

Abstract  
“THE BOWER YET REMAINS:”

HISTORICAL AND ARCHAEOLOGICAL ANALYSES OF  
ANCHOR DESIGN TRENDS IN THE LONG NINETEENTH CENTURY

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In the course of undertaking maritime archaeological research, archaeologists often find that anchors are without context or provenance and that the only potential identifying features lie in an anchor’s design. This study attempts to create an avenue through which such anchors tentatively can be dated. Research is specifically aimed to further the study of anchors within the scope of maritime commerce during the “long nineteenth century” (1789–1914) by focusing on technological change. Historical and archaeological anchor data pertaining to Anglo-American anchor design was collected from Washington, D.C., and North Carolina and analyzed in light of historical trends.



“THE BOWER YET REMAINS:”

HISTORICAL AND ARCHAEOLOGICAL TECHNOMIC ANALYSIS OF  
ANCHOR DESIGN TRENDS IN THE LONG NINETEENTH CENTURY

A Thesis Presented to the Faculty of  
The Department of History  
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In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Arts in Maritime Studies

By  
Elizabeth P. Marlowe

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## Chapter 1: Introduction

### **Introduction**

In the Age of Sail, every element of a ship, from the sails and planks to more mundane items such as anchors, combined to create a fully functioning vessel; in many respects, becoming the most complex machines of their time. During the transition from sail to steam, and from wooden to iron to later steel construction; these elements underwent sudden and significant changes (Johnston 1983). The rapid innovations in propulsion, armament, and defensive measures, seen during the evolution of the British Royal Navy have been well documented (Massie 1991; Brown 1997). However, the individual components of critical nautical equipment - including the design, development and use of anchors - lack quantitative analysis.

Anchors are not only a critical seafaring device, they are elements of a maritime nation's material culture, an aspect of a shipwreck's material assemblage, and a form of more general maritime material culture that may reveal the consequences of technological innovation through their continually changing designs. The technological factors that influenced variations in anchor design across the "long nineteenth century" have not been extensively studied. The long 19th century, as explained by Eric J. Hobsbawm, defines the period by events rather than the traditional 1800 - 1900s definition. This alternative definition has the long 19th century starting with the beginning of the French Revolution in 1789 and ending at the onset of the First World War in 1914. This was a period of rapid change for maritime commerce (Hobsbawm 1962, 1975, 1987). An analysis of an anchor assemblage from this period should provide insight into factors driving innovation.

Due to the variety of anchor types, this study examines anchors associated with, and utilized on, vessels in the long 19th century. The marine anchors recorded during the course of

this thesis were from both military and commercial vessels. This thesis focuses on the technological changes in anchor design, often as a result of expanding maritime commerce. By including military anchors, a greater variety of styles and sizes became available for study. However, many of the historical resources investigated made no distinction between commercial and naval anchors. Historical sources were mainly located in the Mariner's Museum (Newport News, Virginia) and many were accessible online. Archaeologically, anchors were recorded in the Washington Naval Yard (Washington, D.C.) because it was a known repository for anchors. Mooring or permanent anchors (a structure attached to the mooring area's seafloor to which vessels can be secured) and sea anchors (a floating object which is kept off the bow of the vessel to keep the bow pointing into the waves) will not be analyzed. Vessels utilized during coastal and oceanic trade are of the greatest interest to the study, rather than vessels used solely for inland water navigation. By the very nature of their different functions, all excluded anchor types have varied different designs and are research topics in their own right.

During the course of study, the author compiled a list of historical resources to construct a "design database" which subsequently was used as a tool to identify, compare, and contrast archaeological examples. By combining historical and archaeological resources, this study illustrates changes in anchor form and function in a quantifiable way.

Furthermore, this thesis analyzes the technical factors that guided development of the marine anchor by asking the following research questions:

### *Research Questions*

- What technological factors drove the changes in Anglo-American marine anchor design over the period 1789–1914?
  - What was the relationship between other maritime technologies and anchor design?
  - How did anchor size change with increasing vessel tonnage/displacement?

Prior academic research has focused predominately on the evolution of anchors (see Harold Jobling 1993 Master's thesis "History and Development of English Anchors 1550 to 1850"). Both Jobling's thesis and this study seek to classify anchors based on quantifiable differences to facilitate further research, with this thesis focusing more on archaeologically recorded anchors. Typically non-academic works gravitate toward the practical uses of anchors (Smith 1996; Hinz 2000).

Examining technological factors this way contributes to the creation and testing of theories and methodologies for analyses of maritime material culture or watercraft design elements. It also furthers discussions about the practical classification of anchors from different cultures.

### **Changing Times, Changing Designs**

This study of anchors intends to collate and catalog quantifiable differences to create a useable typology to understand changing anchor designs through the long 19th century. The anchor has been a necessity for humans' effective use of water transport and, therefore, has existed throughout maritime history. The slow alteration of the anchor, from pre-Roman times to the 18th century, began to accelerate with the same rapidity as the rest of maritime design during the 19th century (Engle and Lott 1975:244; Curryer 1999:81). Nearly every facet of ship manufacturing underwent alteration during this time. The ships at the end of the 19th century differed vastly from those at the beginning, owing to the urbanization of manufacturing technologies and industrialization (MacGregor 1984:9). With changes in ship construction, such as the widespread use of iron as a building material by the 1880s, anchors evolved from stocked

to almost entirely stockless types (except for use on the smallest vessels and those privately owned) (Hobsbawm 1975:58; Hayler 1980:8.2).

The traditional narrative of the changing design of anchors stems from the first seafarers' use of large stones. The arrival of new technologies, such as the Greek and Roman discoveries of efficient lead smelting methods, allowed for the creation of lead anchors, either sheathed in wood or with wooden components - the first great leap forward in design (Jobling 1993:iii). Anchors slowly evolved from those with wooden sheathing, like the Roman anchors found in Lake Nemi, to the medieval anchors (not greatly changed from those early incarnations), to the anchors of the 16th and 17th century (Jobling 1993:9; Curryer 1999:29). These anchors, especially the British Admiralty long-shank anchor, continued for the next several centuries until the stockless anchor became popular (Upham 1983:14).

Many anchors, disregarding the earliest examples of stone anchors, have similar components and work in the same way. Anchors have identical names for the majority of their similar components including shank, throat, and arm. Other parts receive varying names, including the fluke or palm, the head or crown, and the ring or "Jews-Harp," depending on the text in which they appear (Figure 1; Knight 1960:136; Upham 1983:3; Curryer 1999:7). As depicted in illustrations, such as those within Betty Nelson Curryer's *Anchors: An Illustrated History* (1999), anchor stocks are perpendicular to the line of the arms. Drawings' irregular perspectives can make diagrams appear different from the actual anchor.



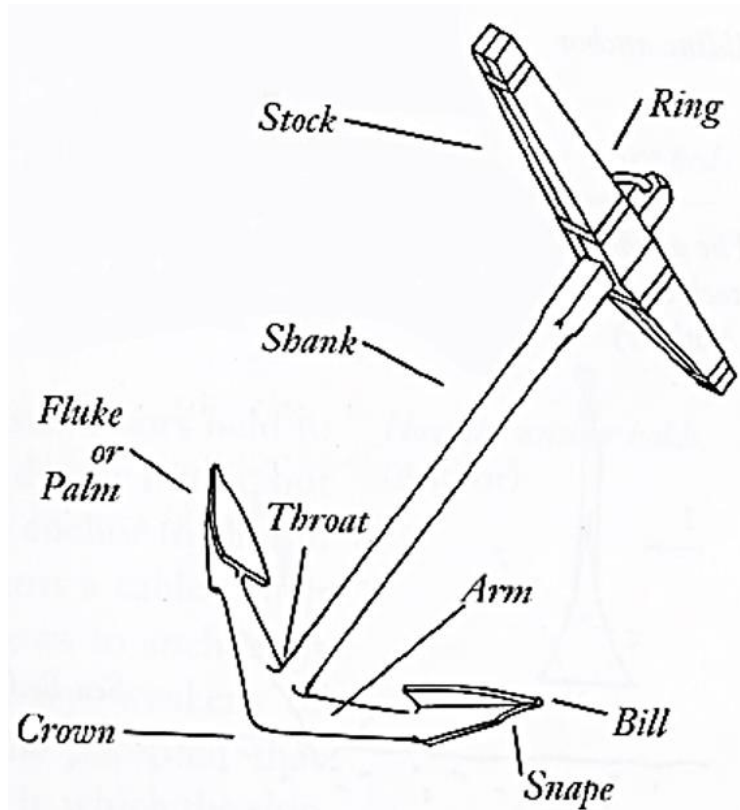


FIGURE 1. Components of an anchor (Curryer 1999:7).

In many stylized depictions - including ancient coins (Upham 1983:5; Curryer 1999:24), the Bayeux tapestry (Curryer 1999:34) and others (Figure 2) - anchors appear with stocks parallel to the arms. Anchors of the pre-modern era were commonly stocked; some stocked anchors are still used (Kemp and Young 1992:49). The modern anchor used by most coastal and oceanic commercial vessels is stockless, or with an exceedingly small stock, owing to changes in how the anchors are used. In 1821, R.F. Hawkins patented one of the earliest stockless anchors (Curryer 1999:112).

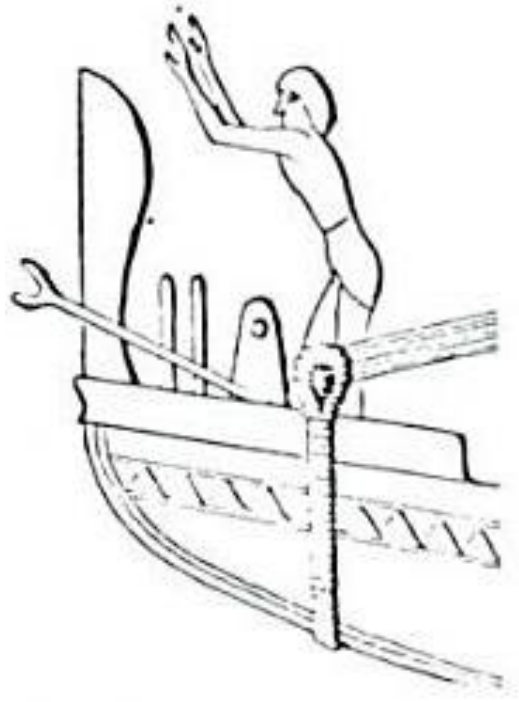


FIGURE 2. Egyptian relief depicting a stone anchor (Upham 1983:4).

Generally, metal watercraft anchors have secured vessels in harbors, ports, and other areas of relatively shallow water for the last millennia. Anchors also control the movement and location of ships in port. The anchor limits pitch, heave, yawing, and surge, while multiple anchors allow for better control (Upham 1983:2). Vessels commonly carried many anchors during the dangerous era of catting and fishing anchors (when the anchor rested on the outside of the hull whenever the anchor was not in active use). The anchor had “first to be catted, or lifted by means of a tackle, to the short beam or *cathead* which projected from the bow. It was then *fished* by a tackle on the *fish davit*,” after which the anchor would be securely stowed until the next use (Upham 1983:19). This early method of raising the anchor risked the loss of one or more anchors and a subsequent, time consuming search for the missing anchor(s) (Moll 1927:311). The process of fishing and catting remained in use for centuries, under various names, until the introduction and widespread use of mechanical windlasses (Curryer 1999:102).

The anchor is an object uniquely created to perform a specific task and to interact with a specific physical environment. The need for multiple anchors lessened when new technologies came into being, such as steam windlasses and stockless anchors, allowing anchors to be stowed less hazardously for both the crew and the vessel (Noel and Beach 1978:14). Anchor styles were chosen for many vessels depending on a variety of factors including suitability for the expected bottom type, stowability aboard, and the ratio of holding power to weight, as well as how easily the anchor can be recovered (Smith 1996:1–2). Some anchors excelled for use in one area but were incompatible for conditions elsewhere. For example, an anchor most suitable for a muddy bottom would not work well on a rocky seafloor.

The period approximating the long 19th century is demonstrative of some of the most rapid technological changes associated with watercraft (Gardiner 1993a:8). While anchors underwent considerable modification in design over this period, it was not until the mid-19th century that British insurance registers reflected a change in the number and weights of anchors used on vessels of different types and tonnage, as necessitated by *The Chain and Cable Act of 1864* (Bedwell 1909:38). American insurance registers did not follow suit until the last quarter of the 19th century (American Lloyds 1877; American Shipmaster's Association 1882).

The “traditional” (or Admiralty) anchor, with its wooden stock and broad flukes (Figure 3), was still used despite new design elements such as the popular iron stock. During this period new designs began to appear corresponding with the changes in watercraft technology (Curryer 1999:83). These changes included various adaptations in the design and construction of ships. The combination of new technologies, such as the steam engine (in its different iterations), innovations associated with industrialization, and the adoption of new forms of power (from sail to coal and, ultimately, oil) were also prevalent at this time (Gardiner 1993a:11). Anchors are

important elements of a maritime country's material culture, an archaeological site's material assemblage, and an example of changes in technological innovation (Peterson 1965:84; Arnold 2000:40). These factors influence the archaeological importance of the anchor. As the design of anchors varied throughout the 19th century, numerous insights were provided into the rapidly changing maritime commercial sphere.

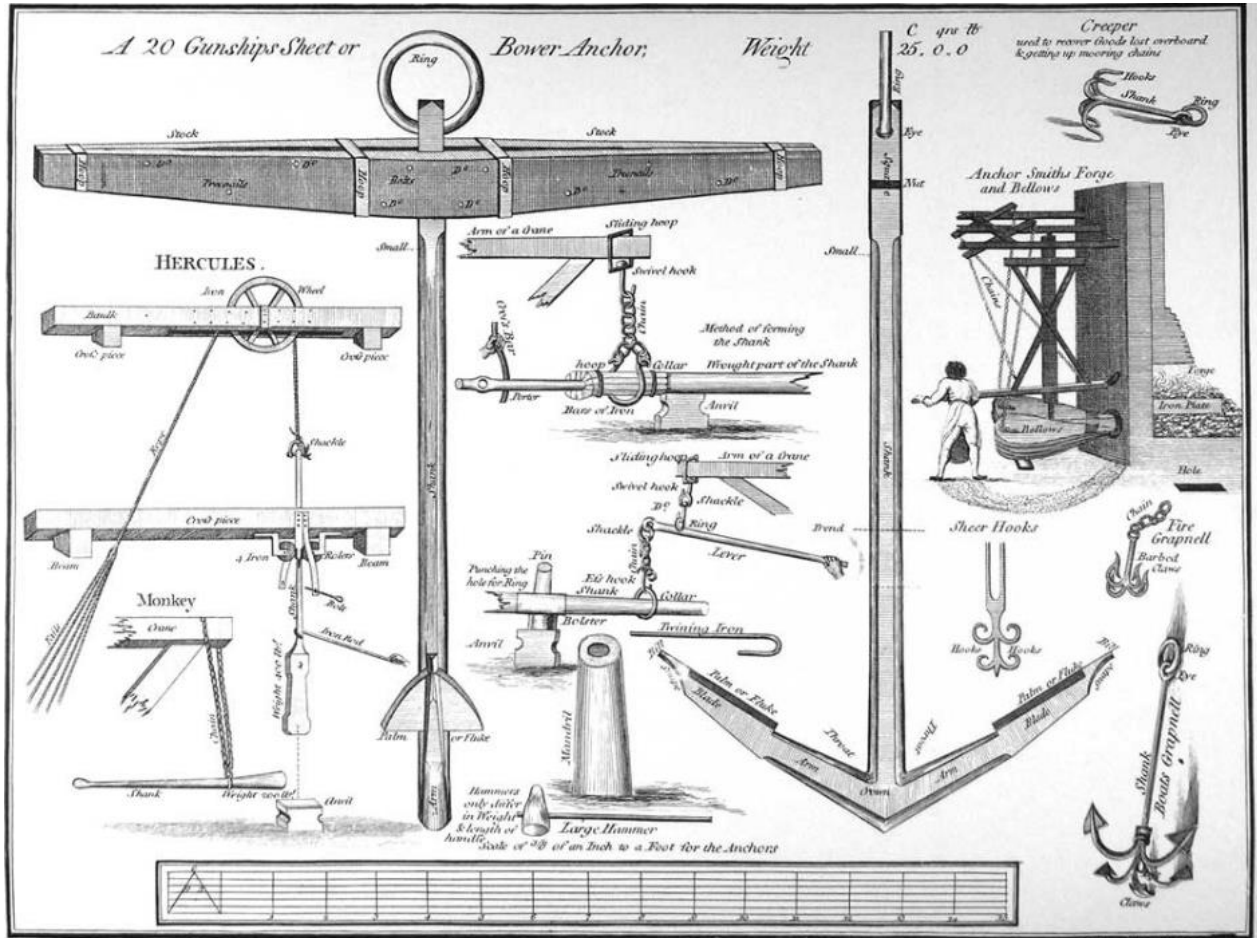


FIGURE 3. British Admiralty Anchor (Steel 1794:77).

During the long 19th century, changes occurred in both the commercial and naval communities, resulting in considerable cross-communication concerning ship technologies, design, and construction. Some merchant companies and national navies, such as the British Royal Navy, were reluctant to invest in research and development owing to institutional

conservatism and tradition. Consequently, only a few companies were at the forefront of the technological changes (Twiss 1986:introduction).

The 19th century commercial vessels grew to immense size and commensurate cargo capacity as steam became more prominent and engine technologies and changing designs produced greater power to move ships through the water (Johnston 1983:10). These included adaptations in the design and manufacture of ships in addition to the introduction of the steam engine. In some countries, there is technological overlap between naval and merchant fleets (Arnold 2000:1). It is important to acknowledge the overlap, but an analysis of it is not the purpose of this study. Commercial vessels, however, faced a similar transition in size and building material as ships designed for military purposes. Registers such as *Lloyd's Register of American and Foreign Shipping* and the *Record of American and Foreign Shipping* (published by the American Shipmaster's Association) illustrate a quantifiable change in the design of merchant ships.

### **Theoretical Perspective: An Overview of Processual Material Culture Theory and Analysis**

The study of material culture and material culture theory ranges across multiple disciplines. These disciplines, including art history, ethnography, and archaeology, have often used material culture as a “means rather than an end, a discipline rather than a field” (Prown 1982:1). However the use of material culture and material culture theory has changed in the last century. Overall, the basis of material culture concerns the artifacts that, finished or unfinished, allow a culture or society to be studied across time (Pursell 1983:304; Patnaik 1995:59). Through artifacts the beliefs (including “values, ideas, attitudes, and assumptions”) of a society can be studied and analyzed (Prown 1982:1). The origins of material culture theory have their roots in art history and archaeology. Studies are not often explicitly theoretical (Prown 1982:11).

Initially, historians and archaeologists ignored the physical environment in which the culture and artifacts are embedded and rather focused on “abstract ideas above things, symbolic meaning above utility, and imagination above empirical facts” (Grassby 2005:591). The 1962 introduction of Lewis Binford’s three “levels of function” represented in material culture created a theoretical approach within processual archaeology in which quantitative analysis and a concentration on different avenues of focus became prevalent.

### *Binford’s Three Functions*

In Binford’s view, material culture has the potential to “represent the structure of the total cultural system” of a particular field of study within anthropology and archaeology (Binford 1962:217). Binford expands his definition with three sub-classes, which function both independently and in cooperation with each other. These three sub-classes represented within material culture assemblages are the *techno-function*, the *socio-function*, and the *ideo-function*. The techno-function, or *technomic layer*, relates to artifacts “coping directly with the physical environment” (Binford 1962:219). This sub-class relates most directly to technology and artifacts that have practical purposes. Technomic artifact classes have “utilitarian function” and are “directly involved in manipulating, storing, or transforming matter, energy, or both...Most activities include artifacts having technofunctions” (Schiffer 2011b:23). The next sub-class of material culture is socio-function, also known as the *socio-technic layer*. Socio-technic artifacts concern material elements that have “their primary functional context in the social sub-systems of the total cultural system” (Binford 1962:219). The third sub-class is ideo-function or *ideo-technic artifacts*. These types of artifacts are directly related to the “ideological component of the social system” being studied (Binford 1962:219). Material culture assemblages may be analyzed according to these three constituent layers (Binford 1962:217).

### *Applying Binford's Paradigm to Anchors*

In this thesis, Binford's material culture theory and paradigm is used to explain the connection of ideas within a cultural or societal framework, such as anchors representing the culture of Anglo-American seafaring during the long 19th century. Material culture's three functions, as introduced by Binford (1962), and adapted by Michael Schiffer (1987:182) among others, can potentially coexist in some aspects of material culture; however they are contrary to analysis in other aspects. The work of Schiffer (1992) acknowledges that artifacts can belong to more than one layer of material culture, while a study's focus can remain on a single layer. Similar to Binford's "Old Copper studies" (as discussed in relation to material culture and techno-function in his 1962 "Archaeology as Anthropology" article), this study of anchors acknowledges that anchors are associated with ideo- and socio-functions; however, the associations with techno-function are the avenues that this study seeks to explore.

### *Examples through Case Studies*

In the decades since the introduction of the layered material culture theory, case studies using quantitative analytical techniques may be seen as hallmarks of the adoption of Binford's paradigm by implicitly processual archaeologists. The following case studies range from the 1960s to the 2000s. All use some form of quantitative analysis and many are focused on technology. These case studies demonstrate the precedent for the theory and method used in this study.

Case studies from the 1960s showed the potential of using a material culture which was highly and locally distinctive through a period of time: 18th century cemeteries in New England. The articles all expand upon the initial study conducted by James Deetz and Edwin Dethlefsen

(Dethlefsen and Deetz 1966). The change of a material culture through time in a concentrated assemblage was graphed out in battleship seriation curves (Dethlefsen and Deetz 1966:504; Figure 4). The study was temporally fixed with the death dates on tombstones and had a large artifact assemblage (Dethlefsen and Deetz 1966:506). This allowed for determining a “mean rate of change” (Dethlefsen and Deetz 1965:204). The studies authored by Dethlefsen and Deetz demonstrate that measurable and quantifiable change of a material culture through time can have important results.

## Concord

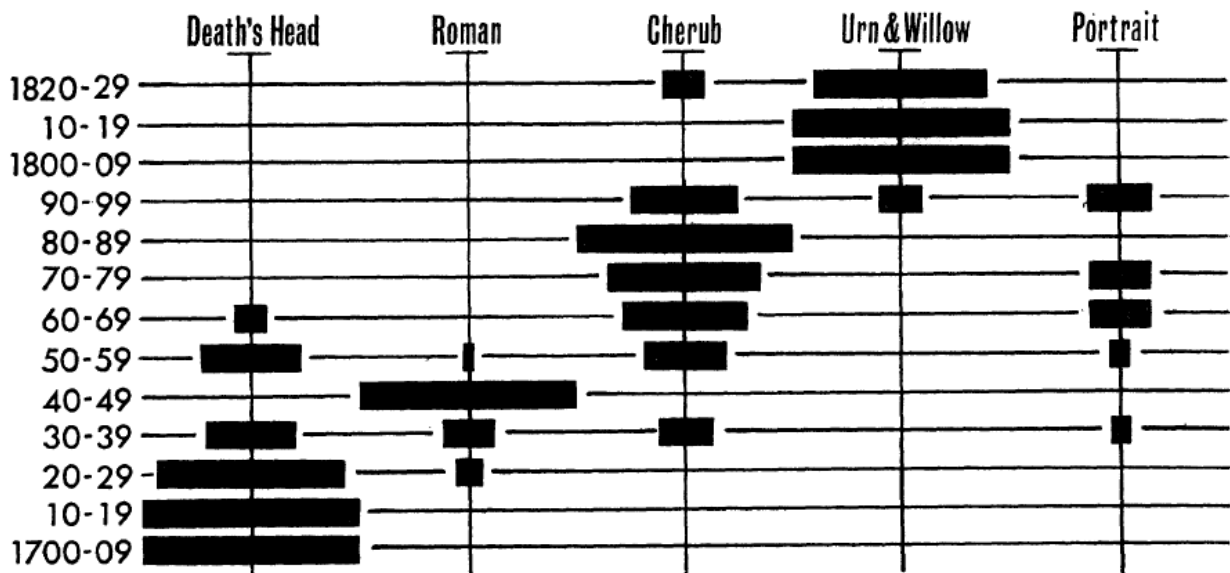


FIGURE 4. Dethlefsen and Deetz’s visual demonstration of stylistic change in an eastern Massachusetts cemetery (1965:202).

The next decade continued the trend of quantifying stylistic material culture change through time. The work on New England cemeteries and the battleship seriation curves continued, with a detailed analysis of the stylistic changes (Dethlefsen and Deetz 1971:33-37). Quantitative analysis work concerning ceramics became increasingly prevalent as well. Stanley South, in his articles “Pattern Recognition in Historical Archaeology” (1978a) and “Research



Strategies for Archaeological Pattern Recognition on Historic Sites” (1978b), championed the use of the mean ceramic date formula to calculate the dates of sites from present pottery. Depending on different styles and design changes in the pottery, different typologies or patterns emerged (South 1978a:224-226). These patterns were extensively tested and found to be reliable. The statistic and quantitative analysis initiated by Dethlefsen and Deetz was expanded in a different direction by South. While the research of Dethlefsen and Deetz was temporally-based and used the date to form their typology, South used a mathematical formula which gave a date as the answer, thereby approaching the quantitative analysis from a perspective based on a seriated typology (South 1978a:225). The differences in approaches still provided the technological and stylistic changes through time with quantitative analytical potential.

Similarly, William Hampton Adams and Sarah Jane Boling’s article “Status and Ceramics for Planters and Slaves on Three Georgia Coastal Plantations” divides an assemblage into the different types of ceramic ware and which class of individual (planter, sawyer, or slave) owned more (Adams and Boling 1989:77; Figure 5). George Miller, in “Classification and Economic Scaling of 19th Century Ceramics” promoted the idea that certain forms of material culture - whether belonging to the techno-function, socio-function, or ideo-function - could be used as status indicators and to analyze a sufficiently large assemblage searching for status indicators can prove highly useful (Miller 1989:93-94). The study of ceramics, however, differs from other studies as there are extensive amounts of literature and studies from which to draw multiple analyses since ceramics are capable of analysis according to their techno-, socio-, and ideo-functions simultaneously.

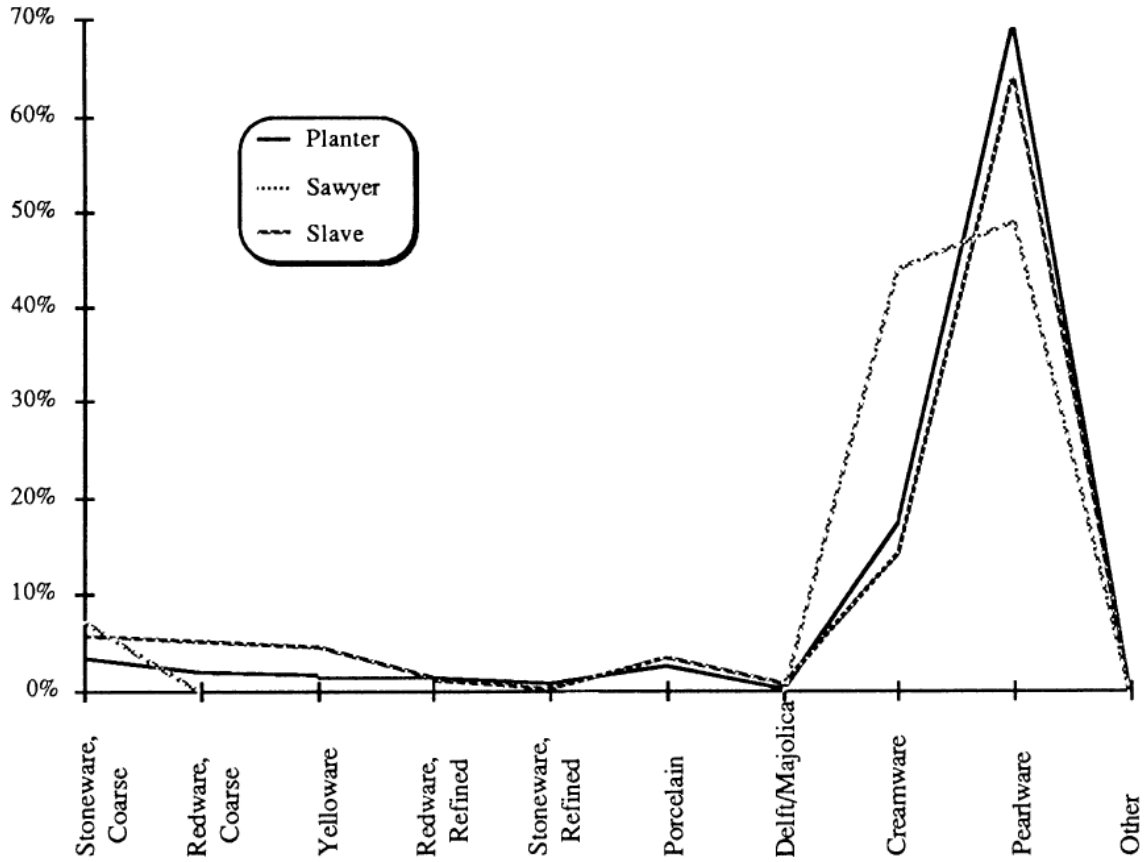


FIGURE 5: Illustration of types of ceramic ware by class (Adams and Boling 1989:77).

While not identified as a study concerned with the *terminus post quem* (limit after which) and *terminus ante quem* (limit before which) dates, Jeff Carskadden and Richard Gartley’s article “A Preliminary Seriation of 19th-Century Decorated Porcelain Marbles” generated the *terminus post* and *ante quem* dates from the artifact assemblage (Carskadden and Gartley 1990:61; Figure 6). The analysis conducted as part of Carskadden and Gartley’s study also extended to the creation of a typology, as seen in Figure 6. This study was highly implicit in its material culture theory, but still provided a working template from which marbles at American archaeological sites can be identified (Carskadden and Gartley 1990:67).

SUGGESTED MANUFACTURING RANGES FOR LATE 19TH-CENTURY CERAMIC MARBLES

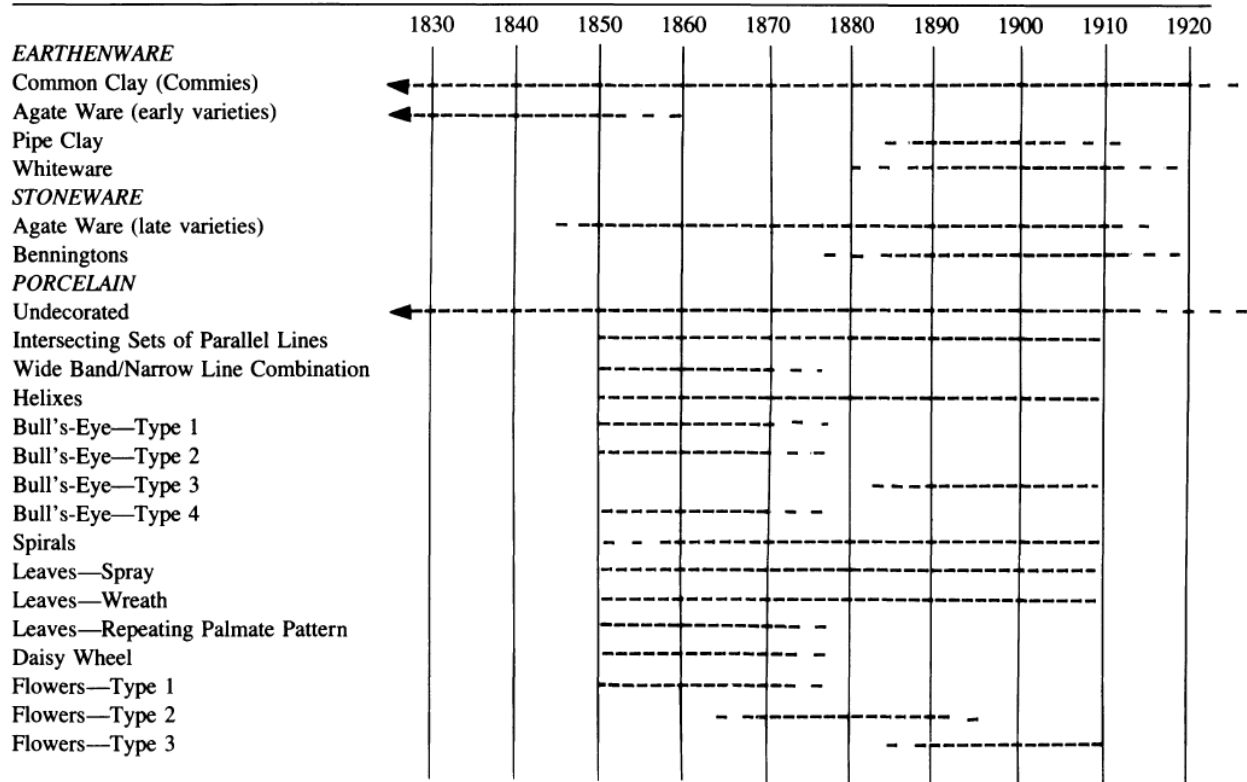


FIGURE 6: Porcelain marble manufacturing ranges (Carskadden and Gartley 1990:61).

William Hampton Adams' 2002 article "Machine Cut Nails and Wire Nails: American Production and Use for Dating 19th-Century and Early 20th-Century Sites" is an example of a techno-function based study. It provides the *terminus post* and *ante quem* as needed to assist in dating the different sites used in the study (Adams 2002:79; Figure 7). Adams states that the methodology of dating based on design or metallurgy needs to be used with caution, but does provide another tool for site interpretation and further analysis (Adams 2002:85).

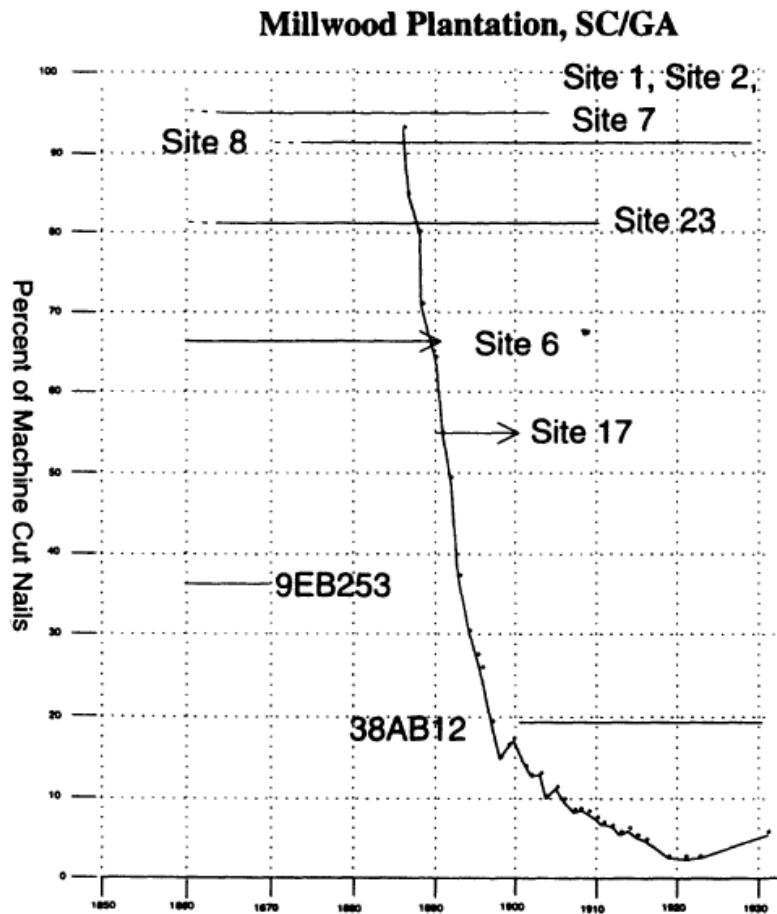


FIGURE 7: Dating sites in South Carolina and Georgia using percentage of machine cut nails (Adams 2002:79).

Of the three different layers, techno-function is the most apt for this study as anchors are being studied and analyzed within the context of their initial design and use, that is, primarily as practical or utilitarian tools. Any subsequent ideo- or socio-technic meanings are products of the societies in which anchors are used. The type of material culture theory used in this study is reflective of the research questions proposed. The case studies illustrate the types of quantitative analysis emulated by this study: including *terminus post quem* and *terminus ante quem* determinations and measuring changes in design. Technomic layer analysis allows for research questions concerning the interconnectedness of technologies throughout a culture to be formed (as is the case of anchor design trends in Anglo-American seafaring culture). While any aspect of

material culture can be analyzed according to the three layers, some artifact types lend themselves to one form of analysis over another. In terms of anchors, an ideo- or socio-function based analysis may be more appropriate for another study (such as art analysis) because it is assumed that these layers are less important when actually using a real anchor for its utilitarian purpose. The technomic category of material culture is concerned with efficiency, distribution, construction, economic variables, and environmental conditions, as well as changes over time in all of those subjects (Binford 1962:219).

## **Thesis Structure**

Following this chapter, which outlines the main objectives of the study, research questions, and theory, Chapter 2 details the traditional narrative of anchor design changes through time. Chapter 2 also includes commentary on the main styles of anchors.

Chapter 3 discusses the methodology of the thesis, split into phases of historical and the archaeological research. The historical research methodology outlines the types of sources used, including treatises, theses, insurance registers, and patents. These different sources allowed for a multifaceted approach to the historical research using technological perspectives. The archaeological research methodology includes pre-existing archaeological datasets available to the author, as well as the new Anchor Dataset (AnD) created for this study. Details regarding the new archaeological dataset summarizes the processes of locating and recording the anchors used in this study. This chapter explains the analytical techniques that the AnD was subjected to during the study.

Chapter 4 describes the constituent parts of the AnD. This chapter explains the author's methods for analyzing anchor data (via data retrieval *queries*) and the results of 36 specific queries extracted from the archaeological dataset. The chapter also uses historical data to find

approximate *terminus post quem* and *terminus ante quem* dates for many of the features of the anchors.

Chapter 5 investigates the different quantitative analyses undertaken as a part of this research. The analysis chapter is mainly concerned with technological analyses. However, some cultural comparisons between the United Kingdom and the United States are also present. The analysis is presented through graphs and figures to correlate data and answer or provide an interpretation of the research questions and associated analyses.

Chapter 6 concludes the study as well as outlining possibilities for future research. The different research questions are revisited in this chapter as well. Each research question is answered within the parameters of this study.

## Chapter 2: A Traditional Narrative of the Anchor

### **A Brief History of Ancient and Medieval Anchors**

The traditional narrative of the changing design of anchors begins with the first seafarers' use of large stones (Moll 1927:293–294; Upham 1983:4; Curryer 1999:18). The stones had either one hole drilled in them to attach a rope, as seen in ancient Egyptian iconography, or multiple holes for the rope cable and sticks (or teeth) to improve holding power on the typically sandy bottom of the Mediterranean (Upham 1983:4; Curryer 1999:18). One of the earliest anchors that is easily recognizable is made of stone and wood, as interpreted from a rock drawing dated 1200 B.C. in Himmelstahlund, Sweden (Curryer 1999:22). Known as *killicks*, these anchors were wooden frames weighted with stone. They continue to be used in some Canadian fishing villages, as well as for emergencies (Hayler 1980:8.1). Killicks were intermediaries between anchors primarily made of stone and those made of lead.

The arrival of new technologies, such as Greek and Roman lead smelting, led to lead anchors sheathed in wood or wooden components. According to Curryer (1999:26), many Ancient Greek and early Roman anchors were wooden with lead inserts in the stock and arms. The first major metal component was the lead anchor stock, easily cast in sand molds and frequently with a noticeable curve in the stock (Curryer 1999:27-28). By A.D. 40, the Romans constructed their anchors of iron rather than of lead, as shown by those found in Lake Nemi (Curryer 1999:29).

Romans began to standardize production following designs similar in construction to the anchors from Lake Nemi in Italy (Figure 8; Curryer 1999:29). Medieval anchors of continental Europe and Great Britain, constructed centuries later, were similar in form to both the Roman anchors and later anchors of the 16th and 17th centuries (Curryer 1999:33). This is

demonstrative of the slow development anchors underwent for most of humanity's time on the world's waterways.

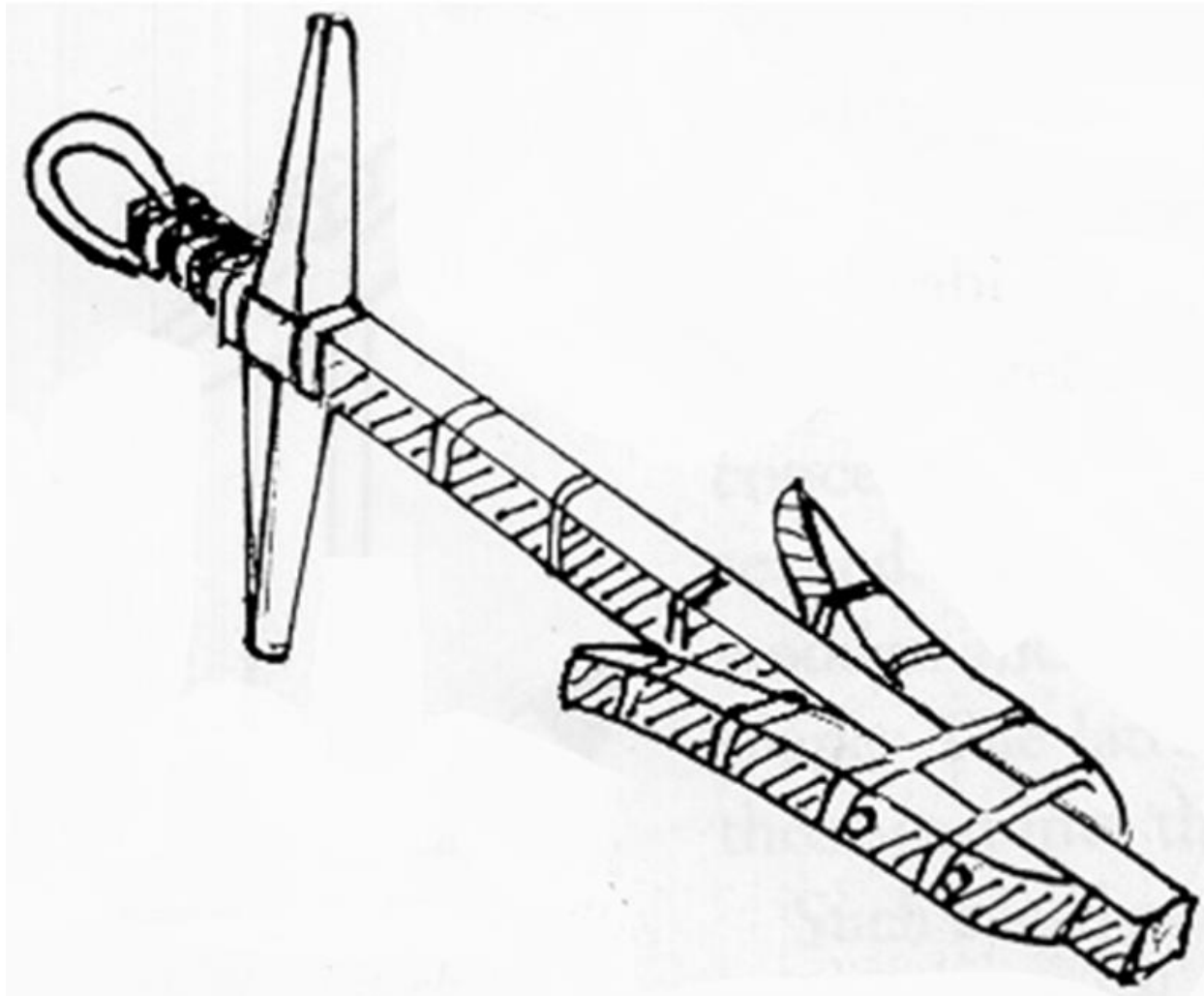


FIGURE 8. Illustration of Roman anchor from Lake Nemi (Curryer 1999:30).

With the wooden sheathing removed, the iron anchors of Lake Nemi (Figure 8) have an iron core and are similar to appearance to anchors associated with the Veneti, the Vikings, and later medieval anchors (Curryer 1999:32–33, 37). The main difference is that Roman anchors consisted of an iron shank, iron arms, and an attached iron stock. This differed from the anchors associated with the Veneti, Vikings, and others, which did not have an iron stock; it is likely the stock was a separate piece added when needed. Design elements of the Lake Nemi anchors can



be found on the wreck sites of *Mary Rose* (sunk 1545), *Trinidad Valencera* (sunk 1588) and other wrecks (Curryer 1999:39). These anchor design elements, especially those similar to the British Admiralty long-shank anchor, were in use for the next several centuries. As in later centuries (like the 19th century) various countries preferred different types of iron ore. For example, some medieval anchors were made of iron from “Sussex or northern Spain” as their purity or strength was perceived as being superior to that from other locales (Upham 1983:12–14).

The anchors of the 16th, 17th, and 18th centuries were comparable in design and functioned along similar general principles (Upham 1983:12–14). Certain countries preferred to use one style of anchor based on the perceived strengths of their design (Jobling 1993:45). The style of the anchor’s arms changed in the late 16th century from curved to straight due to difficulties in manufacturing large curved arms (Curryer 1999:41). The typical post 16th century anchor was made of iron with a wooden stock, though both wooden stocks with iron strengtheners or a simple iron stock became increasingly prevalent during this period. In addition, most anchors had long shanks with straight, angled, or curved arms depending on the country of manufacture and different sizes of shanks. Spanish anchors developed slender shank forms unique to that nation (Jobling 1993:53). The differences in anchor design resulted from different qualities of iron and strengths of manufacturing. The Spanish, for instance, had the best iron but the slender shanks resulted in many anchor shanks breaking with abnormal stresses (Figure 9; Jobling 1993: 45, 53). Over the course of time, anchor design began to standardize to the well-known Admiralty Anchor design. From this point, anchors remained relatively unaltered until the 19th century (Curryer 1999:39, 41, 44).

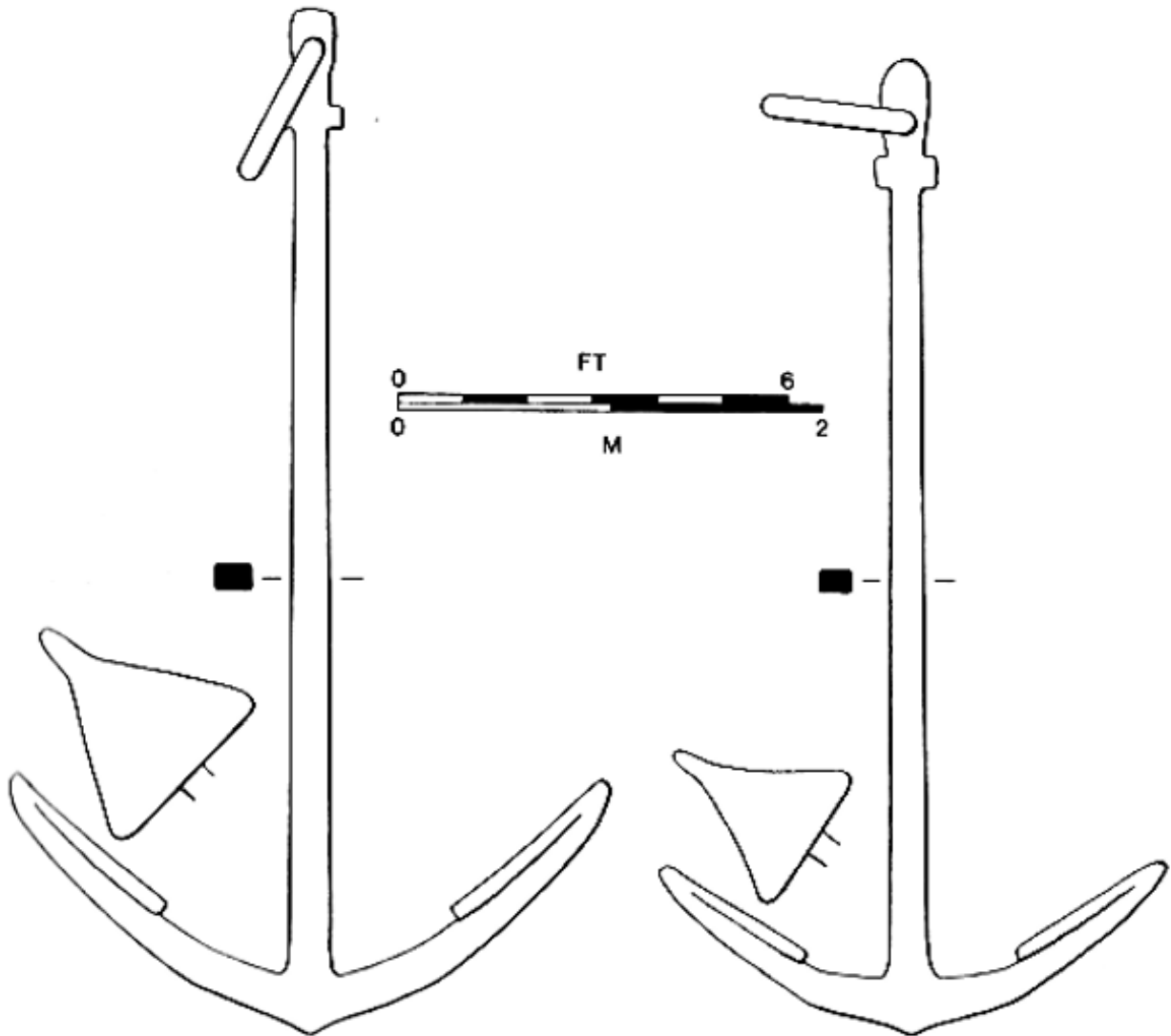


FIGURE 9. Two Spanish anchors from the Spanish Armada of 1588 (Curryer 1999:39).

