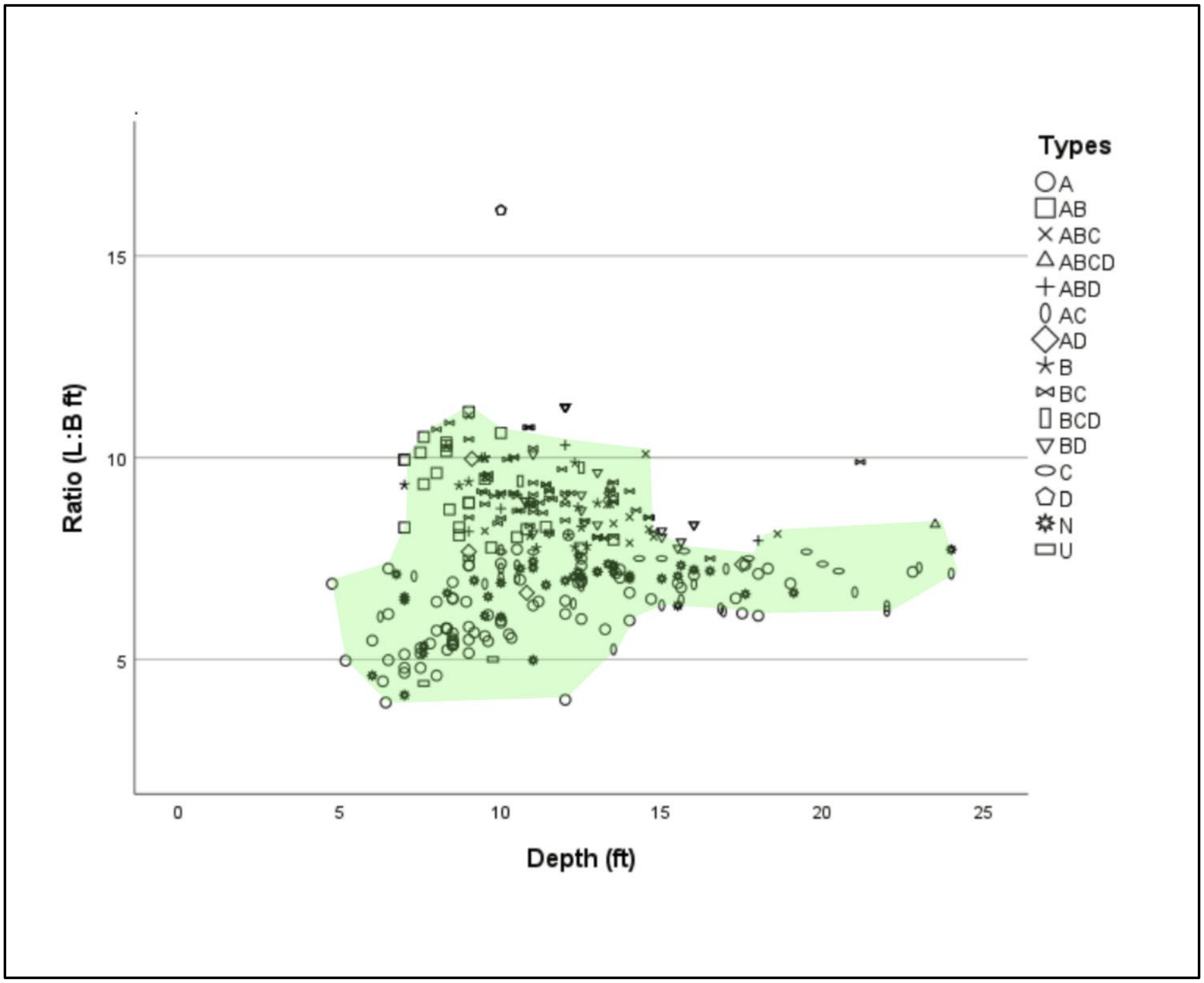


Figure 50. Scatterplot of the distribution of Converted blockade runners in the dataset. (Image by Alexander Owens).

The Extreme type has the second smallest area at 10191.0px² but covers 36.5% of the total area of the dataset (see Figure 51). The Extreme type is more concentrated than the Converted, which shares some of the same vessels, but concentrates outliers on the higher depths. This contrasts with the scatterplot of the Mature type seen in Figure 52. The Mature type has larger area at 15886.5px², partly because it has a wider distribution than that of the Extreme type. This makes it the second largest, with the Mature type covering 57% of the total dataset. The Mature type lies mainly around the 6:1 ratio, but the spatial distribution is very similar to the Extreme type, with 87 vessels being both Extreme and Mature types.

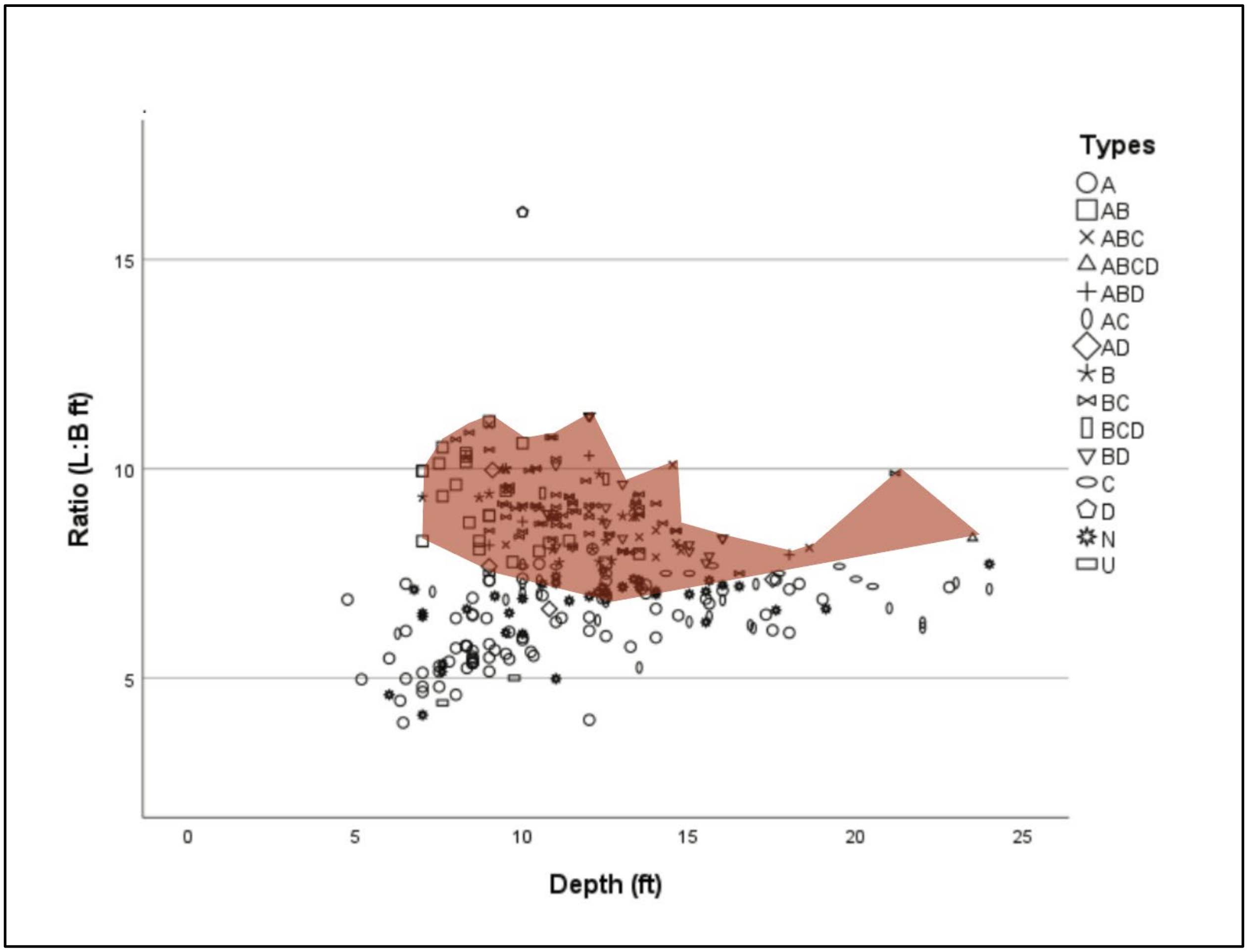


Figure 51. Scatterplot of the distribution of Extreme blockade runners in the dataset. (Image by Alexander Owens).

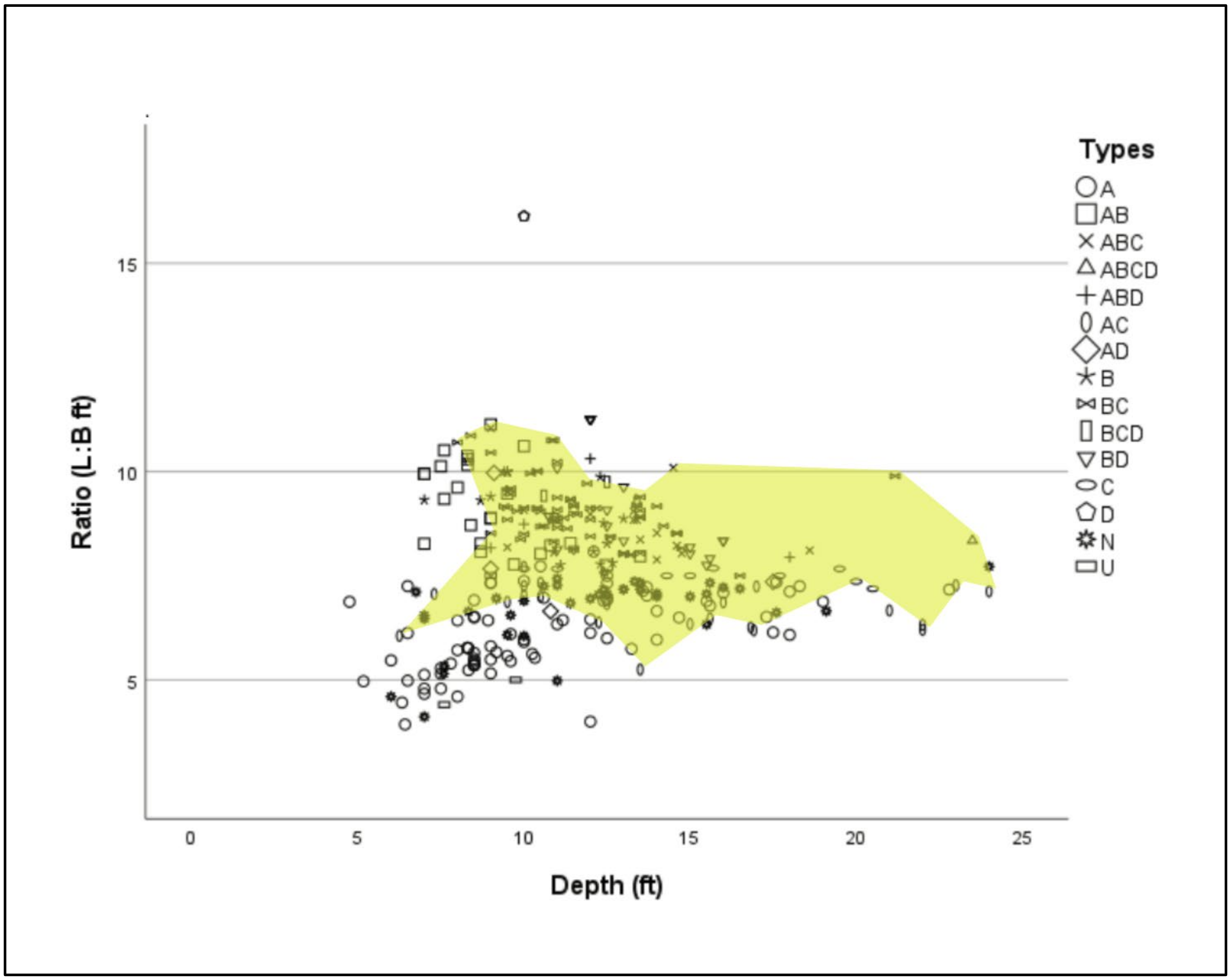


Figure 52. Scatterplot of the distribution of Mature blockade runners in the dataset. (Image by Alexander Owens).

In contrast, the scatterplot of the Enlarged blockade runners appears to form the shape of a hyperbola (see Figure 53). The Enlarged type has the smallest area at 8787.1px², covering only 31.4% of the dataset. This is primarily due to the outliers, which are located at the edges of the hyperbola. One outlier has a ratio of over 15 with a depth of around 10 feet, while another has a ratio of approximately 8 with a depth of around 25 feet. Most of the shape of the convex hull for the Enlarged type is centered on the scatterplot.

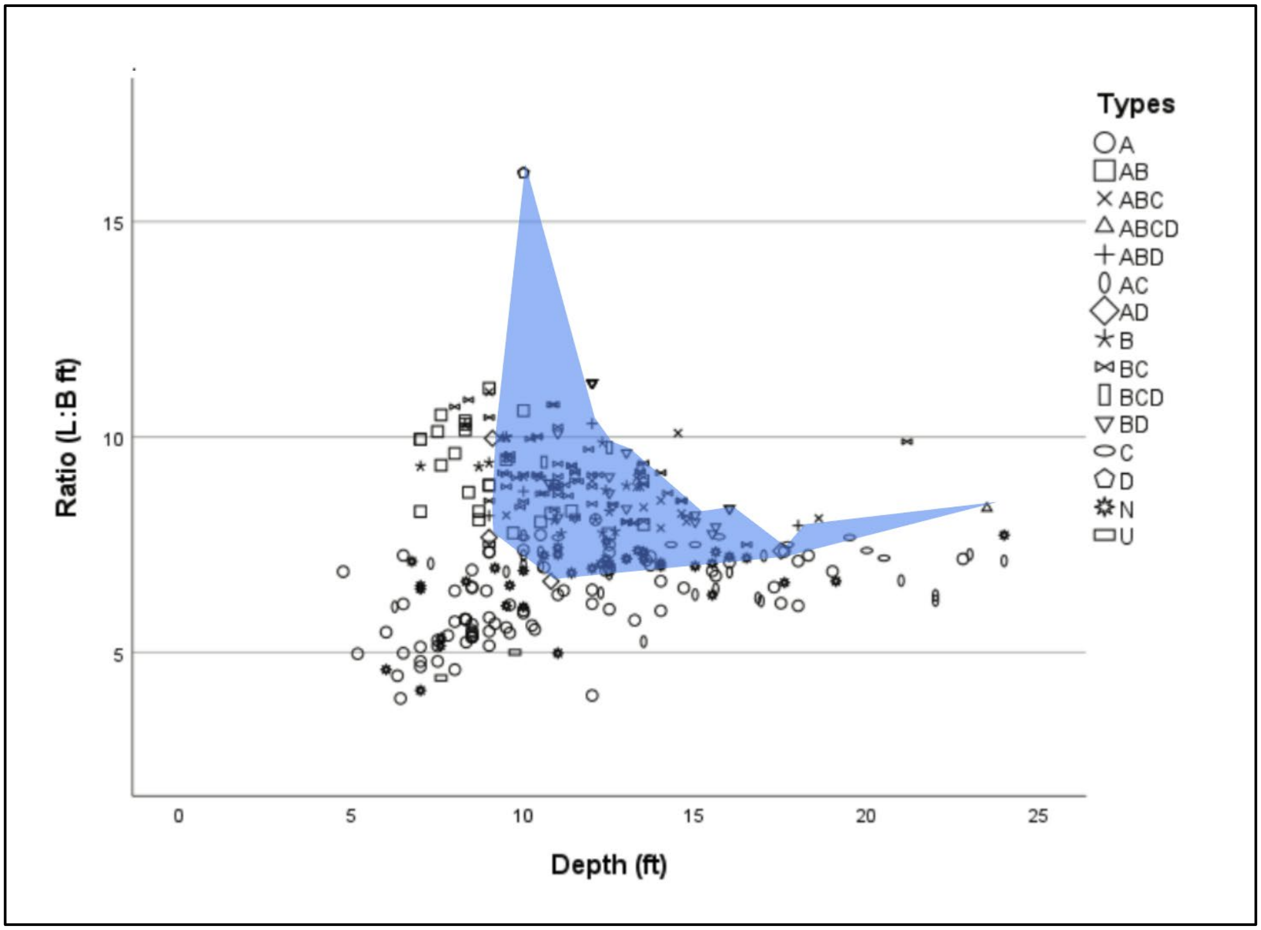


Figure 53. Scatterplot of the distribution of Enlarged blockade runners in the dataset. (Image by Alexander Owens).

When comparing all types simultaneously, however, all types overlap with around 52% of the area being shared between them, and a 46.1% between all purpose-built types (see Figure 54, Figure 55, and Figure 56). The perceived purpose-built types have much in common. They are only different along the edges of the convex hulls, with Enlarged areas along their outliers, Mature areas along their ratio under 8, and Extreme areas along their leftmost wing, which overlaps the Converted vessels. These overlaps make sense in the context of how the type definitions were chosen by previous researchers when examined in isolation, since they suggest a development. Here, Mature and Extreme are not distinct types. When judging them from the overlaps from all types at an area of all types (14510 px^2) its overlays near the entirety of the

Extreme type range and nearly the entirety of the Mature type range (see Figure 56). There is significant overlap between the existing types, specifically the two largest purpose-built variations: Mature and Extreme. This calls into question the entire typology and whether the data can be categorized in such a way.

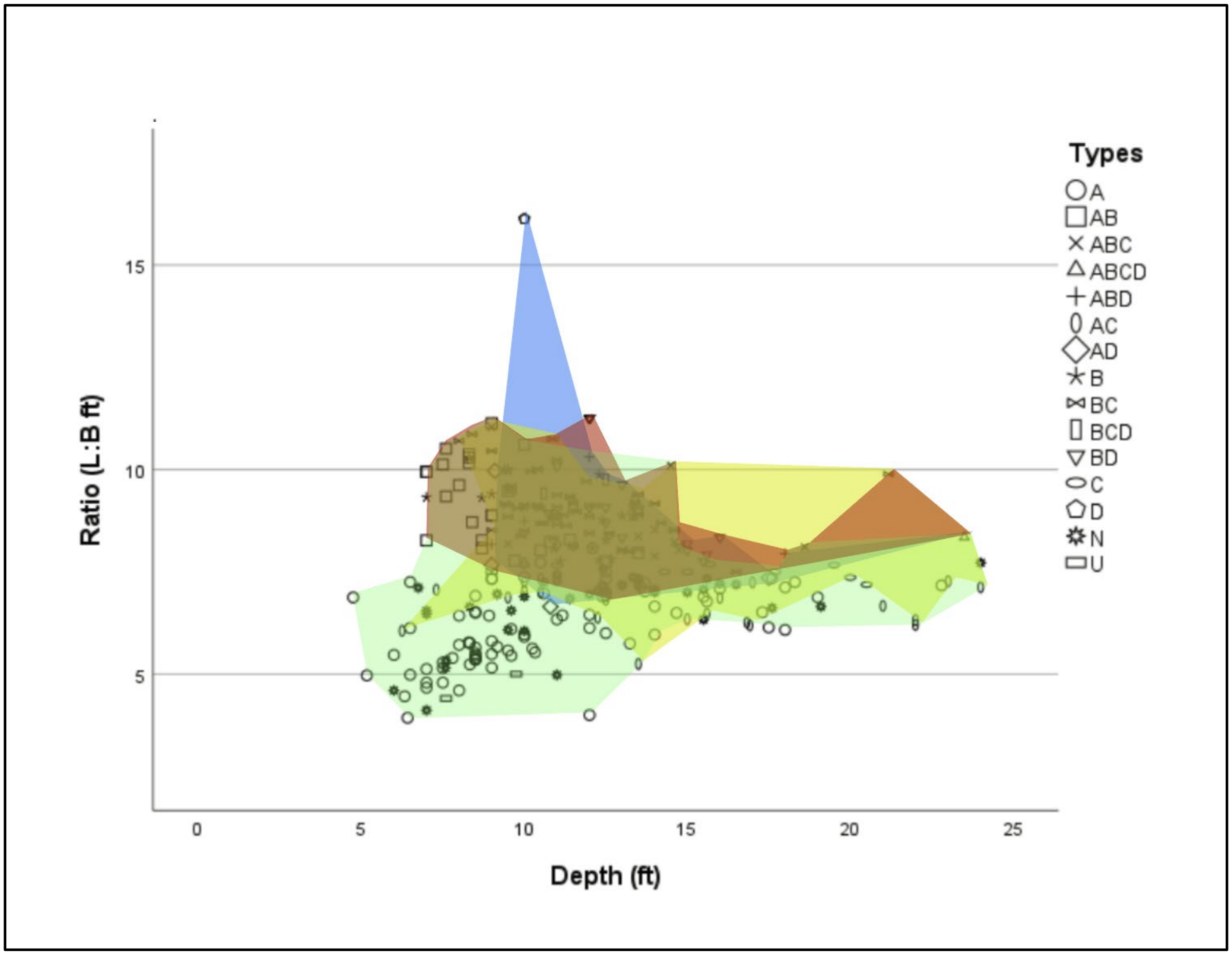


Figure 54. Image of scatterplot of individual types overlayed. (Image by Alexander Owens).

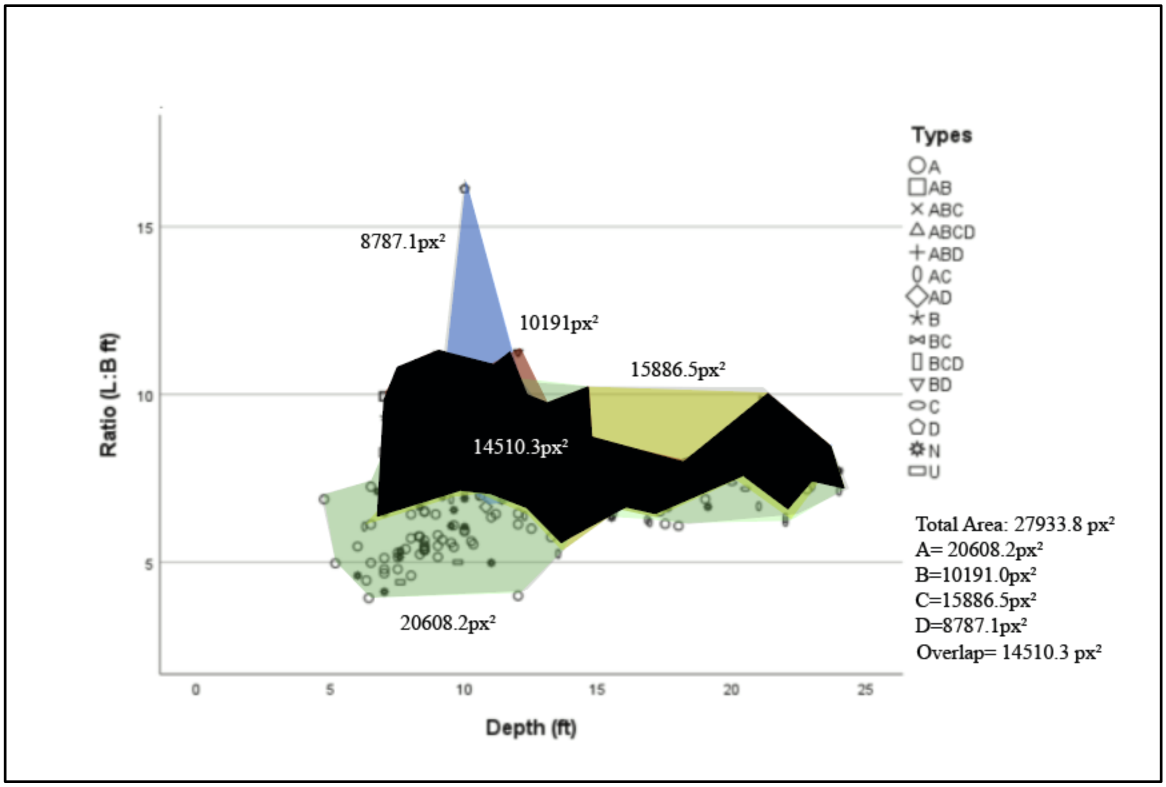


Figure 55. Area lengths of convex hull overlaps. The black polygon shows where data overlap exists for the dataset at 14510.3 px^2. (Image created by Alexander Owens).

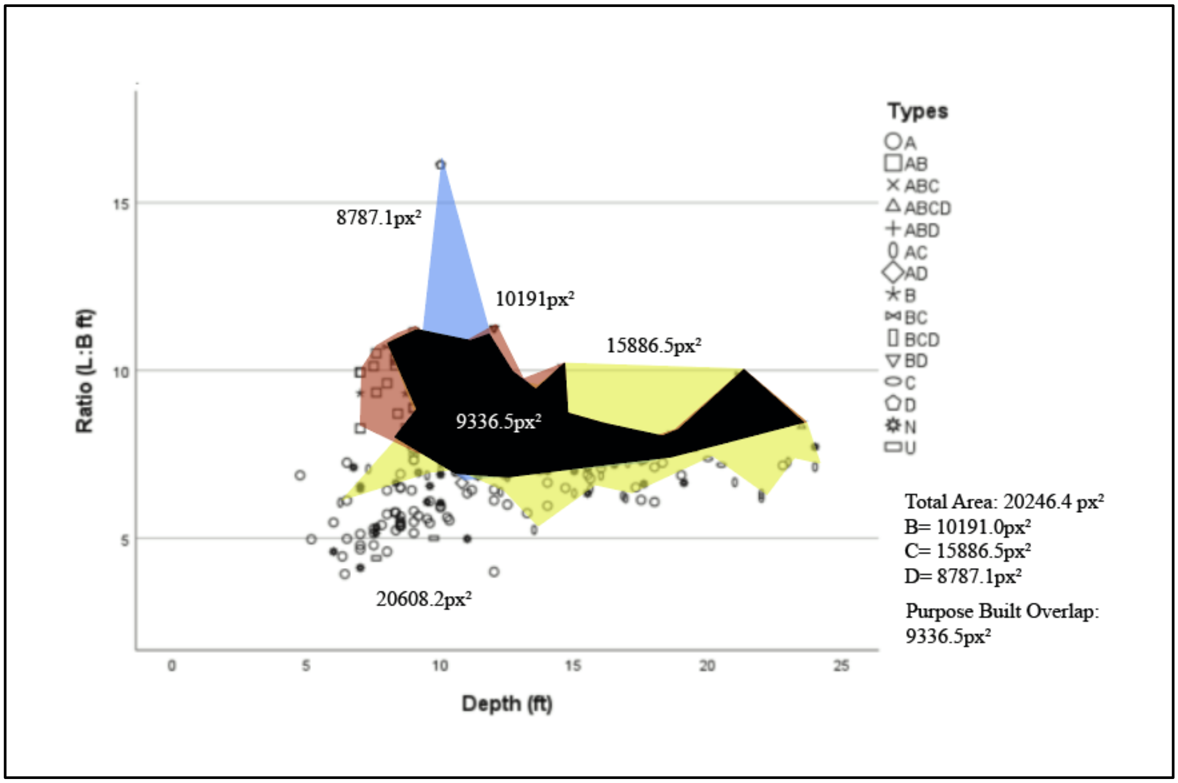


Figure 56. Area lengths of convex hull overlap for only purpose-built types: Extreme, Mature, and Enlarged. The black polygon shows where data overlap exists for the purpose-built dataset at 9336.5 px^2. (Image created by Alexander Owens).

Problem 3: Spatio-Temporal Incoherence

One major point articulated by archaeologist Dwight Read is the importance of a type being consistent in time and space, known as the spatio-temporal coherence (Read 2007:267). As a result, a classification with little basis in the spatio-temporal dimension may not be a true type. Previous authors, such as Wise (1988) and Foster (1991), assumed that the design changes of blockade runners resulted from decisions made by the Confederates and their agents in Great Britain (see Figure 57). When the war started, an influx of New York-built and some British-built blockade runners were required, so vessels of all previous classifications were needed (Converted) (Wise 1988:46-47; Foster 1991:126). After the Confederates recognized the success of Clyde steamers, they sought to build adapt and them to suit their needs, resulting in the

Extreme type (Wise 1988:108; Foster 1991:137). After repeated failures, they settled on a new type that could handle repeat usage, thus creating the Mature type (Foster 1991:138). When the issues with the war became more dire, larger and heavier-built blockade runners were needed, resulting in the Enlarged type (Foster 1991:139). However, the propositions by Foster (1991) cannot be applied for typology. The problem is that the timeline is too short for fundamental changes to effect large-scale changes, and the dataset is limited in that the blockade runner build date is divided by year, not month. However, dividing the types by month does not matter either. When the war chronology is compared to the timeline of blockade runner build dates, there is overwhelming overlap in time for all four types. In the build date, all types have blockade runners spanning from before the war to the end of the war (as shown in Figure 58). There would be a distinct temporal difference for at least one of the four types if there were some temporal relevance (Read 2007:267). Instead, no difference exists between the blockade runner build dates.

For a stylistic classification to be a type, it should have consistent and reasonable variation within space and time compared to other types (Read 2007:214). The basis for this is that a type should result from conscious decisions made by those constructing the item. For an item to be of a particular type, it should have some correlation to those decisions (Read 2007:147). These decisions are typically explained as the result of environmental, economic, or other behavioral factors (Read 2007:149). As such, there can be an overlap within type and space, but there should be trends that correlate to a hypothetical origin and potential spread. When looking at this in time and space, a hypothetical type should have visible clusters represented as distinct regional trends. One of the most significant limitations for types in this period is the relatively short duration of the American Civil War, lasting only four years.