### **The Rise of the Admiralty Anchor**

Over the course of the 16th to the 18th centuries, the design of the anchor began to standardize into what became known as the *English Admiralty pattern anchor* (or *Old Admiralty anchor*, as seen in Figure 10) (Jobling 1993:iii). The Old Admiralty anchor was the strongest anchor available for many years because of its design characteristics and large size. Admiralty

style anchors utilized a large, heavy stock in order to force the flukes into the ocean floor, thereby holding the vessel steady. These anchors remained relatively unaltered until the 19th century when changes in broader maritime technology also altered anchor design.

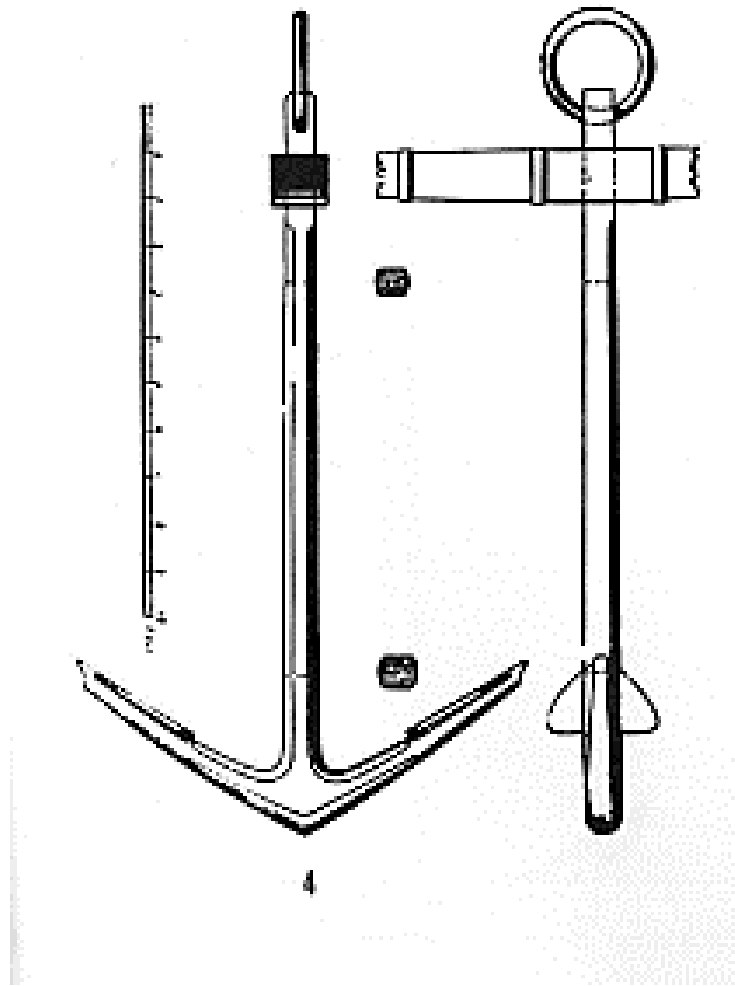


FIGURE 10. Old Admiralty style anchor; British Admiralty Anchor used before 1830 (Peterson 1965:Plate 44).

Despite many advancements in technology, including the design, construction, and changes in the practical application of anchors, the Admiralty anchor has a greater ton-for-ton holding power and is still “unmatched by more modern designs” (Hayler 1980:8.1).

Nevertheless, however, the ease of utilizing stockless anchors outweighed the strength of the Old Admiralty (Figure 11). As industrialization led to more mechanized methods of performing daily

tasks on board vessels, such as the use of a powered windlass for raising the anchor to the hawse holes, it removed the need for catting and fishing the anchor on all but the smallest vessels (Murphy and Jeffers 1849:80; Kennedy 1987:192). The British used the Admiralty anchor the most, in both merchant vessels and Royal Navy ships, and so it is commonly associated with English vessels. This style of anchor identifies vessels with a potential English origin (Chouzenoux 2011:4, 12, 14, 25, 26, 28, 34, 46, 58, 62, 78).

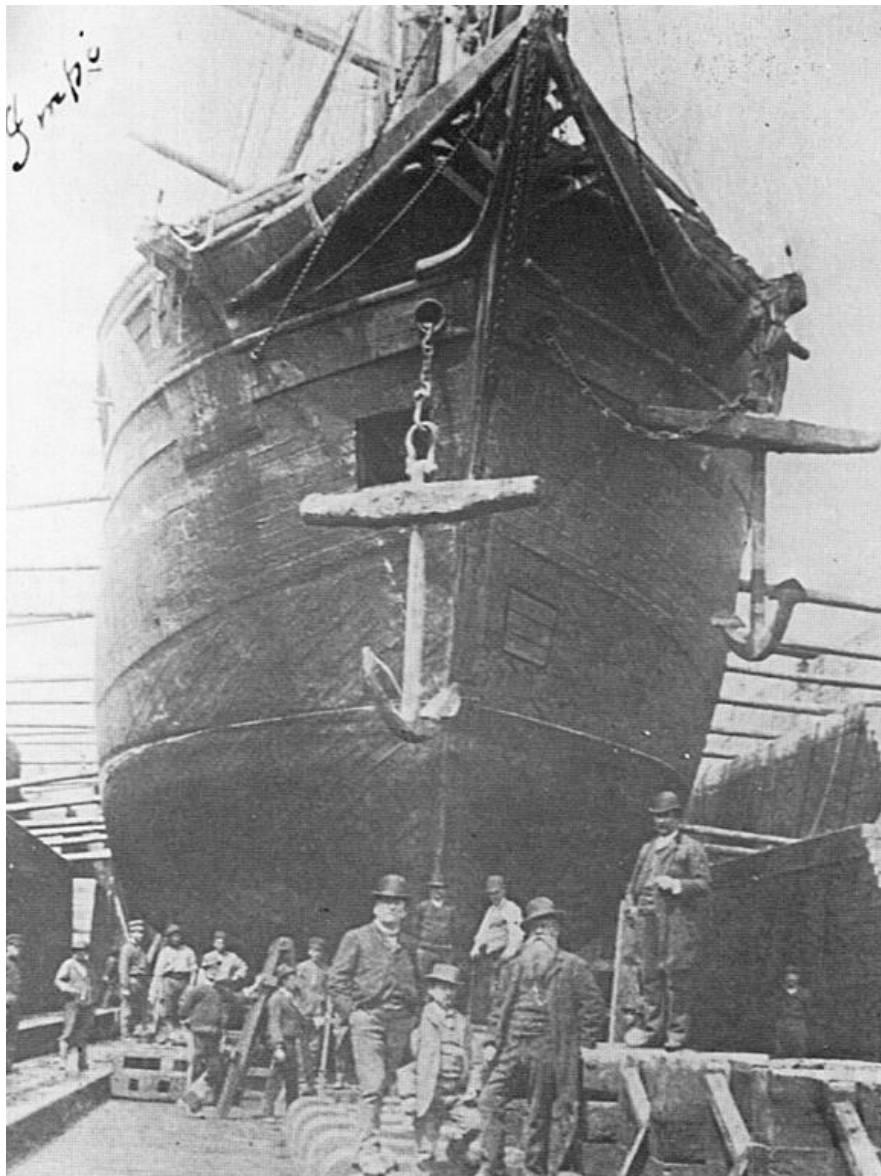


FIGURE 11. Photo depicting two Admiralty-style anchors (MacGregor 1984:122).

## **The Effect of Shipbuilding on the Use of Anchors**

Alterations in anchor design occurred in relation to their function on watercraft. As vessels grew larger and more specialized, common anchor styles had to undergo similar advancements in order to ensure utility and maintain safety standards. In the middle of the 19th century, the largely stable, locally-based shipyards and related industries found themselves in the midst of a “spectacular growth of an integrated global economy, which drew ever more regions into a transoceanic and transcontinental trading and financial network centered upon western Europe, and in particular upon Great Britain” (Kennedy 1987:143). This change resulted in commercial and naval vessels undergoing rapid change due to the necessity to remain competitive in global markets.

The period approximating to the long 19th century, in addition to being demonstrative of radical technological changes due to industrialization, also saw an explosion of different anchor styles and designs (Gardiner 1993b:8). Some designs saw common use in both the merchant marines and navies of various maritime nations, such as Great Britain and the United States.

The 19th century saw the British shipbuilding industry transform from wooden ship construction to a ferrous-hull tradition (Arnold 2000:1). Ship construction underwent intense industrialization because of economic pressures faced first in Great Britain and later in the United States (Thiesen 2006:14). The depletion of lumber resources available in Great Britain, and the corresponding increases in the price of quality timber and lumber, forced British shipbuilders to invest in iron shipbuilding early in the 19th century (Thiesen 2006:43). The United States utilized the traditional Anglo-American shipwright practices longer than Great Britain because of the younger age of the United States’ merchant marine and the prevalence of virgin American forests. Furthermore, the U.S. Steel Corporation monopoly controlled the price

of steel and artificially inflated the metal's price (Thiesen 2006:45). The combination of these factors resulted in Great Britain taking an early lead in producing iron vessels.

During the late 19th century both British and American shipbuilders were at the forefront of tremendous and dramatic technological change. The technological innovations of the preceding decades culminated in mass shipyard urbanization. Shipyards were being constructed closer to prominent cities and vital centers of trade and industrialization which "facilitated the growth of industry" (Thiesen 2006:215). On both sides of the Atlantic, the transformation of the primary ship construction material from wood to iron, and later to steel, is only one small part of the innovations during this period.

One of the most important changes was the arrival of the steamship. The introduction of the steam engine, whether in its initial reciprocating format, the compound engine introduced during the mid-19th century, or the turbine at the end of the 19th century (circa 1890), created a causal chain of events that led to the use of iron as the primary construction material (Johnston 1983:10, 27, 40). The first steam powered vessel to be entered into the *Lloyd's Register of Shipping* was constructed in 1821, however many vessels continued to utilize traditional sail propulsion for years afterward (Simper 1982:132). MacGregor briefly summarized the role of industrialization in maritime construction as:

The quarter century after 1850 coincided with a period of widespread development in mechanical engineering as it applied to shipbuilding: considerable progress was achieved in the manufacture and design of steam engines and propulsion units, and the methods of fitting them satisfactorily into a hull; the building of iron hulls advanced from experimental stages to technological success; and countless improvements in windlasses, anchors, steering gear, rigging and sails improved the efficiency and safety of the ships (MacGregor 1984:9).

The advances in one aspect of technological advancement, such as the manufacture of reliable engines, led to corresponding innovations in other areas.

Steam and iron- or steel-hulled vessels overtook sail and wood's notable lead in 1870, when the shipbuilding industry in Great Britain began constructing more "metal-hulled steam vessels" (Pollard and Robertson 1979:230). Iron shipbuilding, as a general rule, was limited to steamers until 1870, when a greater variety of iron-hulled vessels began to be constructed (MacGregor 1984:10). The height of the clipper ships resulted from the use of iron or steel hulls on sailing vessels.

These broader technological changes allowed major maritime nations, like Great Britain and the United States, to utilize previously unrealized economic advantages (National Council of American Shipbuilders 1930). These advantages corresponded to an increase in ship size. Logically, changes in anchor size, strength, design, and other necessities reflected insurance and safety requirements. From 1830 to 1850, the average tonnage of an American wooden cargo vessel more than tripled from 500 tons to over 1,500 tons and "exceeded the ability of wood to support the weight of the hull" (Thiesen 2006:61). In addition, manufacturers began constructing ships for increasingly specialized functions, such as coastal, oceanic, and inland water navigation, which led to a greater variety of ship types and a greater variety of anchor designs (Pollard and Robertson 1979:230). The changing forms of primary propulsion and a change in the very nature of the market in which ships were now being advertised were the result of increased industrialization (Slaven 2013:16).

### **New Designs in Anchors and their Differences in the 19th Century**

During the 19th century the changes in ship design and construction, with the associated increased progress of industrialization, resulted in many variations and different styles of anchors being designed (Murphy and Jeffers 1849:80). Some anchors varied only slightly from the Admiralty anchor, while others differed dramatically. Shipyards did not supply the vessels they

built with anchors, chains, chain cables, or any other furnishings related to utilizing the anchor (MacGregor 1984:22). *Lloyd's List* reveals the safety significance of utilizing a proper anchor and chain or cable under “Shipping Casualties” which recorded the loss of over thirty vessels in 1864, reportedly resulting from mishaps with the anchor or chain cables (Jeula 1865:459–470). Both factors contributed to the large number of anchor designs found in the long 19th century. The following anchor designs and styles are chronological examples from the 19th century to show the range and relative success of anchors in this period. These anchors have clearly definable design traits and their existence serves to provide a historically linked basis for archaeologically discovered trends found in the AnD (analyzed in Chapter 5).

### *The Pering Anchor*

In 1819, Richard Pering wrote a treatise on the anchor in order to convince both the maritime trade companies and the British Royal Navy of the strength of design and construction of his particular anchor (Pering 1819). The initial anchor designed by Pering (Figure 12) was structurally similar to the Old Admiralty anchor plan while Pering's *Improved Anchor* (1838) adapted the more typical Admiralty anchor to have a less prominent crown. This gave the *Improved Anchor* an appearance of curved arms. The changes in Pering's design reflected how the Admiralty anchor slowly changed over the years it was in use.



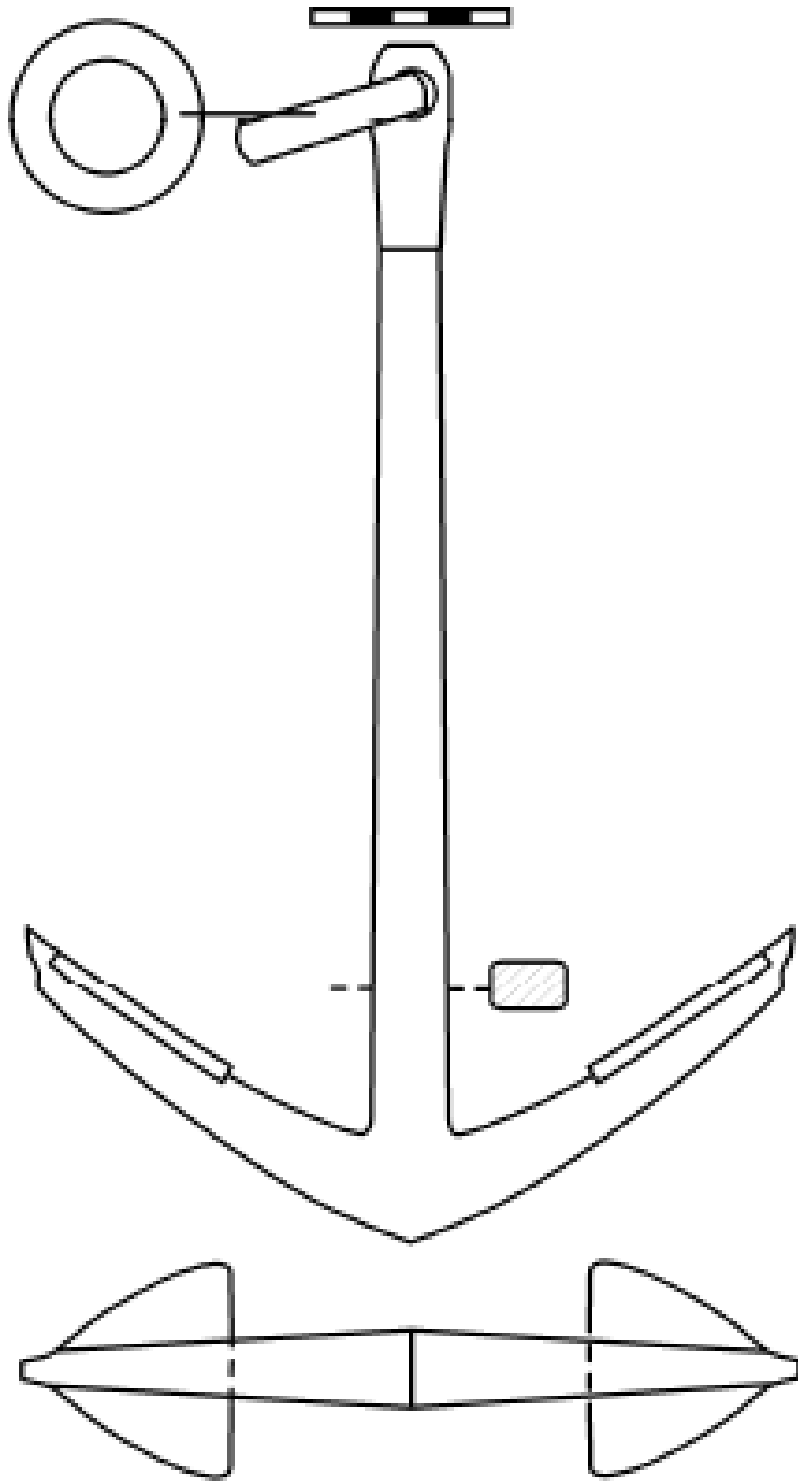


FIGURE 12. Pering anchor (Chouzenoux 2011:25).

*The Porter Anchor*

Other designers, such as William Porter, kept the stock but adapted the arms as Pering had done in 1838 (Figure 13). Porter's design used either a wooden or an iron stock and the arms pivoted through a fork in the shank. The arms, held in place through the crown with a bolt as the moveable arms, possibly provided greater leverage and safety for a vessel, as can be seen in the figure below (Curryer 1999: 76–78).

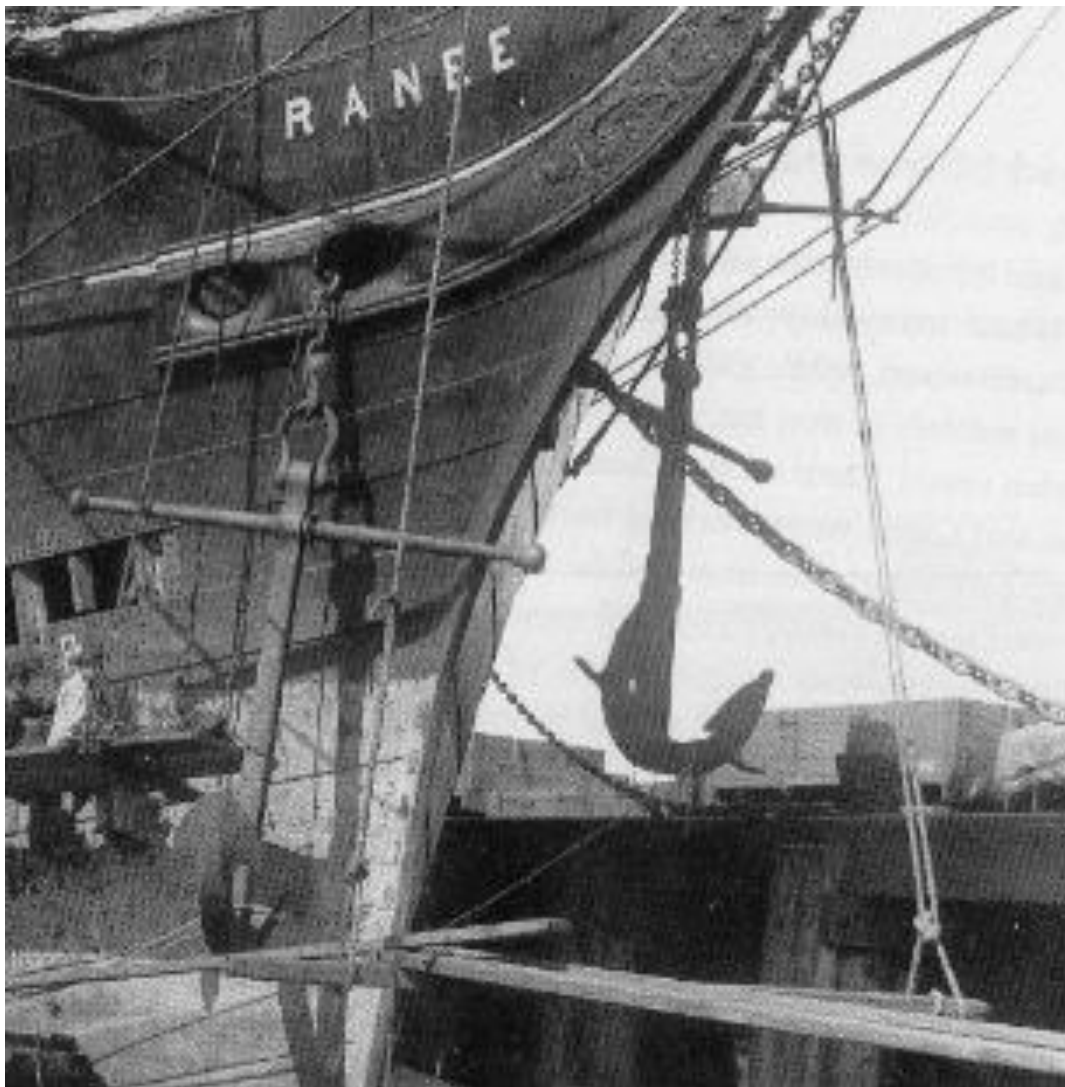


FIGURE 13. Porter anchor silhouetted on far side of cargo vessel (MacGregor 1988:133).

*The Isaac Anchor*

In the mid-1850s the Royal Navy held a competition to see how new designs compared to the preferred Admiralty anchor. The competition saw all but one anchor performing better than the older model. The failing anchor, the Isaac Anchor, was 27 per cent worse than the Admiralty (Curryer 1999:80–81). The attempt to improve on the Old Admiralty anchor unintentionally created a weaker anchor prone to breaking under strain (Figure 14).

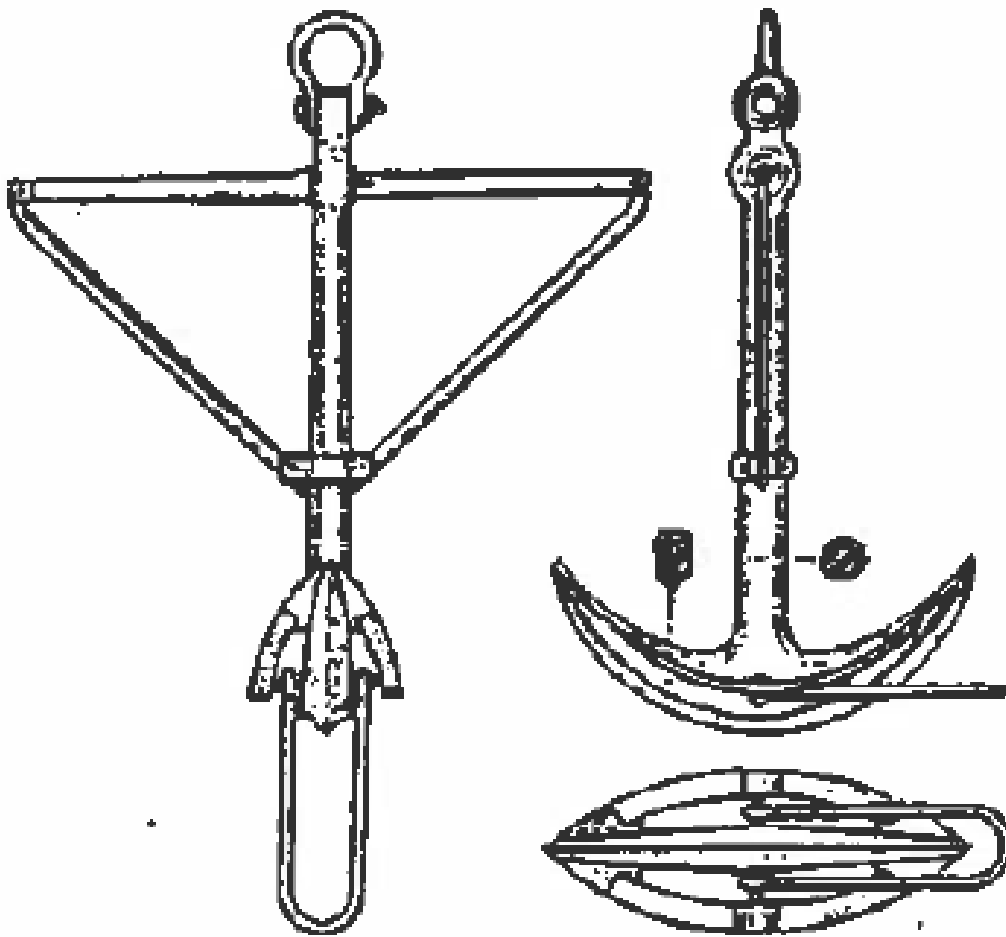


FIGURE 14. Isaac's Anchor (Rubin 1971:239).

### *Stocked vs. Stockless Anchors*

Other adaptations saw the palms, or fluke shape, and angle changed in order to dig into the sea floor with greater efficiency and security. Additionally, the use of iron, rather than a wooden stock, augmented the traditional Admiralty anchor (Curryer 1999:78, 83). Inventions or adaptations regarding other aspects of technology associated with anchors, such as steam windlasses or forged chain cables, affected the process of anchor utilization. Anchors no longer required catting and fishing. Instead, sailors used steam power to raise them and then store them in hawse pipes. Initially, anchors with smaller stocks, called “Self-Canting” anchors, were popular. The term “Self-Canting” refers to a unique type of anchor, of which Hall’s anchor is one. This anchor has a very small metal stock integrated to the shank. Hall’s anchor can be viewed as one of a number of intermediary versions as anchor design changed from stocked to stockless anchors. Toward the end of the 19th century stockless anchors (Figure 15) grew in popularity and design elements of both the ships and anchors once again reflected that change (Upham 1983:27; Curryer 1999:113–114, 117, 126–127). The most recently manufactured anchors are very similar in design to those of the 19th and 20th centuries.

Changes to the anchors used by merchant marines, commercial fleets, and naval fleets slowly occurred throughout the 19th century. Technology began to diverge from more traditional, stocked, Old Admiralty or English Admiralty style anchors to modern stockless anchors, stowed in the vessel’s hawse pipes. However, several early stockless designs proved too unstable in other areas due to the stresses placed on them; the fleets continued to use the stocked anchor for another half a century with little interest in precipitating a wholesale move from stocked-to-stockless types (Upham 1983:19). The modifications on the arms and flukes altered

them significantly from the traditional Admiralty style of anchor. It wasn't until the introduction of the Baldt anchor that the change occurred.

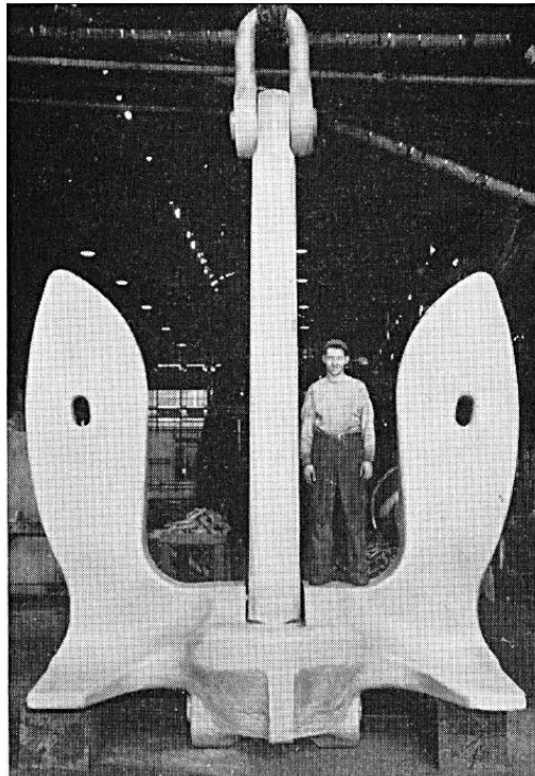


FIGURE 15. United States Navy 40,000-pound stockless bower anchor used on USS Midway (CVA 41) class (Knight 1960:137).

### *The Baldt Anchor*

The stockless anchor is the modern anchor used by the majority of commercial and private vessels that operate in coastal waters and traverse the oceans. Various navies around the world, including that of the United States, use their own variations on the stockless anchor. A popular style of stockless anchor is similar to the Baldt stockless introduced in 1897 (Figure 16; Hayler 1980:8.3). The features of the Baldt stockless anchor are similar to every other stockless anchor. The stockless anchor is the most common, however there are unique variations on the stockless anchor, including the Baldt-style anchor (Curryer 1999:139). Unlike the stocked

Admiralty anchor, stockless anchors used the mobile arms and crown to force the flukes into the ocean floor.

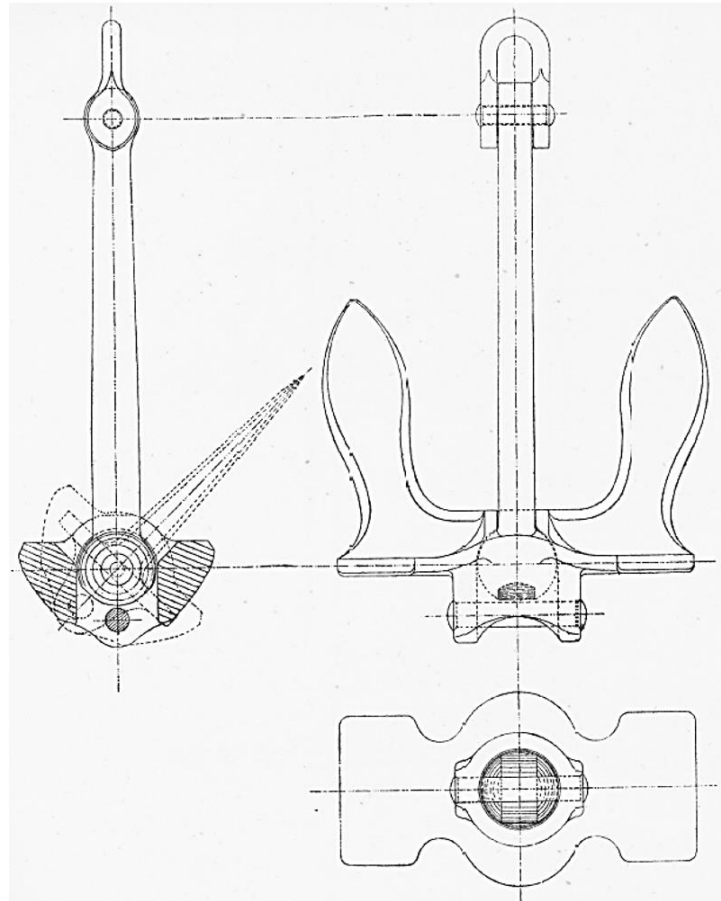


FIGURE 16. Baldt Stockless Anchor (Lloyd's Register of Shipping 1945:16).

The above anchors represent archetypes of the varieties developed and used during the long 19th century. All of them had different perceived strengths and most were successfully adopted and used around the world. The variety of anchor designs used on vessels is still present in the modern world. However, it is important to note that the historical aspects of this topic are exceedingly complex as there is very rarely one inventor solely responsible for any particular innovation (Lienhard 2006:31-32). Contemporaneous adaptations of similar concepts occurred, or an adaptation occurred, but was ignored for some length of time until rediscovery/re-invention.

## Chapter 3: Researching Anchors

### **Introduction**

This project's methodology followed four steps: "(1) observe and record all the facts; (2) analyze and classify the facts; (3) inductively derive generalizations from the facts; and (4) test the generalizations with additional facts" (Lyman 2010:511). The author separated the methodology into historical research, archaeological research, and analysis. The different datasets were quantified in Microsoft *Excel* tables and in a Microsoft *Access* database. This allowed quantitative analyses and comparison of both historical and archaeological data to be completed.

The initial historical research entailed archival and library work. Various books, theses, treatises, insurance registers, and patents offered individual insights into the history and data of anchor designs. Historical sources typically included qualitative data, such as descriptions, patents, and histories. The available qualitative information (e.g. a description of "fluke types") was synthesized and where possible translated into quantitative data (e.g. measurements of the dimensions of fluke types) which would later allow comparisons with archaeological data.

Subsequently, the author collected and processed archaeological data using forms that, again, would allow comparative analysis with the historical data. Together, the different datasets have the potential to illustrate changing design characteristics. Subsequent examination of the changes over time may then illuminate the processes that guided the transformation of old designs into new designs. The historical research section identifies the different types of historical resources used in creating the historical dataset. The historical dataset consisted of treatises, theses, insurance registers, and patents. The archaeological research section introduces two archaeological anchor datasets as well as the new Anchor Dataset (AnD) recorded as a part

of this study. The process of locating and recording anchors in the AnD is also explained. The final section of this chapter introduces the process of quantifying the database (Chapter 4) and conducting the quantitative analysis (Chapter 5).

## **Historical Research**

Much of the primary source material accessed came from the Mariners' Museum collections housed at Christopher Newport University in Newport News, Virginia. The Mariners' Museum material included seamanship manuals, treatises on anchors, naval dictionaries and encyclopedias. The rare collection at the Mariners' Museum provided the opportunity to look at the digitally unobtainable primary sources cited in other works. In addition, digitized collections at the Mystic Seaport Museum in Mystic, Connecticut, provided valuable information from both American and British insurance registers.

Completing the historical research posed several difficulties. During the course of the research the methodological parameters outlined in the prospectus needed to be changed. Originally, the historical database created in Microsoft *Access* was to be comprised of information regarding anchors and anchor weights, types, and number of anchors used on vessels of different tonnage. The historical research focused heavily on the various requirements of anchors listed in insurance registers. However, only one anchor out of the 82 recorded had a known and confirmed weight associated with it. Due to these constrictions, the process of analysis and historical research changed. The original emphasis on the insurance register requirements concerning anchors became a secondary form of analysis. The focus moved to looking at nine different treatises concerned with the size, design, and measurement of anchors (Table 1). A year by year illustration of what sources were used and available during the course of this study can be found in Appendix A.



TABLE 1. Table of Treatises used in Analysis (Marlowe 2016).

Treatises used in Analysis
1763 <i>The Established Sizes and Weights of Anchors for the Royal Navy</i> (Curryer 1999:56)
1783 Diderot's <i>Fabrique des Ancres</i>
1794 Steel's, <i>The Elements and Practice of Rigging, Seamanship, and Naval Tactics Volume 1</i>
1815 Burney's <i>Table of the dimensions of anchors, as made in his Majesty's dockyards, from 1 cwt to 90 cwt, which is the largest anchor used in First Rates, 1809 from Marine Dictionary</i>
1819 Pering's <i>A Treatise on the Anchor</i>
1825 Fincham's <i>Weight and Length of Anchors supplied to the different Classes of Ships from An Introductory Outline to the Practice of Shipbuilding</i> (Curryer 1999:75)
1856 Cotsell's <i>A Treatise on Ships' Anchors</i>
1858 Rodger's <i>Patent Double-Concave Small-Palmed Anchor</i>
1898 Hall's <i>Table of Hall's Patent Admiralty Anchor</i>

### *Treatises*

Treatises were located both online and through the assistance of the Mariner's Museum in Newport News, Virginia. The treatises used for this study ranged from 1763 to 1898 and were mostly concerned with stocked anchors (both wood and iron stocks). Only one table related to stockless anchors. Diderot's *Fabrique des Ancres* (1783) provided a semi-standardized view of how some French shipbuilders and anchor-wrights were constructing anchors (Figure 17). This resource can be considered semi-standardized as it was a source which was used by multiple people; however the measurements described in it were not the same as in some other sources. Some sources did pull directly from it and are discussed later. The limited number of sources from the early part of the study period justified the use of a French source in an otherwise Anglo-American study. A contemporary seamanship manual, Steel's *The Elements and Practice of*

Rigging, Seamanship, and Naval Tactics Volume I (1794) contained a section on anchor construction and included a table of anchor measurements (Figure 18).

**T A B L E**  
**DES PROPORTIONS DE TRENTE ANCRÉS DE DIFFÉRENS POIDS.**

Poids des Ancres.	PROPORTIONS DE CHAQUE VERGE D'ANCRE.										PROPORTIONS DES BRAS DE CHAQUE ANCRE.										PROPORTIONS DES BECS.										PROPORTIONS DES PATÈS.									
	Longueur d'un bras à l'autre.	Largeur au collet.	Épaisseur au collet.	Largeur au carré.	Épaisseur au carré.	Longueur de la culasse.	Diamètre du trou de la culasse.	Distance du trou à la tête de la culasse.	Largeur à la tête de la culasse.	Épaisseur à la tête de la culasse.	Diamètre de son ouverture.	Diamètre de sa grosseur.	Longueur du rond depuis l'amorce jusqu'au carré.	Longueur du carré depuis la naissance jusqu'au bout.	Largeur dans le collet du bras.	Épaisseur dans le collet du bras.	Largeur à la naissance du carré.	Épaisseur à la naissance du carré.	Longueur des becs depuis la naissance jusqu'au bout.	Largeur du bout des becs.	Longueur de la patte sans le bec.	Largeur au talon.	Épaisseur au milieu.	Épaisseur aux côtés.																
1000	9 8	1 7	1 5	3 2	1 6	1 1	2 3	2 4	3 2	1 3	1 9	3 2	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
1200	10 0	1 1 1	1 5	3 4	1 6	1 1	2 4	2 5	3 3	1 3	2 0	3 4	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
1400	10 4	1 1 3	1 5	3 6	1 6	1 1	2 5	2 6	3 4	1 3	2 1	3 5	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
1600	10 8	1 1 6	1 5	3 8	1 6	1 1	2 6	2 7	3 6	1 3	2 2	3 6	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
1800	11 2	1 1 9	1 5	4 0	1 6	1 1	2 7	2 8	3 7	1 3	2 3	3 7	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
2000	11 6	1 2 2	1 5	4 2	1 6	1 1	2 8	2 9	3 8	1 3	2 4	3 8	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
2200	12 0	1 2 5	1 5	4 4	1 6	1 1	2 9	3 0	3 9	1 3	2 5	3 9	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
2400	12 4	1 2 8	1 5	4 6	1 6	1 1	3 0	3 1	4 0	1 3	2 6	4 0	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
2600	12 8	1 3 1	1 5	4 8	1 6	1 1	3 1	3 2	4 1	1 3	2 7	4 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
2800	13 2	1 3 4	1 5	5 0	1 6	1 1	3 2	3 3	4 2	1 3	2 8	4 2	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
3000	13 6	1 3 7	1 5	5 2	1 6	1 1	3 3	3 4	4 3	1 3	2 9	4 3	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
3200	14 0	1 4 0	1 5	5 4	1 6	1 1	3 4	3 5	4 4	1 3	3 0	4 4	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
3400	14 4	1 4 3	1 5	5 6	1 6	1 1	3 5	3 6	4 5	1 3	3 1	4 5	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
3600	14 8	1 4 6	1 5	5 8	1 6	1 1	3 6	3 7	4 6	1 3	3 2	4 6	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
3800	15 2	1 4 9	1 5	6 0	1 6	1 1	3 7	3 8	4 7	1 3	3 3	4 7	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
4000	15 6	1 5 2	1 5	6 2	1 6	1 1	3 8	3 9	4 8	1 3	3 4	4 8	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
4200	16 0	1 5 5	1 5	6 4	1 6	1 1	3 9	4 0	4 9	1 3	3 5	4 9	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
4400	16 4	1 5 8	1 5	6 6	1 6	1 1	4 0	4 1	5 0	1 3	3 6	5 0	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
4600	16 8	1 6 1	1 5	6 8	1 6	1 1	4 1	4 2	5 1	1 3	3 7	5 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
4800	17 2	1 6 4	1 5	7 0	1 6	1 1	4 2	4 3	5 2	1 3	3 8	5 2	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															
5000	17 6	1 6 7	1 5	7 2	1 6	1 1	4 3	4 4	5 3	1 3	3 9	5 3	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1															

Anr. & Millars, Tome II, Paris.

FIGURE 17. Table of proportions of anchors of different weights from Fabrique des Ancres (Diderot 1783:44).

THE MOST APPROVED DIMENSIONS AND WEIGHT OF ANCHORS.

Weight.		Length of the Shank.		Length of the Arms.		Breadth of the Palms.		Thickness of the Palms.		Size of the Trend.		Size of the Small Round.		Outer Diamet. of the Ring.		Thickness of the Rings.	
Cwt.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1	5 8	1 10	0 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
2	6 6	2 2	0 11	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
3	7 0	2 4	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
4	7 6	2 6	1 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
5	8 0	2 8	1 2	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
6	8 6	2 10	1 3	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
7	9 0	3 0	1 4	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
8	9 6	3 2	1 5	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
9	10 0	3 4	1 6	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
10	10 4	3 5	1 7	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
11	10 8	3 7	1 8	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
12	11 0	3 8	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
13	11 4	3 10	1 8	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
14	11 8	3 11	1 8	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
15	12 0	4 0	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
16	12 3	4 1	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
17	12 6	4 2	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
18	12 8	4 3	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
19	12 10	4 4	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
20	13 0	4 4	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
21	13 2	4 5	1 9	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
22	13 4	4 5	1 10	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
23	13 6	4 6	1 10	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
24	13 8	4 6	1 10	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
25	13 10	4 7	1 11	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
26	14 0	4 8	1 11	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
27	14 2	4 8	1 11	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
28	14 4	4 9	1 11	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
29	14 6	4 10	2 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
30	14 7	4 10	2 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
31	14 9	4 11	2 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
32	14 10	4 11	2 1	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
33	15 0	5 0	2 2	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
34	15 1	5 0	2 2	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
35	15 2	5 0	2 2	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
36	15 4	5 1	2 2	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
37	15 6	5 2	2 3	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
38	15 7	5 2	2 3	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
39	15 9	5 3	2 3	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
40	15 10	5 3	2 4	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
41	16 0	5 4	2 4	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

The Number of Anchors allowed each Ship in the Royal Navy, with their Weight and Value.  
S. stands for Stream, K. for Kedge.

No.	110 & 100 GUNS.	VALUE.	No.	98 and 90 GUNS.	VALUE.	No.	80 and 74 GUNS.	VALUE.	No.	Smaller 74 GUNS.	VALUE.	No.	64 GUNS.	VALUE.
	Cwt. Qr.	£ s.		Cwt. Qr.	£ s.		Cwt. Qr.	£ s.		Cwt. Qr.	£ s.		Cwt. Qr.	£ s.
5	81 0	1215 0	5	73 0	1003 15	4	71 0	781 0	4	67 0	670 0	4	57 0	502 2
S. 1	21 0	32 11	S. 1	18 0	27 0	S. 1	17 2	26 0	S. 1	16 0	24 0	S. 1	15 0	22 10
K. 1	10 2	15 15	K. 1	9 0	13 10	K. 1	8 2	12 10	K. 1	8 0	12 0	K. 1	7 2	11 0
No.	60 GUNS.	VALUE.	No.	50 GUNS.	VALUE.	No.	44 and 38 GUNS.	VALUE.	No.	36 GUNS.	VALUE.	No.	32 GUNS.	VALUE.
4	53 0	437 17	4	49 0	382 4	4	40 0	272 0	4	39 0	240 16	4	33 0	210 4
S. 1	12 0	18 0	S. 1	11 0	16 10	S. 1	10 0	15 0	S. 1	9 0	13 10	S. 1	8 1	12 5
K. 1	6 0	9 0	K. 1	5 2	8 0	K. 1	5 0	7 10	K. 1	4 2	6 10	K. 1	4 0	6 0
No.	28 GUNS.	VALUE.	No.	24 and 20 GUNS.	VALUE.	No.	14 GUNS, 300 Tons.	VALUE.	No.	SLOOPs, 200 Tons.	VALUE.	No.	BRIGs, 200 Tons.	VALUE.
4	31 0	198 8	4	23 2	130 11 6	3	20 0	93 0	3	15 0	67 10	3	12 0	54 0
S. 1	8 0	12 0	S. 1	7 2	11 0	S. 1	7 0	10 10	S. 1	6 0	9 0	S. 1	5 0	4 0
K. 1	4 0	6 0	K. 1	3 2	5 0	K. 1	3 2	5 0	K. 1	3 0	4 10	K. 1	2 0	4 0

FIGURE 18. Measurements of Approved Anchors (Steel 1794:81).

Richard Pering's *A Treatise on the Anchor* (1819) provided information and statistics regarding the design and construction of anchors. Pering invented many anchors, some of which became widely adopted over time. In addition, he provides tables regarding the weights and dimensions of anchors adopted by the British Royal Navy (Figure 19; Pering 1819:87). Pering's work provided valuable primary historical research and additional historical sources. Other textual sources of note include seamanship manuals, treatises, and naval dictionaries (see Brady 1847; Ferguson 1944; Engle and Lott 1975; Gillmer 1975; Hayler 1980; Dunbaugh 1992; Kemp and Young 1992; Hawes 1998; Arnold 2000; Hobson and Kristiansen 2004).

Weight	Shank.										Square					
	Length		Size of Throat		Increase or swell				Size				Length	Size to Nut		
					Distance from arm	Size		Trend	Small							
wt.	ft.	in.	in.	in.		ft.	in.		in.	in.	in.	in.	in.	ft.	in.	in.
95	18	7 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	3	4	12 $\frac{1}{2}$	9 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	9	9 $\frac{1}{2}$	7 $\frac{1}{2}$
94	18	7 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	3	4	12 $\frac{1}{2}$	9 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
93	18	6 $\frac{3}{4}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	3	3 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	12 $\frac{1}{2}$	9	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
92	18	6 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	3	3 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	12 $\frac{1}{2}$	9	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
91	18	5 $\frac{1}{2}$	12	9 $\frac{1}{2}$	3	3 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	12	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	8	9 $\frac{1}{2}$	7 $\frac{1}{2}$
90	18	4 $\frac{3}{4}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	3 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	7 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
89	18	4 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	3	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	7 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
88	18	4 $\frac{1}{4}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	3	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	7 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
87	18	3 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	7	9 $\frac{1}{2}$	7 $\frac{1}{2}$
86	18	3	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	6 $\frac{3}{4}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
85	18	2 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	12 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	6 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
84	18	1 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	6 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
83	18	1 $\frac{1}{4}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	6	9 $\frac{1}{2}$	7 $\frac{1}{2}$
82	18	0 $\frac{3}{4}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	5 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
81	17	11 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	5 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
80	17	10 $\frac{1}{2}$	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	2	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	5 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
79	17	10	11 $\frac{1}{2}$	9 $\frac{1}{2}$	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$	3	5	9 $\frac{1}{2}$	7 $\frac{1}{2}$
78	17	9 $\frac{1}{2}$	11 $\frac{1}{2}$	9	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9	7	3	4 $\frac{1}{2}$	9 $\frac{1}{2}$	7 $\frac{1}{2}$
77	17	8 $\frac{1}{2}$	11 $\frac{1}{2}$	9	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	9	7	3	4 $\frac{1}{2}$	9	7 $\frac{1}{2}$
76	17	7 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	4 $\frac{1}{2}$	8 $\frac{1}{2}$	7 $\frac{1}{2}$
75	17	6 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	4	8 $\frac{1}{2}$	7 $\frac{1}{2}$
74	17	5 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	3	1 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	3 $\frac{3}{4}$	8 $\frac{1}{2}$	7
73	17	4 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	3	1	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	3 $\frac{1}{2}$	8 $\frac{1}{2}$	7
72	17	3 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	3	1	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	3 $\frac{1}{2}$	8 $\frac{1}{2}$	7
71	17	2 $\frac{1}{2}$	11	8 $\frac{1}{2}$	3	0 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	11	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	3	8 $\frac{1}{2}$	6 $\frac{1}{2}$
70	17	1 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	3	0 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	2 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$
69	17	0 $\frac{3}{4}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	3	0 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	2 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$
68	16	11 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	3	0 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	2 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$
67	16	10 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	3	0 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	8	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	2	8 $\frac{1}{2}$	6 $\frac{1}{2}$
66	16	9 $\frac{1}{2}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	3	0	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	1 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$
65	16	9 $\frac{1}{4}$	10 $\frac{1}{2}$	8 $\frac{1}{2}$	2	11 $\frac{1}{2}$	11 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	1 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$
64	16	8	10 $\frac{1}{2}$	8 $\frac{1}{2}$	2	11 $\frac{1}{2}$	11	8 $\frac{1}{2}$	10 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	3	1 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$

FIGURE 19. Portion of table of anchor measurements (Pering 1819:88).