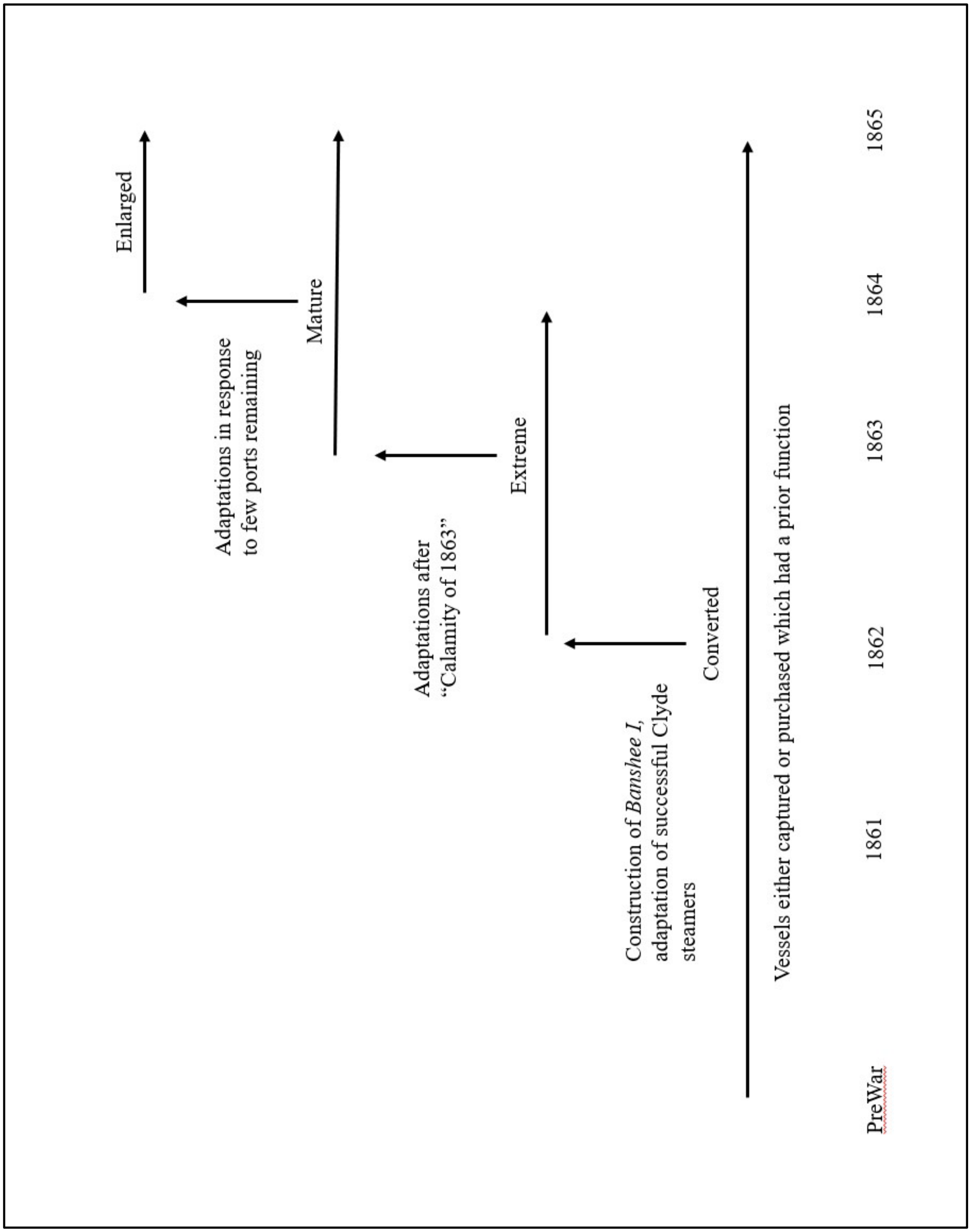


Figure 57. Flow diagram showing the perceived development of types throughout time and the adaptations that led to them. Note that these adaptations are all a result of actions taken during the war, not choices made by those who constructed these vessels. (Image by Alexander Owens).

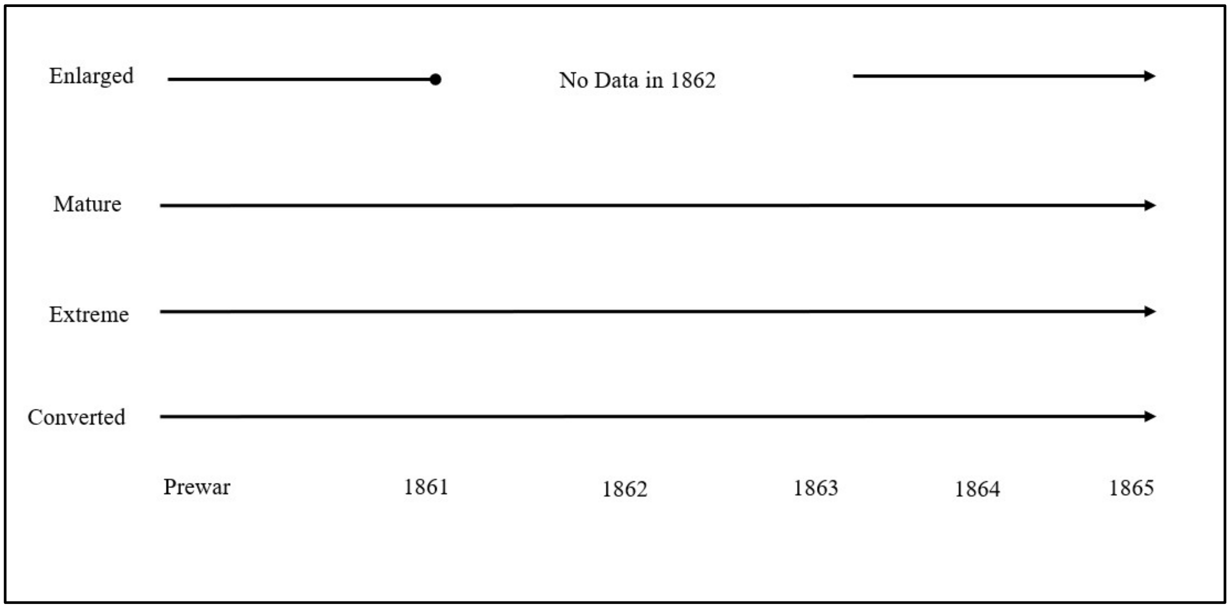


Figure 58. Flow diagram indicating the real distribution of blockade runners by type across time starting in the prewar era and ending with the close of the war in 1865. Notice that all purported types, with exception to enlarged where there is no data, have ships in all time periods. (Image by Alexander Owens).

According to Wise (1988) and Foster (1991), the behavior that led to the creation of different types was the effects of Confederate needs in blockade running. The narrative starts with the immediate need for any ships that could smuggle resources into the Confederacy to maintain the Confederate economy (Wise 1988:52). Then came the popularity of British-built steamers, which led to purpose-built vessels, which innovated British shipbuilding in the direction of ships specifically for blockade running (Wise 1988:92). This came with adaptations primarily in the form of vessels that were less Extreme during the war and ending with larger vessels that maintained dimensions suitable enough to enter the last remaining Confederate ports (Wise 1988:92-94). Wise's description is mainly based on historical research, which gives too much importance to Confederate agents and the construction of blockade runners. The narrative overemphasizes the role of converted Clyde steamers like *Advance* (1862), the role of the first steel-built blockade runner, *Banshee* (1862), and the adaptations that led to the Enlarged blockade runners *Hope* (1864) and *Colonel Lamb* (1864) at the end of the war. The most important blockade runner in this narrative is *Banshee*, which serves as the prototypical blockade runner upon which all other purpose-built blockade runners were modelled (Foster 1991:135;136). Based on the short service of *Banshee I*, it is doubtful that it or its sisterships had enough time to leave an impact, such as creating a Mature type. However, the closure of the ports of Wilmington and Charleston certainly affected the distribution of blockade runners in the last year of the war (Wise 1988:208-209). These large dimensions are not confined to early blockade runners or the region along the Mersey River, where the Extreme-built vessels were said to originate; *Banshee I* was built in 1862 and served as a blockade runner between April and November 1863 (Wise 1988:289).

Time is only half of the issue within the spatio-temporal domain of the existing typology. Geographically, inconsistencies exist, too. For this study, two tools were used to show the spatial distribution of blockade runners by region. The first is Kernel Density Estimation (KDE), a method that shows the association of places from this distribution and distance from other areas inside the dataset. This can be utilized by using Geographic Information Systems (GIS) software, like ArcGIS Pro, to depict the association inside a country or region. KDE analysis indicated a higher association of blockade runners built in Britain within the River Clyde (see Figure 59). The second significant cluster is for Mersey-built vessels, and third in significance were those built on the River Thames, specifically at London. The fourth significant region, the Northeast of England, shows clusters along the Tyne, Tee, and Wear Rivers but are more distantly distributed. Small clusters exist in Dublin and along the Southwest of England, which have been characterized as other (England) clusters for their prevalence but lack of high clusters.

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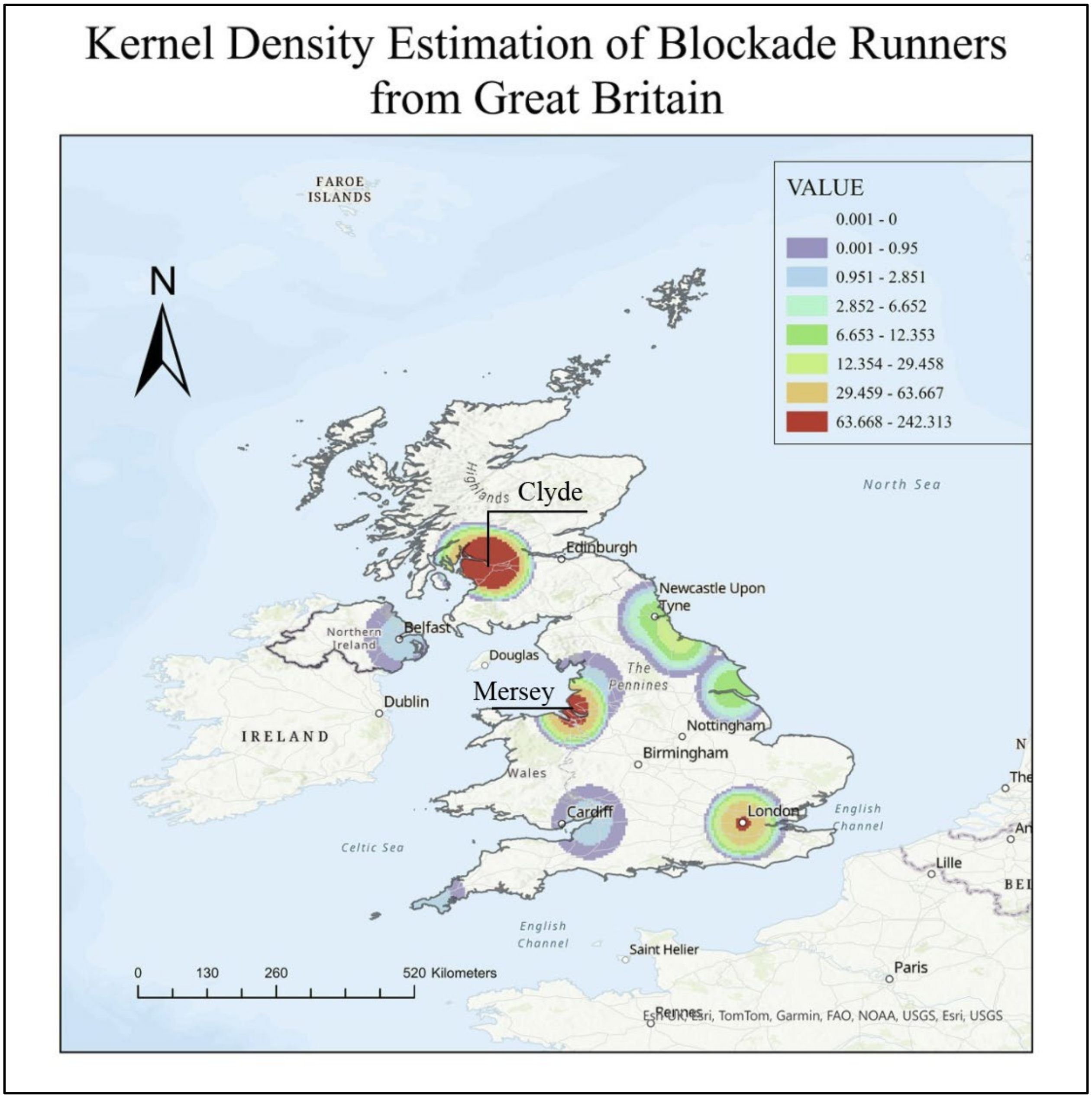

Figure 59. KDE for blockade runners built in Great Britain (*n* =207). Note that largest density, showing the biggest concentration of blockade runners was built along the Clyde, shown as the cluster in the Northwest. The second largest concentration is found along the Mersey, depicted as the center cluster in western England. (Image by Alexander Owens).

North America's KDE shows the dominance of New York's shipyards over others in the data (see Figure 60). Compared to Great Britain's KDE, North America's is sparser. This includes small clusters along the Saint Lawrence River in Canada and patches along the Ohio

River in Cincinnati, Ohio, and Louisville, Kentucky. Distributions also exist inside Maryland, and two small patches exist in Mobile, Alabama, and Charleston, South Carolina.

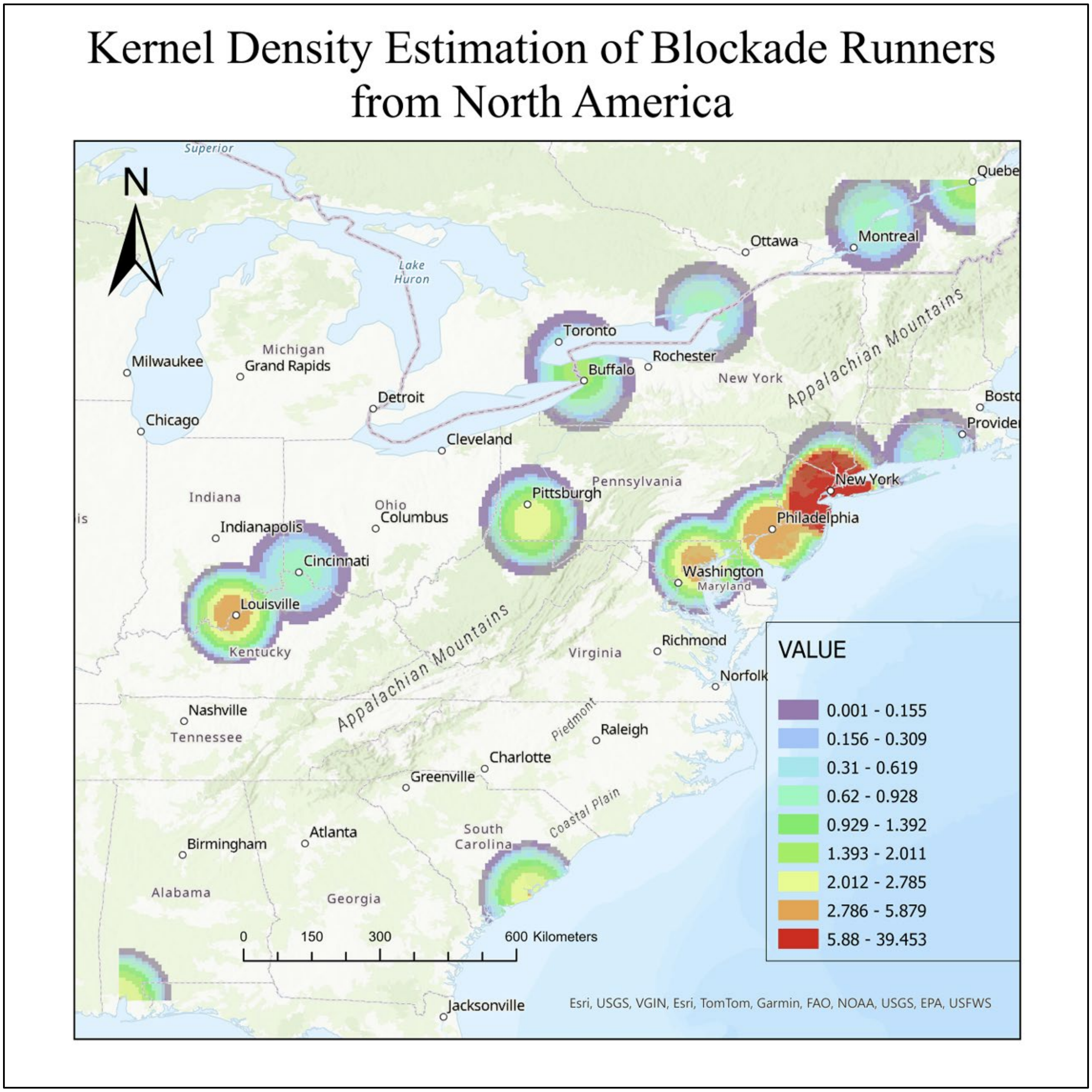

Figure 60. KDE for blockade runners from North America (*n* =61). Note that the largest concentration is found at and around New York. Interestingly there were clusters found along the Ohio River, with two clusters centered around Louisville, Kentucky and Cincinnati, Ohio. (Image made by Alexander Owens).

Another way GIS was utilized was through depicting data on maps over time. The purpose of these was to combine the previously separated conditions of time and space, to better test the efficacy of spatio-temporality in the dataset. The maps through time are also used to better test and illustrate the effect the events of the American Civil War could have on blockade runner production. The method analysis shows that the claims Wise (1988) articulated are accurate, but do not constitute enough difference in time and space to form the creation of vessel types.

Before the conflict emerged, the vessels which would become blockade runners were mainly centered around New York in North America and along the River Clyde (Scotland) in Great Britain (see Figure 61). This rings true to the historical mentions of Clyde-built ships, which were noted as popular blockade runners, like the previously mentioned *Hansa* (1858), *Havelock* (1858), and *Robert E Lee* (1860). There is even more distribution of blockade runners from other parts of Great Britain, like those near London and others in the River Tyne and the River Wear in England. Notably scant in Great Britain is the River Mersey, which has a sparser cluster than other parts of the country. In North America, small pockets of vessels were also made along the Mississippi River, Chesapeake Bay, and more inland.

Vessels the Confederacy could immediately field in the war's beginning were small. Unlike the North, the South lacked much of the infrastructure needed to build blockade-running steamers. Additionally, the politicking between different departments of the Confederacy led to the acquisition of blockade runners, then being relegated to the Confederate Navy, the Ordinance Bureau, and to private citizens willing to take a risky investment (Wise 1988:46-47). With the war just starting, recently built ships were pushed into it on both sides. This includes vessels like *Union* (1861), a New Jersey-built steamer, which was pressed into service while in the port of

Galveston, Texas (Wise 1988:325). In South Carolina, the small pocket represented in Figure 62 represents the construction of *Emma* (1861), a Charleston-built steamer, one of the few ever built in the region (Wise 1988:298).

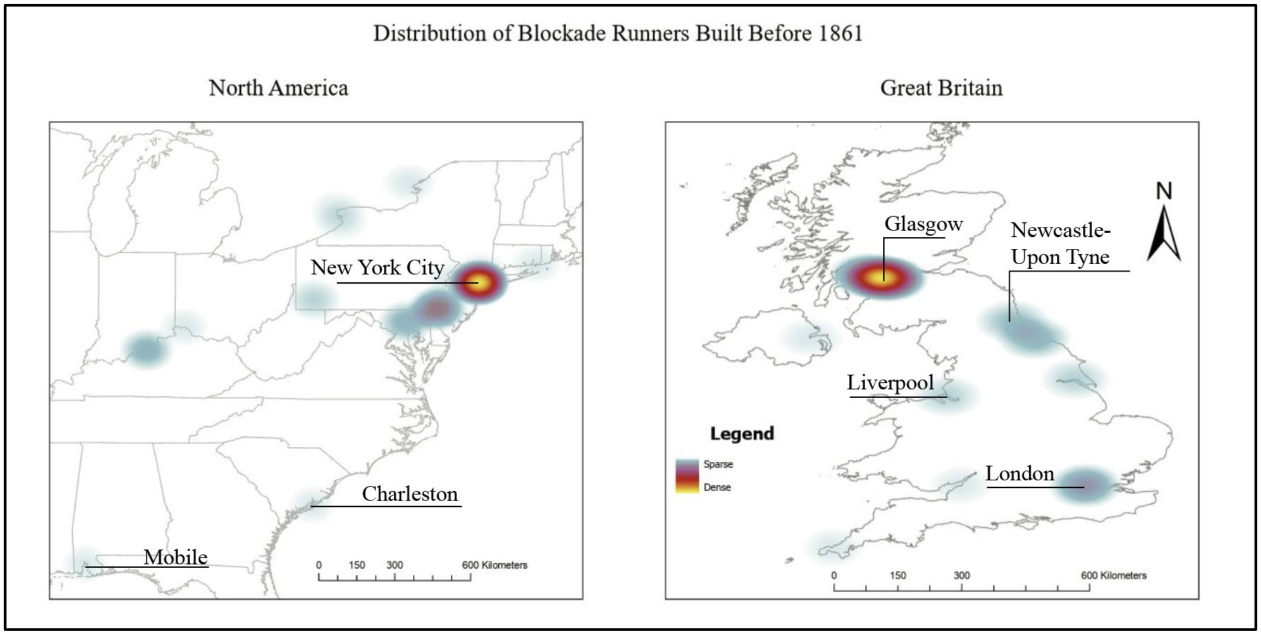

Figure 61. Blockade runners built before 1861 in North America and Great Britian (*n* = 131) (Image by Alexander Owens).

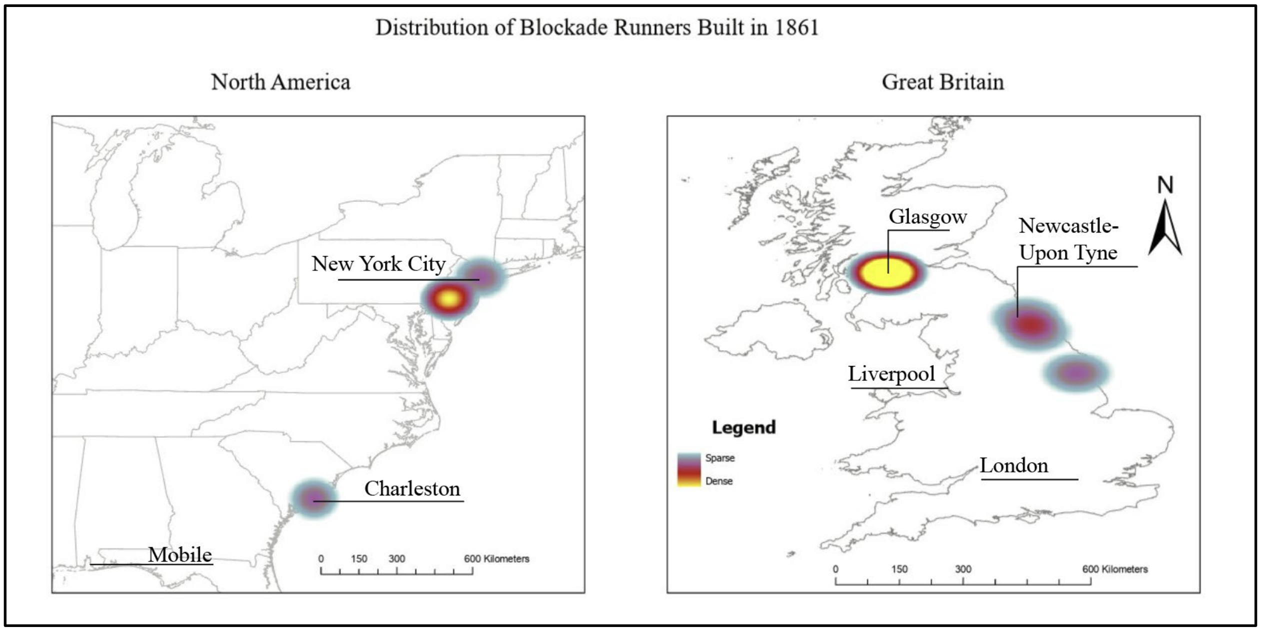

Figure 62. Blockade runners built in 1861 in North America and Great Brittian (*n* = 14). (Image by Alexander Owens).

The Union found difficulty in issuing its blockade with too few vessels ready to serve in the war. North Carolina was noted to only have one blockader until December of 1862 (Wise 1988:25). However, as the Union Blockade Squadron brought in more steam-propelled blockaders, the blockade later became a tangible issue for the Confederacy to face. That year, the most notable loss for the Confederacy was that of New Orleans, Louisina (Wise 1988:80). This was a deep-laden port known as a great cotton exporter, especially before the American Civil War (Wise 1988:80). As Figure 63 shows, there was notable growth in the major shipyards in Great Britain, such as in London, Liverpool, and Glasgow in 1862.

Wise noted that by 1863, many of the newly constructed or converted blockade runners were captured (Wise 1988:138-141). This became known as the “Calamity of 1863” and pushed the Confederacy to acquire more blockade runners. In this same year, there was a tightening of the blockade in and around Charleston, South Carolina. This left Wilmington, North Carolina, as the most important and busiest port in the Confederate States for the remainder of the war. For blockade runner construction, however, the trends of blockade runner production continued in Great Britain (see Figure 64). The production from North America was the result of gunboats, which were captured and converted for blockade running use.

By 1864, several of the British maritime regions dominated blockade runner construction. Blockade runners of Mature and Enlarged types are constructed, such as the Mature type of *Will O' Wisp* (1864), built on the River Clyde, and the Enlarged-type *Hope* (1864), constructed in the River Mersey (Wise 1988:305;327). This may be in reaction to the Calamity of 1863, where more contracts for blockade runners are being fulfilled to react to the ever-increasing demand for goods smuggled into the Confederacy (Wise 1988:117). However, there is not a significant distinction between 1863 and 1864 due to the Calamity of 1863, nor the start of construction by Mature type vessels being built (see Figure 65). The clusters in Great Britain stayed relatively the same between both years, in terms of their density and spatial distribution.

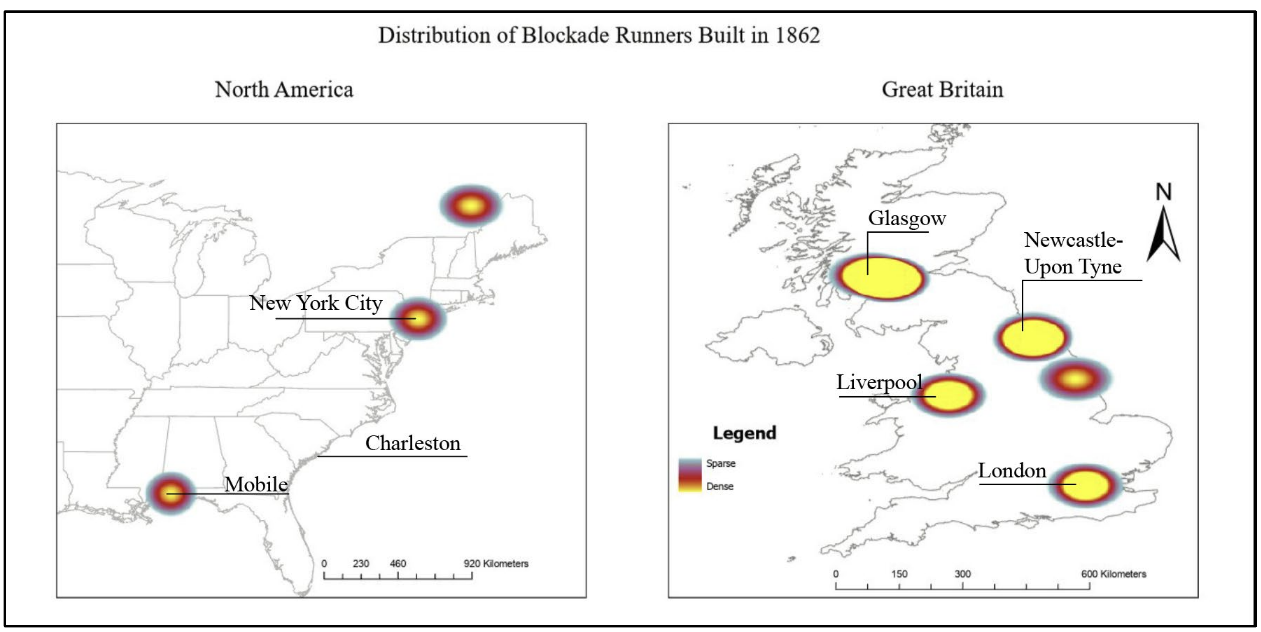

Figure 63. Maps showing the blockade runners built in the year 1862 (n = 21). Note the larger cluster found in the American South, namely New Orleans, LA. In Great Britain, the densities of the clusters appear wider and denser compared to 1861. The cluster along the River Clyde

continues to be a prominent cluster, but the clusters along the River Mersey and the River Thames start appearing as prominent clusters during this year. (Image by Alexander Owens).

Heavily blockaded and with more ports falling to the Union, the Confederacy had less capacity to receive blockade runners, and with the war's end, no ability to make any more (Wise 1988:208). In Great Britain, blockade runner construction drops significantly, with only the three biggest regions, the River Clyde, the River Mersey, and the River Thames, contributing to blockade runner construction (see Figure 66).

The last 23 vessels in 1865 were probably fulfilling contracts (see Figure 66). By February of 1865, Wilmington, NC, was taken by Union troops, and in Charleston, SC, the Confederate forces had retreated from the city (Wise 1988:208-209). With the two remaining ports left vacant, blockade running in 1865 was notably absent.

The geospatial distribution of the blockade runners shows them being built in Canada, the United States, and Great Britain. However, using KDE and spatio-temporal methods, blockade runner production stayed centralized along the British ports of the Rivers Mersey, Clyde, and Thames for most of the war. If there were a purpose-built blockade runner classification, it would have originated in Britain. A Converted blockade runner classification is split between those built either in Great Britain or North America and those built before and during the war. However, a distinct spatio-temporal type does not exist based on the data provided. Instead, regional trends stayed consistent during the war. An alternative conclusion is that regional types could exist, something historians focusing on the British perspective would expect, such as the emphasis on Clyde-built steamers mentioned in Kenneth Davies's *The Clyde Passenger Steamers* (1980).

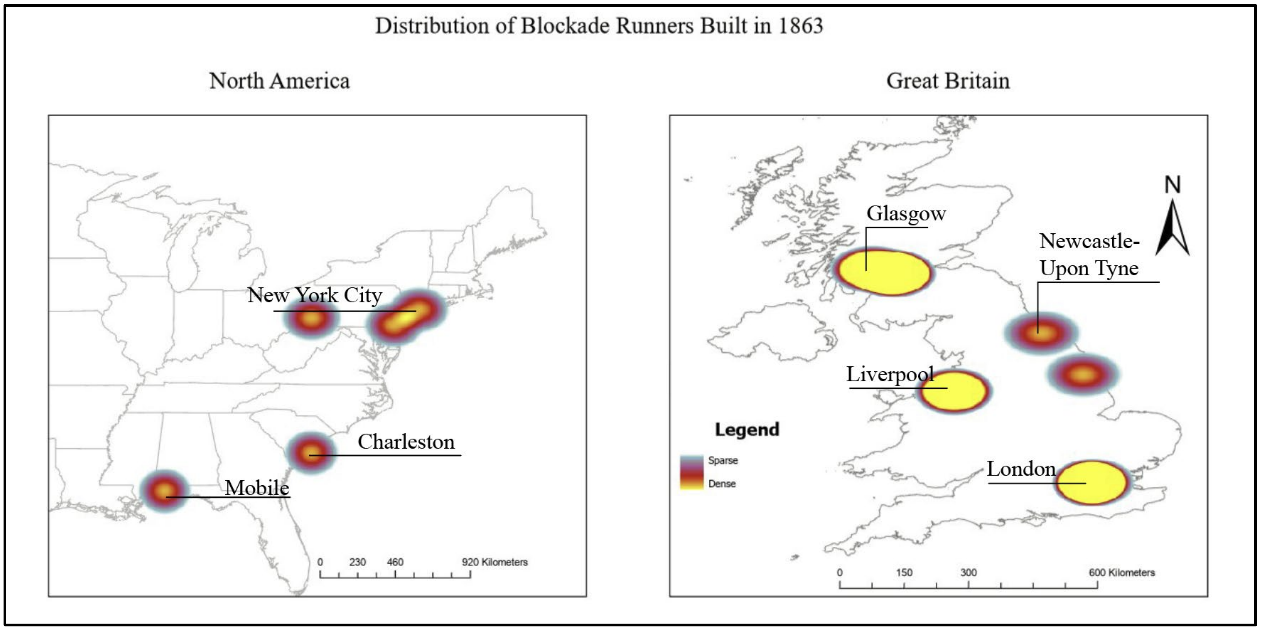

Figure 64. Maps showing the blockade runners built in the year 1863 (n = 41). Note that more North American blockade runners were built during this year compared to 1862. Concentrations in Great Britain remain relatively like those in 1862. (Image by Alexander Owens).