Some of the other sources available, including George Cotsell's 1856 work, *A Treatise on Ships [sic] Anchors*, provided elements of comparison for aspects of the technologies used. Cotsell's work provided useful information for understanding the challenges of refining existing anchors and overcoming opposition to new anchor types, as well as comparing the anchors available in the mid-19th century. Cotsell's treatise included three tables used in the analysis section. These tables included three different comparisons between the length of the arms and shank by different manufacturers and of anchors of different weights (Figures 20-22).

Makers.	Weight in Cwts.	Length of Shank.		Length of Arm.	
		Ft.	Ins.	Ft.	Ins.
Rodger	54	13	1½	5	0
Admiralty	54	13	11	4	7½
Porter	53	12	8	5	0
Admiralty	53	13	10	4	7½
Porter	26	10	8	4	0
Admiralty	26	11	0	3	8

FIGURE 20. Length of the Shank and Arms from different designers and different weights (Cotsell 1856:33).

Plan.	Weight in Cwts.	Length of Shank.		Length of Arms.	
		Ft.	Ins.	Ft.	Ins.
Admiralty	60	14	5	4	9½
Porter's	60				
Rodger's	60	13	5	5	1½
Admiralty	55	14	0	4	8
Porter's	55	16	2	5	1
Rodger's	55				
Admiralty	54	13	11	4	7½
Porter's	54				
Rodger's	54	13	1½	5	0
Admiralty	53	13	10	4	7½
Porter's	53	12	7½	5	0
Rodger's	53				
Admiralty	51	13	8	4	6½
Porter's	51	15	5	5	1
Rodger's	51	13	1½	4	10
Admiralty	45	13	1	4	4½
Porter's	45				
Rodger's	45	13	3	4	9
Rodger's	45	12	3	4	7½
Admiralty	28	11	8	3	9
Porter's	28	10	7	4	1
Rodger's	28	10	5	3	10½

FIGURE 21. Expanded Table showing Length of the Shank and Arms from different designers and different weights (Cotsell 1856:64).

Description of Anchor.					Length of				
					Shank.		Arms.		
					Ft.	In.	Ft.	In.	
The Old plan anchor of . . . .				Cwt.	20	12	10	4	3 $\frac{1}{8}$
Pering's 1st plan anchor . . . .					20	12	6	4	3 $\frac{1}{8}$
Pering's improved . . . .					20	9	11 $\frac{3}{4}$	3	8 $\frac{5}{8}$
The eight anchors tried at Sheerness in 1852.				Admiralty . . . .	20	10	0 $\frac{1}{2}$	3	2
				Rodger's . . . .	20	9	0	3	2
				Trotman's . . . .	20	11	9	4	1 $\frac{1}{2}$
				Lenox's . . . .	20	9	1	3	2 $\frac{1}{2}$
				Aylen's . . . .	20	10	2	3	4 $\frac{1}{2}$
				Mitcheson's . . . .	20	10	0	3	8
				Honiball's (Porter's) . . . .	20	11	9	4	0 $\frac{3}{4}$
				Isaac's . . . .	20	8	6	2	9

FIGURE 22. Different Anchors, including the eight tried in the Royal Navy Trials, comparing the Lengths of the Shank and Arms (Cotsell 1856:84).

Other treatises used in the course of the analysis portion of the thesis included two manuscripts mentioned in Curryer's *Anchors: An Illustrated History* from 1763, 1815, and 1825 (Curryer 1999:56, 60–61, 75). The first table, from 1763, concerned the established sizes and weights of the anchors used by the British Royal Navy (Figure 23). The second table found in Curryer was from 1825 and included the different weights and sizes of anchors but categorized them by the class of ship (Figure 24). Additional anchor information, including tables describing the sizes and weights of anchors made in the Royal dockyards, was found in *Falconer's New Universal Dictionary of the Marine* (Burney 1815:10-17; Figure 25). This table included weights from one hundredweight (or 112 pounds) up to 90 hundredweight (or 10,080 pounds). In addition, the author translated a section from Diderot's 1783 *Encyclopédie*, titled *Fabrique des Ancres*, as the tables were very similar to the other treatises (Diderot 1783:44). The last treatise



used on stocked anchors was Captain William Rodger's *Patent Double-Concave Small-Palmed Anchor*, which contained many valuable charts and tables, as well as comparing the Rodger anchor against its contemporaries (Figure 26; Rodger 1858:47).

The only table relating to stockless or self-canting anchors was in *Table of Hall's Patent Admiralty Anchors* (Hall 1898). This book, published in England in 1898, had tables for anchors ranging from one to 140 hundredweights (Figure 27). In addition, there were design drawings of the patent anchors themselves.

*The Established Sizes and Weights of Anchors for the Royal Navy, c1763*

	Number and Weight of the different Anchors to each Ship				Dimensions of the Anchors, in Feet and Inches								Number and Weight of the different Cables to each Ship: With the number of Yarns in each Strand						
	No.	Cwt	Qrs	lb	L	S	T	T	L	P	B	P	T	P	N	S	W	N of Y	
<b>100 Guns</b>																			
Bowers	5	81	0	0	19	2	0	9½	3	3¼	3	2¼	0	3¼	9	24	120	3 3 0	334
Stream	1	21	0	0	13	4	0	5¼	2	0¼	1	11¾	0	1¼	1	15	46	3 14 8	130
Kedge	1	10	2	0	10	4	0	4½	1	8½	1	9½	0	1¼	-	-	-	-	-
<b>90 Guns</b>																			
Bowers	5	73	0	0	18	7	0	8¾	3	1¼	3	0¼	full	3	9	23	106	0 27 8	308
Stream	1	18	0	0	12	10	0	5½	1	10½	1	11¼	full	1½	1	14½	43	3 5 15	122
Kedge	1	9	0	0	9	9	0	4	1	7	1	8¼	full	1½	-	-	-	-	-
<b>74 Guns</b>																			
Bowers	4	67	0	0	18	1	0	8½	3	0¼	2	10¼	0	2¾	7	22	100	2 19 6	285
Stream	1	16	0	0	12	2	0	4¾	1	9¾	1	11¼	0	1¾	1	13½	37	3 24 8	106
Kedge	1	8	0	0	9	6	0	3¼	1	6	1	7¾	full	1½	-	-	-	-	-
<b>64 Guns</b>																			
Bowers	4	57	0	0	17	3	0	8	2	9¼	2	8¼	0	2¾	7	21	91	3 14 0	255
Stream	1	15	0	0	11	10	0	4¼	1	9¼	1	11	0	1¾	1	13	35	0 23 5	98
Kedge	1	7	2	0	9	4½	0	3½	1	5½	1	6½	full	1½	-	-	-	-	-
<b>50 Guns</b>																			
Bowers	4	49	0	0	16	7	0	7¾	2	8¼	2	6¼	0	2¾	7	19	73	0 23 6	209
Stream	1	11	0	0	10	6	0	4¾	1	8¾	1	9¾	0	1¼	1	12	30	0 0 0	83
Kedge	1	5	2	0	8	6	0	3½	1	3½	1	4½	0	1¾	-	-	-	-	-
<b>44 Guns</b>																			
Bowers	4	40	0	0	15	10	0	7¼	2	5½	2	4½	0	2¼	7	17½	63	3 5 14	177
Stream	1	10	0	0	10	2	0	4¾	1	8	1	9½	0	1¼	1	12	30	0 0 0	83
Kedge	1	5	0	0	8	3	0	3¼	1	3	1	4	0	1¾	-	-	-	-	-
<b>32 Guns</b>																			
Bowers	4	33	0	0	15	3	0	6½	2	3¼	2	2½	full	2½	7	16½	56	2 24 8	157
Stream	1	8	1	0	9	6	0	3¼	1	6	1	7¾	0	1½	1	9½	18	3 5 14	52
Kedge	1	4	0	0	7	9	0	3½	1	2	1	3	0	1	-	-	-	-	-
<b>28 Guns</b>																			
Bowers	4	31	0	0	15	0	0	6½	2	3¼	2	2½	full	2½	6	16	53	1 9 6	148
Stream	1	8	0	0	9	6	0	3¼	1	6	1	7¾	0	1½	1	9	16	3 14 0	47
Kedge	1	4	0	0	7	9	0	3½	1	2	1	3	0	1	-	-	-	-	-
<b>20 Guns</b>																			
Bowers	4	25	0	0	14	0	0	6¼	2	1½	2	0	0	1¾	6	14½	43	3 5 15	122
Stream	1	7	2	0	9	4½	0	3½	1	5½	1	6½	0	1¼	1	7½	11	2 24 8	32
Kedge	1	3	2	0	7	6	0	3	1	1½	1	2½	0	1½	-	-	-	-	-
<b>14 Guns</b>																			
Bowers	3	20	2	0	13	3	0	5½	2	0¾	1	11½	0	1¼	5	13½	37	3 24 8	106
Stream	1	7	0	0	9	3	0	3¾	1	5	1	6	0	1½	1	7½	11	2 24 8	32
Kedge	1	3	2	0	7	6	0	3	1	1½	1	2½	0	1½	-	-	-	-	-

First and Second Rate Ships generally have (beside the undermentioned) another smaller Kedge, of about 4½ or 5 cwt with them.

CONTRACTIONS EXPLAINED.  
L. S. Length of the Shank. T. T. Thickness of the Trent.  
L. P. Length of the Palms. B. P. Breadth of the Palms.  
T. P. Thickness of the Palms.  
N.B. The Diameter of each Ring, from the Outside to Outside, is the Breadth of its respective Palms: And the Size of the Ring is Half the Size of the Small of the Round of the Shank.

CONTRACTIONS EXPLAINED.  
N. Number of Cables of the same size  
S. Size of the Cables.  
W. Weight of each Cable at 100 fathoms.  
N of Y. Number of Yarns in each Strand.

FIGURE 23. 1763 Table of anchor weights and sizes (Curryer 1999:56).

*Weight and Length of Anchors supplied to the different Classes of Ships, from Fincham, 1825*

CLASS OF SHIP	Weight of Anchors supplied	Whole Length		Length from the Ring to the Bill		Length from extreme End to the Bill		Weight of small Anchors			
		Pering	Common	Pering	Common	Pering	Common	Of Stream		Of Kedge	
		No cwt qr	ft in	ft in	ft in	ft in	ft in	ft in	ft in	No cwt qr	No cwt qr
Three-deck ships	Guns 120	4 95 0	18 7¼	19 2¾	14 10	15 5	15 5	16 0	1 21 0	1 5 0	1 10 2
	110	4 90 0	18 4¾	19 0¼	14 7	15 2	15 2	15 9	1 21 0	1 5 0	1 10 2
	104	4 84 0	18 1½	18 8½	14 4	14 11	14 11	15 6	1 21 0	1 5 0	1 10 2
	98	4 76 0	17 7½	18 2	13 11	14 6	13 5	15 1	1 18 0	1 4 2	1 9 0
Two-deck ships	86	4 81 0	17 11¾	18 6¼	14 2	14 10	14 8	15 4	1 18 0	1 4 2	1 9 0
	84	4 81 0	17 11¾	18 6¼	14 2	14 10	14 8	15 4	1 18 0	1 4 2	1 9 0
	82	4 76 0	17 7½	18 2	13 11	14 6	14 5	15 1	1 18 0	1 4 2	1 9 0
	80	4 76 0	17 7½	18 2	13 11	14 6	14 5	15 1	1 18 0	1 4 2	1 9 0
	78	4 76 0	17 7½	18 2	13 11	14 6	14 5	15 1	1 17 0	1 4 2	1 8 2
	76	4 76 0	17 7½	18 2	13 11	14 6	14 5	15 1	1 17 0	1 4 2	1 8 2
	74	4 76 0	17 7½	18 2	13 11	14 6	14 5	15 1	1 17 0	1 4 2	1 8 2
	Built as frigates	58	4 49 0	15 6½	16 0	12 4	12 9	12 10	13 3	1 11 0	1 5 2
60	4 57 0	16 1	16 7	12 9	13 3	13 3	13 8	1 15 0	1 5 0	1 5 0	
50	4 48 0	15 5½	15 11	12 3	12 8	12 8	13 2	1 12 0	1 5 0	1 5 0	
48	4 48 0	15 5½	15 11	12 3	12 8	12 8	13 2	1 12 0	1 5 0	1 5 0	
46	4 46 0	15 3½	15 9	12 1	12 7	12 6	13 0	1 10 0	1 5 0	1 5 0	
44	4 42 0	14 11½	15 5	11 10	12 4	12 3	12 9	1 10 0	1 5 0	1 5 0	
42	4 42 0	14 11½	15 5	11 10	12 4	12 3	12 9	1 10 0	1 5 0	1 5 0	
34	3 29 2	13 11	14 4	11 4	11 5	11 6	11 10	1 8 0	1 3 2	1 3 2	
32	3 29 2	13 11	14 4	11 4	11 5	11 8	11 10	1 8 0	1 3 2	1 3 2	
28	3 25 0	13 2½	13 7	10 5	10 10	10 9	11 3	1 7 0	1 3 2	1 3 2	
Flush-deck Vessels	Tons 26	3 23 0	12 10½	13 3	10 2	10 7	10 6	11 11	1 7 0	1 3 2	1 3 2
	455 20	3 25 0	13 2½	13 7	10 5	10 10	10 9	11 3	1 7 0	1 3 2	1 3 2
	460 18	2 22 0	12 8½	13 1	10 1	10 6	10 5	10 10	1 7 0	1 3 2	1 3 2
		1 25 0	13 2½	13 7	10 5	10 10	10 9	11 3	1 7 0	1 3 2	1 3 2
	400 18	2 20 0	12 6	12 10	9 10	10 3	10 2	10 7	1 7 0	1 3 2	1 3 2
		1 21 0	12 6½	12 11	9 11	10 4	10 3	10 8	1 7 0	1 3 2	1 3 2
	382 18	3 20 0	12 6	12 10	9 10	10 3	10 2	10 7	1 7 0	1 3 2	1 3 2
255 16	3 20 0	12 6	12 10	9 10	10 3	10 2	10 7	1 7 0	1 3 2	1 3 2	
235 10	3 17 0	11 10	12 2	9 4	9 9	10 7	10 0	1 6 0	1 3 0	1 3 0	
Cutters	160 10	3 10 2	9 8¼	9 11½	7 8	7 11	7 11	8 2			

NOTE. These lengths are taken from the establishments; but it will be found that anchors frequently vary considerably from them, it would therefore be most correct, when circumstances will allow in determining the place of the cathead, to stow the anchors properly in relation to the dead-eyes, and fixing the bill board and anchor linings, to take the dimensions from the anchors that are appropriate to the ship.

FIGURE 24. 1825 Table of anchor weights and sizes by class type (Curryer 1999:75).



TABLE of the dimensions of Anchors, as made in his Majesty's dock-yards, from 1 cwt. to 90, which is the weight of the largest Anchors used in the first rates.

Weight.	Length of the shank.		Length of the flukes.		Thickness of the point.		Thickness of the web.		Size of the small ring.		Outer diamet. of the ring.		Thickness of the ring.	
	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.
1	5	8	1	10	0	9	0	0	0	0	0	0	0	1
2	6	6	2	8	0	11	0	0	0	0	0	0	0	1
3	7	0	3	4	1	0	0	0	0	0	0	0	0	1
4	7	6	3	4	1	0	0	0	0	0	0	0	0	1
5	8	0	3	8	1	3	0	0	0	0	0	0	0	1
6	8	6	3	10	1	3	0	0	0	0	0	0	0	1
7	9	0	3	0	1	4	0	0	0	0	0	0	0	1
8	9	6	3	3	1	5	0	0	0	0	0	0	0	1
9	10	0	3	4	1	6	0	0	0	0	0	0	0	1
10	10	4	3	5	1	7	0	0	0	0	0	0	0	1
11	0	8	3	7	1	8	0	0	0	0	0	0	0	1
12	11	0	3	8	1	8	0	0	0	0	0	0	0	1
13	11	4	3	10	1	8	0	0	0	0	0	0	0	1
14	11	8	3	11	1	8	0	0	0	0	0	0	0	1
15	12	0	4	0	1	9	0	0	0	0	0	0	0	1
16	12	3	4	1	1	9	0	0	0	0	0	0	0	1
17	12	6	4	2	1	9	0	0	0	0	0	0	0	1
18	12	8	4	3	1	9	0	0	0	0	0	0	0	1
19	12	10	4	4	1	9	0	0	0	0	0	0	0	1
20	13	0	4	4	1	9	0	0	0	0	0	0	0	1
21	13	3	4	5	1	9	0	0	0	0	0	0	0	1
22	13	6	4	5	1	10	0	0	0	0	0	0	0	1
23	13	8	4	6	1	10	0	0	0	0	0	0	0	1
24	13	8	4	6	1	10	0	0	0	0	0	0	0	1
25	13	10	4	7	1	11	0	0	0	0	0	0	0	1
26	14	0	4	8	1	11	0	0	0	0	0	0	0	1
27	14	3	4	8	1	11	0	0	0	0	0	0	0	1
28	14	4	4	9	1	11	0	0	0	0	0	0	0	1
29	14	6	4	10	2	0	0	0	0	0	0	0	0	1
30	14	7	4	10	3	0	0	0	0	0	0	0	0	1
31	14	9	4	11	2	1	0	0	0	0	0	0	0	1
32	14	10	4	11	3	1	0	0	0	0	0	0	0	1
33	15	0	5	0	2	1	0	0	0	0	0	0	0	1
34	15	1	5	0	3	2	0	0	0	0	0	0	0	1
35	15	3	5	0	3	2	0	0	0	0	0	0	0	1
36	15	4	5	0	3	2	0	0	0	0	0	0	0	1
37	15	6	5	3	3	2	0	0	0	0	0	0	0	1
38	15	7	5	3	3	2	0	0	0	0	0	0	0	1
39	15	9	5	3	3	2	0	0	0	0	0	0	0	1
40	15	10	5	3	3	2	0	0	0	0	0	0	0	1
41	16	0	5	4	3	4	0	0	0	0	0	0	0	1
42	16	1	5	4	3	4	0	0	0	0	0	0	0	1
43	16	3	5	4	3	4	0	0	0	0	0	0	0	1
44	16	3	5	5	3	5	0	0	0	0	0	0	0	1
45	16	4	5	5	3	5	0	0	0	0	0	0	0	1
46	16	5	5	5	3	5	0	0	0	0	0	0	0	1
47	16	6	5	6	3	6	0	0	0	0	0	0	0	1
48	16	7	5	6	3	6	0	0	0	0	0	0	0	1
49	16	8	5	6	3	6	0	0	0	0	0	0	0	1
50	16	9	5	6	3	7	0	0	0	0	0	0	0	1

Continuation of Table.

Weight.	Length of the shank.		Length of the flukes.		Thickness of the point.		Thickness of the web.		Size of the small ring.		Outer diamet. of the ring.		Thickness of the ring.	
	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.	feet.	in.
51	16	10	5	7	3	7	0	0	0	0	0	0	0	1
52	16	11	5	7	3	8	0	0	0	0	0	0	0	1
53	17	0	5	7	3	8	0	0	0	0	0	0	0	1
54	17	1	5	8	3	8	0	0	0	0	0	0	0	1
55	17	2	5	8	3	9	0	0	0	0	0	0	0	1
56	17	3	5	9	3	9	0	0	0	0	0	0	0	1
57	17	4	5	9	3	9	0	0	0	0	0	0	0	1
58	17	5	5	9	3	10	0	0	0	0	0	0	0	1
59	17	6	5	10	3	10	0	0	0	0	0	0	0	1
60	17	7	5	10	3	10	0	0	0	0	0	0	0	1
61	17	8	5	10	3	11	0	0	0	0	0	0	0	1
62	17	10	5	11	3	11	0	0	0	0	0	0	0	1
63	17	11	5	11	3	11	0	0	0	0	0	0	0	1
64	17	11	5	11	3	11	0	0	0	0	0	0	0	1
65	18	0	6	0	3	0	0	0	0	0	0	0	0	1
66	18	1	6	0	3	0	0	0	0	0	0	0	0	1
67	18	2	6	0	3	1	0	0	0	0	0	0	0	1
68	18	3	6	1	3	1	0	0	0	0	0	0	0	1
69	18	3	6	1	3	1	0	0	0	0	0	0	0	1
70	18	4	6	1	3	1	0	0	0	0	0	0	0	1
71	18	5	6	1	3	1	0	0	0	0	0	0	0	1
72	18	6	6	2	3	1	0	0	0	0	0	0	0	1
73	18	8	6	2	3	1	0	0	0	0	0	0	0	1
74	18	8	6	3	3	1	0	0	0	0	0	0	0	1
75	18	11	6	3	3	1	0	0	0	0	0	0	0	1
76	19	0	6	4	3	2	0	0	0	0	0	0	0	1
77	19	1	6	4	3	2	0	0	0	0	0	0	0	1
78	19	3	6	5	3	2	0	0	0	0	0	0	0	1
79	19	4	6	5	3	2	0	0	0	0	0	0	0	1
80	19	6	6	6	3	2	0	0	0	0	0	0	0	1
81	19	8	6	6	3	2	0	0	0	0	0	0	0	1
82	19	8	6	6	3	2	0	0	0	0	0	0	0	1
83	19	8	6	6	3	2	0	0	0	0	0	0	0	1
84	19	9	6	7	3	2	0	0	0	0	0	0	0	1
85	19	9	6	7	3	2	0	0	0	0	0	0	0	1
86	19	9	6	7	3	2	0	0	0	0	0	0	0	1
87	19	10	6	7	3	2	0	0	0	0	0	0	0	1
88	19	10	6	7	3	2	0	0	0	0	0	0	0	1
89	19	10	6	7	3	2	0	0	0	0	0	0	0	1
90	19	11	6	7	3	2	0	0	0	0	0	0	0	1

*Dimensions of the Palms of Anchors, as made in Her Majesty's Dock Yards, at the undermentioned periods; viz.—*

Weight of Anchors.	Old Plan. 1806. •		Old Plan. 1812. †		Mr. Pering's Plan. 1819. ‡		Mr. Pering's Plan. 1832. 		Admiralty Plan. 1840. §							
	Length.		Breadth		Length.		Breadth		Length.		Breadth					
	Ft.	ins.	Ft.	ins.	Ft.	ins.	Ft.	ins.	Ft.	ins.	Ft.	ins.				
90	3	5	3	4	3	2 $\frac{3}{4}$	3	1 $\frac{1}{4}$	3	2 $\frac{3}{4}$	3	2 $\frac{7}{8}$	2	7	2	4 $\frac{1}{4}$
80	3	3 $\frac{1}{2}$	3	2	3	1 $\frac{1}{2}$	3	0	3	1 $\frac{1}{2}$	3	1 $\frac{1}{4}$	2	5 $\frac{3}{4}$	2	3 $\frac{1}{8}$
70	3	1	2	11 $\frac{1}{8}$	3	0 $\frac{1}{4}$	2	10 $\frac{3}{4}$	3	0 $\frac{1}{4}$	3	0 $\frac{1}{4}$	2	11 $\frac{3}{4}$	2	11 $\frac{3}{4}$
60	2	10 $\frac{1}{2}$	2	9	2	10 $\frac{1}{2}$	2	9	2	10 $\frac{1}{2}$	2	10 $\frac{1}{2}$	2	9 $\frac{1}{4}$	2	9 $\frac{1}{4}$
50	2	8 $\frac{1}{2}$	2	6 $\frac{1}{2}$	2	8	2	6 $\frac{1}{2}$	2	8	2	8	2	8	2	8
40	2	5 $\frac{1}{2}$	2	4 $\frac{1}{2}$	2	6	2	4 $\frac{1}{2}$	2	6	2	6	2	5 $\frac{1}{2}$	2	5 $\frac{1}{2}$
30	2	3 $\frac{1}{2}$	2	2	2	3 $\frac{1}{4}$	2	2	2	3 $\frac{1}{4}$	2	3 $\frac{1}{4}$	2	3	2	3
20	2	0	1	11	2	0 $\frac{1}{4}$	1	11	2	0 $\frac{1}{4}$	2	0 $\frac{1}{4}$	1	11 $\frac{3}{8}$	1	11 $\frac{3}{8}$
15	1	11	1	9 $\frac{3}{4}$	1	10 $\frac{3}{4}$	1	9 $\frac{3}{4}$	1	10 $\frac{3}{4}$	1	10 $\frac{3}{4}$	1	9 $\frac{1}{2}$	1	9 $\frac{1}{2}$
10	1	9 $\frac{1}{2}$	1	8	1	9	1	8	1	9	1	9	1	6 $\frac{3}{4}$	1	6 $\frac{3}{4}$
5	1	4	1	3	1	4	1	3	1	4	1	4	1	2 $\frac{3}{4}$	1	2 $\frac{3}{4}$
1	0	9 $\frac{3}{4}$	0	9	0	8 $\frac{1}{2}$	0	8	0	8 $\frac{1}{2}$	0	8 $\frac{1}{2}$	0	8 $\frac{5}{8}$	0	8 $\frac{5}{8}$

FIGURE 26. Table comparing fluke sizes (Rodger 1858:47).

HALL'S PATENT ADMIRALTY ANCHORS.																				
WEIGHTS				HEAD				CROSS STEM				SHANKS				CASTINGS				
Disc.	Chin. Ors. Lbs.	From. Ors. Lbs.	Thread. Couster.	Length.	Depth.	Width.	Opening.	Distance.	Length.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	Twisted. Part.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	0 0 13½	0 2 1	1 5½	3	5½	3½	3½ × 3½	4	5½	3½	13	6½	12½	1½	12½	1½	12½	1½	12½	1½
2	0 1 0	1 0 4½	1 10	3½	6½	4½	2½ × 4½	4½	6½	4½	2	8½	15½	1½	15½	1½	15½	1½	15½	1½
3	0 1 14	1 2 0	2 1	4½	7½	5½	3½ × 4½	5½	7½	5½	2½	9½	17½	1½	17½	1½	17½	1½	17½	1½
4	0 1 27	2 0 7	2 3½	4½	8½	6½	4½ × 5½	6½	8½	6½	2½	10½	19½	1½	19½	1½	19½	1½	19½	1½
5	0 2 14	2 3 14	2 5½	5½	9½	7½	5½ × 6½	7½	9½	7½	3	11½	20½	1½	20½	1½	20½	1½	20½	1½
6	0 3 1	3 0 5	2 7½	6½	10½	8½	6½ × 7½	8½	10½	8½	3½	12½	22½	1½	22½	1½	22½	1½	22½	1½
7	0 3 14	3 3 19	2 9½	7½	11½	9½	7½ × 8½	9½	11½	9½	4	13½	23½	1½	23½	1½	23½	1½	23½	1½
8	1 0 1	4 0 7	2 11	8½	12½	10½	8½ × 9½	10½	12½	10½	4½	14½	24½	1½	24½	1½	24½	1½	24½	1½
9	1 0 12	4 2 18	3 0½	9½	13½	11½	9½ × 10½	11½	13½	11½	5	15½	25½	1½	25½	1½	25½	1½	25½	1½
10	1 0 25	5 0 15	3 1½	10½	14½	12½	10½ × 11½	12½	14½	12½	5½	16½	26½	1½	26½	1½	26½	1½	26½	1½
11	1 1 11	5 2 17	3 2½	11½	15½	13½	11½ × 12½	13½	15½	13½	6	17½	27½	1½	27½	1½	27½	1½	27½	1½
12	1 1 20	6 0 25	3 3½	12½	16½	14½	12½ × 13½	14½	16½	14½	6½	18½	28½	1½	28½	1½	28½	1½	28½	1½
13	1 2 14	6 2 6	3 4½	13½	17½	15½	13½ × 14½	15½	17½	15½	7	19½	29½	1½	29½	1½	29½	1½	29½	1½
14	1 2 24	7 0 20	3 5½	14½	18½	16½	14½ × 15½	16½	18½	16½	7½	20½	30½	1½	30½	1½	30½	1½	30½	1½
15	1 3 14	7 2 8	3 7	15½	19½	17½	15½ × 16½	17½	19½	17½	8	21½	31½	1½	31½	1½	31½	1½	31½	1½
16	1 3 25	8 1 9	3 7½	16½	20½	18½	16½ × 17½	18½	20½	18½	8½	22½	32½	1½	32½	1½	32½	1½	32½	1½
17	2 0 8	8 2 20	3 8½	17½	21½	19½	17½ × 18½	19½	21½	19½	9	23½	33½	1½	33½	1½	33½	1½	33½	1½
18	2 0 19	9 0 12	3 9½	18½	22½	20½	18½ × 19½	20½	22½	20½	9½	24½	34½	1½	34½	1½	34½	1½	34½	1½
19	2 1 15	9 2 13	3 10½	19½	23½	21½	19½ × 20½	21½	23½	21½	10	25½	35½	1½	35½	1½	35½	1½	35½	1½
20	2 2 1	10 0 10	3 11½	20½	24½	22½	20½ × 21½	22½	24½	22½	10½	26½	36½	1½	36½	1½	36½	1½	36½	1½
21	2 2 15	10 2 10	4 0	21½	25½	23½	21½ × 22½	23½	25½	23½	11	27½	37½	1½	37½	1½	37½	1½	37½	1½
22	2 3 1	11 0 13	4 0½	22½	26½	24½	22½ × 23½	24½	26½	24½	11½	28½	38½	1½	38½	1½	38½	1½	38½	1½
23	2 3 16	11 2 18	4 1½	23½	27½	25½	23½ × 24½	25½	27½	25½	12	29½	39½	1½	39½	1½	39½	1½	39½	1½
24	3 0 5	12 0 27	4 2½	24½	28½	26½	24½ × 25½	26½	28½	26½	12½	30½	40½	1½	40½	1½	40½	1½	40½	1½
25	3 0 5	12 3 3	4 3½	25½	29½	27½	25½ × 26½	27½	29½	27½	13	31½	41½	1½	41½	1½	41½	1½	41½	1½
26	3 0 19	13 1 10	4 3½	26½	30½	28½	26½ × 27½	28½	30½	28½	13½	32½	42½	1½	42½	1½	42½	1½	42½	1½
27	3 1 9	14 0 6	4 4	27½	31½	29½	27½ × 28½	29½	31½	29½	14	33½	43½	1½	43½	1½	43½	1½	43½	1½
28	3 2 1	14 3 0	4 4½	28½	32½	30½	28½ × 29½	30½	32½	30½	14½	34½	44½	1½	44½	1½	44½	1½	44½	1½
29	3 2 1	14 3 0	4 4½	29½	33½	31½	29½ × 30½	31½	33½	31½	15	35½	45½	1½	45½	1½	45½	1½	45½	1½
30	3 2 20	15 1 24	4 5½	30½	34½	32½	30½ × 31½	32½	34½	32½	15½	36½	46½	1½	46½	1½	46½	1½	46½	1½
31	3 3 12	15 2 5	4 6½	31½	35½	33½	31½ × 32½	33½	35½	33½	16	37½	47½	1½	47½	1½	47½	1½	47½	1½
32	3 3 12	16 0 25	4 6½	32½	36½	34½	32½ × 33½	34½	36½	34½	16½	38½	48½	1½	48½	1½	48½	1½	48½	1½
33	4 0 6	17 0 3	4 7½	33½	37½	35½	33½ × 34½	35½	37½	35½	17	39½	49½	1½	49½	1½	49½	1½	49½	1½
34	4 1 0	17 0 11	4 8½	34½	38½	36½	34½ × 35½	36½	38½	36½	17½	40½	50½	1½	50½	1½	50½	1½	50½	1½
35	4 1 0	17 3 11	4 8½	35½	39½	37½	35½ × 36½	37½	39½	37½	18	41½	51½	1½	51½	1½	51½	1½	51½	1½

FIGURE 27. Part of one of four tables in Hall's Patent Admiralty Anchor (Hall 1898).

### *Theses*

As previously mentioned, Jobling's Master's thesis, "History and Development of English Anchors ca. 1550 to 1850" (1993), includes detailed contextual information vital to understanding the subject. While the scope of this study is more archaeologically focused than Jobling's, similarities in topic allowed for his prior work to be an important resource.

### *Insurance Registers*

Usually information regarding anchors is found in the introduction to each of the *American Lloyd's* registers (Figures 28 and 29). *American Lloyd's* and the *Record* both note the size of anchors to use with certain tonnages. Additionally, the *Record* (starting in 1883) has tables on the anchors for both wooden and metal vessels as well as tables for vessels powered by steam or sail. Similarities and changes throughout *American Lloyd's* and other records can be seen as evidence of technological innovations culminating in stronger chains and anchors for watercraft. These records, therefore, show corresponding changes in ship technology that allowed larger ships carrying much greater cargo loads than previously possible. These registers provide historical evidence of changing patterns over time.



Table of Weights of Anchors for Tonnage from 100 to 2000.					
Tons.	Howver. lbs.	2 Bowers. lbs.	Tons.	Howver. lbs.	2 Bowers. lbs.
100	900	800	1100	4000	3900
200	1200	1000	1200	4100	4000
300	1500	1300	1300	4200	4100
400	1800	1500	1400	4400	4200
500	2300	2000	1500	"	"
600	2800	2500	1600	4600	4400
700	3200	2900	1700	"	"
800	3600	3300	1800	4800	4600
900	3700	3500	1900	"	"
1000	3900	3800	2000	5000	4800

Table of Size and Length of Chain Cables for Tonnage from 100 to 2000.					
Tons.	1st Size. Inch.	2d Size. Inch.	Length. Fathom.	Size Stream Chain. Inch.	
100	1 1/8	3/4	90	...	...
200	1 1/4	1	120	...	...
300	1 1/2	1 1/4	150	...	...
400	1 3/4	1 1/2	"	...	...
500	1 7/8	1 3/4	180	...	...
600	2	1 7/8	"	...	...
700	2 1/8	2	"	...	...
800	2 1/4	2 1/8	"	...	...
900	2 1/2	2 1/4	"	...	...
1000	2 3/4	2 1/2	225	...	...
1100	"	"	"	...	...
1200	"	2 1/2	"	...	...
1300	2	"	"	...	...
1400	"	"	245	...	...
1500	2 1/4	2	"	...	...
1600	"	"	"	...	...
1700	"	"	270	...	...
1800	"	"	"	...	...
1900	2 3/4	2 1/4	"	...	...
2000	"	"	"	...	...

Table of Weight of Stream and Kedge Anchors for Tonnage from 100 to 2000 Tons.					
Tons.	Stream Anchor lbs.	Kedge Anchor lbs.	Tons.	Stream Anchor lbs.	Kedge Anchor lbs.
100		150	1100	1400	600
200		200	1200	"	"
300	700	300	1300	1500	650
400	800	350	1400	"	"
500	900	400	1500	1600	700
600	1000	450	1600	"	"
700	1200	500	1700	"	"
800	"	"	1800	1800	750
900	1300	550	1900	"	"
1000	"	"	2000	2000	800

*It is necessary that all vessels of 300 tons and over should be furnished with stream and kedge anchors of sufficient weight.*

WEIGHT OF CHAINS PER FATHOM.		
Inch.		lbs.
1/2	.....	14
3/4	.....	18
1	.....	22
1 1/4	.....	27
1 1/2	.....	32
1 3/4	.....	38
2	.....	44
2 1/4	.....	50
2 1/2	.....	56
2 3/4	.....	63
3	.....	70
3 1/4	.....	78
3 1/2	.....	80
3 3/4	.....	95
4	.....	105
4 1/4	.....	115
4 1/2	.....	125
4 3/4	.....	130
5	.....	145
5 1/4	.....	170
5 1/2	.....	196
5 3/4	.....	224
6	.....	"

*It is necessary that all vessels corresponding to the above tonnage, from 100 to 2,000, should have their chain cables of sufficient size and length.*

FIGURE 28. 1865 Anchor weights from *Lloyds Registry of American and Foreign Shipping* (American Lloyds 1865:xxvii).

TABLES FOR WOODEN VESSELS.

TABLE No. 4.

CHAINS AND ANCHORS FOR SAILING VESSELS.

Minimum Weight of Anchors; Sizes and Length of Chain Cables and the Proof Strain to which they are tested.

GROSS TONNAGE.	ANCHORS.								STUD CHAIN CABLE.			
	NAME.			WEIGHT.					Minimum Sizes.	Length.	Test in Tons.	Breaking Test.
	Bower.	Stream.	Kedges.	BOWERS.†		INCLUDING STOCK.						
				With-out Stock.	Test.	Stream.	Kedge.	2d Kedge.				
			Lbs.	Tons.	Lbs.	Lbs.	Lbs.	Ins.	Fathoms.	Tons.		
73	2	1	1	600	7	170	110	-----	1 1/8	90	12	15
100	2	1	1	700	8	200	110	-----	1 1/8	105	13 1/2	20 1/2
125	2	1	1	800	9	225	110	-----	1 1/8	120	15 1/2	23 1/2
150	2	1	1	900	10	280	140	-----	1	120	18	27
175	2	1	1	1000	11	330	170	-----	1 1/8	120	20 3/4	30 3/4
200	2	1	1	1100	12	400	200	-----	1 1/8	135	22 1/2	34 1/2
250	2	1	1	1300	13	450	225	112	1 3/8	135	25 1/2	38
300	2	1	1	1450	14	500	250	125	1 1/2	135	28 1/4	42 1/4
350	2	1	1	1625	15 1/2	560	280	140	1 5/8	150	31	46 1/2
400	2	1	1	1850	17	600	300	155	1 7/8	165	31	46 1/2
450	2	1	1	1900	18 1/2	675	340	170	1 7/8	165	34	48
500	2	1	1	2125	20	775	400	195	1 7/8	180	37 1/2	49 1/2
600	2	1	1	2450	22	900	450	225	1 1/2	180	40 1/2	54
700	2	1	1	2800	24	1000	500	250	1 3/4	180	44	58
800	2	1	1	3125	26	1125	615	280	1 3/4	180	47 1/2	66 1/2
900	2	1	1	3350	28	1225	650	310	1 1/2	180	51 1/2	71 1/2
1000	2	1	1	3575	29 1/2	1250	675	335	1 3/4	180	55 1/4	77
1200	2	1	1	3800	31	1450	725	360	1 3/4	180	63 3/4	88
1400	2	1	1	4000	32 1/2	1550	780	395	1 1/2	180	67 1/2	94
1600	2	1	1	4250	34	1600	840	420	2	180	72	100
1800	2	1	1	4500	35 1/2	1800	900	450	2	180	72	100
2000	2	1	1	4700	37	1900	950	500	2 1/8	180	76 1/4	104
2500	2	1	1	5000	39	2100	1120	560	2 1/2	180	80	110
3000	2	1	1	5400	41	2350	1230	615	2 3/4	180	86	120

FIGURE 29. 1911 Anchor weights for wooden sailing vessels (American Shipmaster's Association 1911:249).

Although many insurance registers are available online, gaps in years of publication required travel in order to extract the information. For example, institutions such as the Mystic Seaport Museum have digitized many volumes of the *American Lloyd's Register of Shipping* but not all the introductions. The volumes of *Lloyd's Register of British & Foreign Shipping* did not often include more than a one-page "Key" to the register, stating the rating and class order for the vessels in the volume (Society for the Registry of Shipping 1833:1). As a result, the

accessible hard copy and digitized versions of *Lloyd's Register of British and Foreign Shipping* do not often contain anchor information.

However, *Lloyd's Register of Shipping* began to introduce a volume titled *Rules and Regulations for the Construction and Classification of Steel Vessels*, which included a fold-out chart of the minimum weights of anchors. The available digitized versions of these volumes do not include the chart extended. In addition, the earliest volume of *Rules and Regulations*, with a readable chart on anchors, located in the course of this research was from 1892. All versions of *Rules and Regulations* from the Mariners' Museum Library were concerned with cast steel anchors only.

Many historians who utilize the *Lloyd's Register of British and Foreign Shipping* and *American Lloyd's* records are looking for specific ship information rather than the various tables and information in the introduction. Important information about anchors exists in the introduction of the register, such as anchor weight depending on type of anchor and ship tonnage.

### *Patents*

Patents provided another layer of historical research. The research utilized patents from both the American and British patent offices (as an example British Patents Class 113--1877-1883:172, 645, 921, 2971, 3975, 61, 1965). These offices have digitized large sections of obtainable patents, and a variety of anchor patents, including diagrams. Other sources, such as Google Patents, provide access to a range of difficult to access patents. In addition, the Mariners' Museum has several books containing patent information (i.e. *Patents for Inventions: Abridgements of Specifications* 1877, *Patents for Inventions: Abridgements of Specifications* 1884, and *Patents for Inventions: Abridgements of Specifications* 1889). The patent offices of

both the United Kingdom and the United States contain a variety of preventative technological innovations to protect ships against anchor failure (*Patents for Inventions: Abridgements of Specifications* 1877, *Patents for Inventions: Abridgements of Specifications* 1884, and *Patents for Inventions: Abridgements of Specifications* 1889). Anchors with a variety of arm sizes, fluke shapes, and number of both arms and flukes correspond with apparent supporting evidence for each anchor. The lack of accessible patents poses a problem for tracing the history of anchor design. Using multiple layers of historical research instead of focusing solely on one type of historical material remedied this problem.

Patents help identify anchor styles as well as cataloguing the quantifiable differences in anchor design. Some patents may outline an invention that never came to fruition. If a patent is an example of an intellectual invention, rather than a physical invention, it still demonstrates change in anchor styles. The difference is that the design only exists in the historical record. The occasional amendment to patents promoted the continuous improvement of the inventor's idea. The differences in patent designs and subsequent amendments to patents show how the technological changes continued throughout the time period (Figure 30). Additionally, some treatises served as publications announcing patents, so while the patent itself has not survived, the treatise provides the information (Figure 31; Rodger 1858:2).

In the course of this study, patents were used as supplemental information to the other historical resources. The patents found while researching lacked the detailed measurements of many other treatises. Without the measurements on patents to tie in the other historical sources and the archaeological datasets, patents were less useful than the treatises.



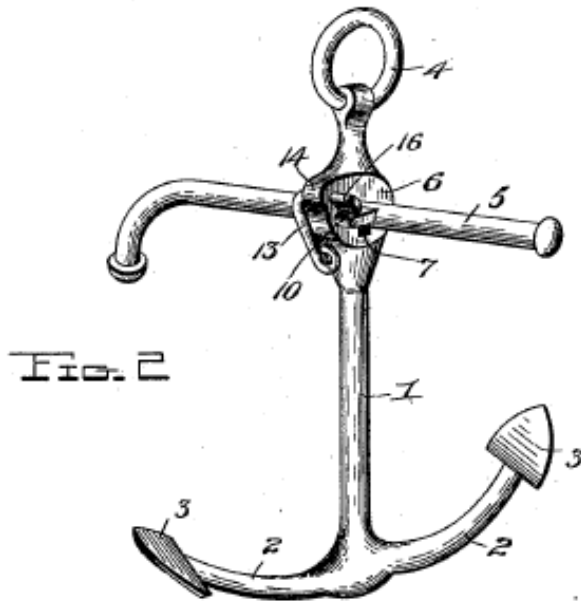
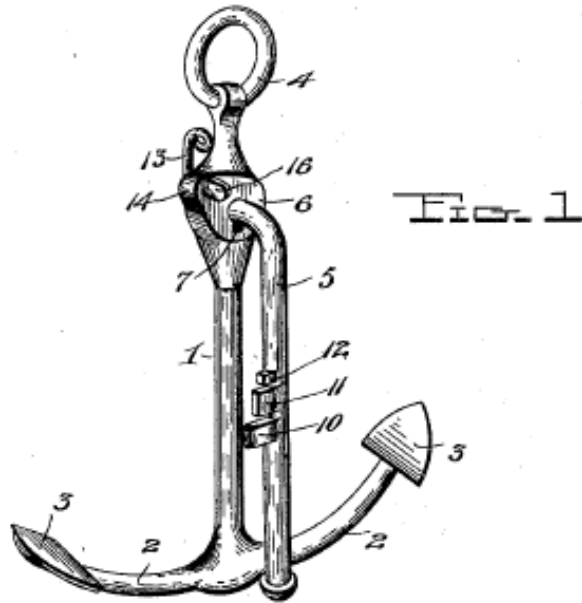
No. 697,149.

Patented Apr. 8, 1902.

F. W. KENNEY.  
SHIP'S ANCHOR.  
(Application filed Aug. 8, 1901.)

(No Model.)

2 Sheets—Sheet 1.

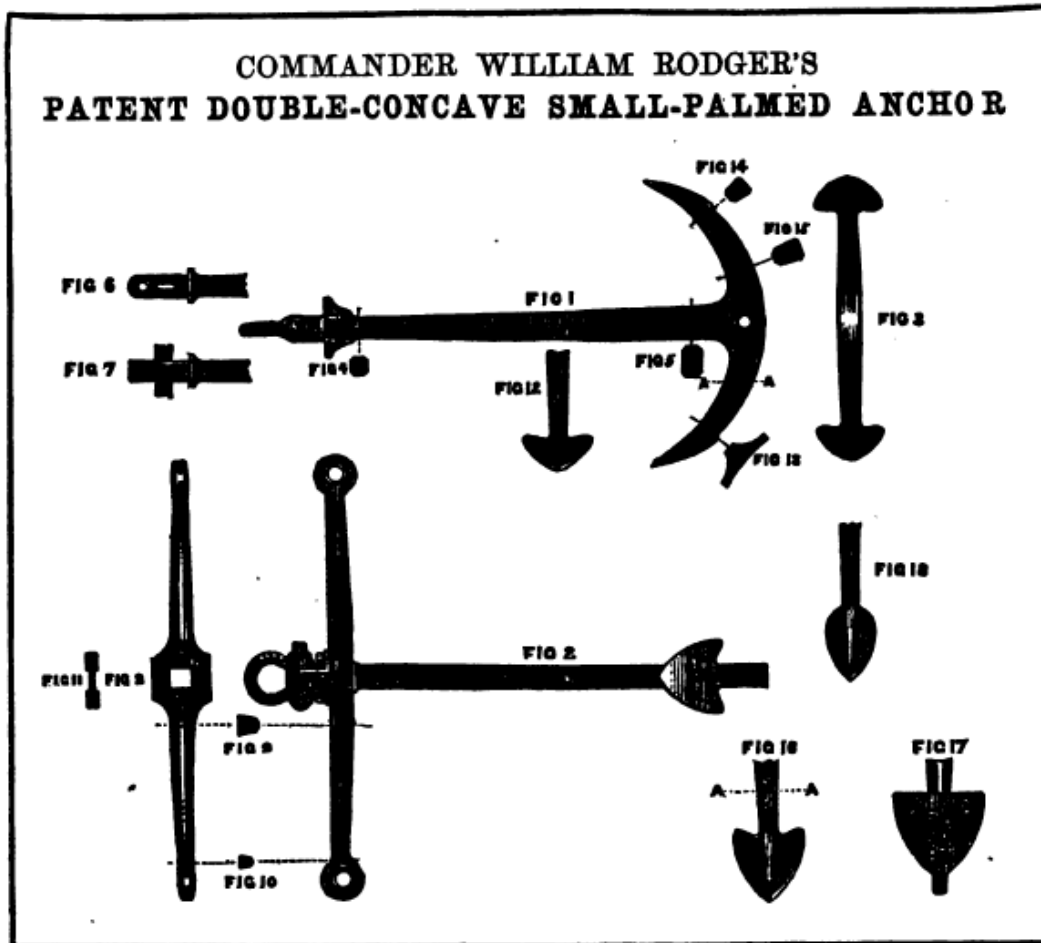


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THE MORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

FIGURE 30. Example of US Anchor Patent Image (Kenney 1902).



Drawn by W.M. RODGER, R.N.

FIGURE 31. Illustration of Rodger's Anchor design (Rodger 1858:2).

### Archaeological Research

Archaeological research entailed recording a sample of anchors from museum collections, publicly displayed anchors, anchors on private property, and other locations as available. The anchors were measured in order to have quantifiable data with which to create a more in-depth understanding of the anchors than is currently available from resources such as Curryer's *Anchors: An Illustrated History* (1999).

Recorded anchor data was collected in a database which allowed for comparison to the historical record and analysis based on database comparison (similarities and differences).

Attributes recorded included material type, construction method, and design features as well as more standard variations, such as the size of the flukes or the length of the arms. These types of details may be found in the patents or plans for anchors but accuracy demands recording the detailed measurements of the anchors used in the archaeological research.

### *Preexisting Archaeological Datasets*

Past studies on anchors concentrated mainly on the anchor's connection to a shipwreck or a historic town (see Nutley 2000 and Stelten 2010 as examples). These studies have often been conducted over the course of a year or a few field seasons and do not appear to span a temporal range greater than a few years. These types of studies are static as they are not connected to broader themes of anchor research. Anchors are often recorded, or a single anchor is analyzed, but a large group of anchors, like the AnD in this study, are not recorded and analyzed. Currently, the only dataset comparable to the one created during the course of this thesis is the Big Anchor Project, though it does not analyze recorded anchors (Nautical Archaeology Society).

### The Big Anchor Project

The Big Anchor Project is a historical and archaeological resource available for public use. As a Nautical Archaeology Society (NAS) initiative, the Big Anchor Project provides a database of anchors from around the world. More importantly, the anchors recorded in the Big Anchor Project followed procedures based on standardized forms, the basis of which served as the foundation of the author's database. This study adapted the Big Anchor Project's pro-forma (Figure 32).

The pro-forma used by the Big Anchor Project was slightly changed and simplified for use in this study. To remove the potential for inconsistent data, certain aspects, such as the Bronze, Silver, and Gold Recording Levels were eliminated. During the Big Anchor Project, the Bronze Recording Level was used for contextual information, the Silver for general features and anchor type information, and the Gold for measured anchor dimensions. The recording levels served a purpose within NAS: first Bronze must be completed, then Silver, and finally Gold. This study's pro-forma removed those different layers while still recording all information. Despite the removal of different levels of the pro-forma, much of the terminology remained the same as it used the professionally recognized descriptors of the various aspects of the anchor (Figure 32). The descriptors refer to the section of the Big Anchor Project's pro-forma regarding features. These feature types and identifiers, defined by the Big Anchor Project's *Recording Guidance for Stocked Anchors*, are in the appendices (Nautical Archaeology Society 2008; Appendix B). The Big Anchor Project was a valuable resource in the continuation of recording anchors, as it allows for global participation without direct supervision. While the largest and best known project regarding anchors was the Big Anchor Project, another project cataloged anchors in the Azores (Chouzenoux 2011). This catalog contains approximately forty anchors from the 17th through 20th centuries. It is particularly useful because the anchors have already been tentatively dated and identified according to style. The catalog concerning anchors in the Azores is the only one where the anchors are still *in situ*; many of the anchors in the Big Anchor Project are in displays, outside museums, or in other public places. Information from these studies was gathered to supplement, as needed, the archaeological dataset created in this study. Neither of these preexisting archaeological datasets were used, as a total of 82 anchors were recorded.

Submit your anchor record to  
[www.biganchorproject.com](http://www.biganchorproject.com)



## Iron Stocked Anchor Recording Form

### Section 1: General Information

Context – BRONZE RECORD	
Category:	
Site:	
Location:	
Reference # :	
Ship name:	
Ship type:	
Ship size:	
Function:	
Anchor type:	

Date and Origin –SILVER RECORD	
Date:	
Period:	
Nationality:	
Certainty:	

Features – SILVER RECORD	
Stock:	<input type="checkbox"/>
Squaring of shank:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Number of arms:	
Inscriptions	<input type="checkbox"/>

Recorders – BRONZE RECORD	
Names:	
Date:	
Group/Org:	
Big Anchor ID:	

Features – SILVER RECORD (Circle where appropriate)					
Stock type:	Wood over	Wood through	Metal over	Metal straight	Metal bent
Stock section:	Circular	Oval	Square	Rectangular	Other Faceted edges
Stock shape:	Straight	Upturned	Tapered	Convex	Other
Stock fasteners:	Trunnels	Nails	Metal straps	Cotter Pin	Other
Stock key:	Parallel	Perpendicular	None	Unknown	
Shank form:	Round/Oval	Facetted	Flattened	Unknown	Other
Shape of flukes:	Triangle	Spade	Tipped Spade	Almond	Other
Crown:	Rounded	Pointed	Tip	Fishbuckle	Swivel Other
Arms:	Straight	Angled	Arc	Segmented Arc	Mobile Other
Weight:					

### Section 2: Anchor Dimensions (recorded in cm and mm units - eg 10.5cm (10cm 5mm) or 182.5cm (eg 1m 82cm 5mm))

Shank – GOLD RECORD	
Length of shank:	
Diameter of top of shank:	
Diameter of bottom of shank:	
Diameter of stock eye:	
Arms – GOLD RECORD	
Length of one arm:	
Amplitude of arms:	
Height of bills:	
Distance between bills:	
Fluke – GOLD RECORD	
Width of fluke:	
Length of fluke:	
Shackle – GOLD RECORD	
Diameter of shackle:	
Diameter of eye of shackle:	
Thickness of shackle pin:	
Opening of shackle:	

Ring – GOLD RECORD	
Diameter of ring:	
Diameter of eye of ring:	
Thickness of ring:	
Key – GOLD RECORD	
Height of key:	
Distance of key:	
Stock – GOLD RECORD	
Length of stock:	
Max. diameter: (if round/oval)	
Min. diameter: (if round/oval)	
Max. thickness: (if square/rect )	
Min. thickness: (if square/rect )	
Max. width: (if square/rect )	
Min. width: (if square/rect )	
<p><i>The Big Anchor Project is coordinated by the            Nautical Archaeology Society  <a href="http://www.nauticalarchaeologysociety.org">www.nauticalarchaeologysociety.org</a></i></p>	

FIGURE 32. Big Anchor Project Iron Stocked Anchor Pro-forma (Nautical Archaeology Society (NAS); Accessed 2015).

*New Archaeological Dataset*

The author sought out and documented anchors according to a modified form based on the research regarding other anchor projects (Figure 33). By collating the AnD, the author was not affected by any of the recording errors which could be present in other datasets. In addition, the pro-forma was created with the express purpose of performing quantitative analysis.

Anchor Recording Form  
Pratt Thesis

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> BNC001
--------------------------------	--------------------------------------	--------------------------

*All Measurements in Decimal Feet*

<b>Contextual Information:</b>		<b>Photos Taken:</b>	
Date (as applicable):	N/A	Number:	9
Vessel Type and Name:	N/A	Range:	BNC001-1 to -5 & BNC-1 to -4
Nationality:	N/A	Redundancy?	<input type="checkbox"/>
Additional Information:	N/A	<b>Features:</b>	
		Chain:	<input type="checkbox"/>
		Ring:	<input type="checkbox"/>
		Shackle:	<input type="checkbox"/>
		Vis. Inscriptions:	<input type="checkbox"/>
		Inscription Details:	N/A
		Weight:	N/A

<b>Other Features:</b>					
Shank Form:	ROUND/OVAL	<i>Facetted</i>	Flattened	<i>Unknown</i>	Other
Fluke Shape:	Triangle	<i>Spade</i>	TIPPED SPADE	<i>Almond</i>	Other
Crown:	Rounded	<i>Tip</i>	POINTED	<i>Fishbuckle</i>	<i>Swivel</i> Other
Arms:	Straight	<i>Angled</i>	SEGMENTED ARC	<i>Arc</i>	<i>Mobile</i> Other
Stock:	Wood Stock <input checked="" type="checkbox"/>		Iron Stock <input type="checkbox"/>	*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent Other
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent Other
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other
Key:	Parallel	PERPENDICULAR	None	<i>Unknown</i>	

<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	6.55	Shank Min. Thickness:	0.15		
Stock Max. Diameter:	N/A	Shank Max. Width:	0.2		
Stock Min. Diameter:	N/A	Shank Min. Width:	0.125		
Shank Max. Thickness:	0.25	Shank Length:	5.25		
Key Height:	5.85	Dist. b/w Bills:	3.2	Ring Dia.:	N/A
Shackle Dia.:	N/A	Height of Bills:	1.3	Ring Eye Dia.:	N/A
Shackle Eye Dia.:	N/A	Bills (LxW):	0.2 x 0.1	Ring Thickness:	N/A
Shackle Pin Thick.:	N/A	Fluke Length:	1.1	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	N/A		
1 Arm Length:	2.3				
Arm Amplitude:	4.6				
Throat Angle(s):	55.583°				

FIGURE 33. Adapted pro-forma, showing sample data for anchor BNC001 (Marlowe 2015).

## Locating Anchors

The new dataset is composed primarily of anchors easily accessible from East Carolina University as well as those from the Washington Naval Yard. The recorded measurements were entered in the Microsoft *Access* database in order to run multiple queries on the types of anchors represented in the sample.

The anchors for this project were found in several accessible areas. Some anchors were located on the Washington Navy Yard as decorations and monuments. This allowed for the easy recording and photography of approximately twenty anchors (Figure 34). This part of the study received valuable assistance from the Naval History and Heritage Command's Underwater Archaeology Branch, located in the Washington Naval Yard, for recording their anchors.

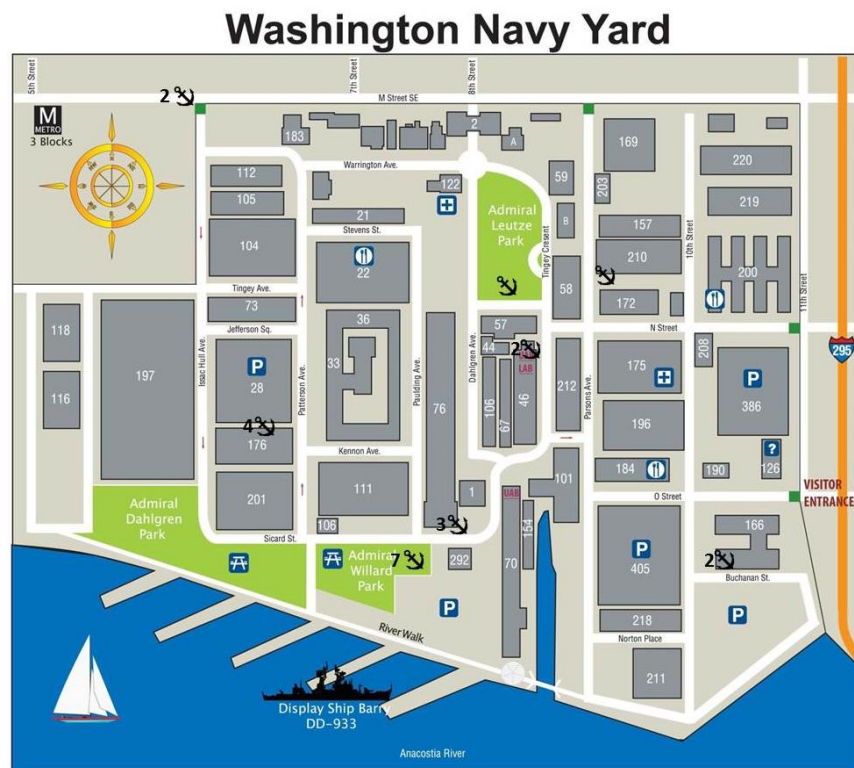


FIGURE 34. Digital creation of Anchor Distribution around Washington Navy Yard as of August 2015 (Naval History and Heritage Command 2015; modified by Marlowe 2015).

The remaining 60 anchors came from locations in eastern North Carolina, predominately Wanchese, with others in Manteo, Bath, Washington, Mann’s Harbor, and Nags Head. The author created a systemic process for locating anchors in North Carolina. The anchors were most frequently located by driving throughout the towns of Wanchese, Manteo, and Nags Head and writing down the nearest associated address. Private landowners with anchors on their properties received a letter (included in Appendix C) asking for permission to record the anchor, stating the intentions of the recording activity, and offering to provide information on the anchor, if possible. In the case of the anchors in Washington and Bath, North Carolina, individuals in the East Carolina University Maritime Studies program gave the addresses of the anchors’ locations. Some individuals gave locations of family members with anchors in front of their residences or businesses, or a general vicinity to search. In addition, the author logged GPS waypoints of the anchors and compiled them into a map showing the locations of the largest bulk of the anchors on Roanoke Island (Figures 35-37).

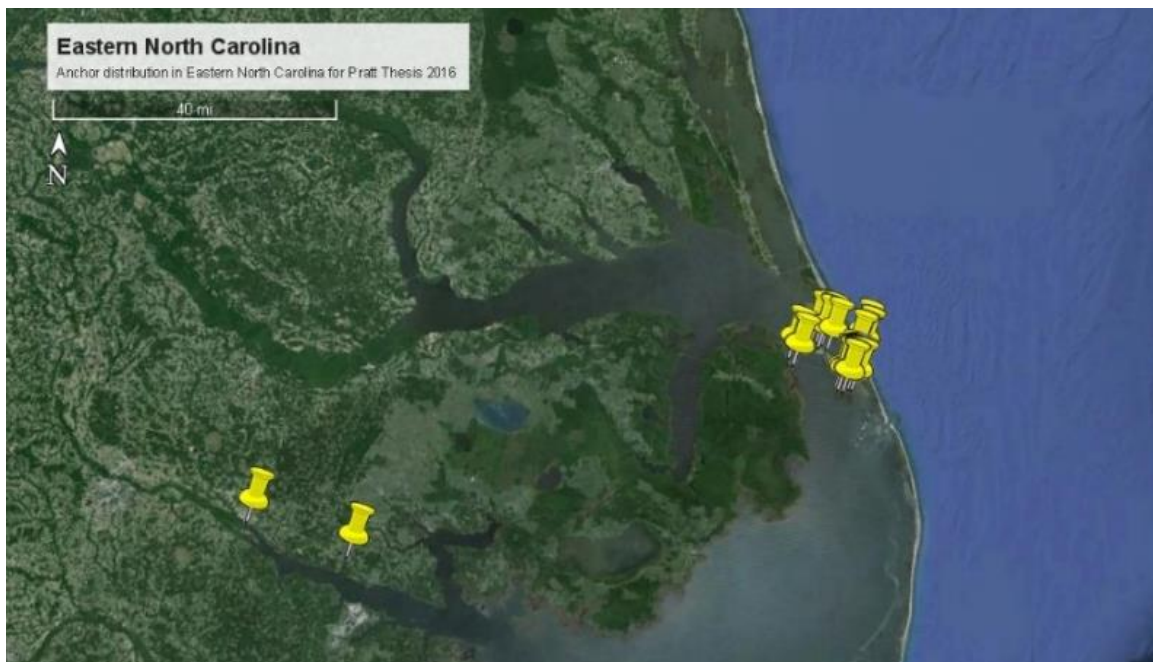


FIGURE 35. Digital creation of Anchor Distribution in Eastern North Carolina (Google Earth 2015; Marlowe 2016).





FIGURE 36. Digital creation of Anchor Distribution in the Outer Banks (Google Earth 2015; Marlowe 2016).



FIGURE 37. Digital creation of Anchor Distribution in Wanchese, NC (Google Earth 2015; Marlowe 2016).

### Recording Anchors

The most efficient way to record anchors is to begin with the large measurements, such as length and breadth of the whole anchor, and then proceed to record each individual element. The elements recorded included the crown, arms, flukes and bills, shank, stock, and shackle or ring. Photographs and a brief sketch were completed at the end of measuring activity. Sketches assisted in correlating each anchor pro-forma to the relevant photographs but were not intended to be used in the analysis of the anchors.

Anchors could not be weighed during fieldwork. The only clues regarding weight came from any weight notations available on an anchor's surface. There is no reliable mathematical formula to calculate the weight of an anchor, as many anchors of similar sizes can weigh vastly different amounts. Many anchor memorials or displays will include the weight of the anchor.

The information from each anchor was entered into the pro-formas created for this study. Each anchor was given a unique site number. An example of a site number would be

“NHNC012,” which indicates “Nags Head, North Carolina, number 12.” Each completed pro-forma was entered into the Microsoft *Access* database. The subsequent queries were used to define the measurement ranges in the AnD, and then used for the analyses. The graphs were created in Microsoft *Excel* using data from the AnD.

Following the general outline of the pro-forma, the following measurements and calculations were taken of each anchor, as possible, based on the condition that the anchor was in:

1. Overall length (decimal feet)
2. Stock Maximum Diameter (decimal feet)
3. Stock Minimum Diameter (decimal feet)
4. Shank Maximum Thickness (decimal feet)
5. Shank Minimum Thickness (decimal feet)
6. Shank Maximum Width (decimal feet)
7. Shank Minimum Width (decimal feet)
8. Shank Length (decimal feet)
9. Key Height (decimal feet)
10. Shackle Diameter (decimal feet)
11. Shackle Eye Diameter (decimal feet)
12. Shackle Pin Thickness (decimal feet)
13. Shackle Opening (decimal feet)
14. 1 Arm Length (decimal feet)
15. Arm Amplitude (decimal feet)
16. Throat Angle (degrees)
17. Distance between the Bills (decimal feet)
18. Height of the Bills (decimal feet)
19. Bill Length (decimal feet)
20. Bill Width (decimal feet)
21. Fluke Length (decimal feet)
22. Fluke Width (decimal feet)
23. Ring Diameter (decimal feet)
24. Ring Eye Diameter (decimal feet)
25. Ring Thickness (decimal feet)
26. Chain Link Length (decimal feet)
27. Chain Link Width (decimal feet)

These measurements record the entirety of the anchor and provide the basis for different calculations and analyses concerning the anchor. The following figures illustrate the process of



recording the anchor and the location of each measurement taken. The overall length of the anchor was from the crown to the furthest extent (the ring or shackle if present) in both stocked and stockless anchors (Figures 38 and 39). In addition, the arm amplitude is shown in the same figure for both stocked and stockless anchors. The arm amplitude was measured from the tip of the bill, around the crown, and to the other bill in a curved line, as seen in the figures.

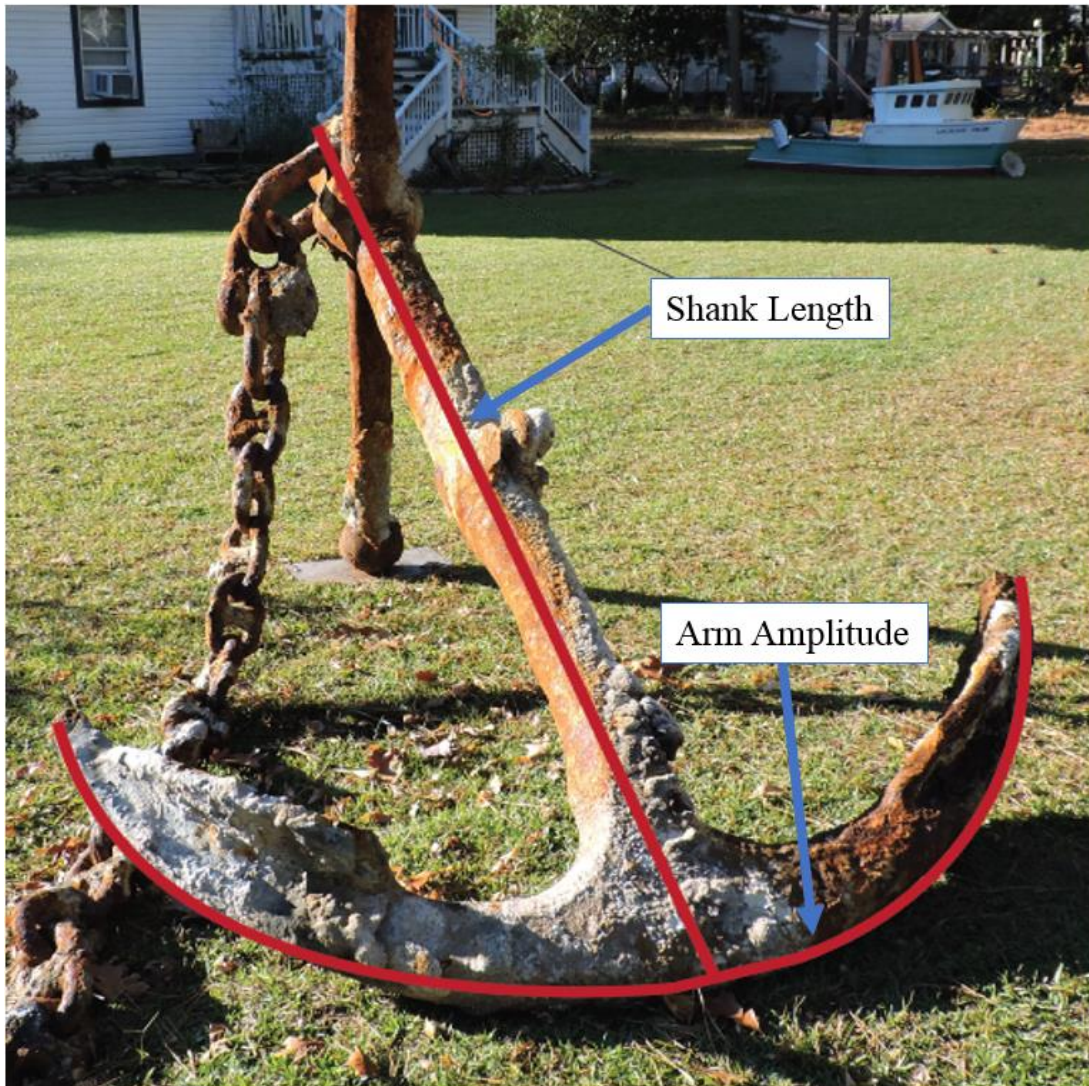


FIGURE 38. WNC017 showing overall length and arm amplitude measurements (Marlowe 2016).

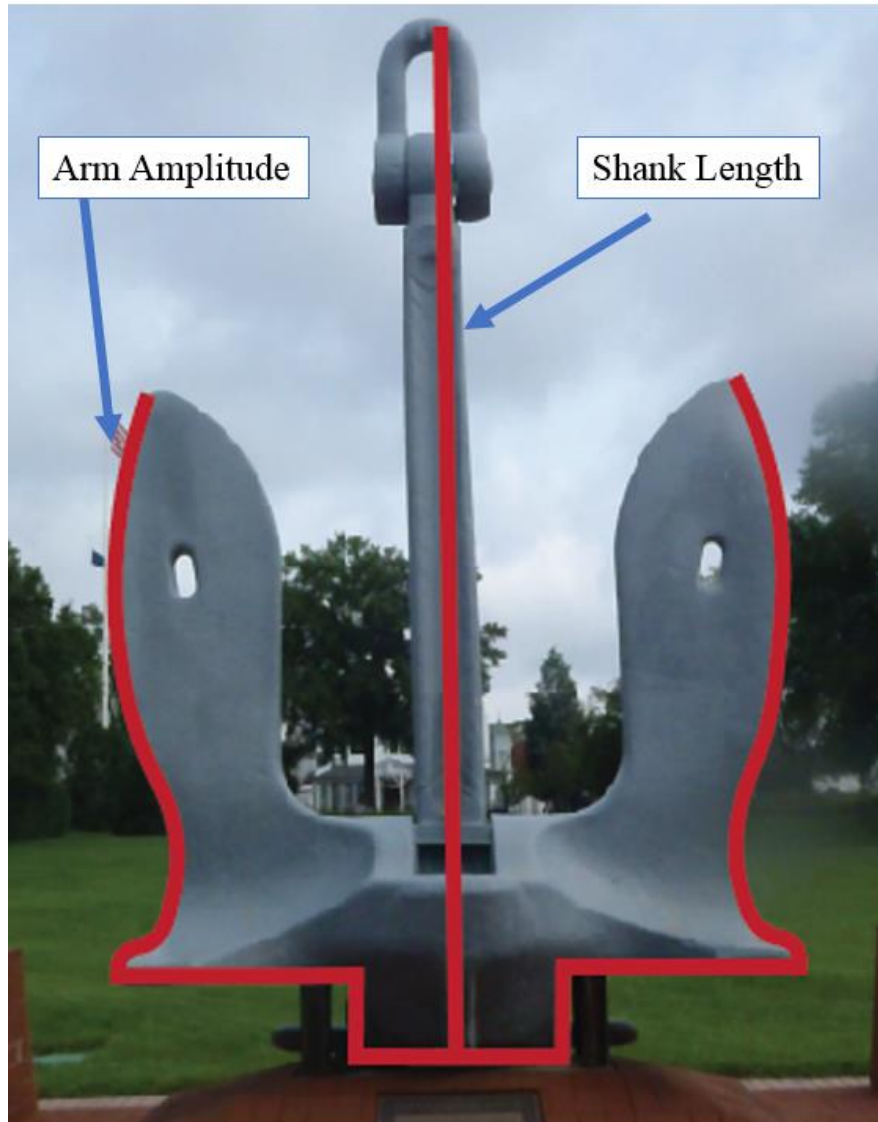


FIGURE 39. WNY008 showing overall length and arm amplitude measurements (Marlowe 2016).

Measuring across the widest portion of the ring or shackle resulted in the exterior measurement (the ring or shackle diameter). The interior measurement, the ring or shackle eye diameter, came from the same location, but from the interior of the ring or shackle to the other side. Ring thickness was also measured (Figure 40). The shackle's additional measurements included the shackle pin thickness and the shackle opening diameter, where the pin went through the shackle to secure it (Figure 41).





FIGURE 40. BNC002 showing the ring diameter, ring eye diameter, and ring thickness measurements (Marlowe 2016).



FIGURE 41. WNC005 showing the shackle diameter, shackle eye diameter, shackle pin thickness, and shackle opening measurements (Marlowe 2016).

Moving along the anchor, the next measurements recorded included the stock and shank measurements. Measured in two places, the information from the stock revealed the maximum and minimum diameters. The shank also received dual measurements, at the base of the stock

(approximately the stock's end) and at the base of the throat, recording the shank width and thickness. The width was the measurement across the anchor while the thickness was the measurement perpendicular to the width (Figure 42). While stockless anchors do not have the stock measurements, the shank measurements were taken in the same way. Occasionally, when the stock was not present, a key would be visible. This allowed the key height to be taken. The key height came from measuring the crown of the anchor up along the shank to the key (Figure 43).



FIGURE 42. MHNC001 showing stock minimum and maximum diameters as well as the shank maximum and minimum widths and thicknesses (Marlowe 2016).





FIGURE 43. MNC004 illustrating the key height measurement (Marlowe 2016).

For stocked anchors, measurements of the flukes and the bills, if present, were taken on the same fluke. The fluke width came from the widest point on the fluke. The fluke length came from the tip of the bill to the base of the fluke. The base of the fluke was determined to be where the anchor arm began flaring out to form the fluke. The bill width resulted from the widest point of the bill, which was often the base of the bill, and the length was from the tip of the bill to its base. The base of the bill was determined to be where the bill met the fluke; often, there was a noticeable curve (Figure 44).



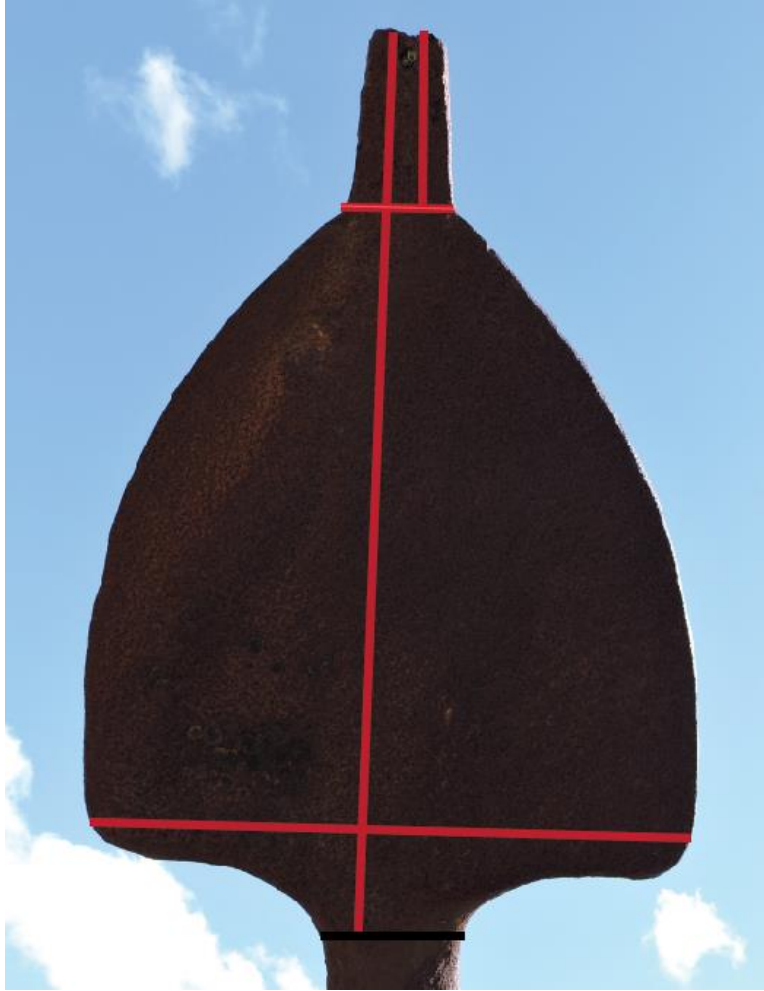


FIGURE 44. WNC001 fluke showing fluke width and length as well as bill width and length (Marlowe 2016).

The arm length measurement, unlike the curved arm amplitude, came from a direct line from the base of the crown to the tip of the bill. Figure 45 shows the stocked anchor arm length, and indicates the bill height and the distance between the bills. Initial measurements were taken by measuring the distance from the tip of one bill to the other and measuring from the base of the crown to where the tape measure crossed the shank from the other measurement (Figure 45). The arm length and the bill height combined to calculate the throat angle of the stocked anchors. In the two figures below with stockless anchors, one shows the bill height and the distance between

the bills while the other shows one arm length and the fluke length and width (Figures 46 and 47).

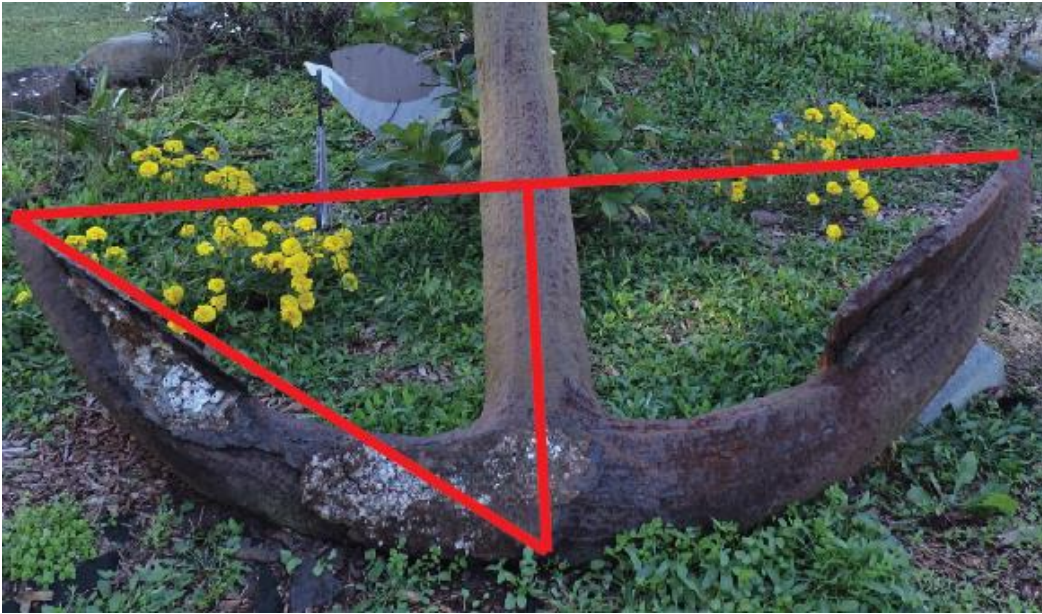


FIGURE 45. WNC020 showing arm length, distance between the bills, and the bill height (Marlowe 2016).

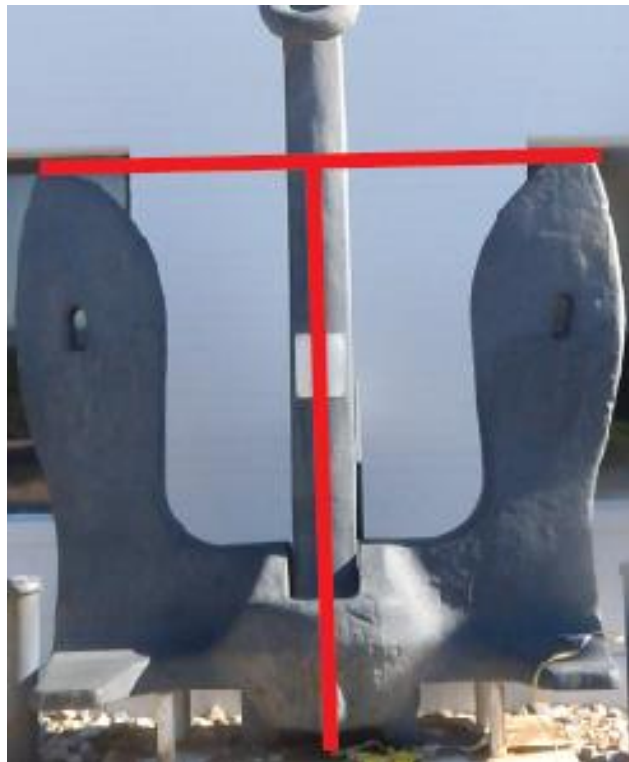


FIGURE 46. WNY020 showing distance between the bills and the bill height (Marlowe 2016).



FIGURE 47. WNY009 showing one arm length, fluke length, and fluke width (Marlowe 2016).

If present, and associated with the anchor, the length and width of the chain was measured. This was accomplished by taking one link, and measuring its length and width (Figure 48). The mass-manufactured chain links were all the same size with no difference in measurements apparent.

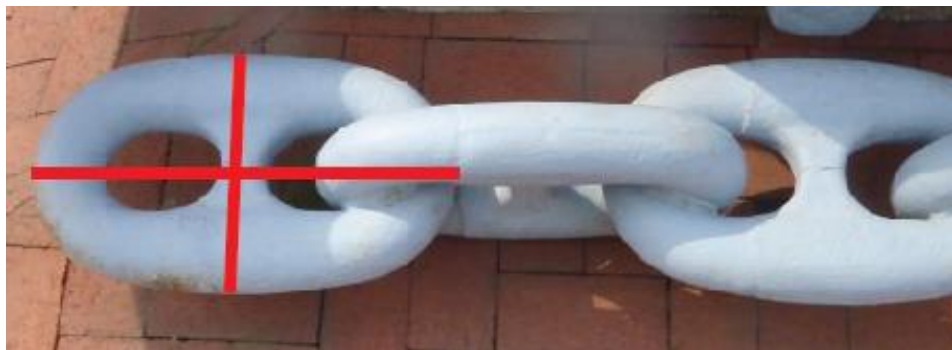


FIGURE 48. Chain from WNY008 showing chain length and width measurements (Marlowe 2016).

Once the measuring phase was concluded, the anchor was photographed. When possible, each anchor was photographed multiple times to capture as much diagnostic information as possible (Bowens 2009:71). The photographs had multiple purposes: to assist in data analysis, to provide; supplement the pro-forma data; and to provide in-text photos for illustrative purposes of certain anchors or design features. Each anchor was photographed face-on against its natural background and also in profile. Special attention was paid to certain parts of the anchor with detailed shots of the stock, flukes, rings as well as any apparent damage, modification, or any interesting features. Approximately three to 15 photographs were taken of each anchor, depending on the anchor's individual features and condition.

After recording the anchors was finished, two additional stages were completed: data-processing and analysis. The processing of anchor specifications included the entry of the pro-formas into the database, created in Microsoft *Access* and *Excel*, as well as the digital manipulation of photographs and creation of artifact drawings as necessary. In addition, maps were created using Google Maps (2013) as needed.

## **Results and Analysis**

The completion of historical and archaeological data collection occurred in the Fall of 2015. Anchor pro-forma and photographs were collated into a catalog (see Appendices D and E) and data from historical and archaeological sources was entered into a Microsoft *Access* database. The treatises used in the historical analysis were included in Microsoft *Excel*, which was used to create complex tables in Microsoft *Word*. The data-processing phase allowed the data to be categorized. The anchor locations were recorded and then compiled into maps in order to have an easily demonstrable visual of the distribution of anchors used for the thesis. Sometimes, in the process of post-processing, it was discovered that a mistake with the pro-



forma existed. For example, the pro-forma had the arm types listed as “Straight, Angled, Segmented Arc, Arc, Mobile, Other” but upon reviewing the data, the anchor arms classified as “Straight” and “Angled” were seen to be the same. To remedy this, all anchor arms types listed as “Straight” were moved to “Angled” to be consistent.

In some cases, measurements were used to extract other variables. For example, one goal was to measure the throat angles. To accomplish this, two measurements, the bill height and the length of one arm, were entered into a triangle angle calculator. The resulting angle was entered into the *Access* database. This methodology provided the most precise angle (i.e., by using geometry rather than a field measurement). The triangle angle calculator required three variables, two of which were the measurements, and the third was a 90 degree corner. This method worked on all anchor types except for most stockless anchors (as the bill height and arm length are the same). Figure 49 illustrates the throat angle measurement methodology.

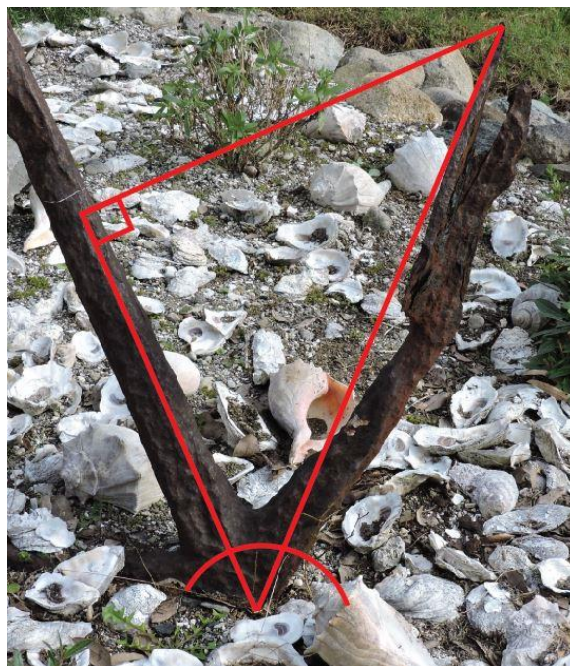


FIGURE 49. Methodology of measuring throat angle demonstrated on BNC002 (Marlowe 2016).

In addition to organizing historical and archaeological data, the data processing phase allowed database queries to be constructed in *Access*. These queries included simple counts (e.g., how many anchors had flukes of which type), as well as the minimum, average, and maximum sizes of components of anchors. Queries were run in *Access* and the results were transferred to *Excel* to create the relevant chart or table for analysis and discussion. These two types of queries allowed the analysis to be completed. The following list shows all of the queries which were created in the *Access* database:

1. Minimum/Average/Maximum Overall Length of Anchors (in decimal feet)
2. Types of Crown Shapes
3. Types of Arm Shapes
4. Minimum/Average/Maximum Arm Length (in decimal feet)
5. Minimum/Average/Maximum Arm Amplitude (in decimal feet)
6. Minimum/Average/Maximum Throat Angle (in decimal feet)
7. Types of Fluke Shapes
8. Minimum/Average/Maximum Fluke Length (in decimal feet)
9. Minimum/Average/Maximum Fluke Width (in decimal feet)
10. Minimum/Average/Maximum Distance between Bills (in decimal feet)
11. Minimum/Average/Maximum Bill Height (in decimal feet)
12. Minimum/Average/Maximum Bill Length (in decimal feet)
13. Minimum/Average/Maximum Bill Width (in decimal feet)
14. Types of Shank Forms
15. Minimum/Average/Maximum Shank Thickness (in decimal feet)
16. Minimum/Average/Maximum Shank Width (in decimal feet)
17. Minimum/Average/Maximum Shank Length (in decimal feet)
18. Was a Stock Present?
19. Minimum/Average/Maximum Stock Diameter (in decimal feet)
20. Types of Stocks
21. Types of Stock Shapes
22. Was a Stock Key Present?
23. Minimum/Average/Maximum Stock Key Height (in decimal feet)
24. Was a Ring Present?
25. Minimum/Average/Maximum Ring Diameter (in decimal feet)
26. Minimum/Average/Maximum Ring Eye Diameter (in decimal feet)
27. Minimum/Average/Maximum Ring Thickness (in decimal feet)
28. Was a Shackle Present?
29. Minimum/Average/Maximum Shackle Thickness (in decimal feet)
30. Minimum/Average/Maximum Shackle Eye Diameter (in decimal feet)
31. Minimum/Average/Maximum Shackle Pin Thickness (in decimal feet)
32. Minimum/Average/Maximum Shackle Opening Diameter (in decimal feet)

33. Was Chain Present?
34. Minimum/Average/Maximum Chain Length (in decimal feet)
35. Minimum/Average/Maximum Chain Width (in decimal feet)
36. Was an Inscription Present?

As can be seen by the different types of queries, some are based on *feature type*, others on *feature presence*, and others on the *measurements of the features*, or the *anchor overall*. The queries were constructed on a systematic basis, for example from the crown of the anchor to the ring, shackle, or chain toward the stock of the anchor.

#### *Associated Research Methods*

The different analyses completed as a part of this thesis required some separate research beyond the anchor research being conducted. In the course of the associated research, the average yearly tonnage for British and United States insurance registers could not be found. Therefore, it was necessary to supplement where possible. A valuable resource, *Historical Statistics of the United States: Colonial Times to 1970 (vol. 2)* provided a table titled “Merchant Vessels Built and Documented, by Type: 1797 to 1964” (Figure 50) which was used for the average American tonnages in the long 19th century (US Department of Commerce 1975).

Other associated research methods specifically related to the analysis are explained in the Analysis Chapter (Chapter 5). The research methods include determining the rate of change, and calculating the change in prices between the contemporary years and current currency amounts. These methods were explained in that chapter in order to explicitly state how the analysis was conducted throughout the course of the study.

Series Q 433-437. Merchant Vessels Built and Documented, by Type: 1797 to 1964

[Gross tonnage of documented vessels of 5 tons or more. As of December 31, 1797-1834; September 30, 1835-1842; June 30, 1843-1940; January 1 thereafter. Includes Alaska, Hawaii, Puerto Rico, Guam, and the Virgin Islands]

Year	All vessels		Gross tonnage			Year	All vessels		Gross tonnage		
	Number of vessels	Gross tons	Steam and motor	Sailing <sup>1</sup>	Canal-boats and barges		Number of vessels	Gross tons	Steam and motor	Sailing <sup>1</sup>	Canal-boats and barges
1844	1,551	867,910	265,859	99	601,961	1890	982	157,410	78,854	59,057	19,499
1845	1,365	942,809	480,442	6	462,361	1879	1,132	198,031	86,261	65,367	39,803
1846	1,175	821,431	419,585	94	401,751	1878	1,258	235,504	81,860	106,064	47,578
1847	877	620,287	388,927	-	231,360	1877	1,029	176,592	47,514	106,331	22,747
1848	-	-	-	-	-	1876	1,112	208,589	69,251	118,672	15,663
1849	949	629,295	352,271	-	277,024	1875	1,301	297,639	62,469	206,884	28,295
1850	1,180	791,649	385,874	-	405,766	1874	2,147	432,725	101,930	216,316	114,479
1851	1,350	836,709	451,375	-	430,529	1873	2,351	539,246	88,010	144,639	126,506
1852	1,522	585,045	348,801	-	336,247	1872	1,643	289,032	49,310	78,291	70,551
1853	1,385	445,617	182,359	8	263,250	1871	1,755	278,227	87,842	97,179	88,206
1854	1,116	400,076	117,011	24	283,041	-	-	-	-	-	-
1855	1,186	589,317	369,016	10	220,291	1870	1,618	276,953	70,621	146,340	59,992
1856	1,190	633,966	477,421	28	156,517	1869	1,726	275,230	65,066	149,029	61,135
1857	990	437,378	313,296	-	124,082	1868	1,802	285,304	63,940	142,742	78,622
1858	992	508,825	165,064	-	145,761	1867	1,518	395,394	72,019	233,584	-
1859	861	194,370	103,358	7	91,005	1866	1,789	394,523	146,483	248,090	-
1860	978	195,190	85,288	39	109,863	1864	2,388	415,749	147,499	268,241	-
1861	1,118	200,290	108,206	-	92,084	1863	1,816	311,045	94,233	216,812	-
1862	1,259	267,381	186,109	16	81,206	1862	864	175,076	55,449	119,627	-
1863	1,275	548,252	509,538	7	38,717	1861	1,146	239,194	60,396	172,208	-
1864	1,744	6,313,977	6,258,608	-	55,369	-	-	-	-	-	-
1865	1,723	8,082,509	8,009,277	129	22,603	1860	1,071	214,798	69,370	145,428	-
1866	1,901	10,431,734	10,389,670	23	92,041	1859	875	156,602	35,305	121,297	-
1867	1,108	4,543,946	4,504,398	14	39,554	1858	1,241	244,712	65,374	179,388	-
1868	703	647,097	586,443	-	60,654	1857	1,448	378,804	74,469	304,345	-
1869	705	446,894	385,681	87	61,126	1856	1,703	469,393	74,865	394,528	-
1870	319	183,229	172,438	17	20,779	1855	2,024	589,450	78,127	595,323	-
1871	673	339,899	269,188	22	70,689	1854	1,774	635,616	91,087	444,579	-
1872	758	287,374	(NA)	(NA)	(NA)	1853	1,710	425,572	109,402	316,170	-
1873	1,589	471,384	113,681	71	357,682	1852	1,444	351,493	98,624	252,869	-
1874	1,207	224,064	59,020	79	164,985	1851	1,357	298,203	78,197	230,006	-
1875	748	62,919	39,341	50	32,528	1850	1,360	272,218	59,911	215,307	-
1876	724	66,649	36,916	33	39,709	1849	1,547	286,577	61,241	195,336	-
1877	642	199,803	168,488	46	22,269	1848	1,851	318,075	66,682	251,423	-
1878	732	312,892	164,620	18	48,254	1847	1,598	240,732	58,979	189,753	-
1879	1,302	386,906	312,996	52	173,858	1846	1,420	188,203	51,778	136,425	-
1880	1,020	254,296	172,969	210	81,117	1845	1,038	146,018	40,925	105,092	-
1881	808	128,976	75,725	797	62,454	1844	766	163,557	30,976	72,561	-
1882	969	257,180	172,901	230	39,709	1843	1,021	129,083	29,158	99,925	-
1883	917	245,144	181,504	326	63,314	1842	761	118,893	27,941	90,950	-
1884	924	224,673	140,586	363	83,824	-	-	-	-	-	-
1885	967	199,846	141,052	2,869	55,924	1840	871	118,309	19,811	98,488	-
1886	1,049	223,968	145,493	914	77,561	1839	899	125,290	34,219	91,041	-
1887	770	335,791	241,802	17,442	76,547	1838	913	115,905	25,607	92,298	-
1888	845	681,232	587,137	25,459	85,636	1837	972	125,913	33,811	92,102	-
1889	1,381	2,265,115	2,071,221	91,743	162,151	1836	911	116,230	26,530	89,600	-
1890	2,047	3,480,639	3,469,028	182,184	88,482	1835	725	75,107	12,347	62,760	-
1891	1,933	3,326,621	3,107,091	79,234	90,296	1834	1,187	161,492	12,620	148,872	-
1892	1,528	1,309,868	1,099,996	83,629	126,243	1833	1,065	144,544	17,386	127,158	-
1893	1,797	664,478	513,245	43,185	108,951	1832	712	88,566	11,437	74,119	-
1894	1,916	807	325,413	258,126	14,755	69,523	-	-	-	-	-
1895	1,157	225,122	154,990	8,021	62,111	1830	648	58,560	8,269	50,291	-
1896	1,151	316,250	224,226	13,749	78,276	1829	796	79,408	10,291	69,127	-
1897	1,475	346,155	243,408	28,610	74,137	1828	886	88,964	5,881	83,083	-
1898	1,565	232,669	153,493	21,221	57,955	1827	951	106,456	11,910	95,446	-
1899	1,423	291,163	237,231	10,692	63,839	1826	1,038	150,378	12,818	117,565	-
1900	1,861	342,068	257,998	19,358	64,717	1824	1,000	116,464	10,293	107,293	-
1901	1,247	238,090	148,208	28,950	60,882	1823	793	92,798	5,216	87,582	-
1902	1,457	614,216	481,624	31,981	109,611	1822	630	75,857	3,767	72,091	-
1903	1,157	471,332	365,405	24,907	81,020	1821	619	57,569	1,861	55,708	-
1904	1,221	418,745	315,707	35,299	67,829	-	-	-	-	-	-
1905	1,012	330,316	197,702	79,418	53,196	1820	557	51,394	5,872	45,522	-
1906	1,184	378,542	286,744	64,908	67,890	1819	876	86,670	5,824	80,846	-
1907	1,811	436,182	271,781	89,979	74,392	1818	923	87,846	3,695	84,151	-
1908	1,491	468,831	308,178	97,698	62,955	1817	1,087	87,626	2,543	85,083	-
1909	1,580	483,489	275,591	126,165	83,733	1816	1,431	135,186	2,926	132,260	-
1910	1,447	398,790	202,828	116,460	74,892	1815	1,329	155,579	546	155,033	-
1911	1,273	300,038	195,059	98,073	50,907	1814	490	29,751	593	29,158	-
1912	1,385	180,458	105,838	84,416	40,204	1813	371	32,883	1,440	31,443	-
1913	891	232,233	106,154	64,808	61,771	1812	(NA)	85,148	118	85,030	-
1914	723	227,097	138,029	65,236	23,832	1811	(NA)	146,691	1,145	145,546	-
1915	694	111,022	69,754	34,990	6,948	1810	(NA)	127,575	-	127,575	-
1916	838	191,195	83,720	83,827	9,648	1809	(NA)	91,397	458	90,939	-
1917	956	211,639	134,369	49,348	27,923	1808	(NA)	31,755	182	31,573	-
1918	1,395	199,633	92,031	83,217	23,885	1807	(NA)	99,783	73	99,710	-
1919	1,384	369,362	185,037	144,290	39,975	1806	(NA)	126,093	-	126,093	-
1920	1,051	294,123	159,046	102,873	32,204	1805	(NA)	128,507	-	128,507	-
1921	1,077	231,134	159,513	60,570	21,246	1804	(NA)	100,753	-	100,753	-
1922	1,014	218,087	142,097	46,590	27,490	1803	(NA)	88,448	-	88,448	-
1923	844	150,450	100,074	34,633	15,743	1802	(NA)	124,755	-	124,755	-
1924	715	95,463	44,468	41,234	9,747	1801	(NA)	-	-	-	-
1925	920	159,066	84,333	65,882	9,861	1800	995	106,261	-	106,261	-
1926	1,190	225,514	91,523	120,621	13,565	1799	767	77,921	-	77,921	-
1927	1,268	265,430	107,229	137,046	21,155	1798	635	49,435	-	49,435	-
1928	1,371	282,270	121,843	118,798	41,629	1797	-	56,679	-	56,679	-
1929	1,168	230,439	118,070	81,389	81,180	-	-	-	-	-	-

- Represents zero. NA Not available.  
<sup>1</sup> Includes canalboats and barges prior to 1888.  
<sup>2</sup> Jan. 1-Dec. 31.