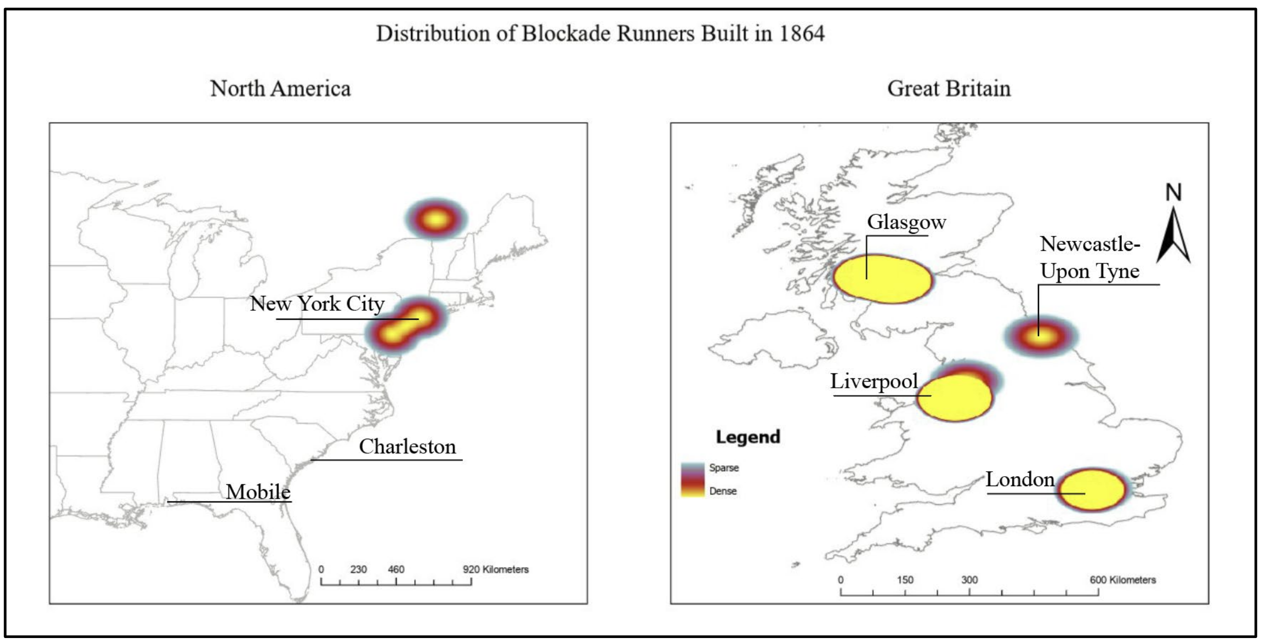

Figure 65. Maps showing the blockade runners built in the year 1864 (n = 69). Note the concentrations in North America decrease in appearance but concentrations in Great Britain stay relatively like those in 1863. (Image by Alexander Owens).

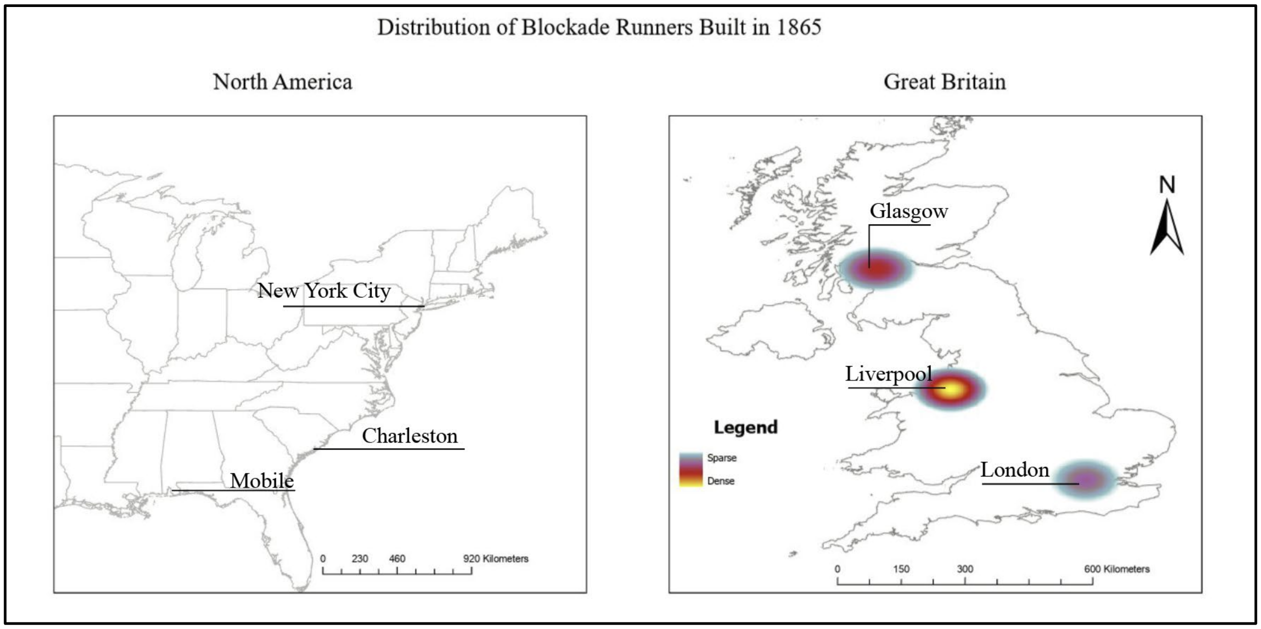

Figure 66. Maps showing the blockade runners built in the year 1865 (n = 23). Note that there are no concentrations in North America and that densities of those in Great Britain are significantly reduced compared to all previous years. (Image by Alexander Owens).

Statistical Analytical Methods

As stated earlier in this chapter, the lack of clear dissections presents a significant problem for interpreting blockade runner types, as defined before. The following section uses different statistical methods to refute existing types. The first is the *k*-means cluster. *K*-means clustering is a method whereby a researcher uses an automated distance method between objects, Euclidean distance, to differentiate between expected clusters. When a researcher believes different clusters exist or not, this method can test if they are statistically significant. Read (2007) noted this method as appropriate when "discovering" and testing a type or typology (Read 2007:136). The reasoning behind this method is that it best fits the type of data by which most of the typology was defined. Great emphasis was given on the relationship of dimensions, especially length, breadth, and depth, which Read (2007:140), stated were appropriate attributes for this method. The other analytical method used is the X^2 association test of independence. This statistical test uses other variables, namely the fields of propulsion and hull type, to determine if they are potential variables with which a new typology could be created. The reason behind this analytical method is that it can find independence between the two ordinal data types to test if they are statistically relevant (Read 2007:140).

When using *k*-means cluster analysis, two tests were given based on the number of clusters expected to be found, also known as *k*. One test of *k*-means analysis was done with four clusters present ($k = 4$), based on what we expect to find from the existing typology, which features four types. Another test of three clusters ($k = 3$), a choice made by the researcher based on the triangular shape of the overall scatterplot (see Figure 68). Both tests were expected to have different results from the distribution of types found in the scatterplot in Figure 67 because of the heavy overlap found there.

In the first test, four clusters ($k = 4$) were distributed somewhat laterally along the depth axis (see Figure 68). Cluster 1 in blue resulted in being in the lower left side of the scatterplot, cluster 2 and 3 were both equally distributed on the Y-axis (the ratio field), but rightward in the X-axis (depth field). Cluster 4 instead formed the top vertex of the dataset, where the ratio axis and depth axis are both higher. This shape and distribution are contrary to the preexisting typology, showing that a vessel’s dimensions were not culturally salient enough for them to be a four-type typology.

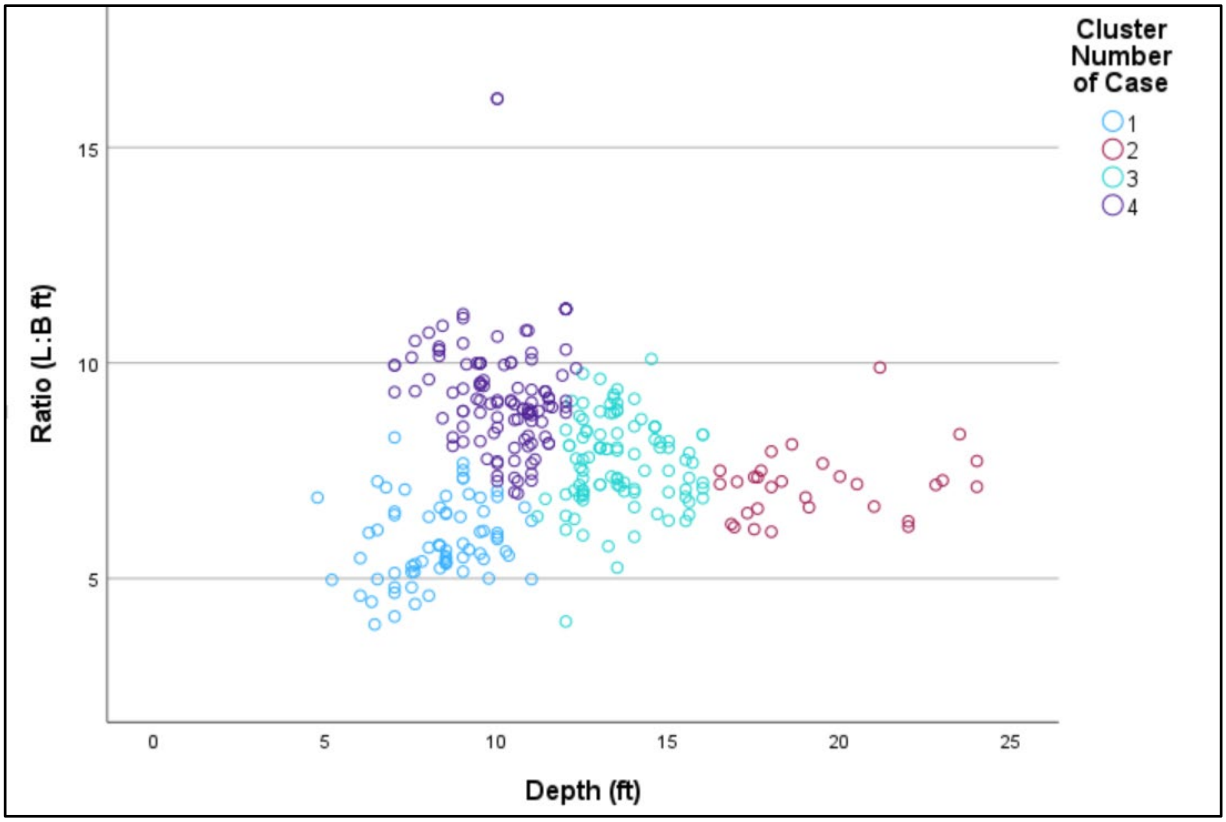

Figure 67. Length-to-breadth ratio and depth scatterplot showing the results of the *k*-means Analysis on the dataset (where $k = 4$, $n = 319$). Cluster 1 is in blue, Cluster 2 is in red, Cluster 3 is in Teal, and Cluster 4 is in purple. (Image by Alexander Owens).

The second test, which used *k*-means, was attempted based on the shape of the data as it presented itself. It appeared to have a concentrated, triangular shape (see Figure 69). However, the clusters of $k = 3$ were distributed more laterally along the x-axis than those of the $k = 4$ test (see Figure 69). This suggests that there is no cultural saliency with these variables combined. Without another attribute to further define a potential cluster based on the existing typology, it appears that it has little to do with the reality found in the database.

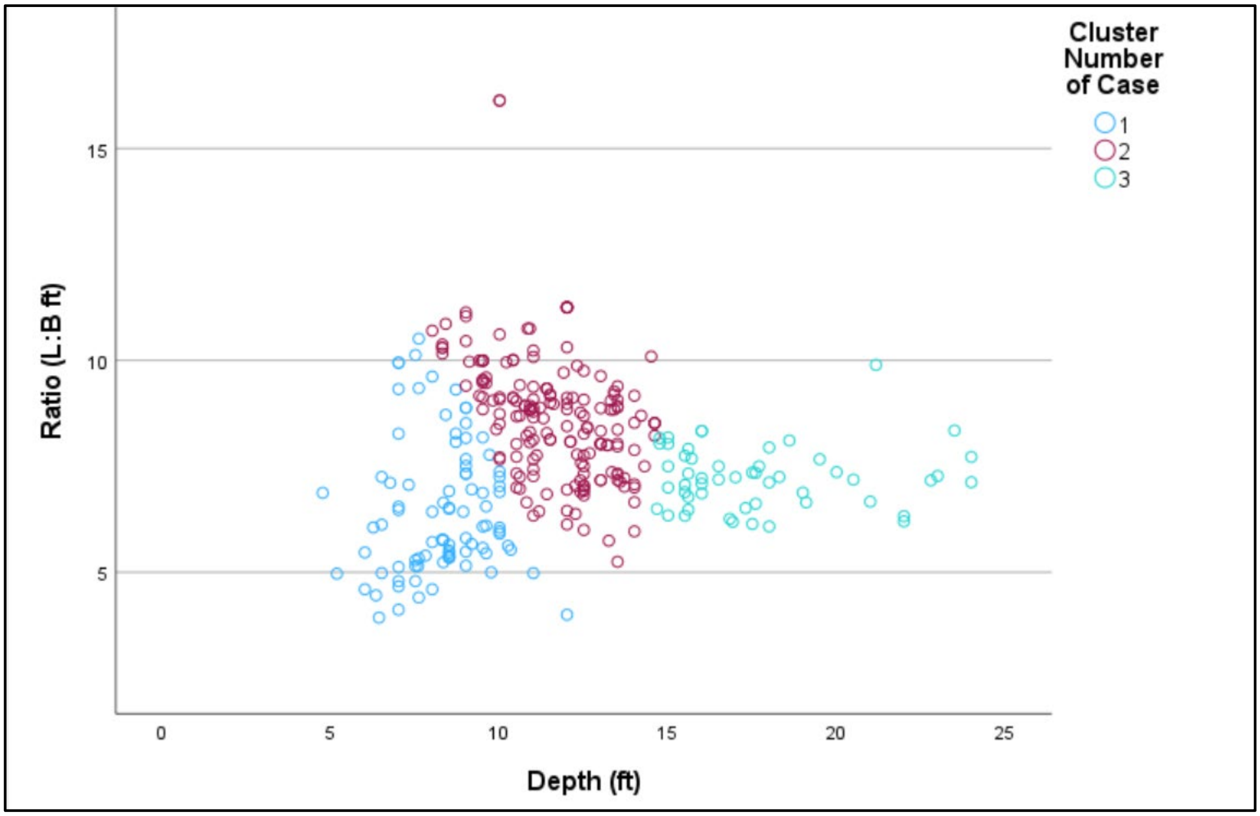

Figure 68. Length-to-breadth ratio and depth scatterplot showing the results of the k-means analysis on the dataset (where $k = 3$, $n = 319$). Cluster 1 is in blue, Cluster 2 is in red, and Cluster 3 is in Teal. (Image by Alexander Owens).