<sup>3</sup> July 1, 1839-June 30, 1940.  
<sup>4</sup> 9-month period.  
<sup>5</sup> Figures by class of vessel do not add to the total for this year.

FIGURE 50: American built vessels with number and tonnages (US Department of Commerce 1975:751).



The British average tonnage was a more intensive process than for the American tonnage. The British average tonnage was not found in other research. The gross tonnage for all British registered vessels built was located, but not the average vessel tonnage. Therefore, the average tonnage—by year—was systematically sampled from every decade (i.e. 1790; 1800; 1810; 1820; 1830; 1840; 1850; 1860; 1870; 1880; 1890; 1900; 1910). These decades provided a broad arc of average tonnages. Three samples were taken from the following years: 1790, 1860, and 1910. The first was a 10% sample spread throughout three sections (beginning, middle, and end) in the *Register*. The second was a 5% sample which was systematically taken throughout the register. The last sample was a 1% systematic sample throughout the entire register. In the case of 1790, the first sample produced 41 pages, the second produced 22 pages, and the third produced 11 pages. The three years were taken to see if, throughout the long 19th century, one sampling method could be used. A sampling method was desired for expediency with acceptable accuracy.

The three samples from 1790, 1860, and 1910 produced very clear results. The results from 1790 (1:171.7; 2:171.4; and 3:157) were all within one standard deviation. This trend continued in 1860 (1:331; 2:317; and 3:354) and 1910 (1:1372; 2:1745; and 3:1648) (Figures 51-53). Due to the fact that each of the three samples fell within a standard deviation from the mean and the 10% sample, it was determined that, for this study, the 1% sample could be used without skewing the data. The systematic averaging of tonnage according to insurance registers is an avenue for future research discovered as a part of this study.

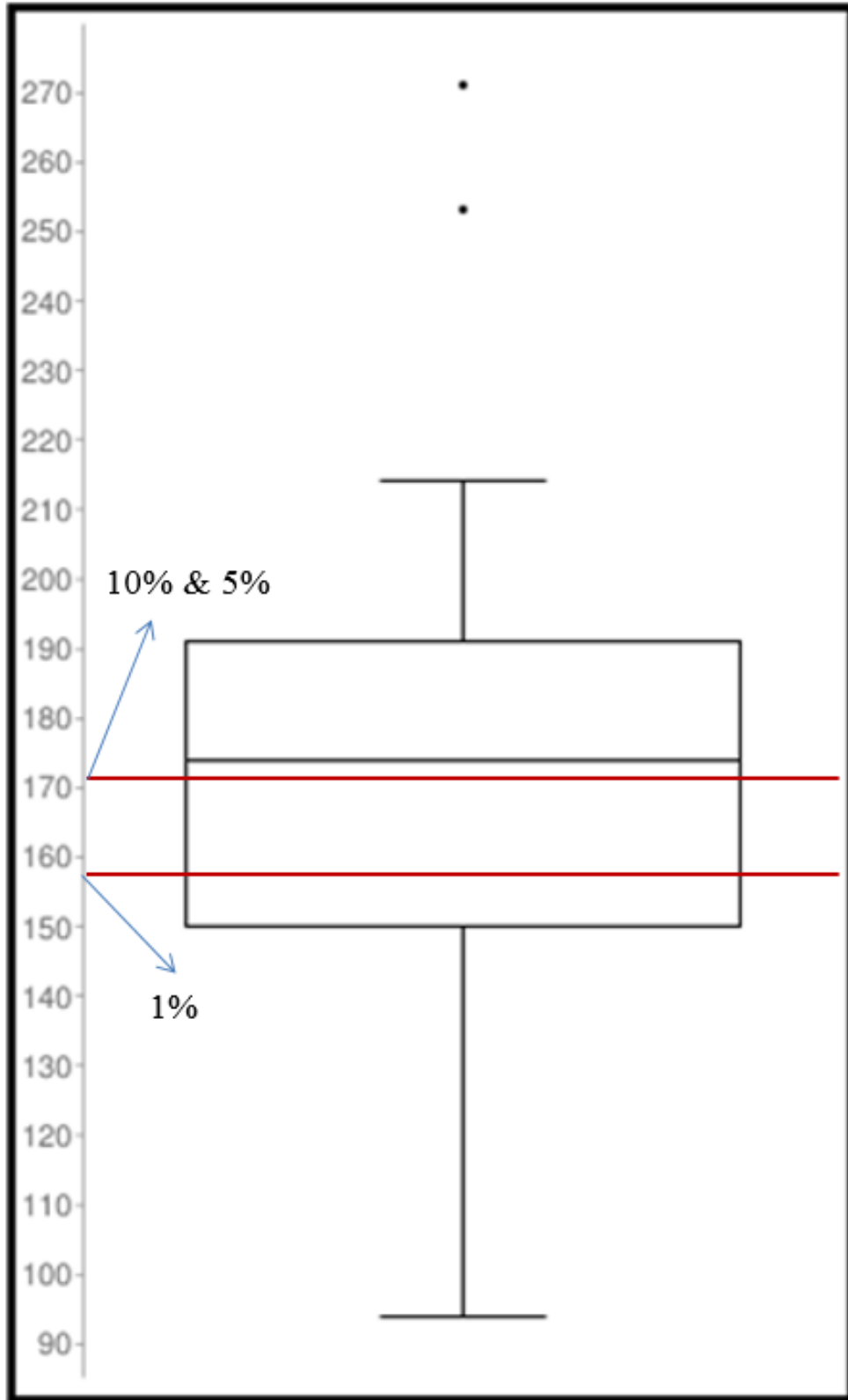


FIGURE 51: 1790 Box and Whisker Plot; Standard Deviation 34 (n=41) (Marlowe 2016).

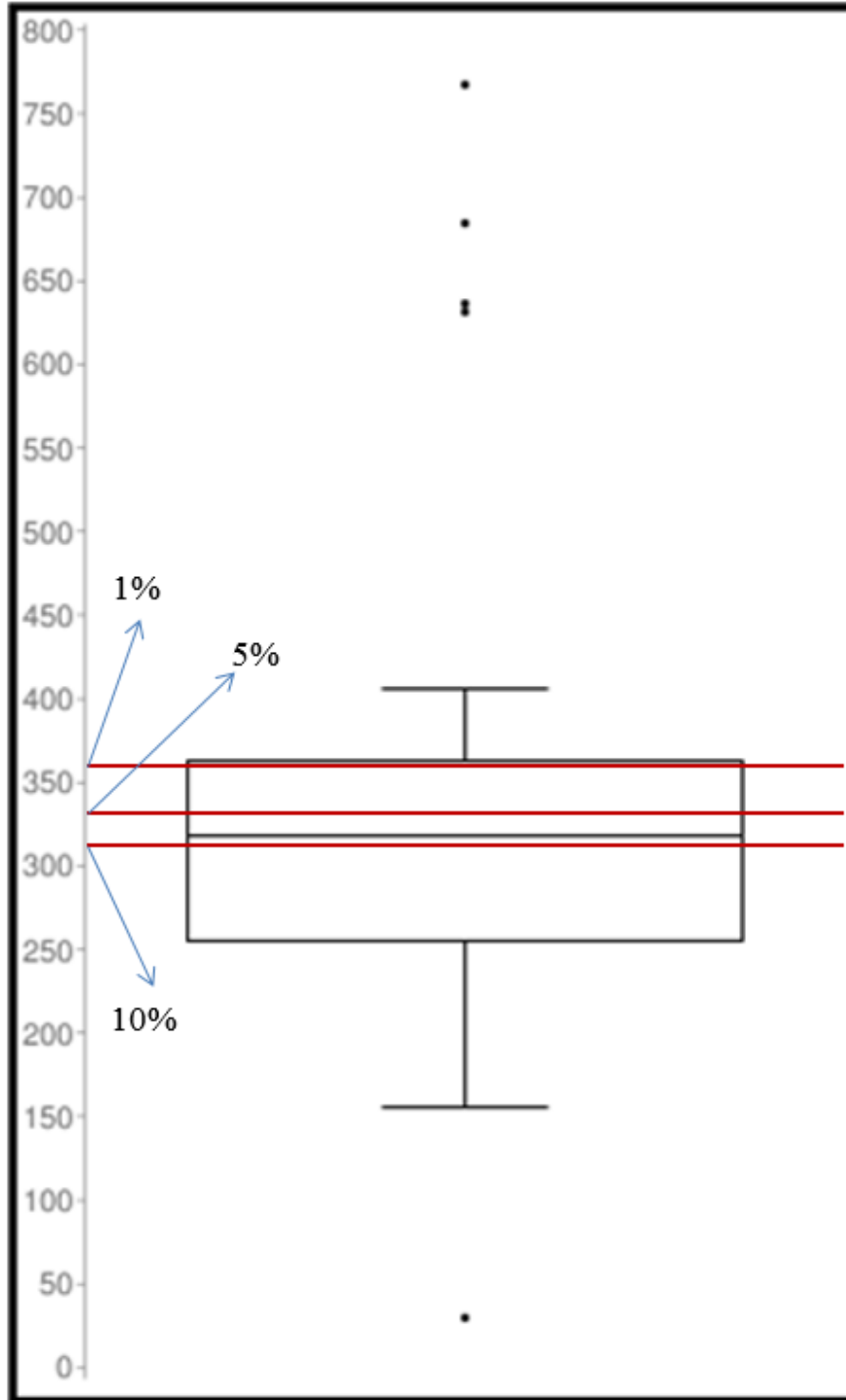


FIGURE 52: 1860 Box and Whisker Plot; Standard Deviation 129 (n=50) (Marlowe 2016).

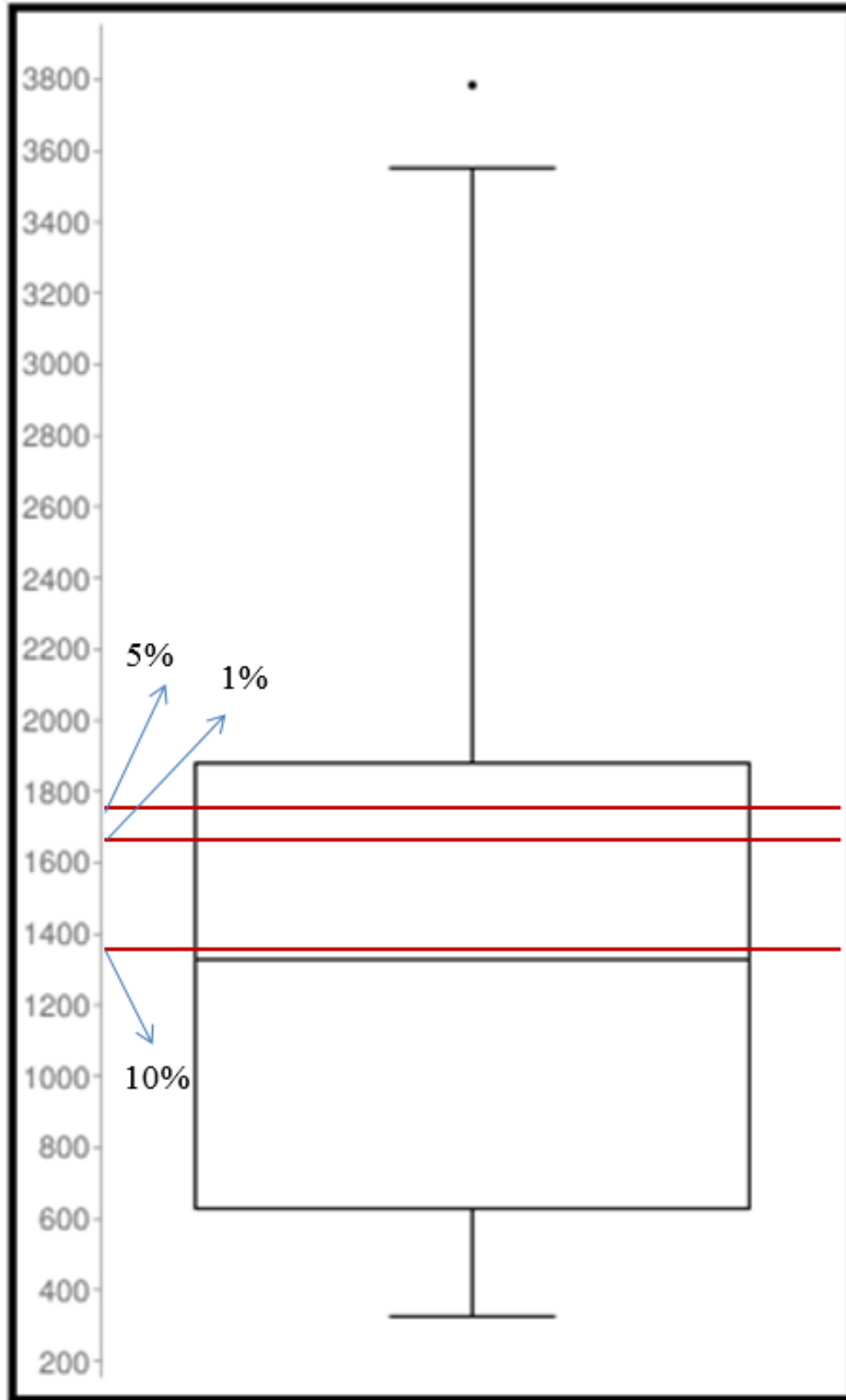


FIGURE 53: 1910 Box and Whisker Plot; Standard Deviation 768 (n=161) (Marlowe 2016).

The analysis, expanded in Chapter 5, was an attempt to see where congruence or dissimilarities exist between historical and archaeological datasets. This was completed by taking historical tables from the treatises and researching other supplemental information such as average tonnage. The information was then visually demonstrated. Other avenues for analysis were identified from the queries run in the *Access* database. Comparisons between the different historical sources were analyzed to determine relative themes and assist in answering the research questions. Then, the archaeological data created from the queries and individual anchor information was placed into historical graphs to see if a certain anchor matched with the different trends. This allowed historical versus archaeological comparison. The different comparisons allowed the individual anchors to have more diagnostic information, such as an approximate anchor weight, which can assist in future studies. The method of analysis conducted allowed for stylistic and quantitative analyses of the archaeological dataset collected as a part of the thesis. Some analyses were purely historical in nature, where the historical record was cross-examined to see if there were variances in it. The analysis predominantly attempted to answer the secondary research questions, which mirror the primary research questions. Charting the changing design and the use of an object entails compiling the many aspects of its design into an analytical format which describes the technological factors they represent.

## Chapter 4: The Anchor Database

### **Introduction**

The AnD (totaling 82 anchors) was divided into different sections based on the proforma. Queries were run in Microsoft *Access*. The results of these queries are the basis of two sections within this chapter. The first section is a description of the anchor database according to their type and overall dimensions. The second section categorizes the anchor database by design elements and outlines the breakdown of design differences and size variations of each feature. This chapter is primarily descriptive as it defines the reach and extent of the anchor database and the diversity of anchors contained therein. When referring to particular anchors, additional specifications may be determined by looking at Appendices D and E. In addition, Appendix F presents a “Data Dictionary” for definitions of terms used throughout this study.

### **Description of General Anchor Dimensions**

The description of general anchor dimensions looks at the overall length of the anchors as illustrated by a minimum length and a maximum length. These extremes are shown by contrasting the measurements and showing images of the smallest and largest anchors in the database. In addition, very few anchors had known dates. The few anchors that have dates associated with them are also included in this section. These two components, overall length and known dates, show the broadest possible range of the database.

#### *Overall Length of Anchors*

The overall length of the anchors was calculated from the measurements of 81 anchors. The largest and smallest anchors recorded came from the Washington Navy Yard which had 22 anchors, and Wanchese, North Carolina, which had over 40 anchors in various places. The larger

anchors are predominately stockless, but the overall length for the dataset spans four feet to just over fourteen feet (see Table 2). Measurements were only taken for 81 anchors as one was eliminated due to being outside the initial time frame of the study. Of the 81 recorded anchors, the average length was 7.7 decimal feet.

TABLE 2. Overall Length of Anchors (n=81; Marlowe 2016).

Overall Length of Anchors (dec.feet)		
Minimum	Average	Maximum
4	7.71321	14.1

The largest anchor, at 14.1 decimal feet, was WNY017 (Figure 54). This anchor no longer has a stock. The smallest anchor was only four feet long (WNC006, Figure 55). This anchor was located on private property (a front yard) in Wanchese, North Carolina.



FIGURE 54. WNY017 in the Washington Navy Yard (Marlowe 2015).



FIGURE 55. WNC006 in private residence in Wanchese, North Carolina (Marlowe 2015).

### *Dated Anchors*

There were five anchors out of the total dataset of 82 with known dates. Most were located in the Washington Naval Yard with one in Nags Head, North Carolina (anchor NHNC006). The dates of the known anchors span from 1858 to 1945. Of these anchors, two were stocked and three were stockless. The anchors with dates are WNY005 (1858), WNY008 (1938), WNY012 (1919), WNY020 (1943), and NHNC006 (1945) (examples seen in Figures 56–58).

The vessel associated with WNY005 is known. The plaque on WNY005's shank stated that this anchor was from USS *Hartford*, a steam sloop of war built at Boston Navy Yard in 1858. USS *Hartford* was Admiral Farragut's flagship at Mobile Bay and New Orleans during the



American Civil War (Naval History and Heritage Command 2009). Only three dated anchors have associated vessels.



FIGURE 56. WNY005 in the Washington Navy Yard (Marlowe 2015).



FIGURE 57. WNY012 in the Washington Navy Yard (Marlowe 2015).



FIGURE 58. NHNC006 outside local business in Nags Head, North Carolina (Marlowe 2015).

## Description of Anchor Design Elements and Features

The second section of this chapter describes the range, variety, and sizes of different design elements and features of anchors. As can be seen in the anchor anatomy diagram (Figure 59), the descriptions progress from the lower end to the top of the anchor. This ensures a full description of all anchor parts. A final section will examine other features of the AnD such as inscriptions. Individual design elements were compared to their design history, giving individual features a *terminus post quem*, which will aid in identifying anchor design and age.

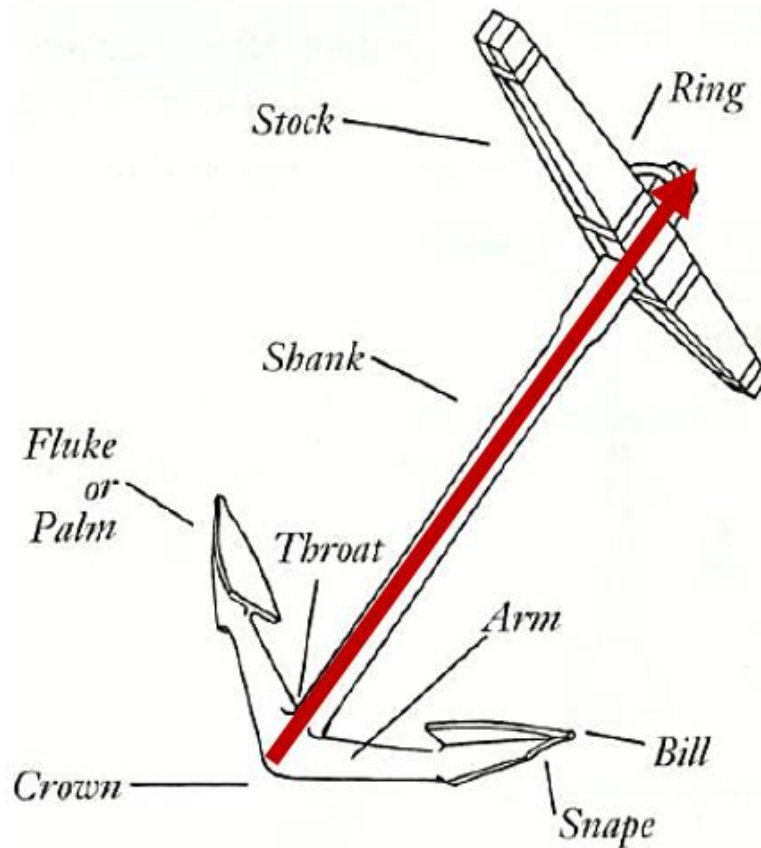


FIGURE 59. Anchor anatomy diagram showing the order of description for sections within this chapter (Curryer 1999:7; modified by Marlowe 2015).

### *Anchor Crown*

This section describes the different types of crowns found in the entire dataset of 82 anchors. As can be seen from the chart (Figure 60), the majority of the crown shapes were “Rounded”, followed by equal parts of the rest: “Swivel”, “Tip”, “Pointed”, and “Other”. These terms are defined in the recording guide (Appendix B). Many “Other” crowns are so labeled because they were obscured or partially buried making their original shape impossible to determine.

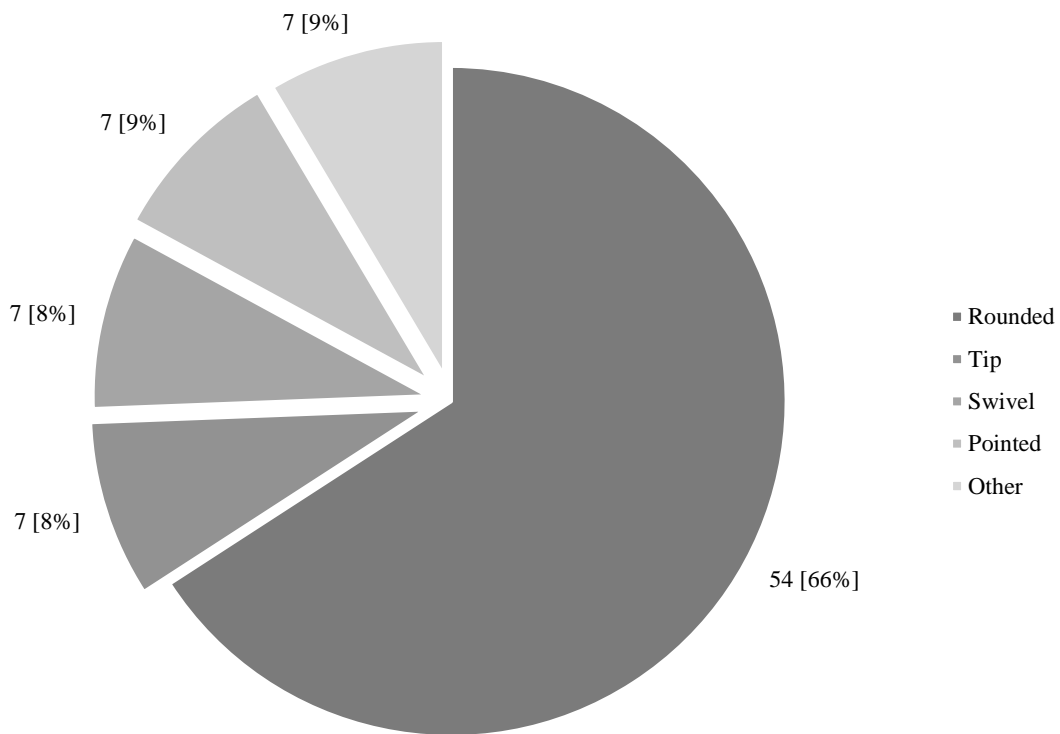


FIGURE 60. Types of Crown in Dataset (n=82; Marlowe 2016).

Pering’s Improved Anchor of 1829 first introduced the round crown anchor and was subsequently adapted by various different inventors and designers (Cotsell 1856:11). The swivel crowns were entirely located on stockless anchors, where the crown and arms are attached to the shank, but are not connected to it. There are other types of “Swivel” anchors but none were found in the course of data collection for this thesis. The other types of “Swivel” anchors include

the Porter Anchor where the arms and crown are mobile and move until they connect with the shank (Figure 61).

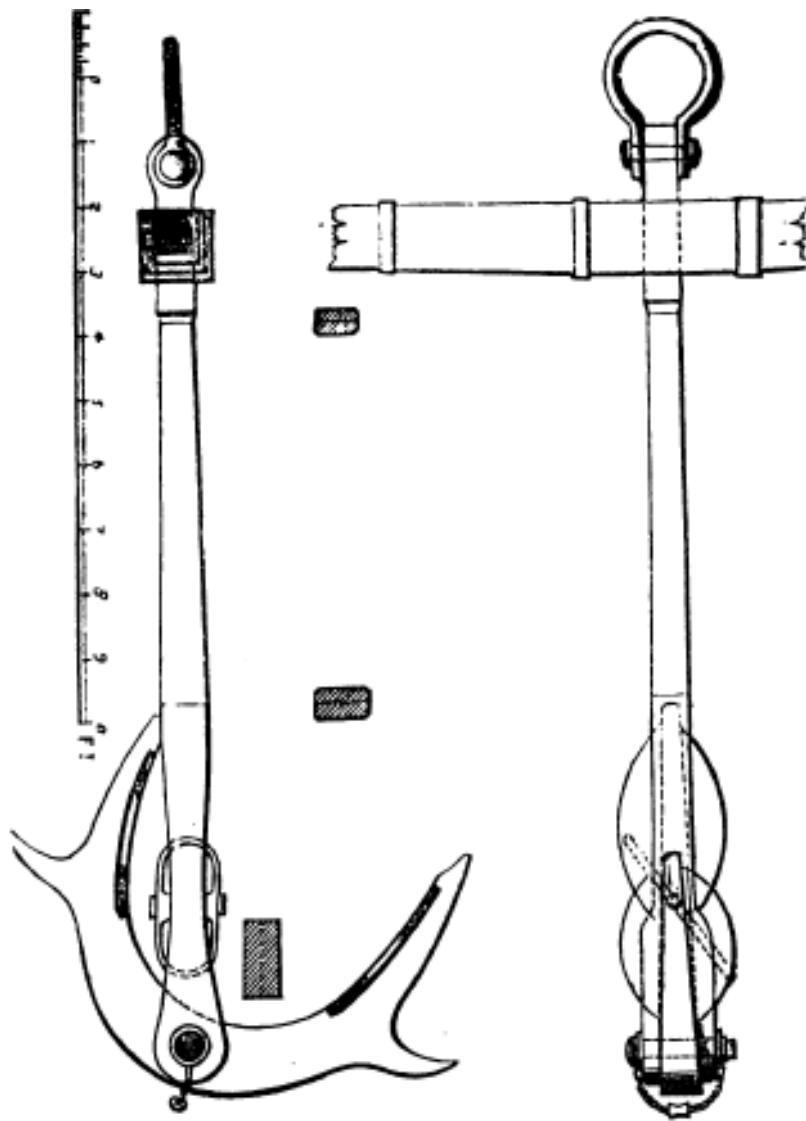


FIGURE 61. Porter's Anchor showing one form of a swivel style crown (Cotsell 1856:26).

The “Tip” and the “Pointed” crowns have a very early origin with anchors from 16th century Spanish vessels having a tipped crown. There are archaeological examples of these anchors from the mid-16th century with both tipped and pointed crowns. The strong pointed crown appears to have been used in Admiralty-style anchors at least since 1717 (Diderot



1769:Plate 10; Diderot 1783:Plate 8; Baker 1938; Curryer 1999:52). The difference between the tipped and pointed crowns is minimal; it is determined by the angle at which the arms come into the crown. The greater the angle, the less pointed the crown. Table 3 shows historical examples of the different types of anchor crown shapes while Table 4 shows examples from this dataset.

TABLE 3. Historical examples of different crown types (Marlowe 2016).

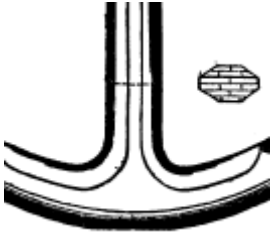


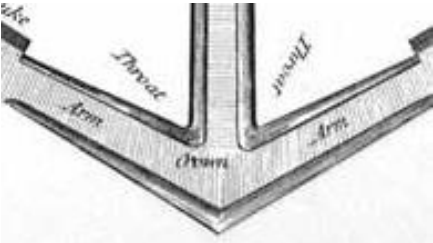




Historical Examples	
Rounded— Pering’s Improved Anchor 1829 in Cotsell (1856:11)	
Swivel— R. F. Hawkins’s 1821 Patent Anchor in Cotsell (1856:40)	
Tip— Anchor style used by “Dutch, Danish, and Swedish Navies” around approximately 1800, from Cotsell (1856:2)	
Pointed— David Steel’s <i>The Elements and Practice of Rigging And Seamanship</i> , 1794	

TABLE 4. Archaeological examples from dataset of different crown types (Marlowe 2016).

Archaeological Examples
-------------------------

<p>Rounded— WNC039</p>	
<p>Swivel— WNY020</p>	
<p>Tip— MHNC001</p>	
<p>Pointed— BNC002</p>	

*Anchor Arms*

The shape of the arms relates to the anchor’s holding power, explaining the wide variety of types and angles (Cotsell 1856:83). The different types of measurements included in this section are the minimum length, average length, and maximum length of one arm, as well as the amplitude of the arms. The arm shapes include “Arc”, “Segmented Arc”, “Mobile”, “Angled”, and “Other.” Two anchors with “Unknown” as their arm type were partially or completely buried and it was not possible to determine the shape of the arms. However, just over half the arm shapes were the “Arc” type. The segmented arc shape was the next most common, with the angled and mobile shapes being equal. The distribution of the dataset is shown in Figure 62.

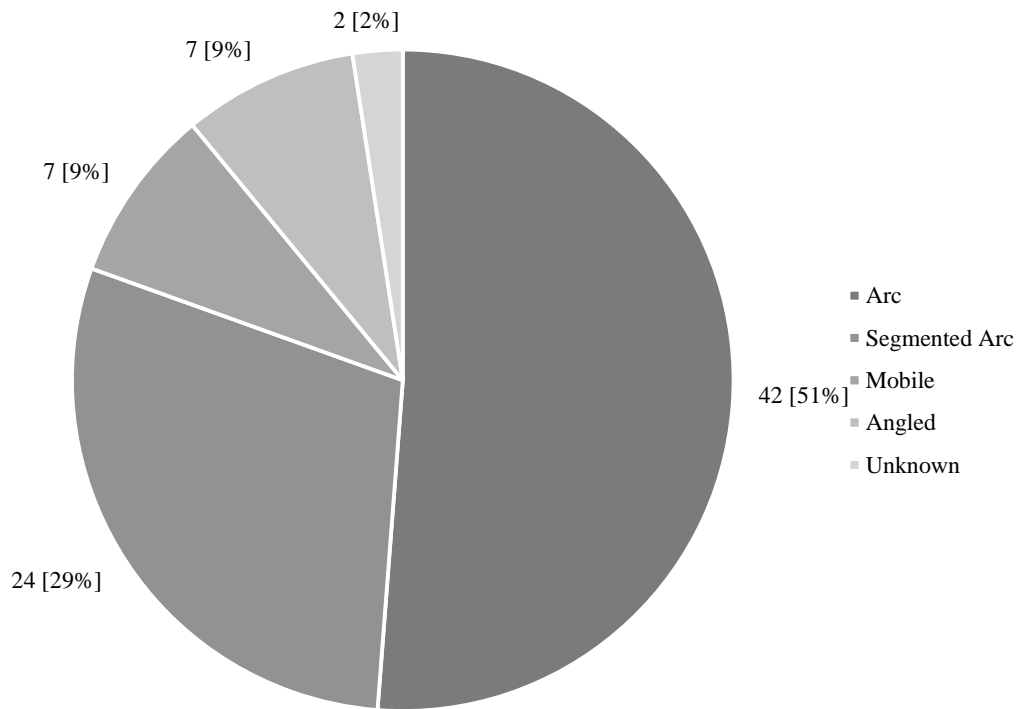


FIGURE 62. Shapes of Anchor Arms in Dataset (n=82; Marlowe 2016).

The arc arm shape appears to have first appeared with Pering’s 1829 Improved Anchor (Cotsell 1856:11). The segmented arc shape and the angled arm shape have a very early origin, both appearing in the 16th century (Curryer 1999:39, 41). In 1821, R.F. Hawkins invented one of



the earliest stockless anchors with mobile arms (Cotsell 1856:40; Curryer 1999:112). While the stockless anchors underwent changes from that time onwards, only one anchor treatise was discovered pertaining to the stockless anchor with a table similar to those found in Pering and Cotsell (Pering 1819:88–98; Cotsell 1856:84). This treatise pertained to Hall’s Patent Admiralty Anchor (1898). The different arm types in the historical record are clearly definable. The two tables below, Table 5 and Table 6, show the historical and archaeological examples for arm shapes.

TABLE 5. Historical Examples of Arm Shapes (Marlowe 2016).


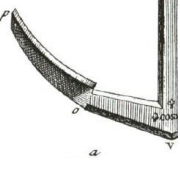
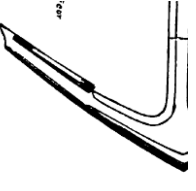



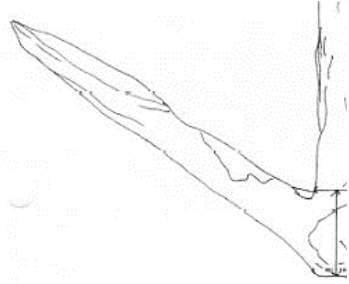

Historical Examples	
Arc— Pering’s Improved Anchor 1829 in Cotsell (1856:11)	
Segmented Arc— Example from Diderot’s <i>Encyclopédie</i> (Curryer 1999:45).	
Angled— Old Plan Long Shanked Anchor in Cotsell (1856:6).	
Mobile— R. F. Hawkins’s 1821 Patent Anchor in Cotsell (1856:40)	

TABLE 6. Archaeological Examples of Arm Shapes from Dataset (Marlowe 2016).

Archaeological Examples	
Arc— MNC002	

	
<p>Segmented Arc— WNC004</p>	
<p>Angled— WNY022</p>	
<p>Mobile— WNC013 (Baldt Stockless Anchor)</p>	

The length of one arm was measured to assist in gaining a fuller understanding of the different parts of an anchor. In addition, some anchors have proportionally shorter arms than

other anchors. In the dataset, 77 had the length of one arm measured. For this dataset, the length of one arm was from 1.58 decimal feet to 7.67 decimal feet (Table 7). In Figure 63, the differing arm lengths can be associated with different anchor types.

TABLE 7. Lengths of One Arm in dataset (n=74; Marlowe 2016).

Length of One Arm (dec.feet)		
Minimum	Average	Maximum
1.58	3.384230769	7.67

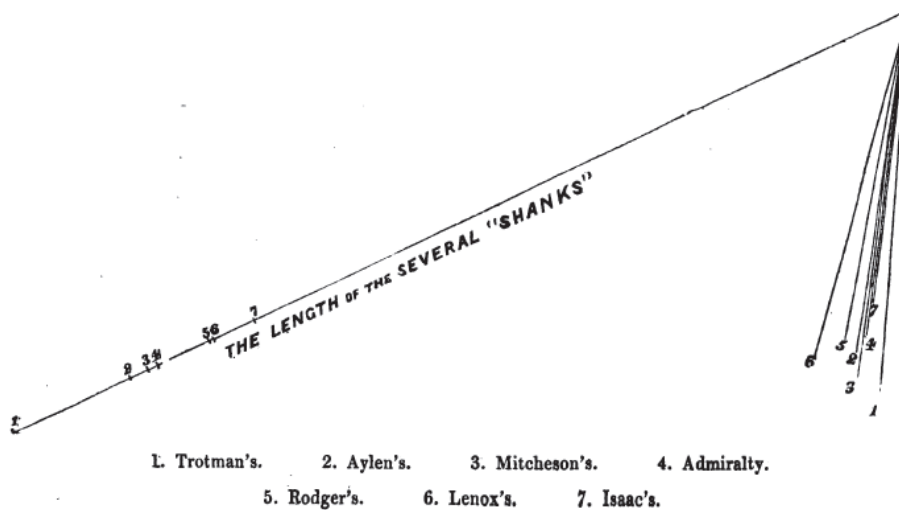


FIGURE 63: Arm lengths pertaining to different anchor types (Cotsell 1856:80).

Arm amplitude, the curved measurement from the tip of one bill, around the crown, and up to the tip of the other bill, gives an overall length of the curvature of the arms. For this dataset, the minimum arm amplitude recorded was 3.33 decimal feet while the maximum was 21.67 decimal feet (Table 8). Out of the dataset, 76 had the arm amplitudes recorded. Two anchors were recorded with the minimum measurement (WNY010 and WNY011) and three anchors recorded with the maximum measurement (WNY001, WNY002, and WNY009). While no historical sources record the arm amplitude, it provides a proportion to the length of the shank. Figures 64 and 65 demonstrate the minimum and the maximum arm amplitude in anchors from the dataset.

TABLE 8. Arm Amplitudes for dataset (n=73; Marlowe 2016).

Length of Arm Amplitude (dec.feet)		
Minimum	Average	Maximum
3.33	7.484342	21.67



FIGURE 64. Minimum arm amplitude measurement (3.33 decimal feet) on WNY010 (Marlowe 2016).



FIGURE 65. Maximum arm amplitude measurement (21.67 decimal feet) on WNY002 (Marlowe 2016).

The throat angle is useful for helping determine the relative straightness or curvature of the arms, especially in situations where the arms may be partially missing or obscured (Table 9).

Throat angles for seventy anchors in the database were calculated. As with other queries, some anchors where this information could not be recorded resulted from the condition or location of the anchors. The method of determining throat angles did not work for almost all stockless anchors' throat angles, the one exception being WNC013. For the majority of the stockless anchors, the bill height and arm length were the same measurement. This was not the case on anchor WNC013. For the AnD, the minimum throat angle was 29.231 degrees and the maximum throat angle was 71.181 degrees. The range of the throat angles illustrates the range of anchors within the dataset. Several anchors had different throat angles on each side of the shank, indicating stress affected some angles. Additionally, early anchors were not machine-made and variances exist.

TABLE 9. Throat Angle in Dataset (n=70; Marlowe 2016).

Throat Angle (dec.feet)		
Minimum	Average	Maximum
29.231	53.03188571	71.181

The throat angle is not discussed in many historical sources, with the exception of Cotsell's 1856 *A Treatise on Ships' Anchors*, an image from which shows the throat angle between different anchors. Figure 66 shows an image created by Cotsell for his 1856 treatise, intended to show that all anchors are based on “two straight lines; and, of whatever *form* or plan, ultimately resolve themselves into these, differing only in the degree of angle or other matters of detail [emphasis in original]” (Cotsell 1856:83). The image shows the different anchors tested by the Royal Navy at Sheerness in 1852 (Cotsell 1856:83). The information shown in the Cotsell figure is not expanded upon. It was placed as a visual demonstration of differences between another aspect of the anchors tested at Sheerness in 1852 and of contemporary and past anchors (Figure 66).

The lines 1, 2, 3, 4, and 5 show the angle of the arms, respectively, of *five* of the Anchors tried at Sheerness in 1852: the dotted line *a*, the angle of the French Anchor; and *b*, of the Dutch, Danish, and Swedish anchors of fifty years ago; the line *x x* being the shank in each case.

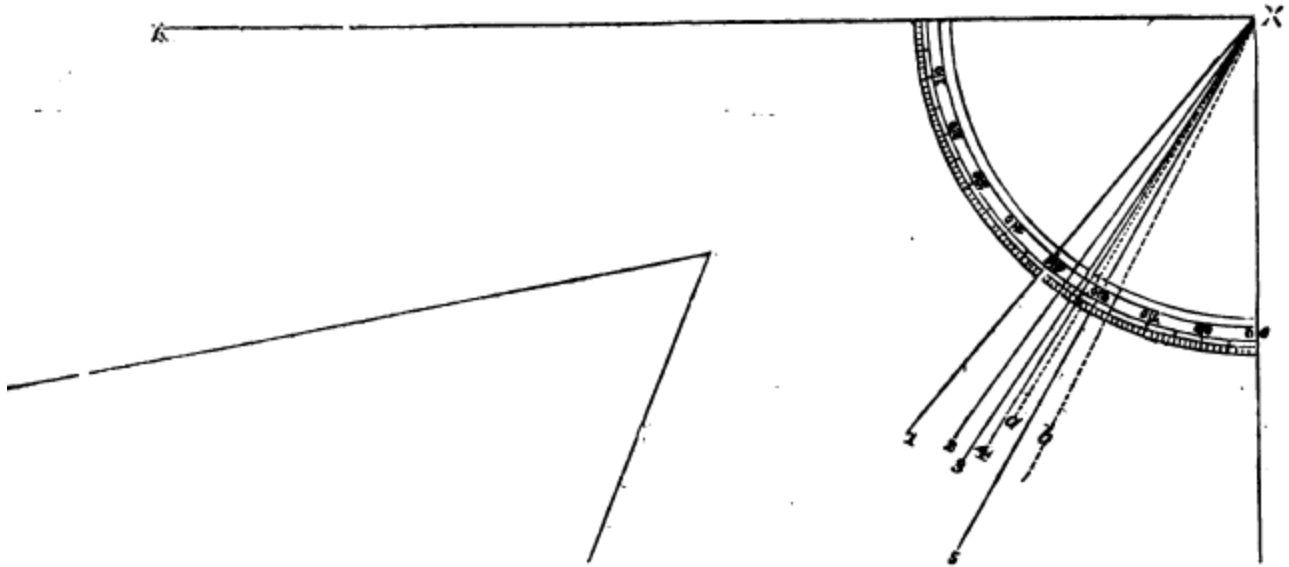


FIGURE 66. Anchor Arm Angles (Cotsell 1856:83).

The archaeological examples shown below demonstrate the minimum and maximum throat angles recorded as well as an example of a 55 degree anchor (slightly above the average). The minimum anchor, WNY013, was found at the Washington Naval Yard. No photograph was taken showing the throat section of anchor WNY013. The average throat angle is from the Washington Naval Yard, WNY017 (Figure 54). The maximum throat angle example is from Wanchese, North Carolina, WNC013 (Figure 67).





FIGURE 67. WNC013 showing maximum anchor throat angle (Marlowe 2015).

### *Anchor Flukes and Bills*

The different types of flukes found in the dataset included “Tipped Spade,” “Almond,” “Other,” “Spade,” and “Triangle.” For this section, “Absent/Other” included anchors whose flukes were no longer present and anchors whose flukes did not fit in other categories. Some of these anchors were stockless, some had two pairs of flukes, and others had undergone repairs resulting in flukes different from their original design. The entire dataset of 82 anchors had the fluke type recorded (Figure 68). The tipped spade type was the most common followed by the almond fluke type (almost exclusively found on the stockless anchors). The least common fluke type was the triangle.

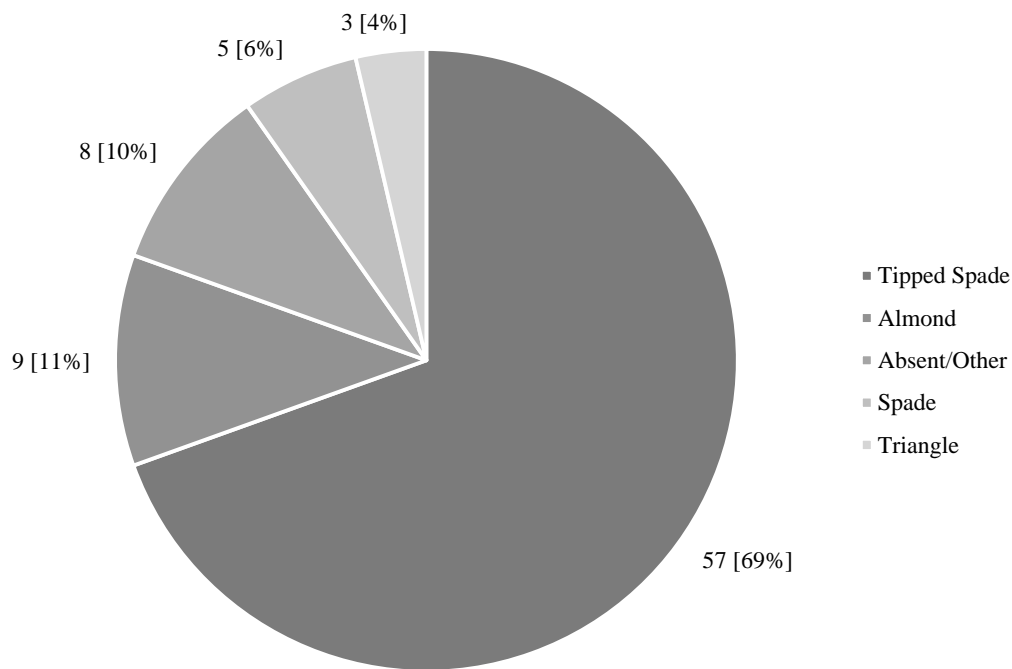


FIGURE 68. Types of Flukes in the dataset (n=82; Marlowe 2016).

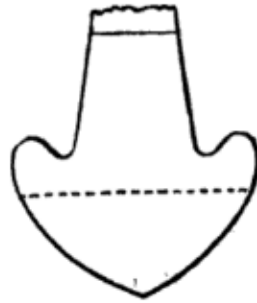
Fluke shapes appear in the historical literature concerning anchors, including the different sizes (Cotsell 1856:63). The tipped spade appears in the section on anchors in both Diderot's 1769 *Recueil de Planches*, as well as Diderot's 1783 *Fabrique des Ancres*, from *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers* (Curryer 1999:39, 41). The illustrations for both of Diderot's works (1769 and 1783) are the same. The spade appears in an illustration of Dutch anchors (Curryer 1999:44). The triangle appears primarily in the 18th century (Curryer 1999:43, 49, 55). Different anchor designs had different fluke proportions, such as seen in Cotsell (Figures 69 and 70; Cotsell 1856:20; 63). The following two tables illustrate the different historical and archaeological examples of fluke types (Tables 10 and 11). Fluke designs changed over the course of the long 19th century and, depending on the condition of the archaeological anchor, can provide assistance in determining the design style of anchor.



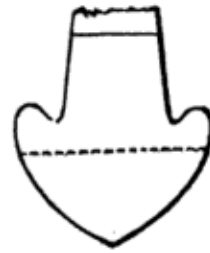
Feet 4·52.



Feet 3·24.



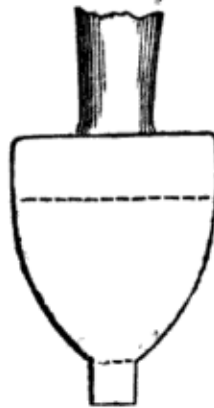
Feet 2·44.



Feet 4·53:



Feet 3·36:



Feet 2·48.

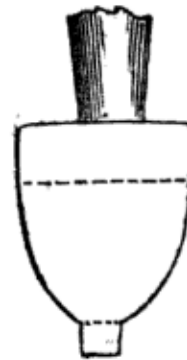


FIGURE 69: Illustration of Different Fluke Types from Cotsell (1856:20).

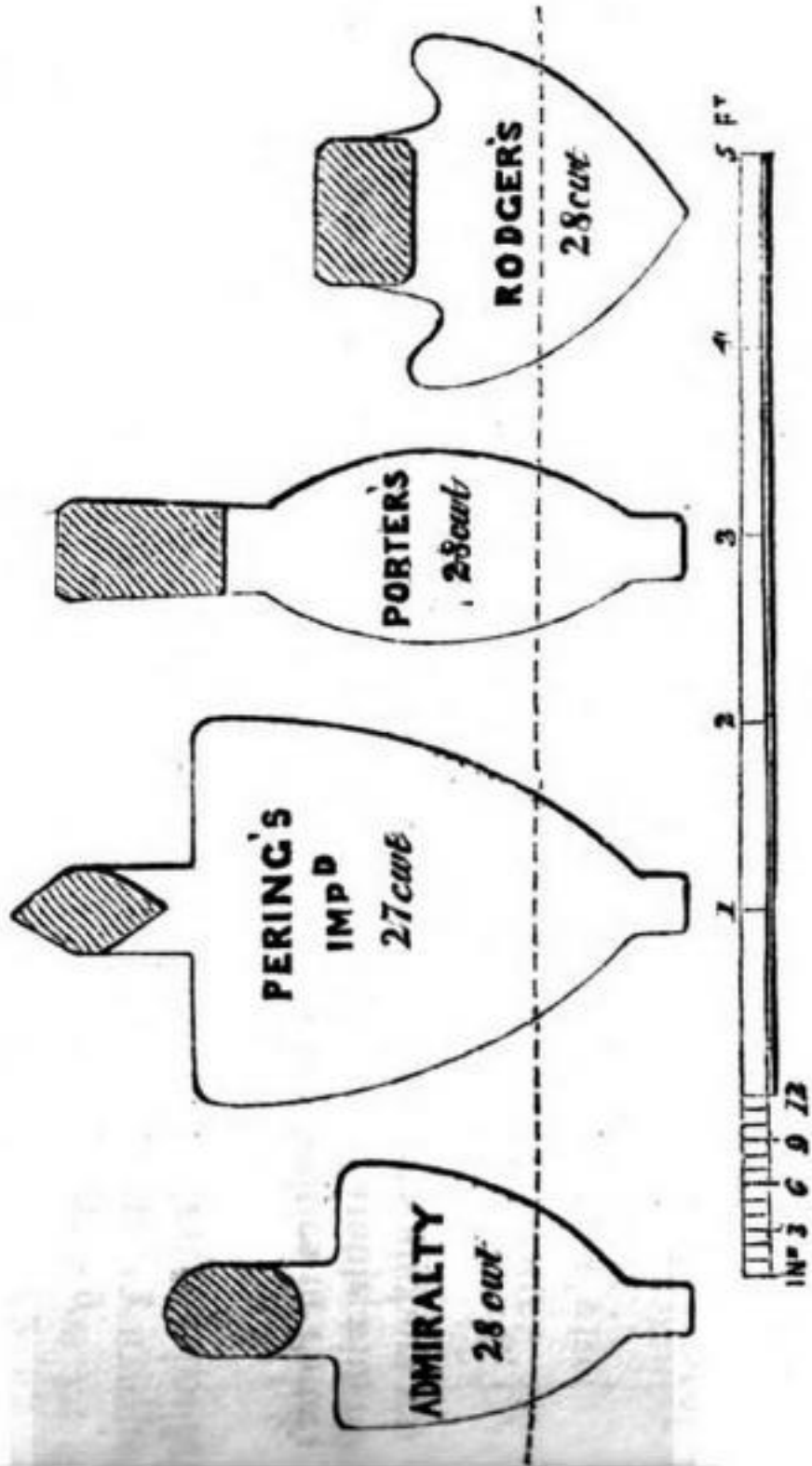


FIGURE 70: Comparison of Anchor Fluke Sizes from Cotsell (in inches and feet) (1856:63).

TABLE 10. Historical examples of Fluke types (Marlowe 2016).

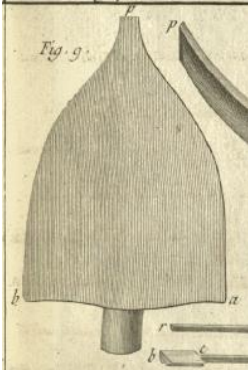
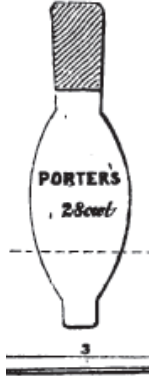

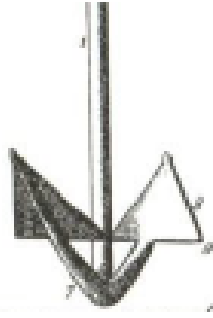






Historical Examples	
<p>Tipped Spade— Tipped Spade construction illustration (Diderot 1783:Plate 8)</p>	
<p>Almond— Example from Cotsell (1856:63).</p>	
<p>Spade— Dutch anchor from about 1830 (Curryer 1999:44)</p>	
<p>Triangle— Dutch anchor from late 17th century (Curryer 1999:43)</p>	

TABLE 11. Archaeological Examples of Fluke Types (Marlowe 2016).

Archaeological Examples	
Tipped Spade— WNY005	
Almond— WNY002	
Spade— WNC040	

<p>Triangle— WNY017</p>	
<p>Absent— WNC015 (other fluke listed as triangle)</p>	
<p>Other— WNY018</p>	

The fluke length and width was recorded when possible. Some flukes had deteriorated to the point where there was no fluke left or not enough to get a complete measurement (Tables 12 and 13). Out of the dataset, 74 fluke lengths and 68 fluke widths were recorded. The size of the flukes, along with the fluke shape, can help identify the date and type of anchor. The minimum length for the flukes recorded in the dataset was 0.1 decimal feet. The maximum length was 7 decimal feet (Table 12). The minimum width for the flukes recorded in the dataset was 0.25 decimal feet. The maximum width was 2.63 decimal feet (Table 13). The average fluke size for

this dataset, based on the queries run in *Access*, has a length of 1.95 decimal feet and a width of 1.33 decimal feet.

TABLE 12. Fluke Length for anchors in the dataset (n=75; Marlowe 2016).

Fluke Length (dec.feet)		
Minimum	Average	Maximum
0.1	1.95527	7

TABLE 13. Fluke Width for anchors in the dataset (n=69; Marlowe 2016).

Fluke Width (dec.feet)		
Minimum	Average	Maximum
0.25	1.338235	2.63

The distances between the bills and the bill height were recorded during data collection (Tables 14 and 15). For some anchors, recording was not possible because part was buried or damaged. From the dataset, distance between the bills was recorded from 78 anchors. The minimum distance between bills was 2.5 decimal feet and the maximum was 10.5 decimal feet (Table 14). Seventy-five anchors from the dataset had the height of the bills recorded in total. The minimum height of the bills was 0.83 decimal feet and the maximum was 8.33 decimal feet (Table 15).

TABLE 14. Distance between Bills in the dataset (n=79; Marlowe 2016).

Distance between Bills (dec.feet)		
Minimum	Average	Maximum
2.5	5.143333	10.5

TABLE 15. Height of Bills in the dataset (n=76; Marlowe 2016).

Height of Bills (dec.feet)		
Minimum	Average	Maximum
0.83	2.160266667	8.33

The length and width of the bills were recorded when possible (some anchor fluke types did not have bills). Fifty-six bill lengths, and 53 bill widths, were recorded. The minimum length and width for the bills recorded was 0.1 decimal feet (Tables 16 and 17). The maximum length was 0.875 decimal feet (Table 16) and the maximum width was 0.6 decimal feet (Table 17). The bill lengths and widths fall within general measurements outlined in *Fabrique des Ancres*, however, the measurements extend beyond the ones listed for the bill length (1783:44).

TABLE 16. Bill Length in the dataset (n=57; Marlowe 2016).

Bill Length (dec.feet)		
Minimum	Average	Maximum
0.1	0.371071	0.875

TABLE 17. Bill Width in the dataset (n=54; Marlowe 2016).

Bill Width (dec.feet)		
Minimum	Average	Maximum
0.1	0.217736	0.6

### *Anchor Shank*

The types of shanks found in the dataset include “Round or Oval,” “Flattened,” “Faceted,” and “Other.” The one anchor shank classified as “Other” was rectangular in shape and did not fit any other classification. In the historical data, the shank’s shape was associated with the anchor type. Illustrations of anchors include a cross-section showing the shape of the shank and, occasionally, of the arms (Figure 71). Despite its importance, the shank’s cross section is often unmentioned in the literature, with Cotsell and Rodgers being the only authors to address shape (Cotsell 1856:14; Rodgers 1858:38; Figure 72). From this dataset, the most common anchor shank shape was the round or oval shape (Figure 73).

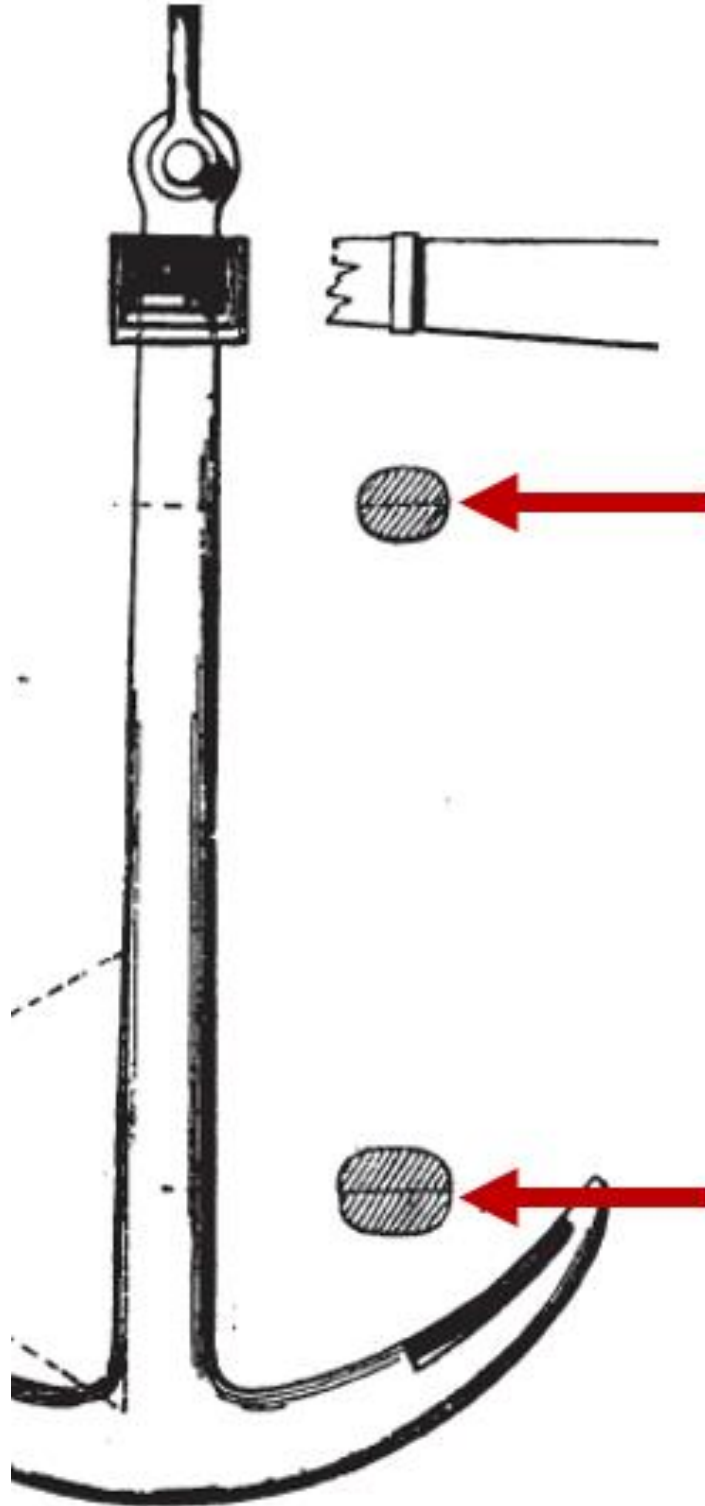


FIGURE 71. Example of shank cross-sections (Cotsell 1856:14; modified by Marlowe 2016).



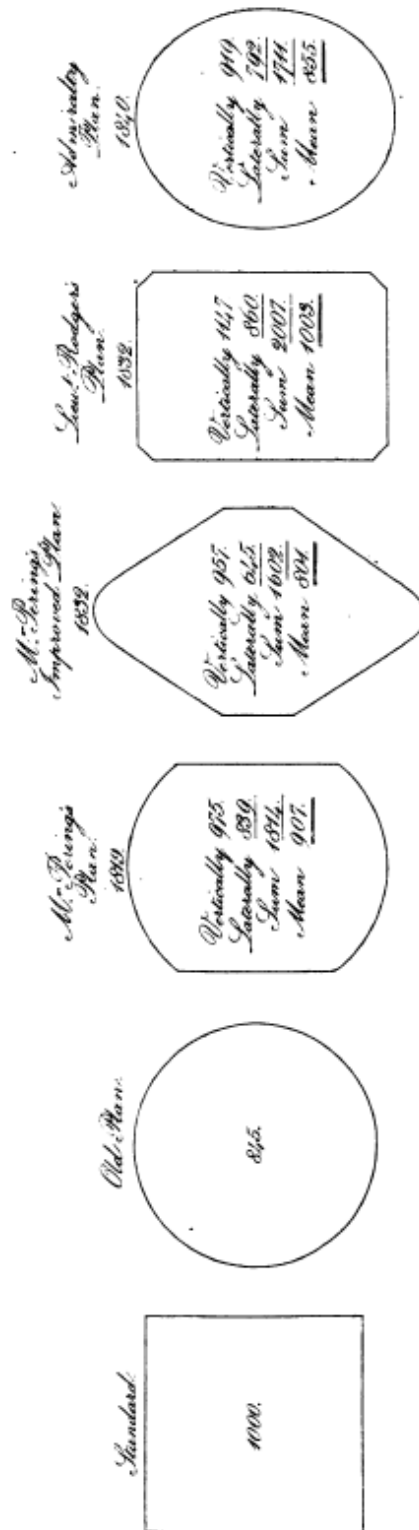


FIGURE 72. Types of anchor shank forms (Rodgers 1858:38).

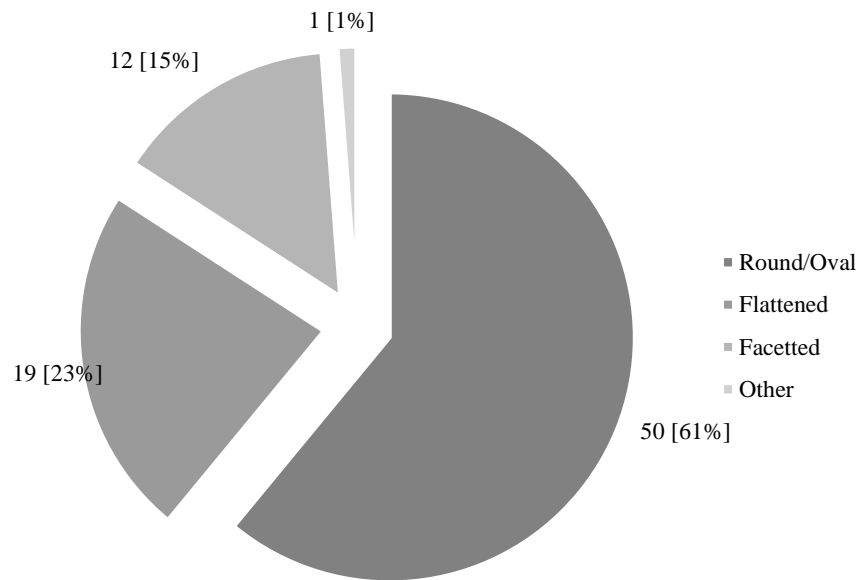


FIGURE 73. Types of Anchor Shanks in the dataset (n=82; Marlowe 2016).

The shank length was measured on 77 anchors included in the dataset (Table 18). The minimum shank length was 3.0 decimal feet, and the maximum was 12.6 decimal feet. The shank was measured from the bottom of the stock to the beginning of the arms.

TABLE 18. Shank Length for the dataset (n=77; Marlowe 2016).

Shank Length (dec.feet)		
Minimum	Average	Maximum
3.0	6.011299	12.6

The shank thicknesses and widths were measured at two places on the shank. The first, maximum shank thickness or width, was measured from the throat of the anchor; the minimum shank thickness or width was measured at the top of the shank (near the stock). Seventy-six maximum shank thicknesses and 72 minimum shank thicknesses were measured. Fewer minimum shank thicknesses were measured because the top of the shanks were inaccessible on

several displayed anchors. For the maximum shank thickness, the measurements ranged from a minimum of 0.2 decimal feet to a maximum of 1.0 decimal foot (Table 19). The minimum shank thickness measurements ranged from a minimum of 0.1 decimal feet to a maximum of 0.75 decimal feet (Table 20).

TABLE 19. Maximum Shank Thicknesses from the dataset (n=77; Marlowe 2016).

Maximum Shank Thickness (dec.feet)		
Minimum	Average	Maximum
0.2	0.535658	1.0

TABLE 20. Minimum Shank Thicknesses from the dataset (n=73; Marlowe 2016).

Minimum Shank Thickness (dec.feet)		
Minimum	Average	Maximum
0.1	0.379028	0.75

Maximum shank widths were recorded on 73 and minimum shank widths were recorded on 71 anchors. Again, fewer minimum width measurements were recorded because of inaccessibility. The maximum shank width measurements ranged from a minimum of 0.1 decimal feet, to a maximum of 2.0 decimal feet (Table 21). The minimum shank width measurements ranged from a minimum of 0.1 decimal feet to a maximum of 0.75 decimal feet (Table 22).

TABLE 21. Maximum Shank Widths from the dataset (n=74; Marlowe 2016).

Maximum Shank Width (dec.feet)		
Minimum	Average	Maximum
0.1	0.484932	2.0

TABLE 22. Minimum Shank Widths from the dataset (n=72; Marlowe 2016).

Minimum Shank Width (dec.feet)		
Minimum	Average	Maximum
0.1	0.34169	0.75

## Anchor Stock

The types and uses of anchor stocks changed throughout the long 19th century, however, no historical record used in this study contained measurements of the different stocks. The historical record pieces together a tentative timeline for the stocks, as seen below (Table 23). Historically, the anchor had a wooden stock since the ancient Greeks (Curryer 1999:26). Iron stocks saw some intermittent use during the Roman and Viking eras but became increasingly common during the long 19th century. The iron stock occurred through the first quarter of the 19th century to the middle of the 19th century in different forms (Figure 74; Cotsell 1856:116; Curryer 1999:77). Stockless anchors first appeared in 1821 but did not become popular until the last quarter of the 19th century (Curryer 1999:112, 114). Eventually iron stocks were more commonly used than wooden stocks. By the end of the long 19th century, the stock was becoming obsolete all together. The information contained in the historical record can provide assistance when a stock is present on an archaeological anchor.

TABLE 23. Table showing stock changes in Stocked to Stockless anchors (Marlowe 2017).

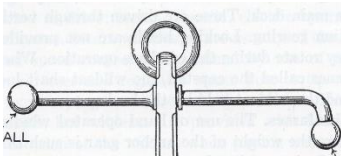
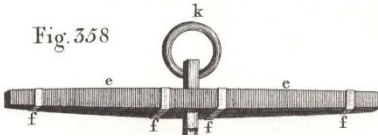
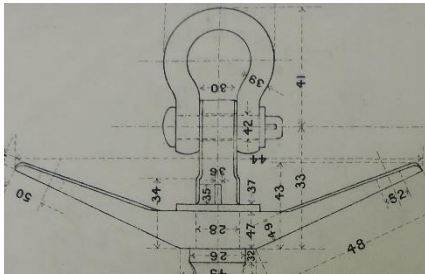
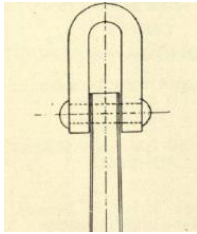
Stocked to Stockless Changes		
Stocked	Intermediary	Stockless
 <p>ALL</p> <p>Iron Stocked (Knight 1960:136)</p>  <p>Fig. 358</p> <p>Wood Stocked (Lever 1819:67)</p>	 <p>Hall's Patent Admiralty Anchor (Hall 1898)</p>	 <p>Hall's Patent Stockless Anchor No. 3 (Lloyd's 1905)</p>

Fig. 1. ADMIRALTY *Hood* Stock.



Fig. 2. Lieut. RODGER'S *Hood* Stock.

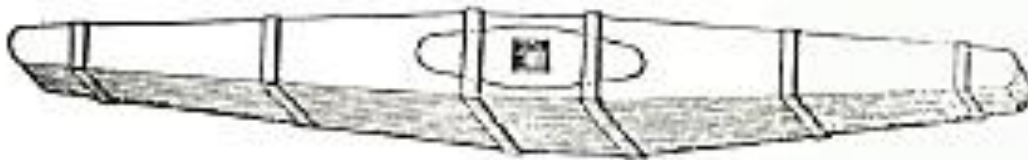


Fig. 3. ADMIRALTY *Iron* Stock.



Fig. 4. Lieut. RODGER'S *Iron* Stock.



Fig. 5. COTSELL'S *Iron* Stock.



FIGURE 74. Examples of stock types (Cotseil 1856:116).

The types of stocks included iron stocks, anchors where no stock remained, stockless anchors, and wooden stocked anchors. It was not always possible to determine with confidence whether stocks had originally been iron or wood for anchors in the dataset that did not have a stock remaining (Figures 75 and 76). The majority of the anchors recorded for the dataset had iron stocks. Two anchors were found with their original wooden stocks (Figure 77).



FIGURE 75. MNC004 without a stock in front of private residence in Manteo, North Carolina (Marlowe 2015).



FIGURE 76. MNC001 without a stock in front of private residence in Manteo, North Carolina (Marlowe 2015).

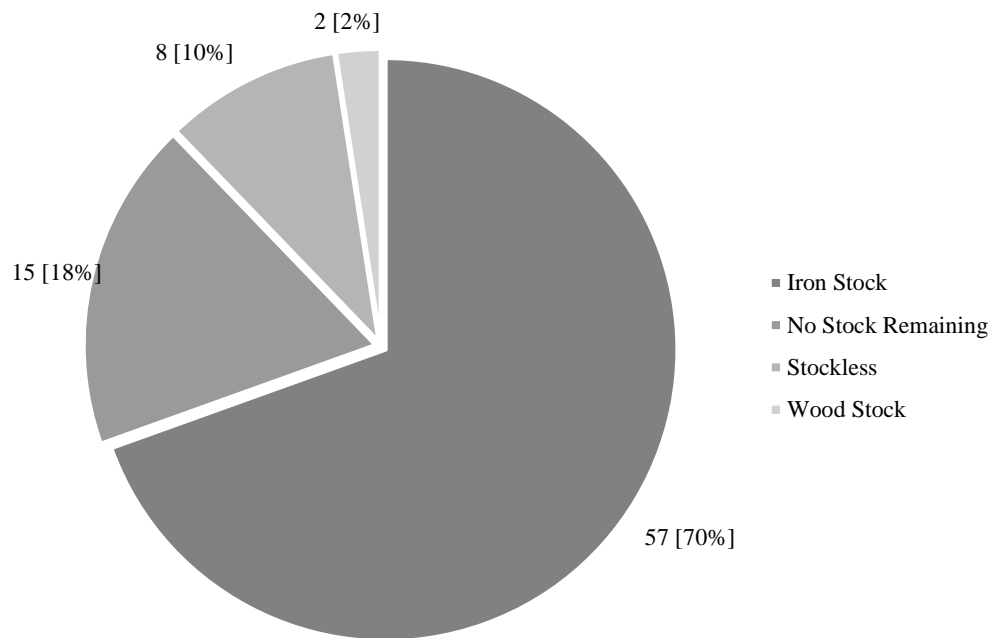


FIGURE 77. Stock Presence and distribution in the dataset (n=82; Marlowe 2016).

The maximum and minimum stock diameter was measured on 57 of 81 anchors. These measurements were not taken from the same 57 anchors as some aspects could not be recorded on certain anchors. The maximum stock diameter measurements ranged from a minimum of 0.1 decimal feet to a maximum of 1.7 decimal feet (Table 24). The minimum stock diameter measurements ranged from a minimum of 0.1 decimal feet to a maximum of 1.4 decimal feet (Table 25).

TABLE 24. Maximum Stock Diameter in the dataset (n=57; Marlowe 2016).

Maximum Stock Diameter (dec.feet)		
Minimum	Average	Maximum
0.1	0.35807	1.7

TABLE 25. Minimum Stock Diameter in the dataset (n=57; Marlowe 2016).

Minimum Stock Diameter (dec.feet)		
Minimum	Average	Maximum
0.1	0.258158	1.4

The different styles of stocks found in the dataset were three main types: straight metal stocks, bent metal stocks, and wooden stocks that went over the shank (Figure 78). Additionally, there are two categories in the figure to account for the missing stocks and the stockless anchors (“Absent” and “Not Applicable”).

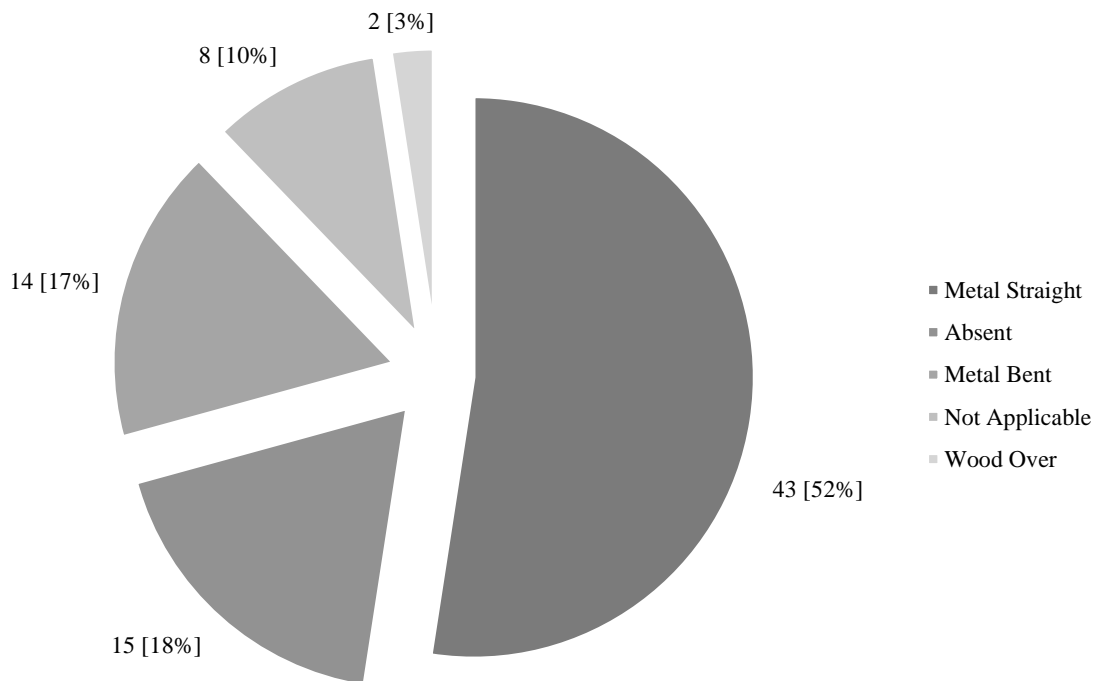


FIGURE 78. Stock Styles in the dataset (n=82; Marlowe 2016).

The various anchor stock styles had different shapes. There were eight shapes, including “Absent” and “Not Applicable”, to account for those anchors missing stocks or stockless. The majority of the anchor stock shapes were bent, followed by absent, then by straight (Figure 79). In addition, the stock sections were either circular or oval, discounting the absent and not applicable (Figure 80).



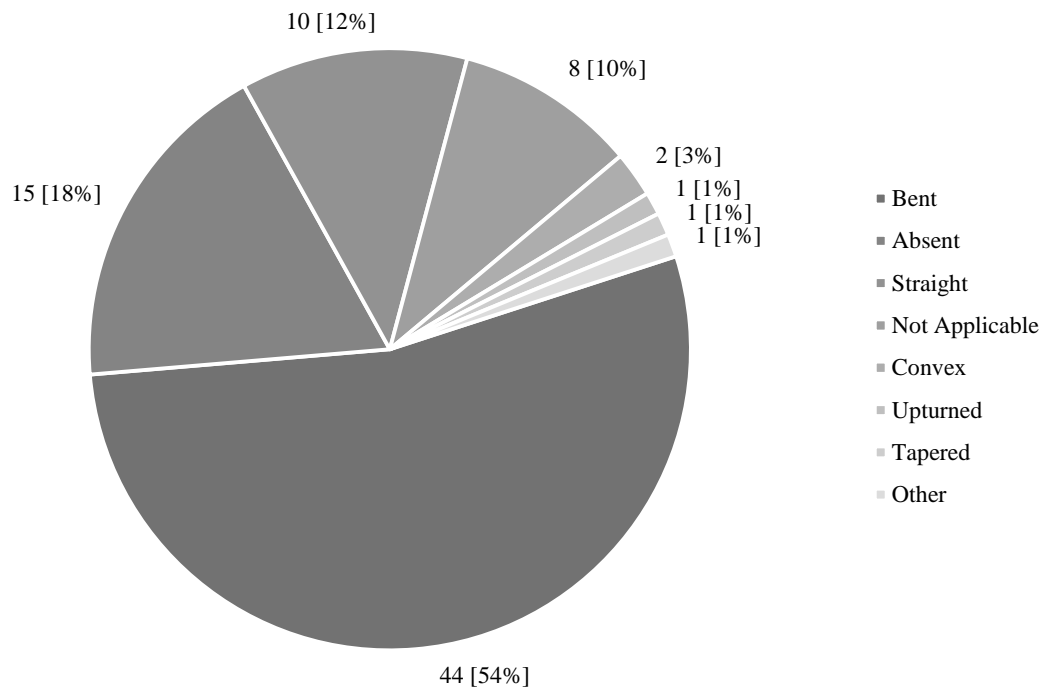


FIGURE 79. Stock Shapes in the dataset (n=82; Marlowe 2016).

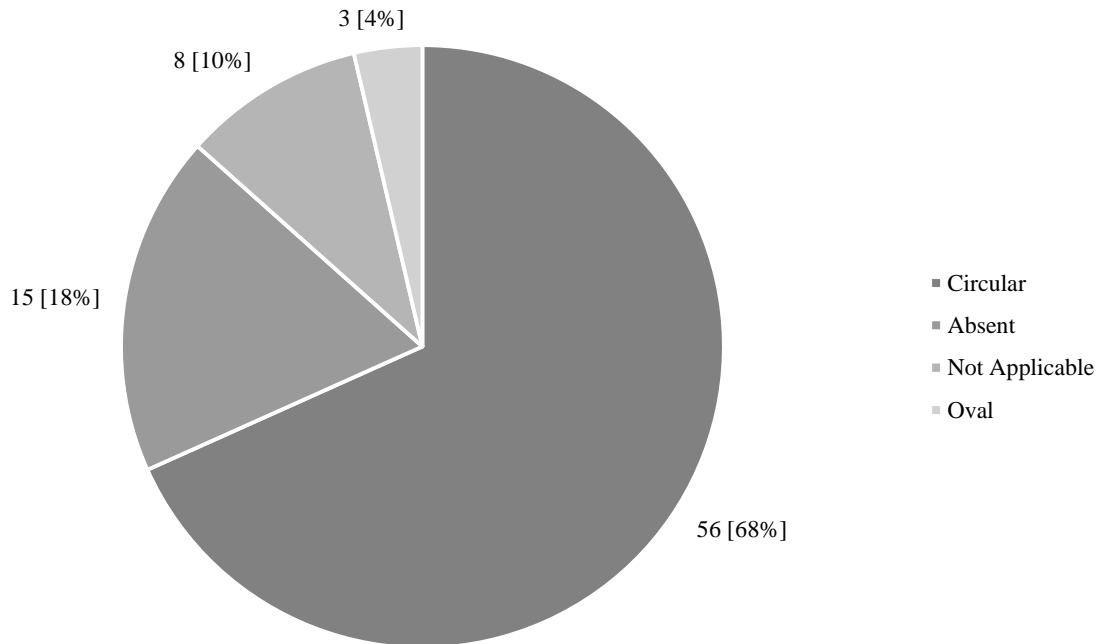


FIGURE 80. Stock Sections in the database (n=82; Marlowe 2016).

The stock key is on the shank for the purpose of locking a wooden stock in place to avoid pivoting movement around the shank (NAS 2015). The presence of stock keys revealed how the iron stocks were attached to the shanks and which anchors potentially had wooden stocks originally. The stock keys were either perpendicular to the shank or parallel with it. In addition, the chart included sections for “Not Applicable,” “Absent,” and “Unknown” (Figure 81). The majority of anchors recorded were listed as “Not Applicable” because iron stocked anchors did not need a stock key.

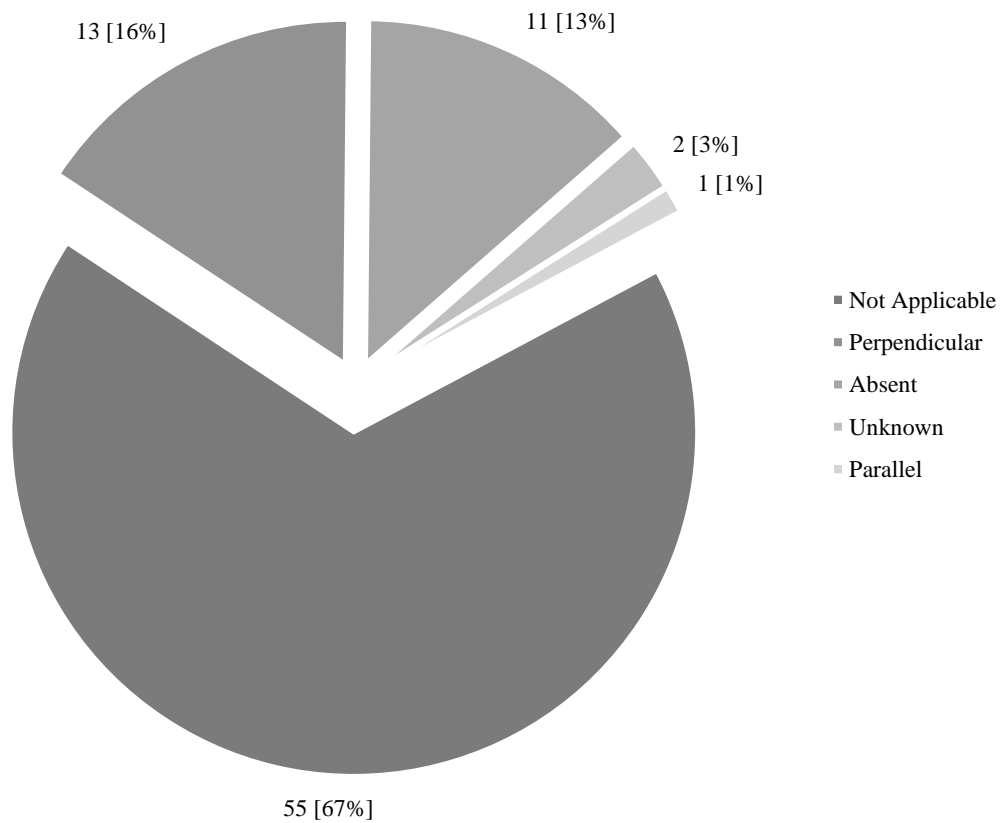


FIGURE 81. Stock Key presence in the dataset (n=82; Marlowe 2016).

The stock key height was measured on 16 anchors. The minimum stock key height was 3.21 decimal feet from the bottom of the anchor at the crown. The maximum stock key height was 12.7 decimal feet from the crown of the anchor (Table 26).

TABLE 26. Key Height on anchors in the dataset (n=16; Marlowe 2016).

Key Height (dec.feet)		
Minimum	Average	Maximum
3.21	7.436875	12.7

*Anchor Rings*

The presence of a ring on the anchor can assist in determining age. According to the historical sources, rings became infrequent after the turn of the 19th century as shackles became more prevalent (Curryer 1999:44-45). The dataset used in this study had 36 anchors with rings and 46 without rings (Figure 82). Some anchors with rings had a shackle as well.

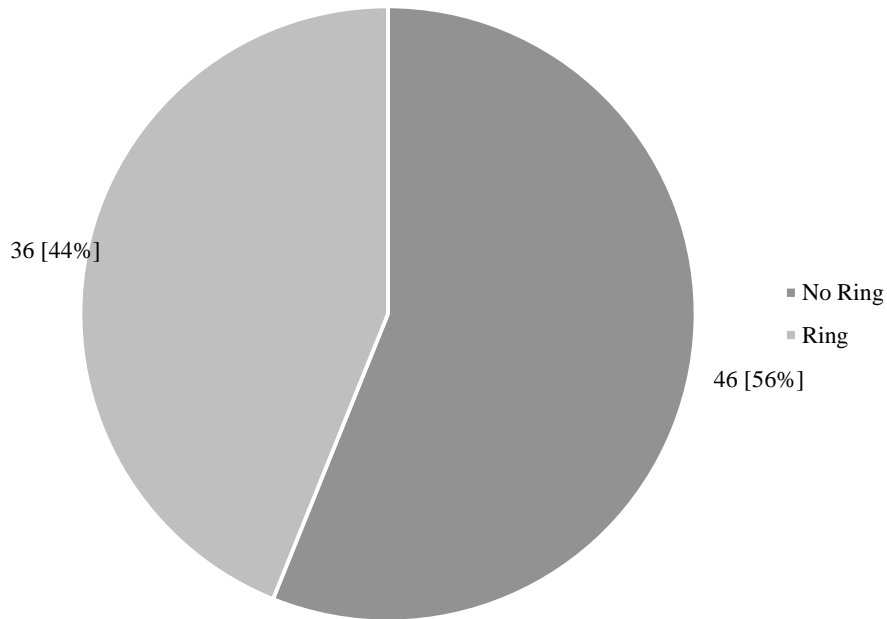


FIGURE 82. Presence of Rings in AnD (n=82; Marlowe 2016).

The ring diameter was measured on 30 anchors. This was recorded where the ring went through the shank. The diameter of the ring ranged from a minimum of 0.1 decimal feet to a maximum of 1.0 decimal foot (Table 27).

TABLE 27. Ring Diameter in dataset (n=30; Marlowe 2016).

Ring Diameter (dec.feet)		
Minimum	Average	Maximum
0.1	0.185833	1.0

The ring eye diameter is the interior measurement from the inside edge directly to the opposite side. Twenty-nine anchor ring eye diameters were measured. The minimum eye diameter was 0.4 decimal feet and the maximum was 1.5 decimal feet (Table 28).

TABLE 28. Ring Eye Diameter in dataset (n=29; Marlowe 2016).

Ring Eye Diameter (dec.feet)		
Minimum	Average	Maximum
0.4	0.822069	1.5

The thickness of the ring was measured by wrapping the tape measure around the ring itself. Ring thicknesses were measured on 25 anchors. The minimum ring thickness was 0.15 decimal feet and the maximum ring thickness was 0.9 decimal feet (Table 29).

TABLE 29. Ring Thickness in dataset (n=29; Marlowe 2016).

Ring Thickness (dec.feet)		
Minimum	Average	Maximum
0.15	0.472	0.9

### *Anchor Shackles*

The shackle first appears in the historical record around the first quarter of the 19th century. The differences between Pering's first (1819) and second (1838) anchors include, among other changes, the shift from a ring to a shackle (Curryer 1999:76). In this dataset, the majority of the anchors recorded (52 examples) included shackles (Figure 83). Some anchors with shackles also had rings. Inaccessible shackles were not recorded.

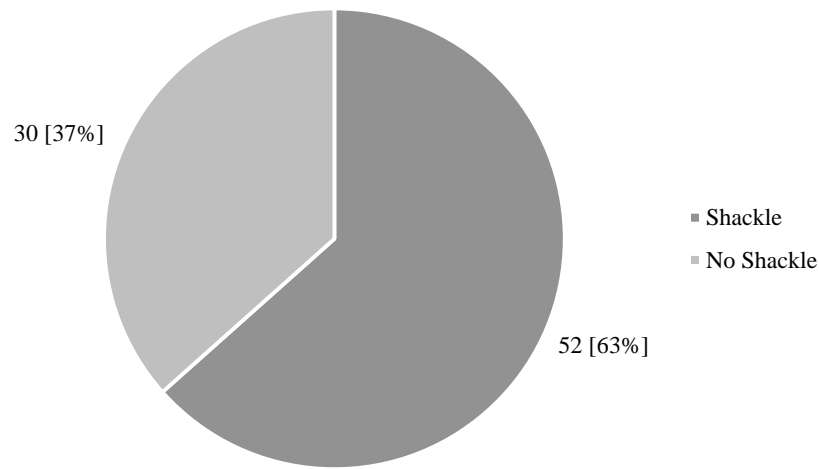


FIGURE 83. Shackle Presence in dataset (n=82; Marlowe 2016).

Shackle thickness is the thickness of metal making up the main part of the shackle. In the dataset, the thickness of the shackle was measured in 42 anchors. The minimum thickness recorded was 0.1 decimal feet and the maximum recorded was 0.35 decimal feet (Table 30).

TABLE 30. Shackle Thickness in dataset (n=42; Marlowe 2016).

Shackle Thickness (dec.feet)		
Minimum	Average	Maximum
0.1	0.182381	0.35

The shackle eye diameter was measured in the same way as the ring eye diameter. The total number of shackle eye diameters recorded was 42 anchors as well. The minimum shackle eye diameter was 0.1 decimal feet and the maximum shackle eye diameter was 1.0 decimal foot (Table 31).

TABLE 31. Shackle Eye Diameter in dataset (n=42; Marlowe 2016).

Shackle Eye Diameter (dec.feet)		
Minimum	Average	Maximum
0.1	0.507857	1.0

The shackle pin thickness was measured on 32 anchors. Some of the anchors' shackles had deteriorated and the shackle pin concreted into the shackle itself. The minimum shackle pin thickness was 0.05 decimal feet and the maximum was 0.5 decimal feet (Table 32).

TABLE 32. Shackle Pin Thickness (n=33; Marlowe 2016).

Shackle Pin Thickness (dec.feet)		
Minimum	Average	Maximum
0.05	0.177031	0.5

The shackle opening diameter is the opening through which the shackle pin passes. The opening diameter was measured on 28 anchors in the dataset. The minimum shackle opening diameter was 0.05 decimal feet and the maximum shackle opening diameter was 0.5 decimal feet (Table 33).

TABLE 33. Shackle Opening Diameter in dataset (n=28; Marlowe 2016).

Shackle Opening Diameter (dec.feet)		
Minimum	Average	Maximum
0.05	0.184464	0.5

### *Anchor Chains*

Occasionally, chains were found with anchors but it was difficult in the course of this study to tell if they were historically associated or not. If the chain was connected to the ring or shackle, it was presumed to be associated, however, if it were draped on the anchor without being attached, it was considered 'not associated' and therefore left unmeasured. Out of the entire dataset, 24 anchors had chain with them in some form or fashion (Figure 84). The chain was often used as an addition to the display, either wrapping around the anchor or being used in the yard decoration in another way.

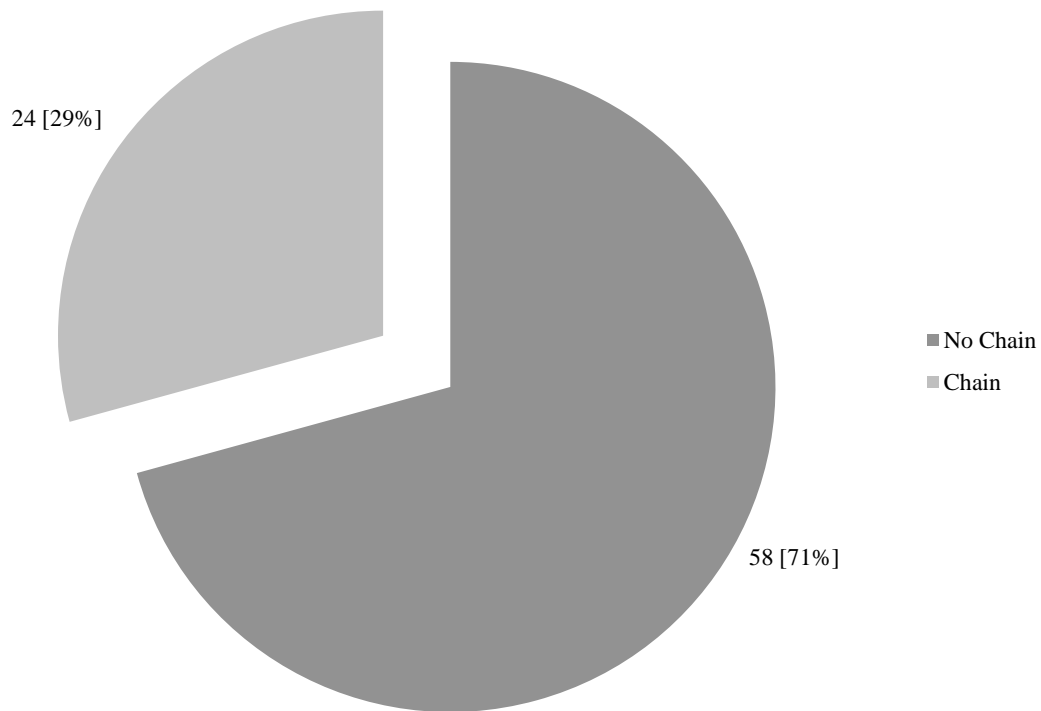


FIGURE 84. Number of Anchors with Chain Presence (n=82; Marlowe 2016).

The following images demonstrate the different ways in which chain was incorporated with the anchor. The first, WNC013, was one of three stockless anchors found in North Carolina. The chain, in Figure 85, is being used as a border between the yard and the overgrown flowerbed where the anchor lies. Another anchor chain is in NHNC002, where just one or two links of the chain were present with the anchor (Figure 86). While these are only two examples of how the presence of chain affected the use and display of the anchor, they are two of the most common. The chain either helped display the anchor or it was simply left as a part of the anchor.



FIGURE 85. WNC013 with chain outside private residence in Wanchese, North Carolina (Marlowe 2015).



FIGURE 86. NHNC002 with chain outside local restaurant (Marlowe 2015).

The following two queries demonstrate the length and width of the chains recorded. Out of the 24 anchors with chains, four were thought to be unassociated and not recorded (WNC004, WNC011, WNC015, and WNY021). Of the twenty recorded, the minimum length and width, the average length and width, and the maximum length and width were as seen in the two tables (Tables 34 and 35).