The analysis of the *k*-means clusters found that the existing typology had no shared cultural saliency to the dimensions found in the blockade runner database. As a result, a search was conducted using the other fields, namely hull and propulsion. The X^2 test of independence was chosen based on utilization by multiple archaeologists for its ability to discern the association or independence of the attributes selected (Spaulding 1953; Read 2007). Using statistical means, the test was made to determine these variables' cultural saliency, or significance. This determines if the appearance of association is just a random occurrence or something nonrandom and potentially culturally salient. The results of this analysis are described below.

At first, there appeared to be some association between hull and propulsion fields (see Figures 70-72). The initial test showed that the data with all blockade runners had an X^2 of 21.029 (*df* = 6) and a *p*-value of <0.001. This result indicates a strong association between hull and propulsion for the whole of the dataset, something which could be statistically significant. The *p*-value looked suspicious, appearing like a Type I error, also known as a false negative. After performing a post-hoc test with the Bonferroni Correction on all the cells, it ended up being a Type I Error, meaning there is no association between these variables and nothing significant from the results of the individual cells. When analyzing without the Bonferroni correction, noted with *a* in Figure 69, three field combinations were found to be statistically significant: iron and twin screw; steel and sidewheel; and wood and sidewheel.

After this, the test then split the dataset between American and British nationalities. The American set's hull and propulsion results did not correlate with the variables (see Figure 70). The resulting X^2 value was .194 (*df* = 2) with a *p*-value of .907. This result shows that there is no association between these variables for the American dataset. These attributes should likely be treated independently, resulting in this data not being sufficient to be used in making any types.

The hull and propulsion of the British set initially showed an X^2 value of 24.78 (*df* = 6) with a p value of <0.001 (see Figure 71). Without the Bonferroni Correction, the combined fields of iron and sidewheel and steel and sidewheel were the only ones shown to be statistically significant. However, applying the Bonferroni correction, the British set also resulted in a Type I Error, suggesting no association between these variables for the British dataset.

Although the results of the X^2 test show that the null hypothesis that these associations result from something potentially random, it is essential to note the limitations of such a method. The first is the small size of the dataset. For the X^2 test to be best utilized, each cell of the test will ideally have more than a count of 5, which may have distorted the results of the X^2 test. This is especially true for the small amount of data being tested, at 350 vessels. Another thing to note is that the Bonferroni correction was set at a p-value of 0.05, but by the factor of the number of cells being tested. Although the p-value of 0.05 is standard for environmental and biological data, it is unknown if it should have been utilized here in as study with a small dataset.

The first statistical method was meant to test if the existing typology could be found using k-means cluster analysis. The current typology failed again, mainly because the large dataset overlap made it unlikely that anything could be ascertained. Although X^2 provided results that could later be interpreted as possible classifications, there currently lacks evidence that this is salient enough to be a typology. In the future, some of the combinations, like the British combinations of iron and sidewheel and steel and sidewheel, could be used to better understand British ships in the period. These possible classifications should be compared to a wider database of all Clydeside and Merseyside ships of a period, in order to understand existing styles of the mid-nineteenth century.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Hull * Propulsion	288	90.3%	31	9.7%	319	100.0%

Hull * Propulsion Crosstabulation

			Propulsion			
			sc	sw	ts	Total
Hull	c	Count	5a	5a	0a	10
		% within Hull	50.0%	50.0%	0.0%	100.0%
		Adjusted Residual	2.5	-1.7	-.9	
	i	Count	40a	115a	22b	177
		% within Hull	22.6%	65.0%	12.4%	100.0%
		Adjusted Residual	1.7	-3.8	3.9	
	s	Count	1a	31b	0a, b	32
		% within Hull	3.1%	96.9%	0.0%	100.0%
		Adjusted Residual	-2.5	3.2	-1.7	
	w	Count	10a, b	59b	0a	69
		% within Hull	14.5%	85.5%	0.0%	100.0%
		Adjusted Residual	-1.2	2.7	-2.7	
Total		Count	56	210	22	288
		% within Hull	19.4%	72.9%	7.6%	100.0%

Each subscript letter denotes a subset of Propulsion categories whose column proportions do not differ significantly from each other at the .05 level.

Figure 69. Chi-square processing results of the whole dataset (*n* = 314) based on hull and propulsion fields. (Image by Alexander Owens).

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Hull * Propulsion	72	83.7%	14	16.3%	86	100.0%

Hull * Propulsion Crosstabulation

			Propulsion		
			sc	sw	Total
Hull	c	Count	0	1	1
		Expected Count	.1	.9	1.0
	i	Count	1	12	13
		Expected Count	1.3	11.7	13.0
	w	Count	6	52	58
		Expected Count	5.6	52.4	58.0
Total		Count	7	65	72
		Expected Count	7.0	65.0	72.0

Figure 70. Chi-square processing results of the American dataset (n = 86) based on hull and propulsion fields. Single screw is represented by ‘sc’, sidewheel by ‘sw’, composite hulls by ‘c’, iron hulls by ‘i’, and wooden hulls by ‘w’ (Image by Alexander Owens).

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Hull * Propulsion	204	92.7%	16	7.3%	220	100.0%

Hull * Propulsion Crosstabulation

			Propulsion			
			sc	sw	ts	Total
Hull	c	Count	5a	4a	0a	9
		Expected Count	2.0	6.0	.9	9.0
		% within Hull	55.6%	44.4%	0.0%	100.0%
		Adjusted Residual	2.4	-1.5	-1.0	
	i	Count	37a, b	100b	21a	158
		Expected Count	35.6	106.1	16.3	158.0
		% within Hull	23.4%	63.3%	13.3%	100.0%
		Adjusted Residual	.6	-2.2	2.6	
	s	Count	1a	31b	0a	32
		Expected Count	7.2	21.5	3.3	32.0
		% within Hull	3.1%	96.9%	0.0%	100.0%
		Adjusted Residual	-2.9	3.9	-2.1	
	w	Count	3a	2a	0a	5
		Expected Count	1.1	3.4	.5	5.0
		% within Hull	60.0%	40.0%	0.0%	100.0%
		Adjusted Residual	2.0	-1.3	-.8	
Total		Count	46	137	21	204
		Expected Count	46.0	137.0	21.0	204.0
		% within Hull	22.5%	67.2%	10.3%	100.0%

Each subscript letter denotes a subset of Propulsion categories whose column proportions do not differ significantly from each other at the .05 level.

Figure 71. Chi-square processing results of the British dataset (n = 220) based on hull and propulsion fields. The field ‘ts’ reflects twin screw propulsion. (Image by Alexander Owens).

Conclusion

The typologies of blockade runners proposed in the past do not fit the processual definition of a typology and fail the methods of identifying one. The typology has been tested using the standards of coherence in creation, distinct dissentions (lack of dataset overlap), and coherence in spatio-temporal contexts. In all areas, the existing typology fails these tests. The method of identifying blockade runner types based on dimensions was incorrect. Additionally, it is incorrect to define types based on their distinct attribute types, thereby isolating each type from the others. The existing typology, as a result, fails the other types. Significant data set overlaps plague the analytical tests of space and time, as well as those of *k*-means. However, a statistical test revealed that a classification could be made using the attributes of the hull and propulsion fields. This indicates that further work is needed to define Civil War blockade runners.

One of the reasons the typologies failed, is because they were based primarily on contributions by Confederates, not by the British manufacturers. Prior historians like Wise (1988), were basing their assumptions on Confederate figures like Bulloch (1884) and Wilkinson (1887). Quotes from blockade runner captains like Thomas Taylor describe the creation of blockade runners like *Banshee* (1862) as a “landmark of blockade history”, instead of as a product of the wider trends of British steamship production (Taylor 1896:33). This way of thinking of blockade history in isolation of its wider British context, should be disregarded.

Future work should focus on the trends identified in Chapter 5 or the substantial amount of data still missing from the current dataset. One way to circumvent this is to create a research question that directly applies to the most studied blockade runner locations, such as those built along the Clyde. Blockade runners have been examined, mostly like how Another fruitful area of research would be to compare blockade runners to all ships made in their region and time, not just those identified as blockade runners. A statistical test with more data and different functions could reveal whether blockade runners are distinct in their construction during the period.

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Appendix A. Blockade Runner Database

Below are the important categories for the blockade runners. Sections not included were those regarding tonnage, acquirers, acquirer company, and area of operation. Proposed types are abbreviated where A is Converted, B is Extreme, C is Mature, and D is Enlarged. All measurements are given in feet. Hull are abbreviated where “i” is iron construction, “s” is steel construction, “w” is wooden construction, “c” is composite, and “u” is where there was no data. Propulsion abbreviations are “sw” as sidewheel, “sc” as single screw, “ts” as twin screw, and “u” is where there was no data.

Name	Types	Ex. Name	Builder	Build Location	Build Year	Length	Breadth	Depth	Hull	Propu-lsion
A.J. Whitmore	A	Fox, Fanny	Thomas Collyer	New York, NY	1857	180	28	8.92	w	sw
Abigal	BD		William C. Miller and Sons	Liverpool, England	1865	250	30	13	s	sw
Acadia	AC		Jacques Felix Lincennes and William McNaughton	Sorel, Quebec, Canada	1864	211.92	31.09	12.5	u	sw
Adela	ABC		J. & G. Thomson	Govan, Scotland	1859	211	23.5	12	i	sw
Adelaide	U		No Data	No Data	No Data	No Data	No Data	No Data	i	sc
Adler	A		No Data	Newcastle, England	1857	176.4	25.6	15.5	i	sc
Advance	ABC	Lord Clyde, Frolic	Caird and Company	Greenock, Scotland	1862	236	26	10	i	sw
Adventure	BD	Tientsin, Amazona	Denny and Company	Dumbarton, Scotland	1865	250	30	16	i	ts
Agnes E. Fry	BC	Roe, Fox	Caird and Company	Greenock, Scotland	1864	236.6	25.2	13.5	i	sw
Agnes Louisa	BCD	Grapeshot	No Data	No Data	1864	243.8	25	12.5	i	sw

Ajax	N	Olustee	William Denny and Brothers	Dumbarton, Scotland	1865	176	25	12.5	i	ts
Alabama (I)	AC		Samuel Sneden	Brooklyn, NY	1859	226	32	7.3	i	sw
Alabama (II)	A	Rangoon	No Data	Newcastle, England	1860	No Data	No Data	No Data	u	u
Albatross	BC		Laird and Sons	Birkenhead, England	1865	240	30	13.2	s	sw
Alert	AB		No Data	Hull, England	1855	176	21.4	10.8	u	u
Alexandria	N	Mary	William C. Miller and Sons	Liverpool, England	1862	145	20	10.6	w	sc
Alice	ABC	Sirius	Caird and Company	Greenock, Scotland	1857	231.6	26.2	13.4	i	sw
Alice Vivian	A		No Data	New Albany, IN	1856	175	32	6	w	sw
Alliance	A		Tod and MacGregor	Glasgow, Scotland	1856	140	30	7	i	sw
Amelia	U		James Brown	No Data	1864	No Data	No Data	No Data	u	sc
Anglia	A	Anglica, Admiral Du Pont	Ditchburn and Mare	West Ham, England	1847	195	28	12.5	i	sw
Ann	A		Richardson, Duck, and Company	Stockton-on-Tees, England	1860	175	28.5	17.5	i	sc
Annie	N	Pallas, Preston, Rover	John and William Dudgeon	London, England	1863	170	23.09	13.33	i	ts
Annie Childs	A	North Carolina, Julie Usher, T.D. Wagner	Novelty Iron Works	New York, NY	1860	169.5	29.5	13.24	i	sc
Antona	A		Neilson and Company	Whiteinch, Glasgow, Scotland	1859	166.9	23.1	13.7	i	sc
Arabian	A		Niagara Harbor Company	Niagra, Ontario, Canada	1851	174	24	18.3	w	sw
Aries	N		James Laing	Deptford, Sunderland, England	1862	202.3	27.6	15.6	i	sc

Arizona	A	Carolina	Harlan and Hollingsworth	Wilmington, DE	1859	201	34	10	i	sw
Armstrong	BC		Wingate and Company	Whiteinch, Glasgow, Scotland	1864	230	26.5	10.5	i	sw
Atalanta	BC	CSS Tallahassee, Olustee, Chameleon, Amelia, Haya Maru	John and William Dudgeon	London, England	1863	220	24	14	i	ts
Atlantic	AC	Elizabeth	Thomas Collyer	New York, NY	1852	216	28	10	u	sw
Austin	A	Donegal	Harlan and Hollingsworth	Wilmington, DE	1860	203	34	10	i	sw
Austrian	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Badger (I)	BC		Jones, Quiggin and Company	Liverpool, England	1864	218	24.3	11.6	c	sw
Badger (II)	BC		No Data	No Data	No Data	218	24	11	i	sw
Bahama	C		Pearse	Stockton-on-Tees, England	1862	215	29.2	20	i	sc
Banshee (I)	BC		Jones, Quiggin and Company	Liverpool, England	1863	214	20	8	c	sw
Banshee (II)	BD		Aitken and Manswell	Kelvinhaugh, Glasgow, Scotland	1864	252	31	11	s	sw
Bat	BC	Teazer, Miramichi	Jones, Quiggin and Company	Liverpool, England	1864	230	26	9.5	s	sw
Beatrice	N		McNab	Greenock, Scotland	1863	167.5	24.1	12	i	sc
Bendigo	B	Milly	No Data	No Data	No Data	162.1	20.1	10.9	i	sw
Bermuda	BC	Czar, Bahamas	Pearse and Lockwood	Stockton-on-Tees, England	1861	211	21.33	21.17	i	sc
Blenheim	AC	Richmond	No Data	Glasgow, Scotland	1848	210	30.6	16	u	sw

Boston (I)	A	Nashua	No Data	Quebec, Canada	1852	170	22	10.5	u	sw
Boston (II)	A		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Britannia	N		Barclay, Curle and Company	Glasgow, Scotland	1862	189	26	11	i	sw
British Queen	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
C. Vanderbilt	A	Black Joker	Bishop Simonson	New York, NY	1837	170.6	23.3	9	w	sw
Caledonia	A		Tod and MacGregor	Glasgow, Scotland	1856	No Data	No Data	No Data	i	sw
Calhoun	A	General Sedwick	Lawrence Sneden	New York, NY	1851	174.3	27.5	11	w	sw
California	A		No Data	New York, NY	1847	204.5	29.58	8.5	w	sw
Calypso	A	Winchester	William Denny and Brothers	Dumbarton, Scotland	1855	190.3	27.1	13.7	i	sc
Cambria	A		Thomas Toward	Newcastle, England	1854	157	21.9	22.8	i	sc
Carolina	A		No Data	Philadelphia, PA	1861	128	23.9	8.5	u	sw
Caroline	BC		William Denny and Brothers	Dumbarton, Scotland	1864	225	28	13	i	sw
Cecile	A		Harlan and Hollingsworth	Wilmington, DE	1857	156.5	29	8.5	i	sw
Celt	U		Steam Celt Company of Charleston	Charleston, SC	1863	No Data	No Data	No Data	w	sw
Ceres	N		John and William Dudgeon	London, England	1863	173	22.83	12.42	i	ts
Charles Morgan	AC		Jacob A. Westervelt	New York, NY	1854	220.2	34	15.6	w	sw
Charleston	A		No Data	No Data	1836	124	22.5	8.5	w	sw
Charlotte	BC		Archibald Denny and Brothers	Dumbarton, Scotland	1864	226.3	28.2	13	i	sw
Chatham	A	Agnes Mary	Laird	Birkenhead, England	1838	115	24	7.5	i	sw