TABLE 34. Chain-link Length in dataset (n=20; Marlowe 2016).

Chain-link Length (dec.feet)		
Minimum	Average	Maximum
0.3	0.63	1.5

TABLE 35. Chain-link Width in dataset (n=20; Marlowe 2016).

Chain-link Width (dec.feet)		
Minimum	Average	Maximum
0.2	0.38875	0.92

The different types of chain are illustrated by the following examples. The first, a simple chain, is from NHNC005, (Figure 87). The second is from MHNC001 and shows a segmented chain (Figure 88). These were the two main chain types found in the 20 anchors with associated chain. Both types were used during the 19th century. Between 1812 and 1860, British merchant and military vessels were issued both hemp and chain cables. Over the years, chain cable became more popular (Harland 2013:75). Diagnostic chain design literature is more prevalent than similar literature on anchors (examples include Frost 1963; Unglik 1982; Murphy 1993)



FIGURE 87. NHNC005 chain type example outside local hotel in Nags Head, North Carolina (Marlowe 2015).

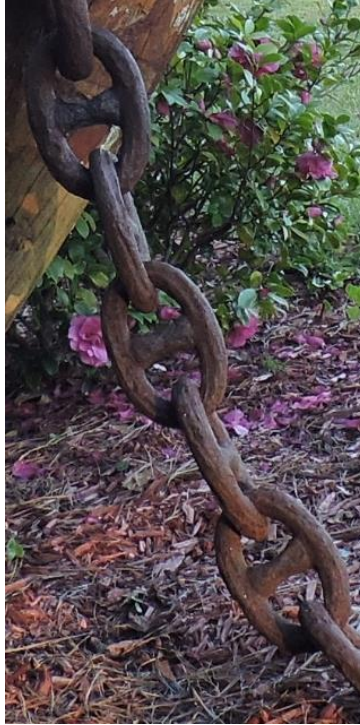


FIGURE 88. MHNC001 segmented chain example outside private residence in Mann’s Harbor, North Carolina (Marlowe 2015).

### *Anchor Inscriptions*

The presence of inscriptions on anchors can assist in dating as well as stating who made the anchor, for whom the anchor was made, the anchor weight, the stock weight (if present), the month and year that the proofing or other test was conducted, as well as other relevant information (Lloyd’s Register of Shipping 1902-1914; Curryer 1999:156). Each marking has a specific location dependent on the organization which prescribed the use of the anchor (for example, an insurance register) (Curryer 1999:156). The main challenge for recording inscriptions is that they are often worn or covered in concretion (e.g. anchors recovered from a long period of submergence). As a result, inscriptions are frequently illegible. Some anchors which have not been submerged for long periods of time retain their inscriptions. Fifteen anchors in the dataset possessed some type of inscription (Table 36; Figure 89).

TABLE 36. Anchors with Visible Inscriptions (Marlowe 2016).

Anchors with Visible Inscription	
Form Number	Visible Inscription Details
WNY001	Shank: US Navy 77 4 41 181 2 44 Back MD 4-01 NA
WNY002	Shank: US Navy 747 P8F 2- B Back: 4-01
WNY003	Builders Crest Baldt NY 10 P
WNY004	Builders Crest Baldt NY 10 P
WNY007	AWS Baldt A. Co. 8049
WNY008	Builders Crest 5 1779 Bethlehem, US
WNY009	On Chain: USN Baldt 2 1/4 inches
WNY012	727 L85 1919 US Navy
WNY016	Baldt Anchor Co. Chester PA
WNY020	43(8?) Navy 4714 5195
WNC001	Baldt W
WNC009	US
WNC013	Chester PA (and more illegible)
NHNC006	On fluke: 632594 2 On Shank: LWT 4125 RS A1 Norfolk NY UL 1945 SENO 58960 US Navy
WNC034	Unreadable

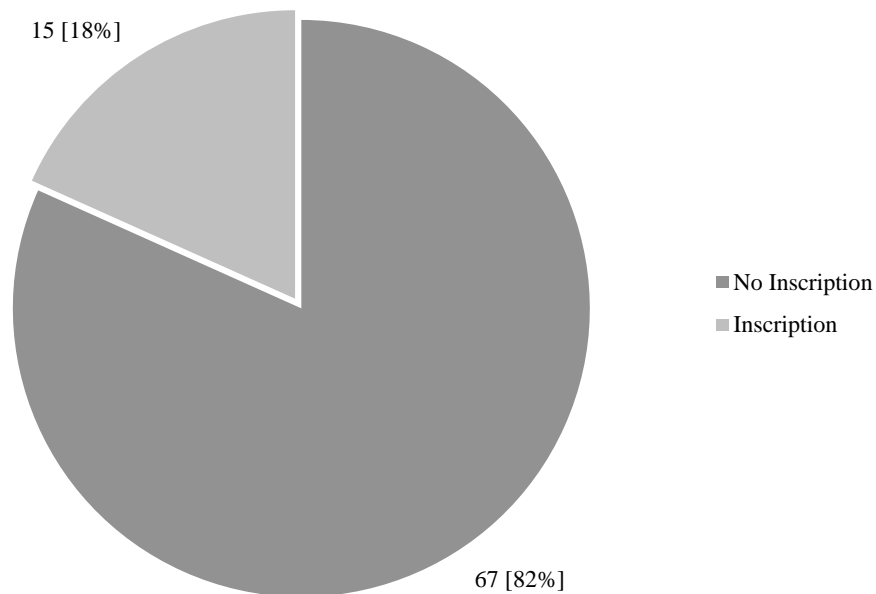


FIGURE 89. Number of Anchors with Visible Inscriptions (n=82; Marlowe 2016).



Two images below are representative of the types and quality of inscriptions found in the fifteen anchors. The first, found on the crown of WNC034, is illegible (Figure 90). The second, from NHNC006, is very well preserved (Figure 91).



FIGURE 90. WNC034 visible inscription outside private residence in Wanchese, North Carolina (Marlowe 2015).



FIGURE 91. NHNC006 visible inscription on shank outside local business in Nags Head, North Carolina (Marlowe 2015).

The results from the database illustrate the breadth and depth of the collected data. The 82 anchors in the dataset provided the basis for over 30 queries, described here, and analyzed in

the next chapter. The ten different sections of this chapter describe the major elements of anchors represented in the database. From the crown to the shank, and including any present inscriptions, these elements provide the clues to identify anchors and allow for a technomic analysis of the assemblage; the technomic analysis provides insight into changes which may have driven changing anchor designs. This chapter has also provided historical data to supplement the dataset and to provide a *terminus post quem* to certain identifying features of the anchors.

The collected and sorted archaeological data from the AnD in this chapter is applicable to the historical data in order to answer the research questions. These questions contain other avenues of analysis which are explored in the next chapter.

## Chapter 5: Analyzing the Anchor Database

### **Introduction**

Chapter Four (the Anchor Database) introduced the scale of the Anchor Database. This chapter analyzes the available datasets to answer the research questions and form conclusions. The synchronic and diachronic quantitative analyses outlined in this chapter have been designed to examine the changing techno-function of anchors in the long 19th century and inspect how technological processes and events directed design change. Material culture theory, while ranging from “the more aesthetic [socio-function] to the more utilitarian [techno-function]” provides an unfulfilled opportunity to narrow the scope of Binford’s techno-function in the form of anchors (Prown 1982:15). The History Chapter demonstrated that anchors are a form of both socio- and ideo-function. Anchors, as a category of utilitarian material culture, were modified over the long 19th century to fit the changing needs of society. In this way, anchors are an excellent example of a technomic artifact because they serve a practical purpose for interacting with the physical environment.

The idea and use of techno-function, as outlined in the Introductions’s theory section, delineated the boundaries of this study. Analyses in this chapter are formed using three types of data - 1) general technological trends, 2) diagnostic information extracted from historical treatises concerning anchor design and scale, and 3) the Anchor Database (AnD) created by the author and outlined in the previous chapter.

This chapter is organized based on the different trends illustrated in this thesis, mainly broad and specific changes in technology. The different components of anchor design trends, ultimately, are factors which illustrate how anchor design changed over the long 19th century. In addition, a brief discussion on the cultural differences apparent in the treatises is present.

## **Technological Analyses**

The utilitarian purpose, and therefore the techno-function, of anchors can be divided into three broad themes: 1) anchors' ability to stop ships, 2) anchors' ability to hold watercraft in place, and 3) the design features of anchors that ensure success. These three themes relate to the technological changes which occurred during the long 19th century and which resulted in demonstrable change in anchor design. This section outlines the technological analyses using the three broad themes. Anchor size (length, breadth, and weight as applicable) and anchor design are incorporated into each consideration. Unless specifically stated as the weight of the anchor, size is considered synonymous with the length of the anchor or a particular anchor design element.

### *Design Elements Contributing to Anchor Stopping Power*

An anchor's stopping power is dependent on its ability to secure itself to the ocean floor. In this way, stopping power and holding power are closely related. A factor in both, but more related to stopping power, is the size of an anchor. An anchor's size is most easily defined by two attributes: overall length and weight. These two factors directly influence the other design elements, and therefore the anchor's ability to function. As shown in the Results Chapter, the AnD minimum length was four decimal feet, the average was 7.71 decimal feet, and the maximum was 14.1 decimal feet. Historical treatises indicate a large difference in measurement between a one hundredweight (CWT) anchor and a 140 CWT anchor. The size and types of vessels dramatically changed during the long 19th century. The general trend to larger vessels was the result of broad changes in shipbuilding including the transition to metal-hulled vessels and the invention and widespread use of engine-powered propulsion (Gardiner 1993b:8). One

hypothesis follows that larger vessels needed larger anchors, and that perhaps we can quantify the rate of change per year of both watercraft and their anchors to assess if the hypothesis holds true (and the degree of correlation between the growing size of watercraft and their anchors). An analysis of the overall anchor length in the AnD and historical treatises could assist in determining certain trends. These trends could include confirmation of the apparent trend of stockless anchors' size being considerably larger than the majority of the dataset (seen in the Results Chapter) could affect the other analyses and data.

The United Kingdom and the United States approached shipbuilding in the long 19th century in very different ways. For a period, both steamships and auxiliary steam ships were in use, but the march of technological advancement rendered many forms of sailing vessels unnecessary (Gardiner 1993a:246). The use of machinery in place of personnel led to smaller crews being required to work on-board the vessels. The change in machinery led to changes in the anchors and how they were stowed. As anchor stocks grew smaller, anchors no longer had to be catted on the exterior of the hull, eventually leading to stockless anchors being drawn up into the hawse holes for safe stowage. These changes are evident in the types of anchors patented throughout the long 19th century. The United Kingdom's utilization of all-metal hulls also encouraged the use of stockless, or self-canting anchors (such as Hall's 1898 anchor). The differences between United Kingdom and United States tonnage is demonstrated by comparing graphs of the different average ship tonnage (Figure 92 and Table 37). The vessel size dramatically increased in the United Kingdom over the course of the period. This graph, and associated table, shows the changes in United Kingdom and United States average tonnages over the period of the long 19th century.



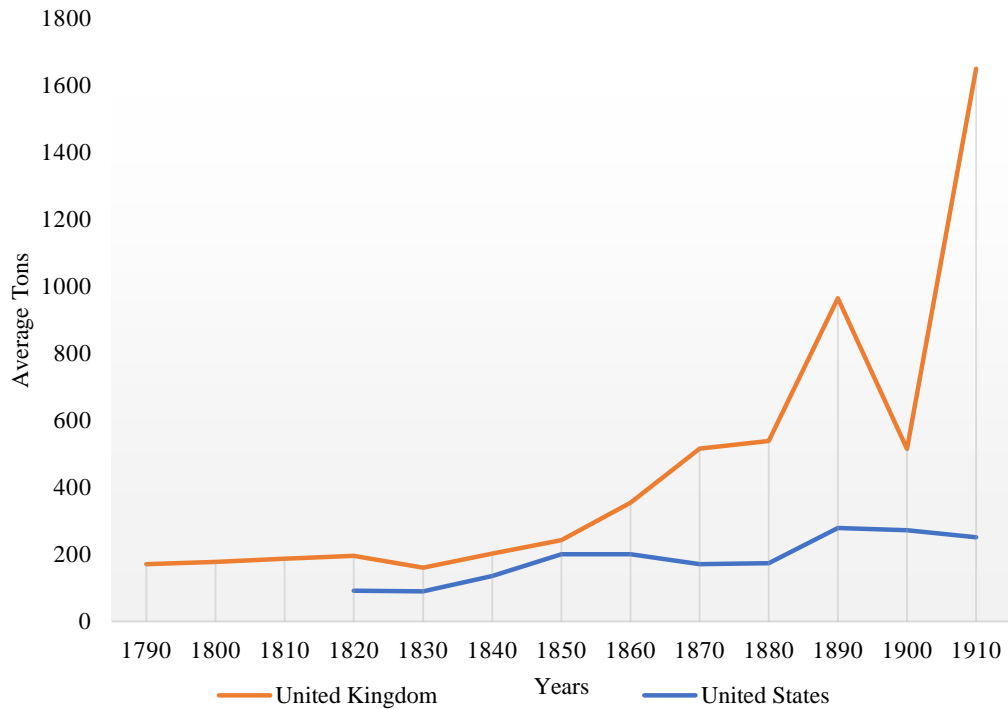


FIGURE 92. United States and United Kingdom Average Vessel Tonnage (n=7838 tons; Marlowe 2017).

TABLE 37. Average Tonnage for British and American vessels (Marlowe 2017).

YEAR	British	Average tonnage	American	Average tonnage
1790	Lloyd's <i>Register of British and Foreign Shipping</i> (Lloyd's)	171	No data	
1800	Lloyd's	177	United States Department of Commerce (DOC)	106
1810	Lloyd's	187	No data	
1820	Lloyd's	196	DOC	92
1830	Lloyd's	160	DOC	90
1840	Lloyd's	202	DOC	135
1850	Lloyd's	242	DOC	200
1860	Lloyd's	354	DOC	200
1870	Lloyd's	515	DOC	171
1880	Lloyd's	538	DOC	174
1890	Lloyd's	964	DOC	279
1900	Lloyd's	514	DOC	272
1910	Lloyd's	1648	DOC	251

Additionally, seven of the nine total British and French anchor treatises (1763-1898) span the study period and outline detailed information regarding the relationship between weight (hundredweight or CWT) and the overall length of anchors. The relationship of weight to length can be represented graphically (Figure 93), can illustrate agreement or disagreement between treatises, and can demonstrate how knowledge about anchor design changed through time. Most of the lines, recording stocked anchors, are clustered together. The lowest line records the self-canting Hall anchor from 1898. This general trend, where the stocked anchors are all similar in trend whilst the self-canting anchor treatise is separate, is noticeable throughout measurements in the historical treatises. The trend lines illustrate that change for historical treatises did not occur at a standard rate, which suggests that an additional factor(s) was influencing anchor design. The rate of change for overall length is drawn from the historical treatises.

Graphs in this section were created to compare anchor size in the AnD to anchor size described in historical treatises, however, historical treatises utilize CWT as the constant throughout the different measurements, and there was no way to weigh the anchors during the course of study. Due to this constraint, it was determined that overall length, which exists in both AnD and historical treatises, and a measurement equaling total breadth, would allow for the total size analyses to be completed. This study utilized the measurement of one arm, a straight line from the crown to the tip of the bill, multiplied by two (to represent two arms) to indicate the breadth of the anchor. This method was used consistently for the treatises and the AnD. Looking at the AnD anchor dimension data in more detail provides an opportunity to examine breadth in relation to overall length in more detail.

Within this graph, it is also possible to superimpose the ranges of the minimum, average and maximum sizes of the AnD dataset (the colored zones behind the lines). The colored blocks

in the graph demonstrate the recorded overall lengths for the AnD. A comparison of the historical treatise data and the AnD statistics in Figure 93 indicates that the overall length of the recorded anchors exceeds the overall lengths given in the historical treatises. The addition of a trend line illustrates that the AnD anchors could have fallen into the historical treatises' range at a heavier weight, outside the treatises. The graph also suggests that anchors in the AnD closely related to all historical treatises data, but tend to align best with Hall's 1898 treatise data for all but the smallest anchor size (indicated by the recorded minimum) and all other treatises until approximately 20 CWT (or, where the recorded average is indicated).

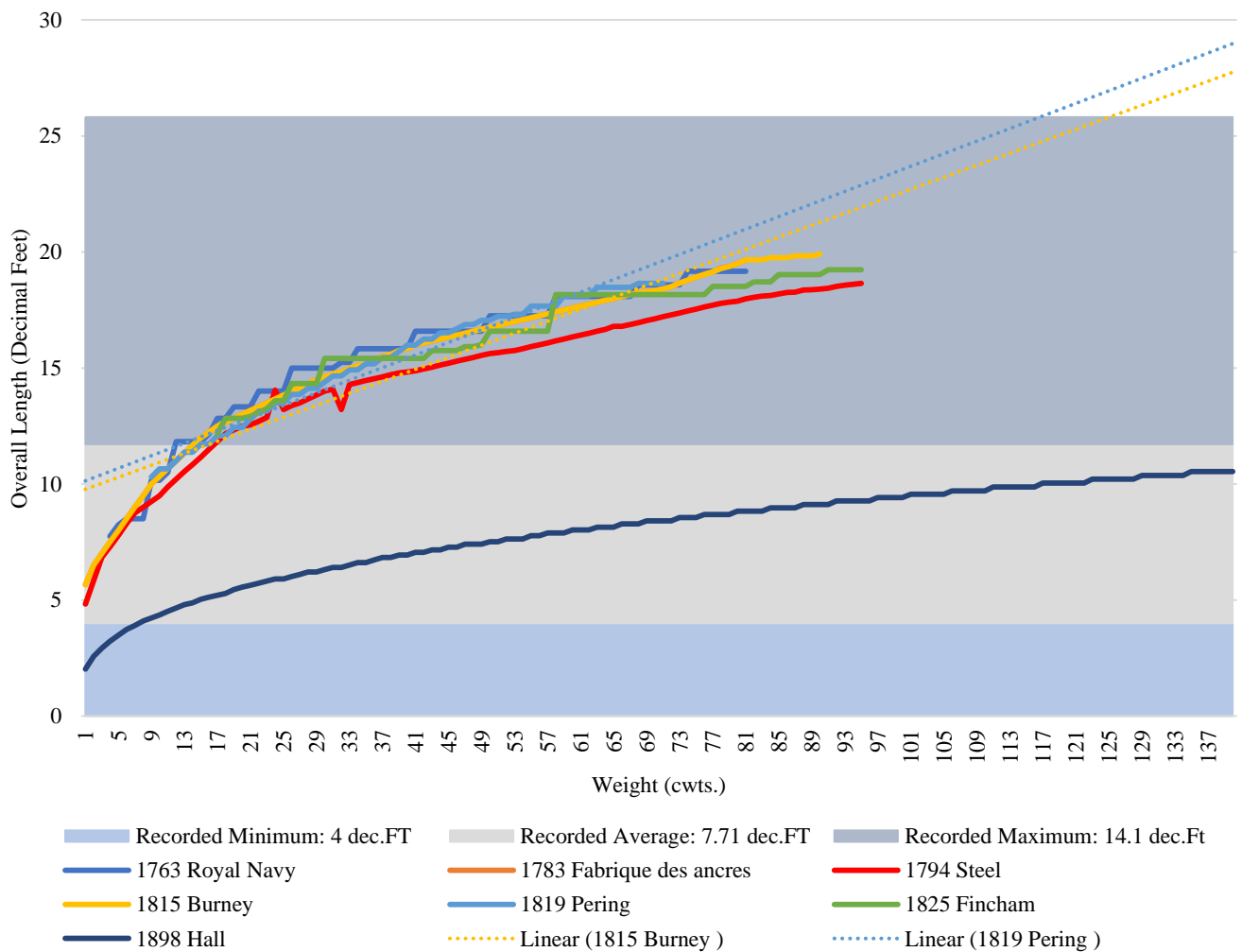


FIGURE 93. Overall Length between AnD and Historical Treatises (n=624.77 dec. FT; Marlowe 2017).

A factor in the stopping power of an anchor is the presence (or lack) of a stock. The stock also contributes to the anchor's holding power. Stocked anchors appear in the historical record much earlier than stockless anchors, and the change in size for both designs can indicate a tentative date period. The available historical treatises and sources provide indications when certain anchor designs were invented. An element of the design which changed over the course of the long 19th century was the stock. For this section, the type of stock (if present) was used to divide the AnD into two sections. This allowed the relation between arm length (multiplied by two) and overall length (seen in Figure 94) to illustrate that the different stock types have a direct relation on the changing size of the anchors. In the AnD, the clear majority of anchors had stocks. The addition of the stock as a sorting factor helps illustrate that the preceding figure (Figure 93) may be misleading due to the presence of stockless anchors. The anchor dimensions in the AnD generally fall between Steel (1794) and Pering (1819) as well as between Pering (1819) and Hall (1898). This indicates the likelihood that the AnD represents anchors between these two eras, as well as some outliers for these periods.

In Figure 94, stockless anchors which sit above the Hall (1898) line most likely represent those stockless anchors which post-date the long nineteenth century, but follow a similar trend. Other outliers could represent anchors which have no stocks remaining, and have different measurements than the anchor dimensions contained in the collected treatises. In addition, the abundance of predominantly British treatises indicates a likelihood that American anchors were similar in style to the British (i.e., American shipbuilders used British anchors or followed British designs). The AnD anchors which differ from the historical trend lines and are larger than the others in the AnD could indicate American variation from British anchor design. As has been previously noted, no American treatises containing anchor measurements were located during the

course of this study. The trend lines for the AnD demonstrate that the AnD has a much greater variation in measurements than the historical treatises, but it appears to fall within the range of historical treatises.

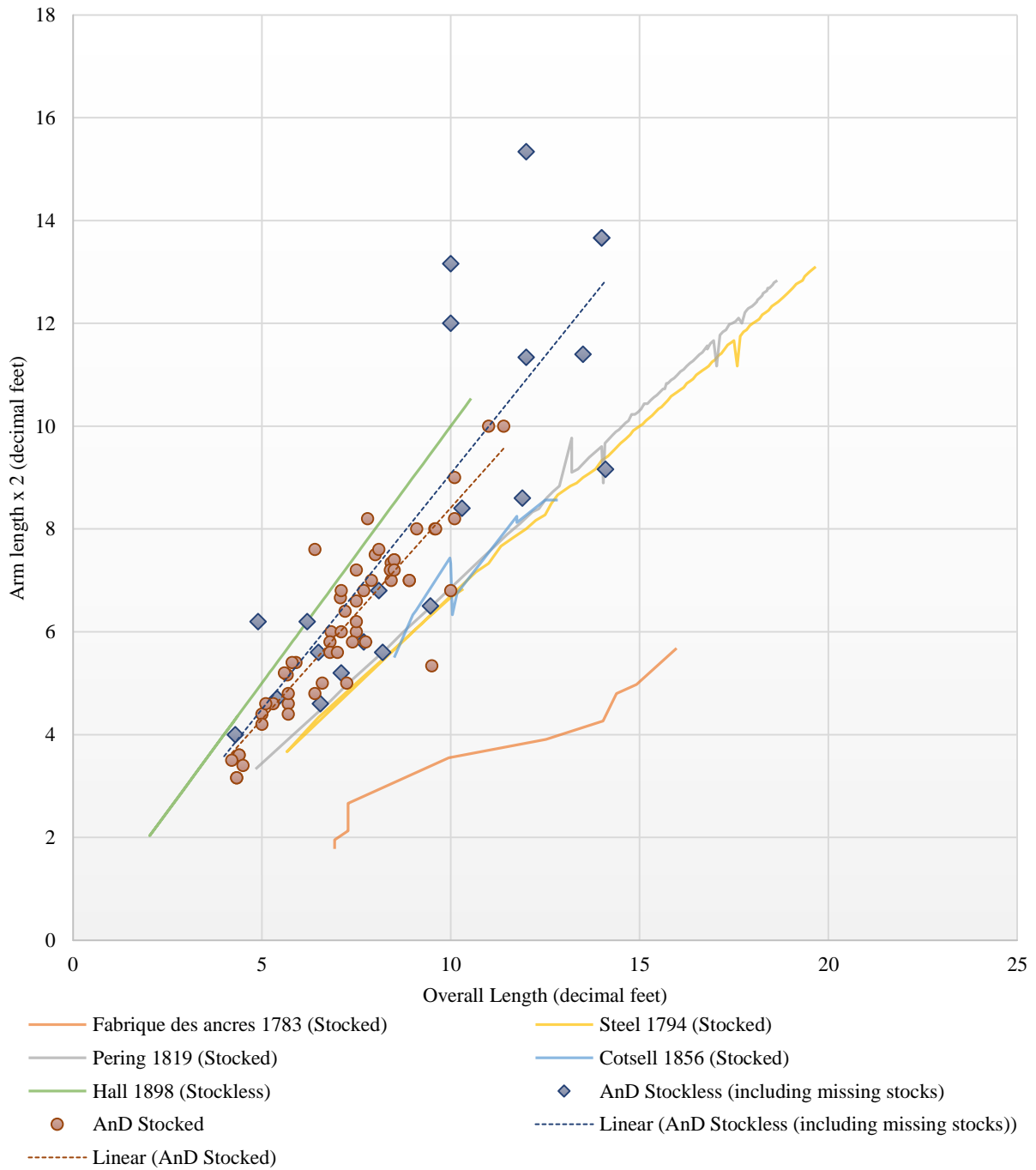


FIGURE 94. Overall and Arm Length sorted by Stock Type (n=624.77 dec. FT; Marlowe 2017).

Figure 95 may allow us to make other interpretations, particularly interpretations about technological change and utilitarian function. This is because the treatises have publication dates, and can be argued to represent the nature of technological knowledge at the time of their printing. The rate of change for overall length is demonstrated by comparing the treatises. These treatises have noticeable characteristics. For example, the 1794 Steel treatise has the lowest length among the stocked treatises. In addition, lengths reported in the 1783 and 1815 treatises are identical. Hence, Figure 95 illustrates the raw data which was used to make the following rate of change determinations. The table below illustrates the different treatises which contained information regarding the overall length. In order to determine the rate of overall change, lengths associated with 10 CWT categories were collated from seven treatises (Table 38). These were then organized so as to compare years. Taking the highlighted row (20 CWT) as an example, each measurement underwent two mathematical calculations. First, the percentage of change was determined by utilizing the following calculation:

$$\left(\frac{New}{Old} * 100\right) - 100$$

This calculation allowed for the percentage change to be accurately reflected as, for example, 20% increase rather than 120% increase. The second factor was to take the result and divide it by the number of years separating the two treatises. As an example:

$$\left(\frac{13}{13.333} * 100\right) - 100 = -2.497 \text{ (total percentage changed)}$$

$$\frac{-2.497}{20} = -0.125 \text{ (rate of change per year)}$$

The first result is the total percentage change between the two measurements. In this example, the overall length of a 20 CWT anchor shrank by 2.497% between the publication of the Royal Navy's 1763 treatise and the publication of *Fabrique des ancrs* in 1783. The second

result signifies that the overall length of anchors from 1763 to 1783, was shrinking at a rate of 0.125% per year. This method of obtaining the rate of change is used throughout this chapter.

TABLE 38. Overall Length in Decimal Feet from the Treatises (Marlowe 2017).

CWTs	1763 Royal Navy	1783 Fabrique des an cres	1794 Steel	1815 Burney	1819 Pering	1825 Fincham	1898 Hall
<b>1</b>		5.666	4.833	5.666			2.031
<b>10</b>	10.166	10.333	9.500	10.333	10.658		4.364
<b>20</b>	13.333	13	12.500	13	12.435	12.833	5.552
<b>30</b>	15	14.625	14.000	14.625	14.391	15.416	6.312
<b>40</b>	15.833	15.833	14.833	15.833	15.983	15.416	6.937
<b>50</b>	17.25	16.75	15.625	16.75	17.05	16.583	7.52
<b>60</b>	18.083	17.583	16.333	17.583	18.116	18.166	8.02
<b>70</b>	18.583	18.333	17.125	18.333	18.649	18.166	8.416
<b>80</b>	19.166	19.5	17.875	19.5		18.52	8.833
<b>90</b>			18.395	19.917		19.02	9.114

By tabulating the percentage of change across anchor weights it is possible to measure and graphically depict the changing size of anchors on a treatise-by-treatise basis (Figure 95). While there are potential comparisons outside the sequential treatises, this comparative method allows all treatises containing the same measurements to be compared. As with the previous graph, those relating to stocked anchors are clustering together, while the treatise relating to stockless anchors sits below the others. This is demonstrative of the large rate of change which occurred during the transition from stocked to stockless anchors. As an example, anchors were 56% smaller between the 1825 treatise and the 1898 treatise.

Among the stocked anchor treatises, most are fairly stable, with only small variations in change between the different weights. However, the line between Pering’s 1819 treatise and Fincham’s 1825 treatise shows large variation. Pering (1819) deviated, over the course of the weights illustrated in Table 39, between a 17% increase in the size of anchors, to a -9.45%

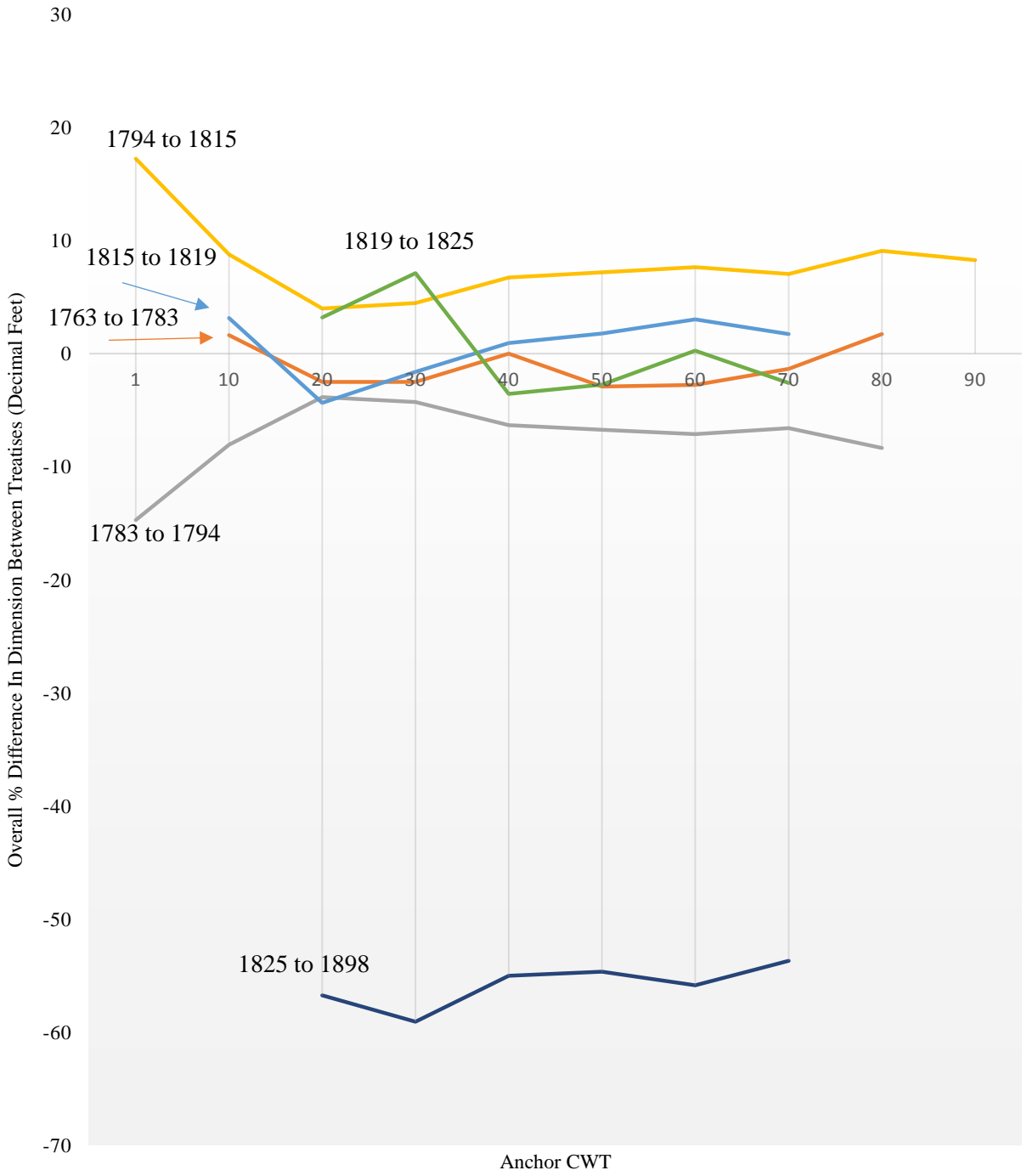
decrease in the size of anchors. When the historical treatises are compared, however, Pering’s appears to be one of the most stable (Figure 95). The two lines with the most variation and differences are post-Pering, which corresponds with the new design in Hall’s treatises. The gap discrepancies between Fincham and Hall are indicative of the drastic change from stocked to stockless with anchors becoming smaller around 10% per year. Table 39 also shows acceleration reduction in anchor size despite the same weight throughout the years.

TABLE 39. Percentage change by year (Marlowe 2017).

CWTs	Royal Navy (1763) to <i>Fabrique des ancrs</i> (1783)	<i>Fabrique des ancrs</i> (1783) to Steel (1794)	Steel (1794) to Burney (1815)	Burney (1815) to Pering (1819)	Pering (1819) to Fincham (1825)	Fincham (1825) to Hall (1898)
1		-7.573	3.967			
10	0.835	-7.573	3.967	8.125		
20	-1.665	-4.545	2.381	-14.125	6.633	-9.974
30	-1.875	-5.682	2.976	-5.850	17.083	-12.471
40	0.000	-9.091	4.762	3.750	-9.450	-11.615
50	-2.500	-10.227	5.357	7.500	-7.783	-12.415
60	-2.500	-11.364	5.952	13.325	0.833	-13.899
70	-1.250	-10.982	5.752	7.900	-8.050	-13.356
80	1.670	-14.773	7.738			
90			7.248			

Demonstrating the absolute differences between the treatises provides another example of the change from stocked to self-canting and stockless anchors. In Figure 95, a visual representation of these absolute differences demonstrates how the different treatises, all from Europe, vary over the course of the long 19th century. The percentage differences illustrate that there were periods where anchors were larger as well as periods where anchors were smaller. These apparent trends correspond to the design elements changes in the rest of the historical record.





- Royal Navy (1763) to Fabrique des ancrs (1783)
- Steel (1794) to Burney (1815)
- Pering (1819) to Fincham (1825)
- Fabrique des ancrs (1783) to Steel (1794)
- Burney (1815) to Pering (1819)
- Fincham (1825) to Hall (1898)

FIGURE 95. Absolute Differences between Sequential Treatises- Expressed as Percentage Change (Marlowe 2017).

The historical treatise data is then compared to the average tonnage data in order to demonstrate the relative rates of change. Unlike the previous figure, Figure 96 illustrates change per year in the historical treatise data, in comparison to the average tonnage of British and American vessels. The absolute difference illustrates the large gaps between the treatises, while the rate of change (by year) exhibits the impact of new designs in a more detailed level. The rate of change, by year, between vessels and the treatises demonstrates that Pering's 1819 treatise seems to be the point at which rapid developments starts to occur, both in the increased standardization of anchors and the flux that average tonnage undergoes for the remainder of the long 19th century. Noticeably, at several points in the graph similarities occur.

The overarching designs between the different weights in the treatises changed at pivotal moments during the long 19th century, changing both the design and the lengths of anchors. Between the different measurements, generally, the same increments in anchor size are occurring. The graph shows the treatises indicate agreement; anchors were subject to minor changes over the long-term punctuated by rapid specification changes. It also suggests that Pering is a focal point for anchor design. The Pering paradigm shift identified in the data is supported by pre- and post-Pering anchor design changes illustrated in the History Chapter, indicating a pivotal point in the re-design or manufacture of anchors over a broad scale.

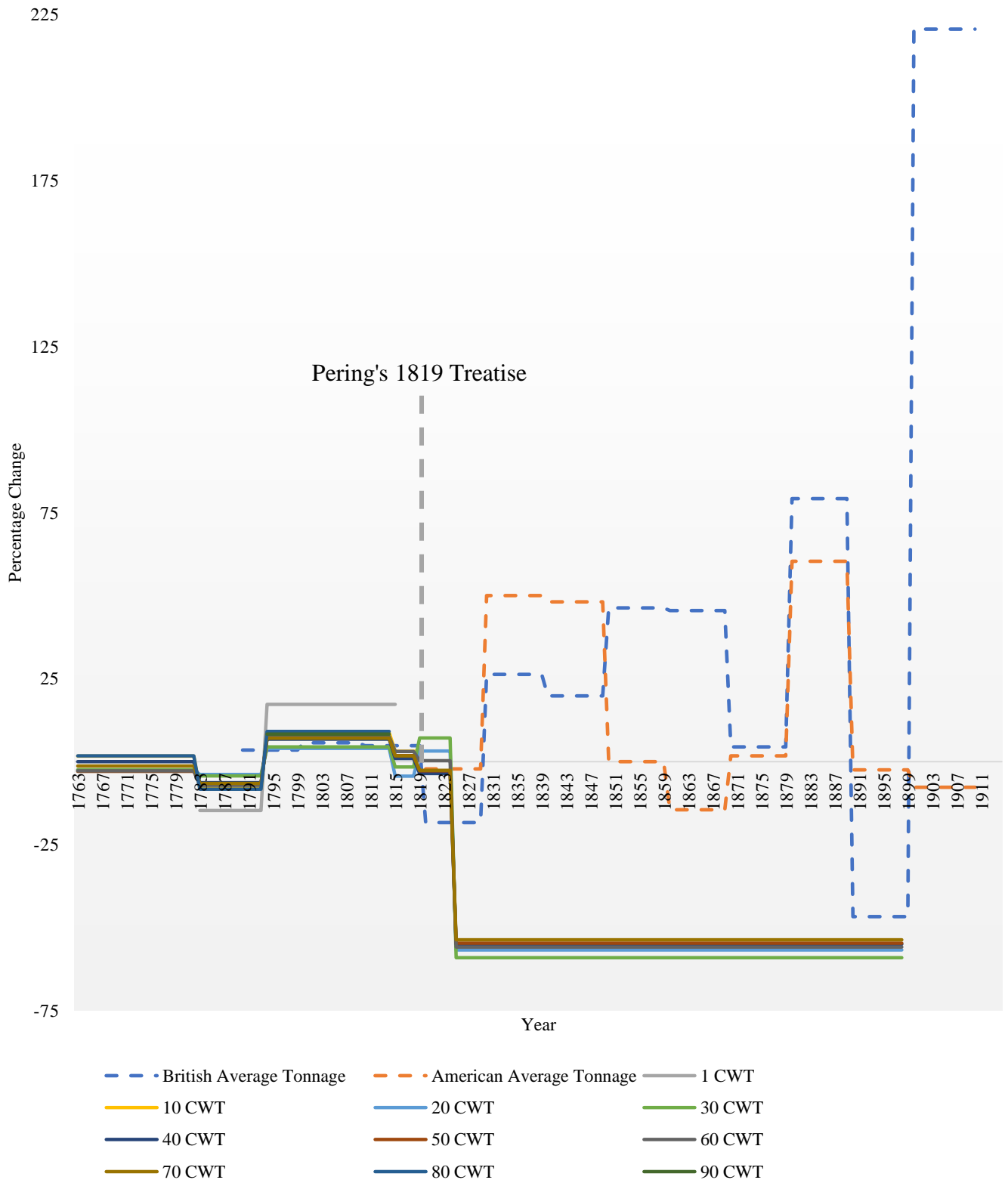


FIGURE 96. Percentage Rate of Change by Year for Overall Length and Average Tonnage of British and American Vessels ( $n_{\text{length}}=624.77$  dec. FT;  $n_{\text{tons}}=7838$  tons; Marlowe 2017).

The overall length of the AnD anchors compared to the historical treatises supports several general trends that became apparent throughout the study. The History Chapter explained how the technomic, or utilitarian function, of anchors has not changed over time. It also demonstrated how, over the course of the long 19th century, vessels went from carrying over half a dozen anchors to just one or two. The pivotal changes occurring because of the increase in ship size and the corresponding decrease in anchor size suggests that sheer weight (per the historical treatises) was no longer the primary factor in determining an anchor's performance. The historical treatise data demonstrates that the anchor's overall length shrank over time, even as vessels became larger. Technological innovations such as the mechanical windlass and storing of anchors in the hawse holes prohibited the use of the stock. This is supported historically with the invention of the stockless anchor after the widespread design and creation of metal-hulled ships in the mid-19th century. Other factors, contributing to the use of anchors are design elements which are a contributing aspect of holding power. As seen in the Results Chapter, the individual design elements of the anchor changed during the long 19th century. The analysis of some of these elements – such as the stock, fluke, arms, and crown – can assist in determining the factors which were most important for an anchor's ability as a techno-function.

#### *Design Elements Contributing to Anchor Holding Power*

Two of the main elements of the anchor which have a direct influence on use, and therefore design, are the stock and the fluke. These elements specifically changed significantly during the long 19th century and directly influenced the anchor's holding power and holding ability. The holding ability of an anchor is its ability to stay in place and hold the ship in place, regardless of the forces enacted upon it by current, surge, or tide, and the forces upon the vessel, such as wind or severe weather. However, an anchor must also be retrieved without damage to

itself or the vessel. The History Chapter explained the use of different anchor designs in relation to the holding power and ease of recovery, including the use of the stock in anchors. The Admiralty anchor remains unmatched in ton-for-ton holding power (Hayler 1980:8.1). As stated earlier, this appears to be due, in part, to the heavy stock which would turn the upper anchor to lie flat on the ocean floor, subsequently forcing a broad fluke into the bottom. It is in the long 19th century that an anchor design's holding power becomes, in some ways, a secondary factor to the overall safe operation of the vessel. The difficulties in retrieving and stowing the Admiralty anchor design, combined with the rapid increase in size to reach a required weight, resulting in the self-canting, and later the stockless, anchor becoming more popular. The stockless anchor uses a mobile or "swivel" crown to rotate the arms and fluke to dig into the ocean floor. The holding power of stockless anchors is based on fluke shape alone, but the advantages of the stockless anchor are based on size, as can be seen in the preceding analyses, and the ability for the anchor to be mechanically recovered and stowed in the hawse holes.

This section will analyze the stock size, type, and presence in the AnD. The stock analyses will include overall AnD trends as well as iron stock specific trends. The stock information will be compared to the historical treatises to examine general trends. This section will also look at fluke size and type to indicate the differences in anchor designs relating to anchor holding power. The AnD data will be comparatively analyzed against the historical treatises.

### Stock

The presence and type of stock demonstrates the type and size of vessel that used it and the technological capabilities of the anchor (such as windlasses which allowed the anchor to be mechanically recovered). While the historical record mentions design elements of anchor stocks,

however it does not mention the measurements of stocks. For much of the section concerning stocks, the AnD was exclusively used.

In Figure 97, the AnD overall length was graphed with the AnD anchors' corresponding doubled arm sizes (i.e., the single extant arm lengths multiplied by two). In addition, the bubble size shown in Figure 97 represents the AnD anchors' arm amplitudes. The resulting data was then placed into different series on the graph, per stock type. This graph most accurately illustrates the breadth and type of anchors found in the AnD, and therefore from which period individual anchors potentially date during the long 19th century. Contrary to the historical data, Figure 97 shows stockless anchors to be of substantially larger size compared to anchors which had either iron or wooden stocks. This graph, when added to the rate of change information from earlier in the chapter, indicates that the stockless anchors of the AnD are much larger than the corresponding historical treatise suggests. A few stockless anchors were known to come from the 20th century; this graph suggests that all the recorded stockless anchors came from the 20th century. The wooden stocked anchors appear very similar in size, however broad general trends about wooden stocked anchors would require a sample size greater than the two AnD anchors (MHNC001 and WNC003) which had their original wooden stocks in place. It is likely that several other anchors in the dataset had wooden stocks (e.g., BNC001, MNC001, and NHNC004), though the stock no longer remains.

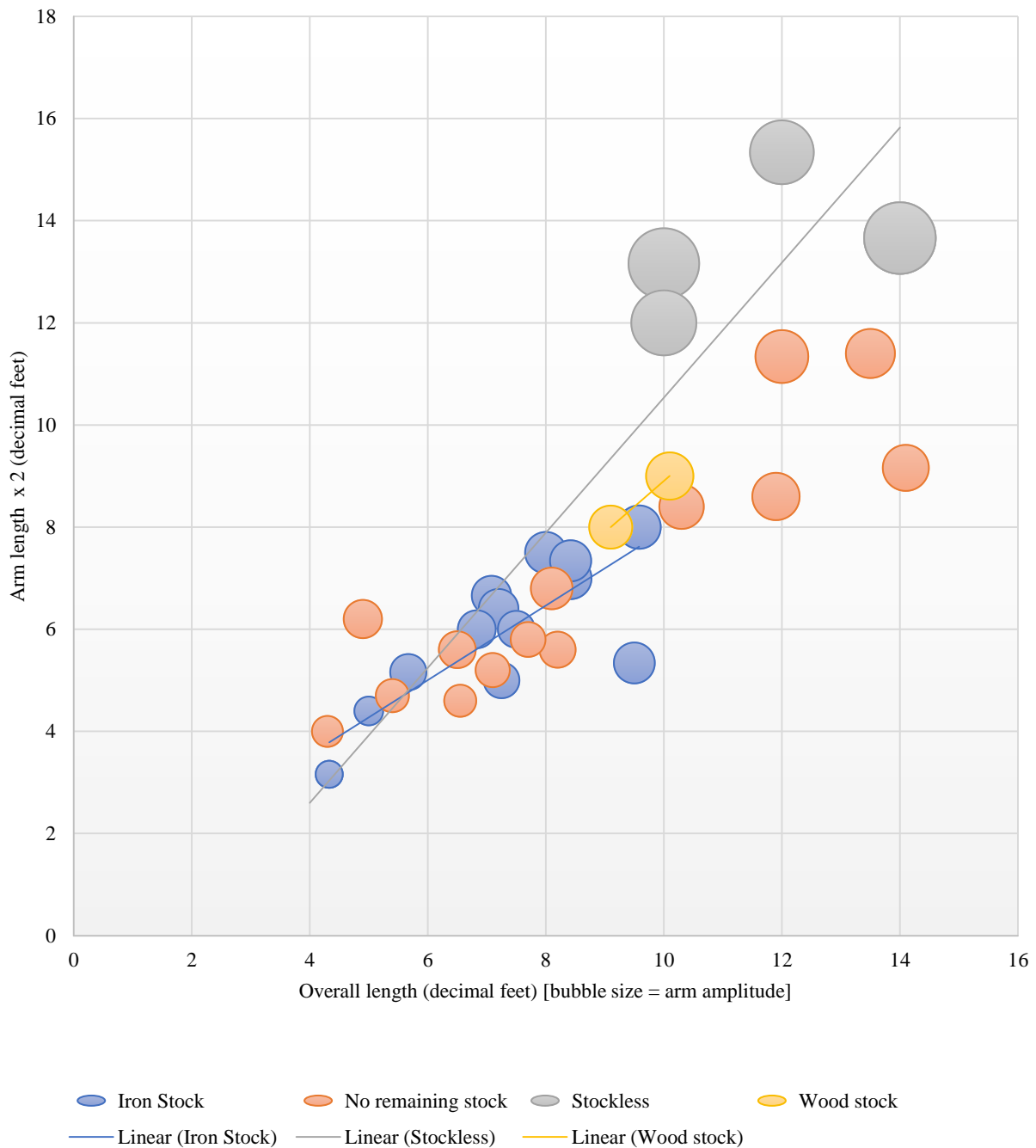


FIGURE 97. Arm Length, Overall Length, and Arm Amplitude sorted by Stock Type ( $n_{2arm}=527.94$  dec. FT;  $n_{length}=624.77$  dec. FT;  $n_{amp}=568.81$  dec. FT; Marlowe 2017).