Chicora	BC	Let Her Be	William C. Miller and Sons	Liverpool, England	1864	221	26	10	s	sw
Circassian	ABC D		Robert Hickson and Co.	Belfast, Ireland	1856	242	29	23.5	i	sc
City of Petersburg	BC	Roe (I)	Caird and Company	Greenock, Scotland	1863	223	25	13.5	i	sw
City of Richmond	BC		John and William Dudgeon	London, England	1864	230	27	14.6	i	sw
Clifton	AC		Jeremiah Simonson	Brooklyn, NY	1861	210	40	13.5	w	s
Colonel Lamb	BD		Jones, Quiggin and Company	Liverpool, England	1864	279	36	15.5	s	sw
Columbia	N		Archibald Denny and Brothers	Dumbarton, Scotland	No Data	168	24	14	i	sc
Condor	BD		Randolph, Elder and Co.	Govan, Scotland	1861	270	24	12	i	sw
Constance	B	Constance Decima	John Scott and Sons	Greenock, Scotland	1864	201.4	20.15	9.4	w	sw
Coquette	BC	Maryland	Hoby and Son	Renfrew, Scotland	No Data	228	25	12.17	i	ts
Cornubia	AB	New England	Harvey and Son	Hayle, England	1858	190	24.5	12.5	i	sw
Crescent	N	Nita	No Data	No Data	No Data	146	22.3	7	w	sw
Cronstadt	A		Martin Samuelson and Co.	Kingston, Ontario, Canada	1859	149.4	21.6	12.5	u	sw
Cuba	AD		Samuel Sneden	Greenpoint, New York	1854	250	32.6	9	w	sw
Cumberland d	C		No Data	No Data	No Data	232.5	31	14.3	u	sw
Curlew	BC		Jones, Quiggin and Company	Liverpool, England	1865	225	24	11	s	sw
Dee	N	Aurora	John and William Dudgeon	London, England	1863	165	23	13	i	ts
Deer	BC	Palmyra	W. H. Potter and Co.	Liverpool, England	1864	230	26.17	11	s	sw

Denbigh	AB		Laird and Sons	Birkenhead, England	1860	182	22	8.7	i	sw
Despatch (I)	U		No Data	Liverpool, England	No Data	No Data	No Data	No Data	u	u
Despatch (II)	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Diamond	A		James Henderson	Renfrew, Scotland	1853	No Data	No Data	No Data	i	sw
Dolphin	AB	Annie	Robert Napier	Glasgow, Scotland	1844	170.2	21.2	10.5	i	sw
Don	N	Diana	John and William Dudgeon	London, England	1863	162	23	12.25	i	ts
Douro	U		No Data	No Data	No Data	No Data	No Data	No Data	i	sc
Dream	BC		W. H. Potter and Co.	Liverpool, England	1864	231	26	11.2	s	sw
Druid	AB		Barclay, Curle and Company	Glasgow, Scotland	1857	160.1	20.6	9.7	i	sw
Eagle	AB	Jeanette	Denny and Company	Dumbarton, Scotland	1852	169.9	16.5	8.3	i	sc
Economist	A	Bonita	Archibald Denny and Brothers	Dumbarton, Scotland	1860	191	26	17.6	i	sc
Edith	N	Chickamauga	John and William Dudgeon	London, England	1864	175	25	15	i	ts
Ella (I)	A	Philippi	No Data	Brooklyn, NY	1863	150	23	8.5	w	sw
Ella (II)	BC		William Denny and Brothers	Dumbarton, Scotland	1864	225	28	13	i	sw
Ella Warley	AC	Isabel	S. H. Duncan	Baltimore, MD	1848	220	33	21	w	sw
Elsie	B		John Scott and Sons	Greenock, Scotland	1864	201.4	20.15	9.5	i	sw
Emily (I)	A		William Simons and Co.	Renfrew, Scotland	1863	181	22.4	12.1	i	sc
Emily (II)	BC		William Denny and Brothers	Dumbarton, Scotland	1864	255	34	16.5	i	sw
Emma (I)	U		No Data	Charleston, SC	1861	150	30	9.75	w	sw

Emma (II)	B		Barclay, Curle and Company	Glasgow, Scotland	1862	164.5	21.2	11.1	i	sc
Emma (III)	U		Denny and Company	Dumbarton, Scotland	1865	No Data	No Data	No Data	u	u
Emma Henry	BC		J. & G. Thomson	Govan, Scotland	1864	211	25.2	9.9	i	sw
Enterprise (I)	A		No Data	Brownsville, PA	1852	172.17	26.5	8.5	w	sw
Enterprise (II)	BD	Yangtze, Brazil	Denny and Company	Dumbarton, Scotland	1865	250	30	16	i	ts
Eugenie	BC		Martin Samuelson and Co.	Hull, England	1862	235	24.2	11.9	i	sw
Evelyn	BD		Randolph, Elder and Co.	Govan, Scotland	1864	270	24	12	i	sw
Fairy	N		J. & G. Thomson	Govan, Scotland	1861	149.33	21	6.75	i	sw
Falcon	BD		Randolph, Elder and Co.	Govan, Scotland	1864	270	24	12	i	sw
Fannie	ABC	Orion	Caird and Company	Greenock, Scotland	1859	231.5	26.2	13.3	i	sw
Fanny	A	A.J. Whitmore, Fox	Thomas Collyer	New York, NY	1857	180	28	8	w	sw
Fingal	A		J. & G. Thomson	Govan, Scotland	1861	178	25	18	i	sc
Flamingo	BD		Randolph, Elder and Co.	Govan, Scotland	1864	270	24	12	i	sw
Flora (I)	N	Virginia, Cape Fear	John and William Dudgeon	London, England	1862	161.3	22.5	12.4	i	ts
Flora (II)	ABC		John Scott and Sons	Greenock, Scotland	1858	215	25.7	13.5	i	sw
Flora (III)	U		No Data	No Data	No Data	No Data	No Data	No Data	i	sw
Flora (IV)	AB	Rouen	Millwood	London, England	1853	178.5	20.1	9	u	u
Florence	BD		Aitken and Manswell	Kevinhaugh, Glasgow, Scotland	1864	252	25	11	i	sw

Florida (I)	A		E.S. Whitlock	Greenpoint, New York	1859	180	31	9	w	sc
Florida (II)	N	Oreto, Manassas	William C. Miller and Sons	Liverpool, England	1862	191	27	14	w	sc
Florie	BC		Wingate and Company	Whiteinch, Glasgow, Scotland	1863	222.4	23.5	9.6	i	sw
Fox	BC		Jones, Quiggin and Company	Liverpool, England	1864	219	22	10.2	s	sw
G. T. Watson	N	Kate (II)	John and William Dudgeon	London, England	1863	165	22.5	13.5	i	ts
Galveston	AC	General Quitman	Jeremiah Simonson	Brooklyn, NY	1857	236	37	12.25	i	sw
Gem	AB		James Henderson	Renfrew, Scotland	1854	161	15.9	7.5	i	sw
General Buckner	A	Eugenie, Glasgow	No Data	Keyport, New Jersey	1862	119.2	22.1	7.8	u	sw
General Clinch	A		James Poyas	Charleston, SC	1839	131	24	8.5	w	sw
General Miramon	A	Pagnes Coneo, Elizabeth	No Data	Glasgow, Scotland	1859	133.5	24.5	9.6	u	u
General Moultrie	A		William Collyer	New York, NY	1856	150	26.67	10.25	w	sc
General Rusk	A	Blanche	Harlan and Hollingsworth	Wilmington, DE	1857	200	31	12	i	sw
General Whiting	N	Rafael	No Data	No Data	No Data	199.5	30	19.1	u	u
Georgia	ABC	Virginian, Japan	Denny and Company	Dumbarton, Scotland	1863	219	27.25	14.75	c	sc
Georgia Belle	BD		Jones, Quiggin and Company	Liverpool, England	1864	250	28	10.75	s	sw
Georgiana	BC		J. G. Lawrie and Co.	Whiteinch, Glasgow, Scotland	1862	205.5	25.17	14.75	i	sc
Georgiana McCaw	A	Dundalk	Robert Napier and Sons	Govan, Scotland	1844	No Data	No Data	No Data	i	sw

Gertrude	N		Barclay, Curle and Company	Glasgow, Scotland	1863	156	21	11	i	sc
Gibraltar	A	Habana, Gibraltar	Reaney Neaffie	Philadelphia, PA	1859	170.9	28.1	18	w	sc
Gladiator	A		Pearse	Stockton-on-Tees, England	1860	195	27.5	16	i	sc
Granite City	N	City of Dundee	Archibald Denny and Brothers	Dumbarton, Scotland	1862	160	23	9.17	i	sw
Grey Jacket	N		Thomas Meaher	Mobile, Alabama	1863	165.5	24	10	w	sw
Greyhound	B		Kirkpatrick, McIntyre and Co.	Greenock, Scotland	1863	201.4	22.7	13	i	sc
Habanero	U	Montgomery	No Data	No Data	No Data	No Data	No Data	No Data	u	u
Hansa	AB		No Data	Glasgow, Scotland	1858	177	22.2	No Data	u	sw
Harriet Pinkney	N	Lela	No Data	Middlesborough, England	1862	191.3	28.9	17.6	c	sw
Hattie	BC		Caird and Company	Greenock, Scotland	1864	219.4	20.2	8.4	i	sw
Havana	A	Acorn	Allison Builders	Hoboken, New Jersey	1855	115.3	22.5	7	u	sc
Havelock	ABC	General Beauregard	J. and G. Thomson	Govan, Scotland	1858	223.17	26.17	14	i	sw
Hawk	BD		Henderson and Coulbron	Renfrew, Scotland	1864	254	28	12.5	w	sc
Hebe	N		John and William Dudgeon	No Data	1863	165	23	13.5	i	ts
Helen	BC		No Data	No Data	1864	230.2	25.9	13.5	i	sw
Helen Denny	BC		A. J. Inglis	Glasgow, Scotland	1864	212.8	25.2	12	i	sw
Herald (I)	ABC	Antonica	John Reid and Co.	Port Glasgow, Scotland	1851	222	22	14.5	i	sw
Herald (II)	A	Exhange	No Data	Baltimore, MD	1839	115	24	7	w	sw

Hercules	N	Vicksburg	Denny and Company	Dumbarton, Scotland	1865	176	25	12.5	i	ts
Hero	C		W. Earle	Hull, England	1861	224.3	29.2	15.7	i	sc
Heroine	B		No Data	Glasgow, Scotland	1862	179	19.2	7	i	sw
Hope	BD	Churruca	Jones, Quiggin and Company	Liverpool, England	1864	281	35	15	s	sw
Hornet	BD		Jones, Quiggin and Company	Liverpool, England	1865	250	28	10.9	s	sw
Ida	N		No Data	No Data	No Data	70	17	7	w	sw
Imogene	BC		Denny and Company	Dumbarton, Scotland	1865	225	28	13.5	i	sw
Index	BC		No Data	Deptford, England	1863	208.8	25.7	11.5	u	u
Iona (I)	ABC		J. and G. Thomson	Govan, Scotland	No Data	225.2	20.4	9	i	sw
Iona (II)	AD		J. and G. Thomson	Govan, Scotland	1863	249.2	25	9.1	i	sw
Isabel	A		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Ivanhoe	B		John Scott and Sons	Greenock, Scotland	1864	201.4	20.15	9.5	i	sw
James Battle	AC		No Data	New Albany, IN	1860	209	34.5	6.25	w	sw
James L. Day	A		No Data	New York	1843	187	25.5	9	w	sw
Jamestown	AC		Jacob Westervelt	New York, NY	1852	240	33	23	w	sw
Jeanette	B	Eagle	Denny and Company	Dumbarton, Scotland	1865	169.9	16.5	8.3	i	sw
Julia	BC		William Simons Co	Renfrew, Scotland	1863	210	23.2	9.8	i	sw
Juno (I)	A	Helen	Tod And MacGregor	Glasgow, Scotland	1860	No Data	No Data	No Data	u	u
Juno (II)	AB		G.K. Stuthart and Co.	Bristol, England	1853	163.2	19.7	11.4	i	sw
Jupiter (I)	AB		Tod And MacGregor	Glasgow, Scotland	1856	184.9	18.2	8.3	i	sw

Jupiter (II)	AB		Miller, Ravenill and Co.	Blackwall, England	1849	163.5	17	8	i	sw
Kate (I)	A		Samuel Sneden	Greenpoint, New York	No Data	165	29.83	10.33	w	sw
Kate (II)	N		John and William Dudgeon	London, England	1863	165	22.6	13.5	i	ts
Kate Dale	A		No Data	New Albany, IN	1855	193.75	37	8.33	w	sw
Kate Gregg	ABC	Stag	Denny and Company	Dumbarton, Scotland	1854	213.5	23.6	13.3	u	u
Kelpie	AB		Tod And MacGregor	Glasgow, Scotland	1857	191	18	10	u	sw
Kenilworth	B		John Scott and Sons	Greenock, Scotland	1864	201.4	20.15	9.5	i	sw
Lady Sterling	BCD		Scott Russell	Blackwall, England	1864	241	26	13.4	i	sw
Lark	BC		Laird and Sons	Birkenhead, England	1864	210	23	10.4	s	sw
Laura	N		No Data	No Data	No Data	121	22.7	7.6	w	sw
Laurel	C	Confederate States	A. J. Inglis	Glasgow, Scotland	1863	207	27	10	i	sc
Lavinia	A	Harriet Lane	William H. Webb	New York, NY	1857	180	30	12.5	w	sw
Lelia	BD		William C. Miller and Sons	Liverpool, England	1865	252	30	12.6	s	w
Leopard	ABC	Stonewall Jackson	Denny and Company	Dumbarton, Scotland	1857	222	27	14.6	i	sw
Let Her Run	U		No Data	No Data	1864	No Data	No Data	No Data	u	sw
Leviathan	A		Raney and Son	Chester, PA	1863	120	30	12	u	sc
Lilian	BC		J. and G. Thomson	Govan, Scotland	1864	225	26	11	i	sw
Little Ada	N		William Simons and Co.	Renfrew, Scotland	1864	112	18.5	10	i	sc
Little Hattie	BC		J. and G. Thomson	Govan, Scotland	1864	226	26	10.6	i	sw
Little Lilly	A	Flushing, Nan Nan	No Data	Brooklyn, NY	1860	156.33	27.13	8.33	i	sw
Lizzie (I)	U		No Data	No Data	No Data	89	20.2	7.6	u	u

Lizzie (II)	BC		Henderson and Coulbron	Renfrew, Scotland	1864	230	22	9	i	sw
Lizzie Davis	N		No Data	Mobile, Alabama	1862	115	25	6	w	sw
Lloyd	U	Sea Queen	J. Pile and Co.	West Hartlepool, England	1862	No Data	No Data	No Data	i	sc
Lodona	N		No Data	No Data	1862	204.2	28.4	16.5	i	sc
Louisa Ann Fanny	D		No Data	London, England	1865	250	15.5	10	i	ts
Lucy	BC		Jones, Quiggin and Company	Liverpool, England	1863	215	20	10.83	s	sw
Luna	U	Witch	No Data	No Data	No Data	No Data	No Data	No Data	u	sw
Lynx	BC		Jones, Quiggin and Company	Liverpool, England	1864	220	24	11.5	s	sw
Magnolia	AD		Jeremiah Simonson	Greenpoint, New York	1857	246	37	10.8	i	sw
Mail	AB	Susanna	Tod And MacGregor	Glasgow, Scotland	1860	179	18	7	i	sw
Margaret and Jessie	ABC		Robert Napier and Sons	Glasgow, Scotland	1858	205	26	14	w	sw
Maria	U		No Data	No Data	No Data	No Data	No Data	No Data	u	sw
Mariner	A		No Data	Philadelphia, PA	No Data	92	20	8	u	u
Marmion	B		John Scott and Sons	Greenock, Scotland	1864	201.4	20.15	9.5	i	sw
Mars	AB		No Data	No Data	1849	180	19	9.5	i	sw
Mary (I)	N		Laird and Sons	Birkenhead, England	1863	198.6	30.3	9.6	i	sw
Mary (II)	BC		John and William Dudgeon	London, England	1865	230	27	14.6	i	ts
Mary and Ella	BC		Caird and Company	Greenock, Scotland	1864	221.3	22.1	10.4	i	sw

Mary Anne	B		Charles Connell and Co.	Glasgow, Scotland	1863	203.4	20.6	12.3	i	sw
Mary Augusta	D		John and William Dudgeon	London, England	1865	250	15.5	10	i	ts
Mary Bowers	BC		William Simons Co	Renfrew, Scotland	No Data	226	25	10.5	i	sw
Mary Celestia	BC		William C. Miller and Sons	Liverpool, England	1864	221	22.1	10.4	i	sw
Matagorda	AC	Alice	Harlan and Hollingsworth	Wilmington, DE	1858	220	30	10.5	i	sw
Matilda	BC		Hoby and Son	Renfrew, Scotland	1864	228	25	12	i	ts
Maude Campbell	BC		Denny and Company	Dumbarton, Scotland	1864	226.3	28.2	13	i	sw
Mayflower	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
McRae	A	Marquis de la Habana	No Data	No Data	No Data	176	29.5	14	w	sc
Memphis	C		Denny and Company	Dumbarton, Scotland	1862	230	30	19.5	i	sc
Merrimac	C		No Data	No Data	No Data	230	30	11	i	sw
Mexico	AC		Westervelt and McKay	New York, NY	1851	208	32.8	15	w	sw
Minho	AB		Blackwood and Gordon	Paisley, Scotland	1854	175.3	22	13.5	c	sc
Minna	ABC		No Data	Newcastle, England	1858	214.1	26.4	18.6	i	sc
Minnie	B		Barclay Curle and Co	Glasgow, Scotland	1863	181.1	22.4	12.1	i	sc
Modern Greece	AC		Richardson	Stockton-on-Tees, England	1859	210	29	17	i	sc
Nashville	AC		William Collyer	New York, NY	1853	216	34.83	22	w	sw
Nelly	A	George Dudley, Catawaba	No Data	Wilmington, DE	1838	177	24	10	w	sw

Neptune	N		Robert Napier and Sons	Glasgow, Scotland	1861	166.6	27.4	9.5	i	sw
Neva	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Nicolas I	A		No Data	London, England	1839	182.4	28	17.3	u	sw
Night Hawk	BC		McAndrew	Preston, Liverpool, England	1864	220	21.5	11	i	sw
Nina	A		Thomas McDowell	Washington, NJ	1848	145	26	9.5	w	sw
Nola	BC		Caird and Company	Greenock, Scotland	1863	228.4	25.2	13.5	i	sw
Norseman	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
North Heath	BC		No Data	No Data	No Data	229.9	25	13.4	i	sw
Nutfield	BC		James and Ash and Co.	Cubbit Town, London, England	1863	224.2	26.6	12.6	i	sw
Old Dominion	BC		Caird and Company	Greenock, Scotland	No Data	227.8	26.2	14.2	i	sw
Oregon	ABC		No Data	New York, New York	1846	216.83	26.5	9.5	w	sw
Orizaba	AC		Jeremiah Simonson	New York, New York	1858	210	30	10.5	w	sw
Ouachita	A		No Data	England	1858	116	16	6.5	i	sw
Owl	BC		Jones, Quiggin and Company	Liverpool, England	1864	230	26	10.9	s	sw
Pacific	ABD		No Data	London, England	1854	255	32.1	18	i	sw
Patras	A		Richardson	Stockton-on-Tees, England	1859	150	20	12.5	i	sc
Pearl	AB		James Henderson	Renfrew, Scotland	1859	182.2	19.5	7.6	c	sw

Pelican	B		No Data	Hull, England	1863	187.42	24	12.67	i	sc
Penguin	BC		Laird and Sons	Birkenhead, England	1865	240	30	13.2	s	sw
Pet	N		No Data	Blackhouse, Middlesborough, England	1862	141	20.6	11.4	i	sc
Peterhoff	C		No Data	No Data	No Data	210	28	15	i	sc
Pevensey	U		No Data	No Data	No Data	No Data	No Data	No Data	i	sw
Phantom	B		William C. Miller and Sons	Liverpool, England	1863	192.9	22	12.4	s	sc
Phoebe	A		Denny and Company	Dumbarton, Scotland	1851	172.8	25.5	15.6	i	sc
Pizarro	U		No Data	No Data	No Data	190	25.3	9	u	u
Planter	A		No Data	Wheeling, West Virginia	No Data	156	35	6.33	w	sw
Plover	BC		Jones, Quiggin and Company	Liverpool, England	1865	224	24	11.4	s	sw
Powerful	A		No Data	Lewis, Quebec, Canada	1862	126	23	??	w	sw
Presto	BC	Fergus	Alexander Stephen and Sons	Glasgow, Scotland	1863	210	23	9.5	i	sw
Prince Albert	AB		William Denny and Brothers	Dumbarton, Scotland	1849	138.1	16.7	7	u	sw
Princess Royal	N		Tod And MacGregor	Glasgow, Scotland	1861	196.75	27.25	16	i	sc
Ptarmigan	BD		Randolph, Elder and Co.	Govan, Scotland	1864	270	24	12	i	sw
Raccoon	B		No Data	No Data	No Data	201.2	21.4	9	u	sw
Ranger	U		No Data	No Data	No Data	No Data	No Data	No Data	i	sw
Rattlesnake	B		John and William Dudgeon	London, England	1864	201.8	24.4	12.5	i	ts
Ray	BD		William Miller and Sons	Liverpool, England	1865	252	29	12.5	s	sw

Red Gauntlet	B		John Scott and Sons	Greenock, Scotland	1864	201.4	21.1	9.5	i	sw
Reliance	N		No Data	No Data	No Data	134	26.9	11	w	sw
Robert E. Lee	ABD	Giraffe	J. and G. Thomson	Govan, Scotland	1860	268	26	12	i	sw
Rosine	BD		Jones, Quiggin and Company	Liverpool, England	1865	270	33	15	s	sw
Rosita	A	Union, Carolina	No Data	Philadelphia, PA	1861	128	23.92	8.5	u	sw
Rothesay Castle	N		William Simons and Company	Renfrew, Scotland	1861	191	28.75	8.33	i	sw
Rouen	AB	Flora IV	No Data	Millwood, London, England	1853	178.5	20.1	9	i	sw
Ruby (I)	AB		Henderson and Co.	Renfrew, Scotland	1854	177.4	17.1	8.3	i	sw
Ruby (II)	AB		Henderson, Coulbom and Company	Renfrew, Scotland	1857	187	16.8	9	u	sw
Ruby (III)	BD		Jones, Quiggin and Company	Liverpool, England	1865	261.1	33	15.6	s	sw
Run Her	BC		John and William Dudgeon	London, England	1865	230	27	14.6	i	ts
Sachem	A	Clarinda	No Data	New York, NY	1844	121	23.5	7.5	w	sc
Saint Johns	A	Spaulding	W. F. Willink	New York, NY	1853, rebuilt in 1857	150	26	8.3	w	sw
Saint Mary	A	Nick King, Genesee	Harlan and Hollingsworth	Wilmington, DE	1856	160	28	8	i	sw
Salvor	A	M. S. Perry	Van Syke, Motter and Company	Buffalo, NY	1856	183	26.6	19	w	sc
Savannah	A	Everglade, Oconee	No Data	New York, NY	1856	169.5	30	8.5	w	sw
Scotia (I)	A	Fanny and Jenny	Wigram and Co.	Blackwall, England	1847	202.17	28.33	13.58	i	sw

Scotia (II)	AB		Tod And MacGregor	Glasgow, Scotland	1845	141.3	17.5	8.7	i	sw
Scottish Chief	A		No Data	Wilmington, DE	1855	123.75	18	4.75	w	sw
Sea King	C	Shenandoah	Alexander Stephen and Sons	Glasgow, Scotland	1863	230	32	20.5	c	sc
Secret	BC		Bowdler, Chaffer and Company	Seacombe, England	1864	231	26	11	s	sw
Selma	ABD	Florida, Selma	No Data	New York, NY	1856	250	30.6	9	u	sw
Siren	N	Lady of Lyon	No Data	No Data	No Data	110	17	7	u	sc
Snipe	BC		Jones, Quiggin and Company	Liverpool, England	1865	224	24	11.4	s	sw
Soler	ABD	Worcester	No Data	New York, NY	1841	249	28.5	10	u	u
Southerner	N		No Data	Stockton-on-Tees, England	1863	294.75	38.17	24	c	sc
Southwick	C		No Data	Sunderland, England	1861	210	28	17.7	i	sc
Spaulding	A	St Johns	W. F. Willink	New York, NY	1853	150	26	8.3	w	sw
Spunkie	AB		Tod And MacGregor	Glasgow, Scotland	1857	191.3	18.2	7.6	i	sw
Stag	BC		Bowdler, Chaffer and Company	Seacombe, England	1864	230	26	12	s	sw
Star	AB		Tod And MacGregor	Glasgow, Scotland	1849	156	17.9	8.4	i	sw
Star of the West	AC	San Juan, St. Philip	Jeremiah Simonson	Greenpoint, New York	1852	228	32	24	w	sw
Stettin	N	Sheridan	Pile	Sunderland, England		171	27	15.5	i	sc
Stono	A	Isaac Smith	Lawrence and Foulks	Nyack, NJ	1851	171.5	31.25	9	w	sc
Stormy Petrel	BC		William Simons and Co.	Renfrew, Scotland	1864	225	25	11.5	i	sw
Sunbeam	A		No Data	England	1857	132	25.6	9	i	sw

Susan Beirne	BD		Aitken and Mansell	Kelvinhaugh, Glasgow, Scotland Scotland	1864	252.2	31	11.5	s	sw
Susanna	AB	Mail	Tod And MacGregor	Glasgow, Scotland	1860	179	18	7	i	sw
Suwanee	A	Pampero	No Data	Baltimore, MD	1850	189.6	27.2	10.6	w	sw
Swan (I)	N		No Data	No Data	No Data	188	36.5	7.58	w	sw
Swan (II)	BC		Bowdler, Chaffer and Company	Seacombe, England	1865	216	26	10.9	s	sw
Syren	N		No Data	Greenwich, Kent, England	1863	169.5	24	15.5	i	sw
Talisman	B		John Scott and Sons	Greenock, Scotland	1864	201.3	21.15	9.5	i	sw
Tartar	BC	Emily	Henderson, Coulborn and Company	Renfrew, Scotland	1864	230	25	11.5	i	sw
Tennessee	AC	Mobile, Republic	John R. Robb	Baltimore, MD	1853	210	33.92	16.92	c	sw
Texas	AC		Thomas Collyer	New York, NY	1852	216	34.5	16.83	w	sw
Texas Ranger	A		No Data	New Albany, IN	1851	137	27.5	6.5	w	sw
The Dare	BC		Alexander Stephen and Sons	Glasgow, Scotland	1863	211.7	23.1	9.4	i	sw
Theodora	A	Black Witch, Carolina, Gordon, Nassau	Lawrence Sneden	Greenpoint, New York	1851	177	27.5	11.17	w	sw
Thistle (I)	A		Laurence Hill Co.	Port Glasgow, Scotland	1859	184.5	25.2	12.5	c	sc
Thistle (II)	B		Laurence Hill Co.	Port Glasgow, Scotland	1864	201.5	25.9	12.3	i	sw
Tristram Shandy	BC	Boxer	Aitken and Mansell	Kelvinhaugh, Glasgow, Scotland		225.5	23.5	9.6	i	sw

Triton	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u
Tropic	ABC	Huntress	No Data	New York, NY	1838	225	24.5	No Data	w	sw
Tubal Cain	A		Blackwood and Gordon	Paisley, Scotland	1853	151.7	22	12.4	i	sc
Union (I)	A	Rosita, Carolina	No Data	Philadelphia, PA	1861	128	23.92	8.5	u	sw
Union (II)	AC		William H. Webb	New York, NY	1850	215	34	22	w	sw
Venus	B		J. and G. Thomson	Govan, Scotland	1862	159.2	17.1	8.7	i	sw
Vesta	N		John and William Dudgeon	London, England	1863	165	23	13	i	ts
Victoria (I)	A		George Greenman	Mystic, CT	1859	180	29.5	9.6	w	sw
Victoria (II)	A		No Data	Hull, England	1856	173	26	14	i	sc
Virgin	BC		Aitken and Mansell	Kelvinhaugh, Glasgow, Scotland	1864	216	24.5	10.9	i	sw
Virginia (I)	C		John and William Dudgeon	London, England	1864	No Data	No Data	No Data	i	sw
Virginia (II)	A	Noe-Daquy	No Data	No Data	No Data	170	26.17	14.67	i	sc
Vixen	BC		No Data	London, England	1864	224	26.3	9	i	sw
Vulture	BCD		Aitken and Mansell	Kelvinhaugh, Glasgow, Scotland	1864	242	25.7	10.6	i	sw
Wando	BC	Let Her Rip	Kirkpatrick, McIntyre and Co.	Greenock, Scotland	1864	225.3	26.1	11.3	i	sw
Warrior	A		No Data	Mobile, Alabama	1857	129.75	33	6.42	w	sw
Wasp	BD		Jones, Quiggin and Company	Liverpool, England	1864	250	28	10.75	s	sw
Wave	A	Argosy II	No Data	Mongohela, PA	1863	154	31	5.17	w	sw
Wave Queen	U		No Data	No Data	No Data	No Data	No Data	No Data	u	u

Whisper	BD		Pile, Spence and Company	West Hartlepool, England	1864	260	27	13	i	sw
Widgeon	BC		Jones, Quiggin and Company	Liverpool, England	No Data	224	24	11.4	s	sw
Wild Dayrell	BC		Jones, Quiggin and Company	Liverpool, England	1863	215	20	10.9	i	sw
Wild Rover	U		J. and G. Thomson	Govan, Scotland	No Data	No Data	No Data	No Data	u	sw
Will of the Wisp	BC		William Simons and Co.	Renfrew, Scotland	1863	210	23	10	i	sw
William Bagley	A		No Data	Belle Vernon, PA	1854	173	32.75	7.5	w	sw
William G. Hewes	AC	Ella and Annie, Malvern	Harlan and Hollingsworth	Wilmington, DE	1860	239.4	33	10	i	sw
William H. Webb	A	Webb	William H. Webb	New York, NY	1856	190	31	12	w	sw
William Seabrook	A	Ellie	No Data	New York, NY	1831	136	24	9.17	w	sw
Wren	BC		Laird and Sons	Birkenhead, England	1864	211.1	23.2	10.4	s	sw
Yorktown (I)	A		No Data	Cincinnati, OH	1848	173	28.25	6.5	w	sw
Yorktown (II)	AD	Patrick Henry	William H. Webb	New York, NY	1859	250	34	17.5	w	sw
Young Republic	AC		No Data	Brooklyn, NY	1864	205	29.83	9.5	u	sw
Zephine	AC	Frances, Marian	Harlan and Hollingsworth	Wilmington, DE	1864	225	32	10	i	sw