The AnD, as demonstrated in the Results Chapter, had a multitude of iron stocked anchors. These anchors had primarily two types of iron stocks: Metal Straight or Metal Bent. However, there was great variation in the size of the stocks (Figure 98). There is a cluster of

AnD anchors, illustrated by the green circle, in the size of the stock and the overall length. There are points at which the stocks are noticeably larger or smaller than the surrounding anchors. The differences in stock size are an indication of differences in anchor design, however the historical record does not go into detail concerning stocks. This could be indicative of the increasing standardization seen in the overall length analyses as well as indicative of different anchor types. The increasing standardization is also a component of holding power. Standardized anchors, which were tested by insurance registers, would likely be less prone to failing to dig into the ocean floor, resulting in the vessel moving from the desired anchorage. The historical record, both treatises and insurance registers, states anchors were classified as *bower*, *stream*, or *kedge* anchors. These types differed in weight and size with selection determined by the size of vessel which they were used on. While these sources included weights for anchors, they do not include measurements.

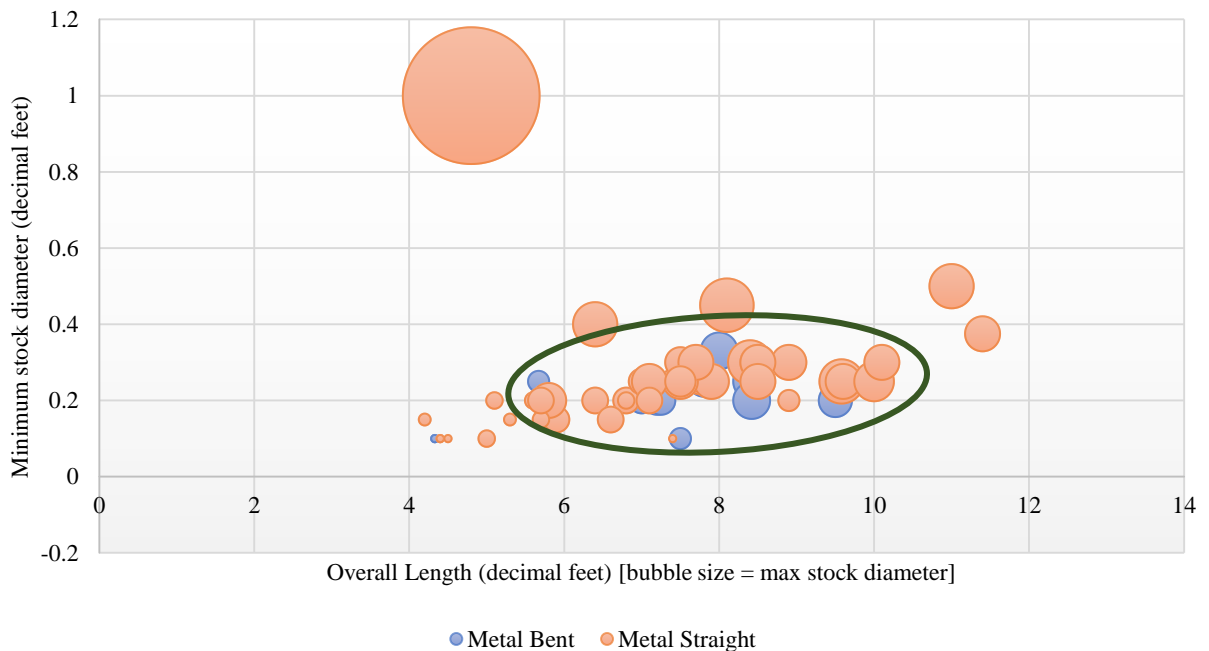


FIGURE 98. Stock Size and Overall Length of the AnD, sorted by Stock Type ( $n_{\min}=14.72$  dec. FT;  $n_{\max}=20.41$  dec. FT;  $n_{\text{length}}=624.77$  dec. FT; Marlowe 2017).



The type of stock and the stock size can be indicative of the relative trends of stocked anchors and the need for an anchor to hold. Figure 99 displays only stocked anchors. Most stocks tended to be around half a foot or smaller in diameter; one specimen (MHNC001, likely dating to the early 19th century based upon stock material) demonstrates that wooden stocks could be much larger than the iron stocks. This factor probably has to do with the weight of wood versus iron. For a secure hold to be achieved, the anchor would need to have a heavy stock. Iron stocks could be much smaller while being heavier (i.e. iron is denser than wood). In addition, the presence of a wood stock indicates that it was, most likely, from the earlier part of the long 19th century. As explained earlier, the stocked anchors used the stock to help force a fluke into the ocean floor. A lighter stock would not succeed as well as a heavier stock.

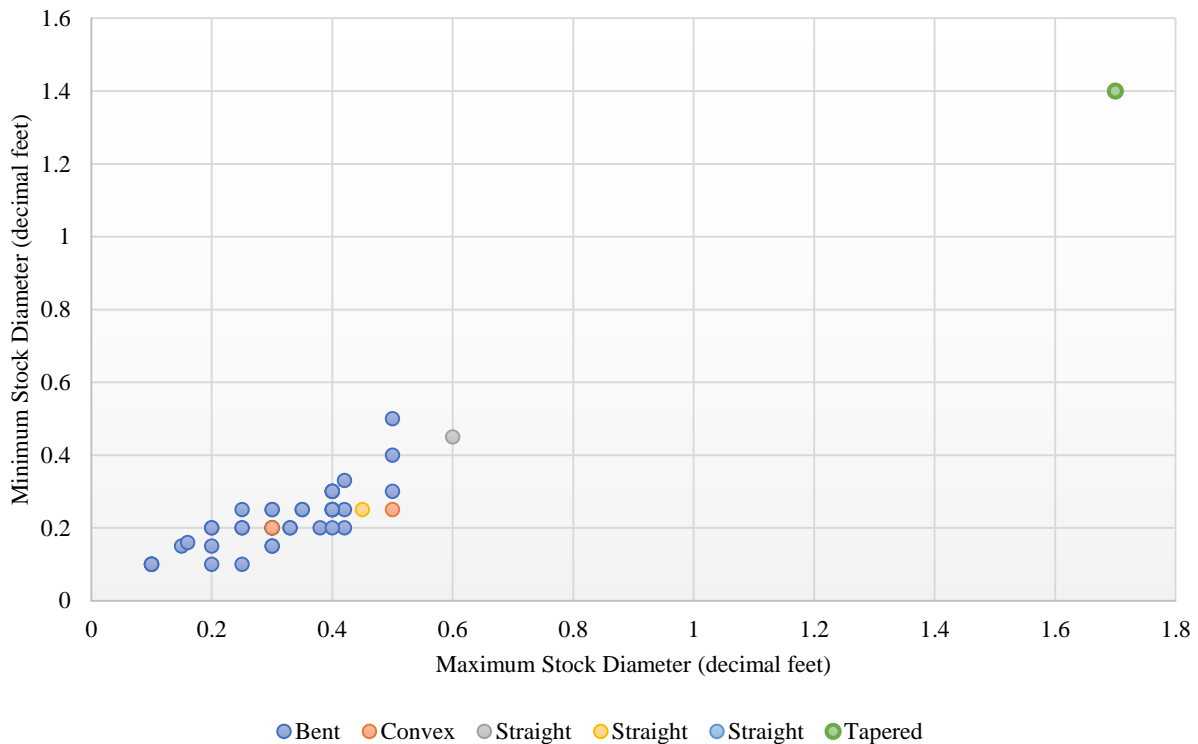


FIGURE 99. Stock Maximum and Minimum Diameter and Sorted by Stock Type (( $n_{\min}$ =14.72 dec. FT;  $n_{\max}$ =20.41 dec. FT; Marlowe 2017)

## Fluke

The historical record has illustrated that post-Pering's 1819 treatise anchor flukes began to change in size and have more variation in type than before. In general, prior to Pering, fluke designs were limited to Tipped Spade, Spade, and Triangle. Pering both increased the size of the flukes, compared to contemporary Admiralty anchors, and standardized fluke size. It is likely that the increase in fluke size is due to the need for an anchor with greater holding power. As seen in Figure 100, shortly after the introduction of Pering's 1819 treatise (and his improved anchor treatise in 1838), ship tonnage began increasing. The broader fluke size in Pering and post-Pering stocked anchor treatises is an indication that holding power was becoming increasingly important. The holding power of stocked anchors relied on the interplay between the stock, the arms, and the flukes. The stock would provide the weight, and lie on the ocean floor so that one fluke would dig into the ocean floor and hold the vessel in place. However, this traditional method of anchorage posed issues in areas of extreme tides. A low tide could result in the vessel settling on the other fluke, and potentially damaging the vessel, anchor, or both.

The History Chapter demonstrated some of the variation which occurred in the long 19th century however the chapter does not include historical sources relating to stockless anchors. The self-canting Hall anchor, from 1898, demonstrates that the flukes were decreasing as smaller anchors were increasing in weight. The decrease in anchor and fluke size, and the increase in overall anchor weight, corresponds to the other analyses discussed in this section (Figures 93-99); anchor design was changing and, in the process, causing established anchor attributes to change as well. The holding power of the self-canting, and later stockless, anchor was due to both flukes being able to dig into the ocean floor. This was due to the mobile arms and crown. The self-canting and stockless anchor designs allowed for reduced, and eventually eliminated the

need for, interplay between multiple components of the anchor. However, the degree to which anchor designs are standardized was not apparent in the other analyses, due to the variety of measurements in different treatises. This further supports the hypothesis of Pering’s treatise creating a paradigm shift in anchor design. The AnD does not align itself with any one treatise, though some individual anchors correspond almost exactly with historical treatises. The trend line for the AnD in Figure 100 illustrates that some stockless anchors began to “merge” the flukes and the arms, resulting in considerably longer flukes, so that there is no longer a weak point for the anchor to fail with the flat and broad fluke on top of a considerably smaller arm, as can be seen in the historical illustrations of anchors (Cotsell 1856:20). Figure 100 also illustrates how the historical treatise data results in an almost straight line (after the Royal Navy’s 1763 treatise), which is another indication of increased standardization over the course of the long 19th century.

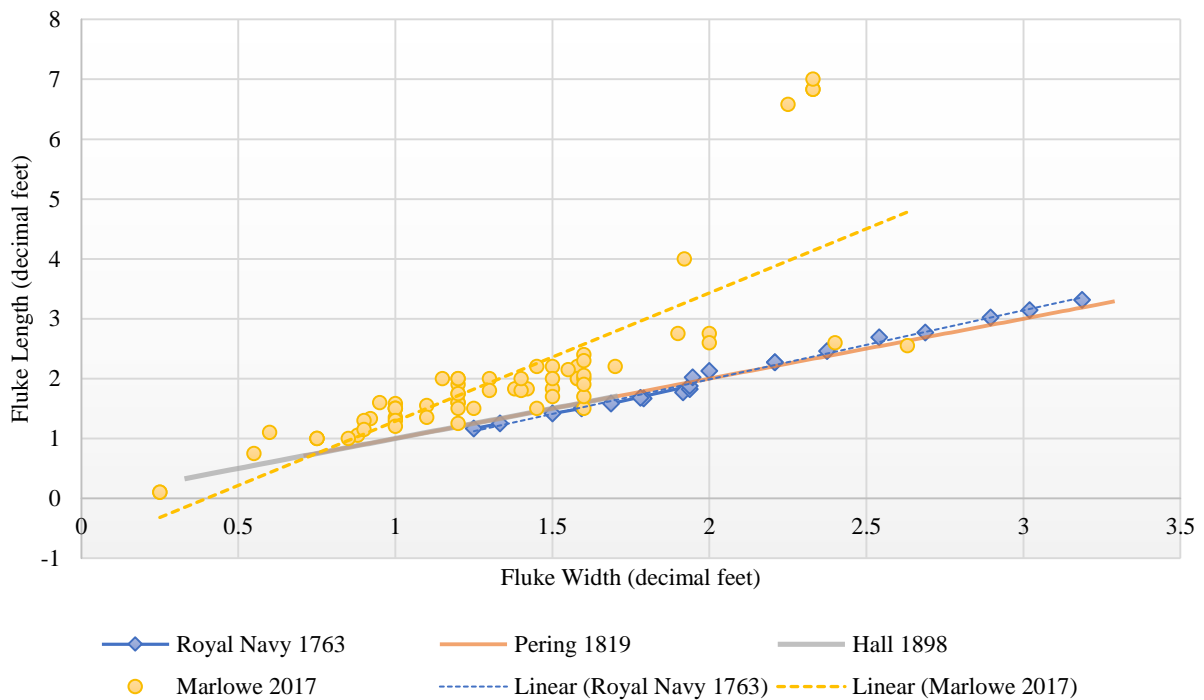


FIGURE 100. Fluke Length and Width Comparison ( $n_{\text{Fluke Length}}=144.69$  dec. FT;  $n_{\text{Fluke Width}}=91$  dec. FT; Marlowe 2017).

As seen in Figure 101, the distribution and prevalence of fluke design types would be an indication of age as well as measuring how knowledge (in this case based on the designer's culture of origin) changed. The Almond flukes are, for the most part, far longer than other fluke designs. The Almond-shaped anchor flukes correspond in the AnD to the stockless anchors. The analysis of the historical record has demonstrated that the Spade and Triangle are most like Pering anchors, which is supported by their general size (Cotsell 1856:20, 63). The variations that exist are probably due to the limited weights in the treatise, though it is highly likely that anchors outside that weight range were forged. The trend lines for the different fluke types indicate that the range of size change dramatically with stockless anchors. A difficulty with the historical record is that there are beginning dates (such as Pering) for many elements of anchor design, however there are no end dates when a particular design element was no longer manufactured (as an anchor could continue to be used after it was no longer in production). The analysis of the historical record demonstrates that fluke design has changed because of a perceived benefit to the utilitarian function of the anchor, such as the flukes becoming larger to add holding power. This study analyzed the change in the flukes as not being primarily decorative (socio-technic) or symbolic (ideo-technic), but being related to the utilitarian function (technomic) of the anchor. The perceived benefit to the techno-function by amending the design of the fluke may be an increase in holding power.

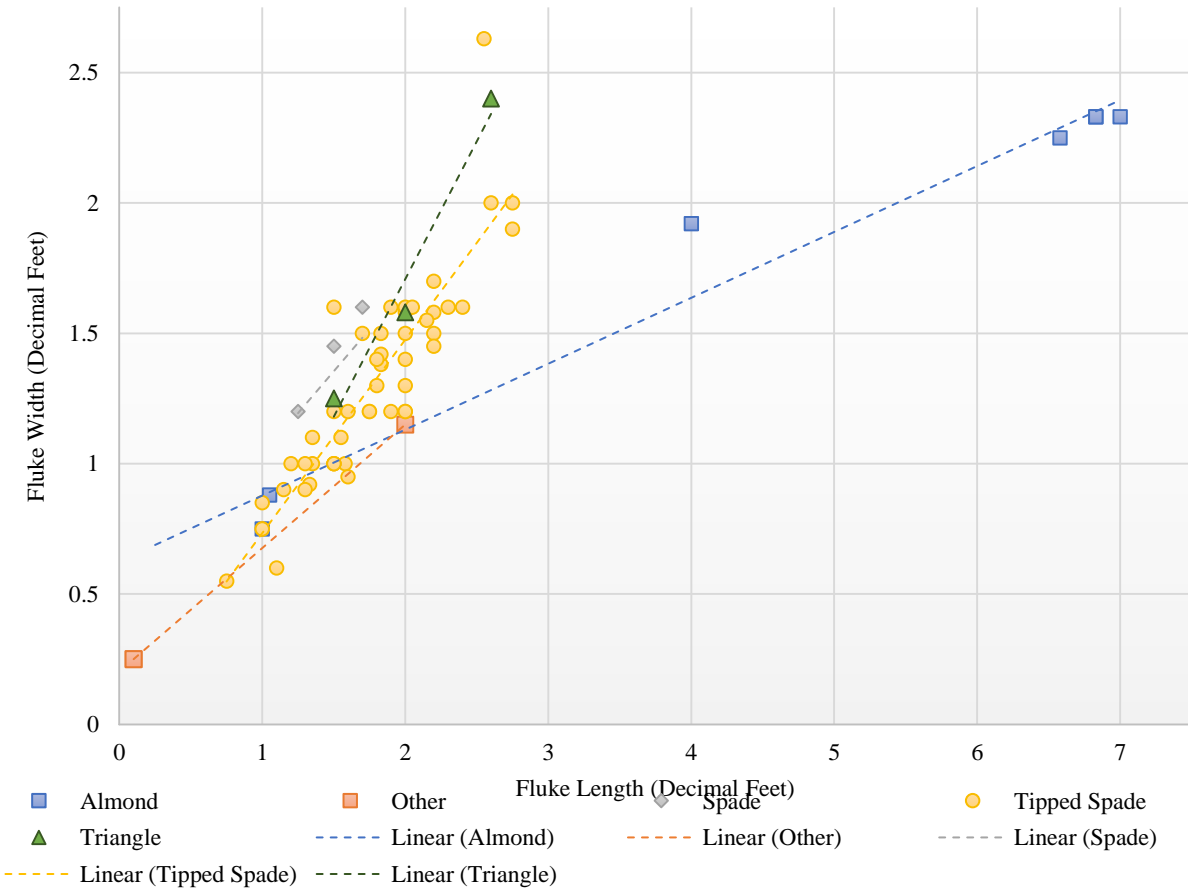


FIGURE 101. Fluke Length and Width in the AnD ( $n_{\text{Length}}=144.69$  dec. FT;  $n_{\text{Width}}=91$  dec. FT; Marlowe 2017).

*Design Elements Contributing to Success of Anchor Use*

The ability of an anchor to hold itself and the vessel in place is an important factor for determining which anchor style to use on a vessel. However, as the broken anchors in the AnD attest, sometimes the anchor would fail. It is possible for an anchor to fail without breaking, by slipping lose from the ocean floor and causing the vessel to drift. However, the historical and archaeological records indicate that the forces at work upon an anchor (caused by the ocean currents and motion of the vessel), broke anchors with frequency. The main points at which anchors appear to have broken are at the joint between the arms and crown, along the arms themselves, and along the shank. The historical record demonstrates that many shipwrecks were

caused by anchors breaking (e.g. Jeula 1865:459–470). Another factor which contributed to an anchor's ability was the strength of the cable, chain, or rope that connected the anchor to the vessel. Some anchors in the AnD were recorded with chain, or had broken rings or shackles. The historical record, primarily seen in insurance registers, dictated what types of chain or cable to use, as well as requiring anchors to undergo rigorous tests to ensure the strength of the anchor.

This section looks at the arms, crown, and shank as components of both the historical treatises and the AnD, as these were the most likely to fail under stress. The historical and AnD datasets are comparatively analyzed to generate general trends, and then the AnD is looked at for further analysis. The strength of the cable, chain, or rope, as well as the rings and shackles are not considered, due to there being limited information in the historical treatises concerning those elements.

### Arms / Crown

The arms and crown have been known, from the historical record, to sheer off at their joint. This is most likely due to faults created during the anchor's forging. Few historical sources included information about anchor construction (forging). The historical record, when compared to the AnD (Figure 102), demonstrates the continued increasing standardization which has been visible throughout the technological analyses. This standardization is not mirrored by the AnD, which, similar to the previous analyses, does not align itself with any treatise. It is not entirely clear from this graph how the difference between stocked and stockless anchors factor nor is it clear which are stockless. However, Pering does not seem to be the turning point, as it has been in the past.

The differences between the historical record and the AnD data suggest that there is a possibility of American divergence from the assessed treatises. As has been stated before, the

treatises for this study were predominantly British (with one French treatise). This preponderance of British treatises in the historical record suggests that the American shipbuilders and owners were either obtaining British-made anchors, using British designs, or were using anchors which did not follow the technical advice proposed by the British. There, AnD data could be a reflection of the American design trends for anchors. In the case of design elements contributing to an anchor's success, this could result in American anchors having a greater variety of lengths and widths, as is demonstrated in Figure 102.

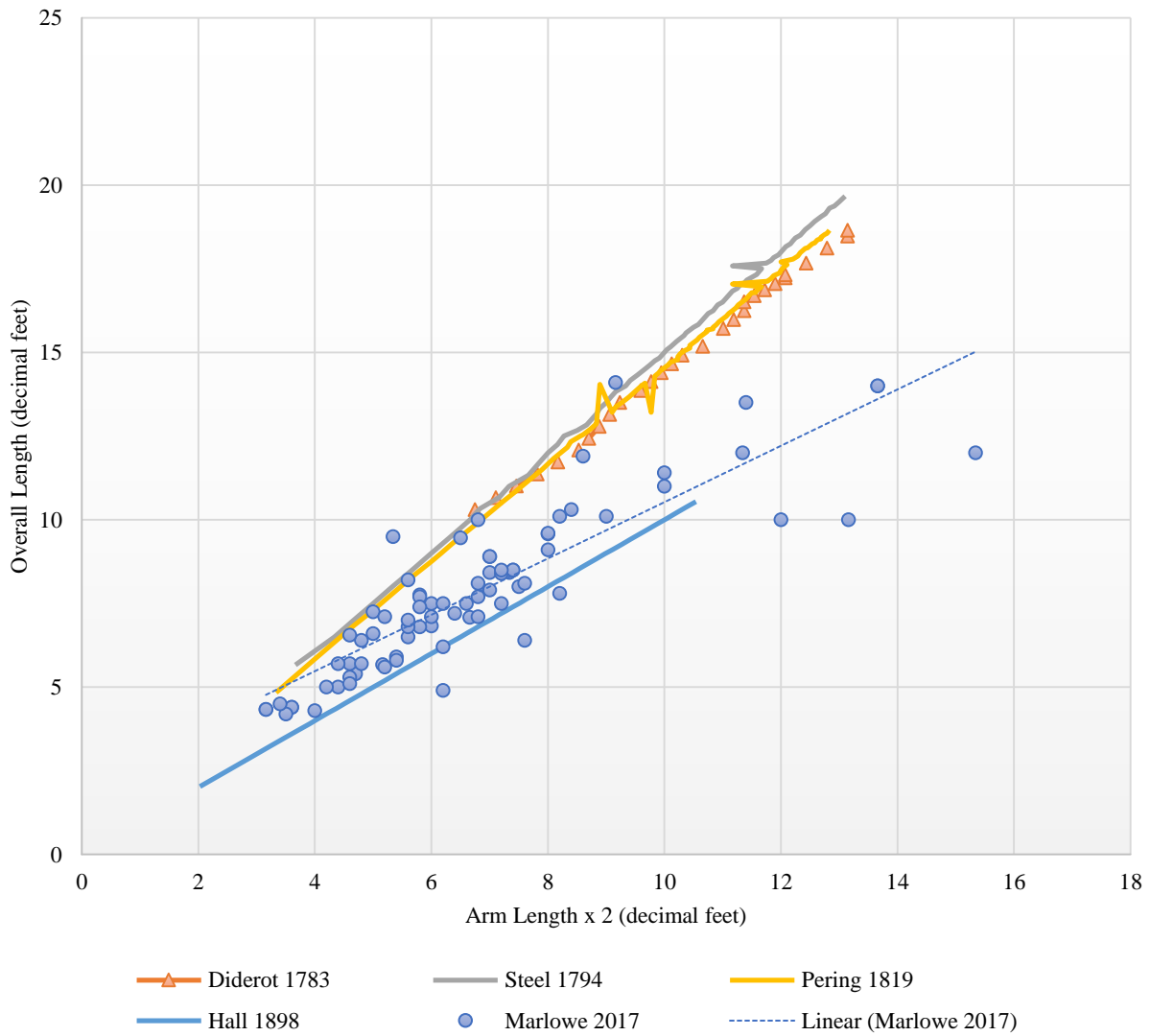


FIGURE 102. Doubled Arm Length and Overall Length ( $n_{2arm}=527.94$  dec. FT;  $n_{length}=624.77$  dec. FT; Marlowe 2017).

The size differences between stocked and stockless anchors, in addition to illustrating the increase in vessel size, also determines that there was a point where stockless anchors changed in length and breadth over a short period of time. Almost all stockless anchors contained some form of inscription, as seen in the Results Chapter. The inscriptions contained clues to their origins; all are thought to have been American-made, either for the United States Navy or by an American company (mainly the Baldt Anchor Company, Chester, Pennsylvania). The overall length and breadth differences between the British and the American anchors is partially due to the age of the anchors, as the stockless anchors appear to be post-long 19th century. It was after the long 19th century, that the American shipbuilding industry overtook the British (circa 1918) and started building more and larger vessels. Larger vessels needed larger anchors to reduce the potential for breaking and ensure anchor success. The AnD stockless anchors are an indication of the overall change in vessel tonnage, and corresponding anchor size, for American vessels. The stockless anchors of the AnD are, therefore, examples of how American and British anchor designs differed.

The AnD illustrates that the variation between stocked and stockless is marked (Figure 103). However, the trend lines indicate that the miniaturization of the stockless anchors continues into more modern anchors. Some stockless anchors in the AnD are outside the period of the long 19th century, and yet the trend continues. This is illustrated by the trend line demonstrating a decrease, as opposed to the increases seen in other trend lines. The graph illustrates the similarities between the different anchor designs which made it difficult to conclusively ‘identify’ any stocked AnD anchor as being from a particular design. In addition, this graph continues to identify the extreme size differences between stocked and stockless



anchors, demonstrating how much larger vessels had become since the beginning of the long 19th century.

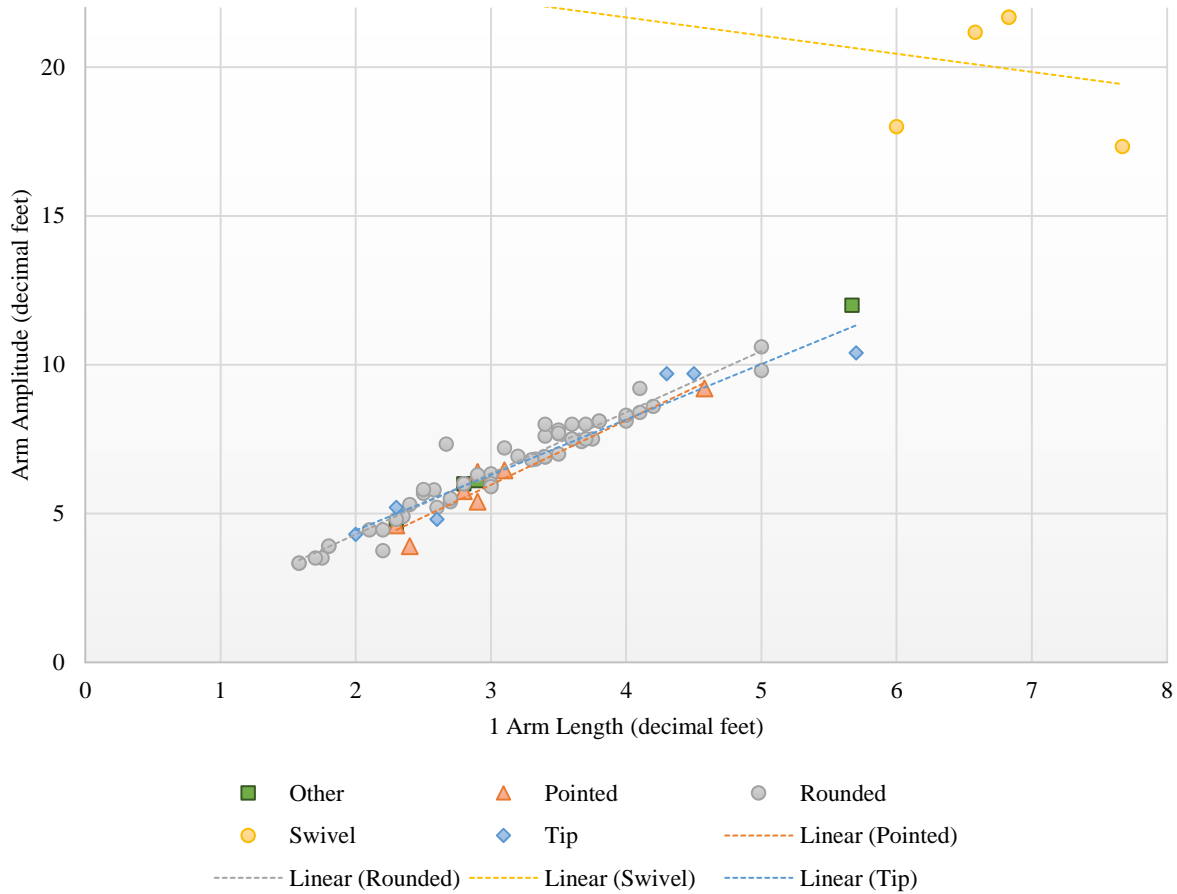


FIGURE 103. Arm Length and Amplitude by Crown Type ( $n_{\text{arm}}=263.97$  dec. FT;  $n_{\text{amp}}=568.81$  dec. FT; Marlowe 2017).

### Shank

The historical records of anchor construction indicate that the shank was the most complicated piece of the anchor, based on sheer continuous length (Diderot 1783). In addition, the shank was the key element connecting the different parts of the anchor. If the shank were to break, the anchor would fail and the vessel potentially endangered. Several shanks in the AnD had broken. Others had sections which had deteriorated more severely than the surrounding iron.

The shank is one of the points where the historical record has anchors with larger measurements than those seen in the AnD. The ranges of maximum, minimum, and average shank length in the AnD varied from the historical treatises, as seen in Figure 104. However, it is interesting to note that the maximum shank length for the AnD was from a stocked, rather than stockless, anchor. The differences in anchor styles played a large part in the relative size of the shank.

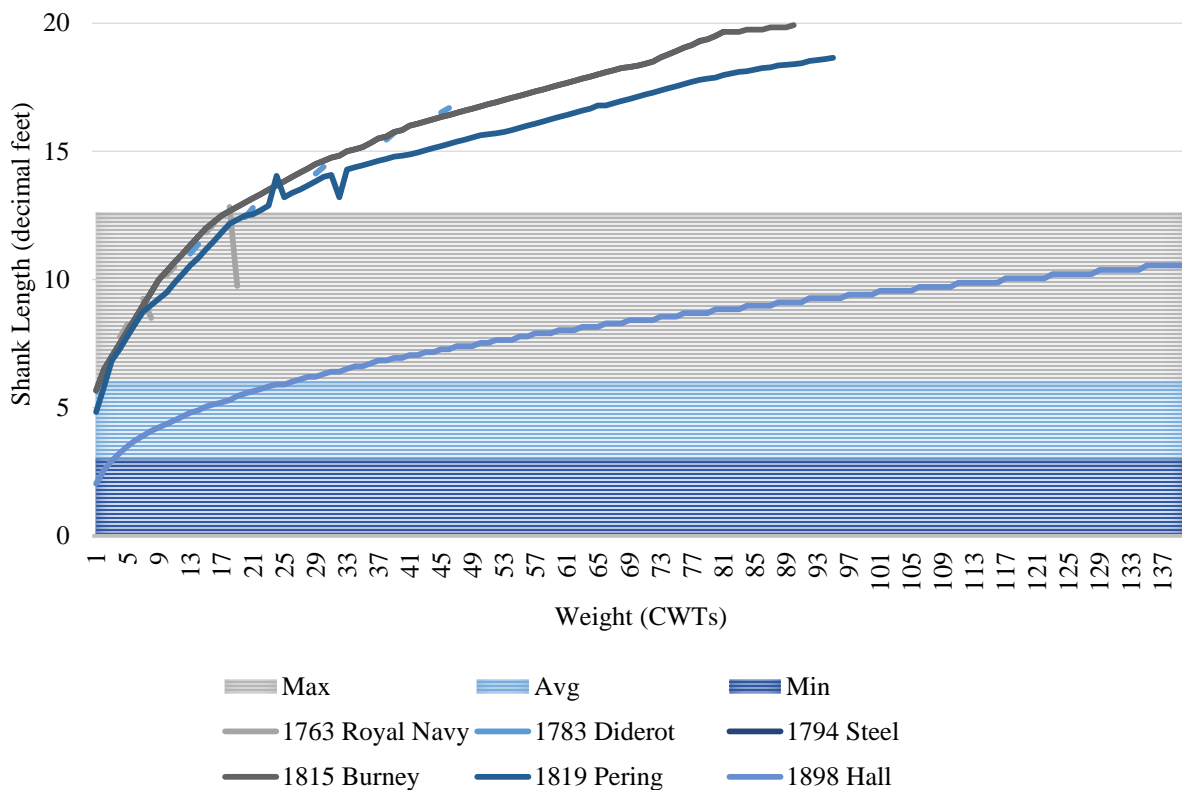


FIGURE 104. Shank Length in AnD and Historical Sources ( $n_{\text{shank}}=462.87$  dec. FT; Marlowe 2017).

Figure 105 indicates some of the different sizes and types of shanks indicated in the AnD. Unlike the historical treatises, only four styles were recorded in the AnD. The historical treatises, especially Cotsell (1856), indicate that there were more. As with the fluke analysis, this could be an indication of where the perceived benefit of strengthening the anchor occurred. The benefit of

strengthening one aspect of the anchor would potentially improve the overall utilitarian function of the anchor. By strengthening the shank, the anchor had the potential to fail less often. The interesting component for the stocked verses stockless anchors was that, among the shanks, the stockless anchors were in much better condition than the stocked anchors. This may be due to factors beyond the anchors themselves, such as the anchor's location and their age. The trend lines indicate that all recorded shank styles were prone to greater variation than some other components. Based on this graph, it does not appear that shank style can be an indicator of design without corroborating information from other anchor elements. However, if the shank is damaged or altered in some way, it could provide valuable information.

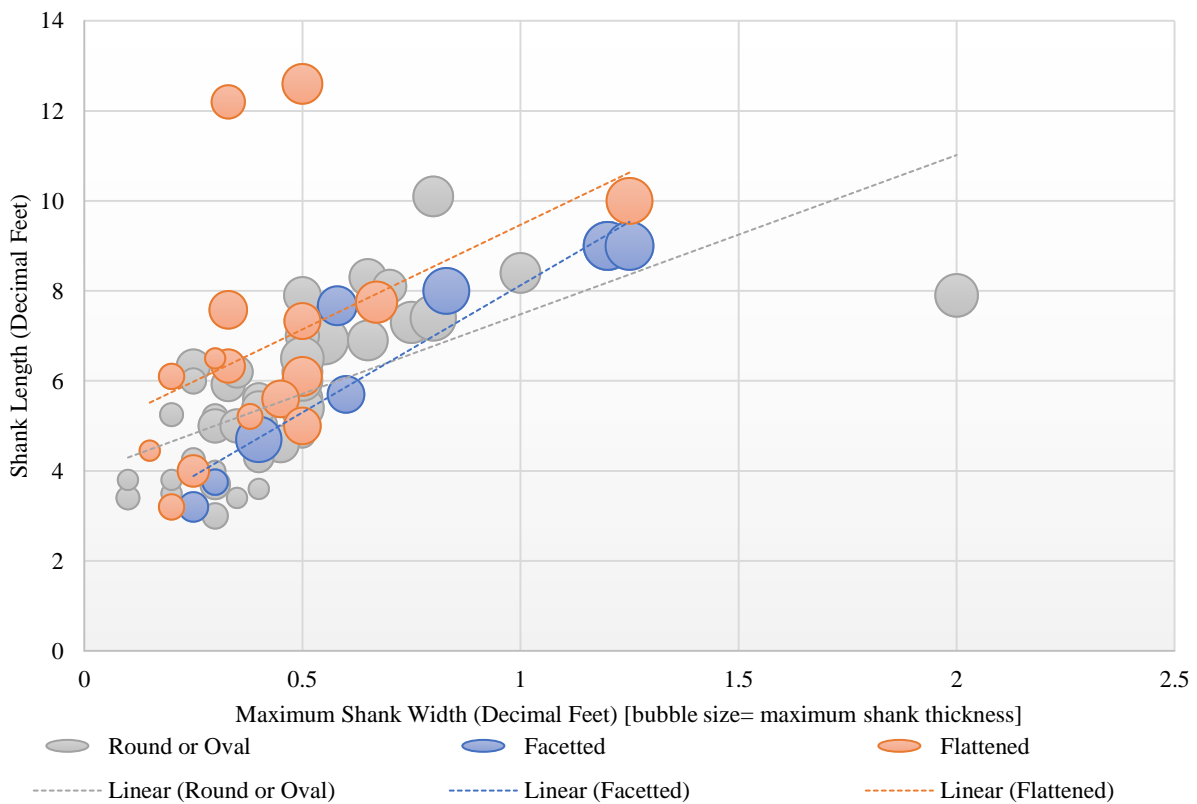


FIGURE 105. Shank length, width, and thickness from AnD ( $n_{\text{shank}}=462.87$  dec. FT;  $n_{\text{Swidth}}=35.40$  dec. FT;  $n_{\text{Sthick}}=40.71$  dec. FT; Marlowe 2017).

The technological and utilitarian aspects of anchors are firmly based in the designs and materials used. Differences between designs provide important information for classifying anchors in the AnD. The design elements contributing to the major functions of the anchor (to stop, to hold, and to resist failure) all have noticeable changes over the course of the long 19th century. Differences between historical treatise data and the AnD provide clues to potential design differences, specifically manufacturing differences, between the United Kingdom and the United States.

## **Conclusion**

The cultures investigated in this study include the United Kingdom and the United States maritime cultures. The influence of each culture affected the knowledge base of respective nations' anchor designers. These designers, such as Pering, Cotsell, and Hall, all produced information and anchor design changes. Differences between treatises are the result of the designers' knowledge. This knowledge is dependent on the nationality of the designer, and is explained further in the first section. Design is driven by those with knowledge and the needs of the manufacturers (and larger industry). The design of technologies (in this case anchors) is not always dictated by the consumer, though they have influence on the scale of use.

The nine treatises used in this study were almost exclusively British in origin, with the exception one from France (Diderot 1783). The predominance of British treatises suggests several aspects related to the cultural factors at play in anchor design (and that of other technologies). First, there is the suggestion that the British were more concerned with improving the utilitarian function of anchors at an earlier point in the long 19th century than their American counterparts. As seen previously, the United Kingdom was out-producing the United States in terms of average tonnage of vessels (Figure 92). The United Kingdom's larger maritime

dependence, as an island with far-flung economic interests, would result in a greater focus on maritime technologies associated with shipbuilding. The numerous and varied anchor treatises and maritime documents produced over the course of the long 19th century bear witness to this global maritime focus. Another suggestive point is that the United Kingdom was a proponent of a highly mathematical or scientific industrial methodology, an example of which can be seen in the anchor trials described in Cotsell (1856:83). By documenting and recording comparisons between anchors, as well as the relative successes or failures, the British introduced a degree of standardization which was increasingly apparent throughout most of the long 19th century. However, it is likely that other countries had treatises and were equally rigorous in their testing but their records were not located during the course of this study.

In addition, the French treatise *Fabrique des Ancres* (1783) and the British treatise *Table of the dimensions of anchors, as made in his Majesty's dockyards, from 1 cwt to 90 cwt, which is the largest anchor used in First Rates* (Burney 1815) are identical. This suggests that, while the historical sources found in the course of this study are predominately British, other cultures wrote treatises on anchor measurements. It may be that non-British treatises were incorporated into other works such as Diderot's treatise and, therefore, do not appear as overtly in marine science literature.

By comparison, this study had no historical treatises on anchors from the United States. The technological analyses noted that the majority of anchors from the AnD did not align with the British treatises, suggesting that American-specific anchor information was not recorded in a fashion similar to the British treatises. In contrast to the methods of the United Kingdom, with mathematical formulas and scientific precision for the construction of vessels, the United States

preferred a method more akin to intuition, which continued as the United States slowly switched from wooden to metal-hulled vessels (Thiesen 2006:86).

The potential of the AnD to represent a majority of American anchors is supported by small differences between the existing treatises. The differences in individual design elements suggest a minute difference in the utilitarian function of anchors between the United Kingdom and the United States. The types of vessels utilized during the long 19th century differed greatly between the United Kingdom and the United States. The interrelationships between the factors included in technology and culture all provide clues as to both the broad and specific factors which influenced the design of anchors over the course of the long 19th century. This chapter has investigated synchronic and diachronic quantitative analyses in order to examine the changing techno-function of anchors. The next chapter applies the results of the analyses to the research questions (outlined in the Introduction Chapter).

## Chapter 6: Conclusion

### **Introduction**

This study presents an historical and archaeological approach to the study of anchors in the long 19th century. Anchor design changes over this period are indicative of greater and simultaneous changes in maritime technology. Using historical and archaeological data, this study began the process of identifying anchor designs in a more comprehensive manner than has been done before. The majority of the anchors recorded in this study had no context or provenance and many were in a state of deterioration. This study demonstrated a method by which anchor designs and dates can be identified with more certainty. However, this study was limited by the physical location of the anchors and the inability to weigh the anchors recorded in the AnD. In addition, the predominance of British and other European historical sources provided a view of the AnD which does not make allowance for American design changes.

### **Reiteration of Study**

This study investigated both historical and archaeological data in order to analyze anchor design trends. The traditional narrative of the changes in anchor design over time showed gaps in the historical record. Historical anchor materials found in the course of this study appeared to mainly be located in the long 19th century with reassessments conducted in the late 20th century. Other sources were scattered through different centuries. In the course of research, historical information was found for 124 years out of the long 19th century (1789-1914). While much of that information had the potential to include anchor data, little of it is currently digitally accessible and was, therefore, inaccessible to the author. It was therefore important that this study utilized historical and archaeological resources. The methodology of the study strived to

combine historical and archaeological data in order to present interdisciplinary answers to the research questions. Using both forms of data allowed for cross comparisons to be conducted on the data.

The results section presented the archaeological dataset's length and breadth. The different aspects of the anchors included the anchor crown, arms, flukes, bills, shank, stock, rings, shackles, chains, and inscriptions. The anchor assemblage (AnD), comprising 82 anchors, demonstrated different characteristics, some of which did not correspond to the historical data. The analysis section investigated the changing utilitarian function, or techno-function, of anchors in the long 19th century and examined how technological processes and events directed design change.

## **Discussion of Findings**

The data collected as a result of this study provides the basis from which other studies can progress. The technological analyses conducted in the previous chapter were wide ranging, however the physical inability to weigh the anchors limited detailed comparison and analysis. The cultural differences between the different treatises were also broadly discussed.

### *Technology*

The technological analyses used in this study were concerned with the utilitarian function of anchors. These analyses included the stopping power of an anchor, the holding power of an anchor, and the ability of an anchor to succeed based on individual design elements. This section was focused on relating the changes in anchors to broader technological changes occurring in the long 19th century through historical treatises and AnD comparisons.



### What was the relationship between other maritime technologies and anchor design?

This question was partially answered in the course of this study. The information available was not fully conducive to formulating a relationship between other maritime technologies and anchor design. In part, this was due to the fact that this question was, and continues to be, vague. This question would be better answered by defining “relationship” as well as “maritime technologies.” Future research could present a history of an associated maritime technology, such as a capstan or a windlass, and present important design changes to see whether the anchor or the associated technologies came first. Within the parameters of this study, this was not possible. In the broadest possible terms of “maritime technology”—meaning the vessel itself—this study was able to partially answer how anchor size changed in the long 19th century.

### How did the size of anchors change with increasing vessel tonnage/displacement?

This question was partially answered in the course of this study. Comparisons between vessel and anchor size (as in vessel tonnage and overall anchor length) illustrated that as vessels became larger, some anchor designs became more compact. These analyses contributed to the assertion that anchor design changed drastically throughout the long 19th century: anchors became proportionally smaller as vessels became larger, until the change from stocked to stockless anchors made a larger anchor practical once again.

The analyses in the technology section (design elements contributing to stopping power, holding power, and an anchor’s success) illustrated that the comparison between the historical resources and the AnD is viable and produces conclusive results. The AnD demonstrated that the presence of the stockless anchors, for which there was only one historical comparison available (Hall 1898), skewed the data. The technological analyses section also appeared to indicate that

many anchors in the study did not fit completely into any one style or section. These all assisted in partially answering the research question; however a broader sample, with archaeologically recorded anchors from other places besides the United States, could prove valuable.

### *Cultural Differences*

Culture was hypothesized to be the most intangible for a techno-function focused material culture study. This section relied on illustrating the cultural differences between the technological analyses. The cultural linkages are an area of prime focus for future research.

As explained in the section ‘Treatises by Nationality’ (in the Analysis Chapter), the majority of the treatises used in this study were British in origin. Throughout the long 19th century, the United Kingdom had a far greater dependence on maritime trade than the United States. This is demonstrated by the rapid acceptance of metal-hulled vessels and alternate propulsion methods in the United Kingdom. During the same period, the United States maintained traditional wooden shipbuilding. The historical resources discovered as a part of this study, seen in Appendix A, illustrate that the vast majority of accessible information came from the United Kingdom. As demonstrated in the previous chapter, the anchors in the AnD did not align themselves with a particular treatises, suggesting that American anchors could have been different than their British counterparts. The cultural differences between the United Kingdom and the United States were very much apparent in the broader maritime traditions of each, however this study was not able to explicitly link technological changes to American shipbuilders or designers. The cultural differences for the technological changes of this period exist, and future research could connect them to changes in anchors.

## **What Technological Factors Drove the Changes in Anglo-American Marine Anchor Design Over the Period 1789–1914?**

As demonstrated in the Analysis Chapter, technological factors assisted in changing Anglo-American design of anchors. In addition, aspects of the technological changes have the potential to have influenced other cultural and economic factors.

The cultural changes occurring in the long 19th century assisted in the exchange of ideas and technologies between the United Kingdom and the United States. The increasingly varied technologies used in the maritime spheres of shipbuilding and commerce led to a greater interest in their adoption and use; published materials on the subjects increased decade by decade. This period is indicative of some of the swiftest technological changes recorded in history, with many forms of maritime technology undergoing radical transformations (MacGregor 1984:9). These factors all contributed toward altering the form of the vessels used during this time and therefore changed the fixtures and fittings on those vessels including anchors. Maritime technologies altered in parallel with various cultural and economic factors. Anchors are a demonstrable representation of those rapid and startling changes.

The technomic analysis conducted showed that, while vessel tonnage consistently grew over the course of the long 19th century, anchor dimensions began to shrink due to improvements in design and materials. Similarly, the utilitarian function of anchors was minutely altered over the course of the long 19th century as individual design elements were changed. The major factors that affected anchor design in this period were technological, though other factors included both economic and cultural changes. The technological innovation seen in the long 19th century affected many aspects of maritime technology, which in turn caused other technologies to change. As seen in the Analysis Chapter, multiple components of the anchor changed in response to the rapid cultural, technological, and economic changes of the period.

The research and analysis conducted as a part of this study provided important and previously unknown information regarding anchors. This study's information and results provides the basis for future research concerning anchors.

## **Future Research**

This study and its components are only a part of the potential historical and archaeological information surrounding anchors. Four major areas which could profit from future research include anchor foundries, detailed anchor construction methodologies, further research into anchor chain development, and the progression from cable to chain. All these areas, and this study, relate to a larger question of the differences and similarities of anchors used for commercial and military vessels. In addition, broader connections between technology, economy, and culture could be investigated.

This study was limited in scope, with only 82 anchors from parts of the East Coast of the United States. A future study concerning anchors could utilize the Big Anchor Project's online database in order access a numerically and geographically larger anchor dataset, as well as recording anchors in different areas around the United States.

In the course of this study, very few sources referenced anchor foundries or smithies. Research seems to be lacking in regard to these histories. The history of the particular foundries that created anchors could provide insight into the changes anchors underwent as materials changed. In addition, anchors with makers' marks could potentially be traced back to the foundry of origin. Tracing anchors' foundries of origin, and correlating this information with anchor type, could provide an additional avenue of research into changing maritime economies. Additionally, the historical aspect of which foundry formed which anchors and the methodologies of anchor construction would be instructive for design analyses. In the course of this study, a poem on

anchor construction was the extent of sources concerning the subject (Ferguson 1883). This avenue of future research would expand the use of economic histories for investigating the relative costs and method of smelting iron to provide a more well-rounded view of the construction of anchors.

An entirely separate avenue of investigation concerns the design changes and use of anchor chains. Historical work has been done on the changes in anchor chain design. Chains have a variety of different styles, sizes, and perceived strengths (Harland 2013:72). The differences in those aspects have the potential to assist in providing dating information. Archaeologically discovered anchors, used in this study, sometimes have associated chain. Chain break is often the prime cause of the anchor's loss rather than the anchor itself breaking in some way. This study provided a cursory investigation into this topic but, lacking primary sources, it also proves to be an avenue for more in-depth research. In addition to the different styles of anchor chain, the progression from using a cable to secure the anchor to a chain should be investigated. This has the potential of providing a *terminus post quem* or *terminus ante quem* of loss for a shipwreck or anchor.

An aspect which would tie all of the above together would be investigating, analyzing, and understanding the similarities and differences between anchors used by other nations and by the military and merchant fleets. This study was concerned with Anglo-American anchor histories and treatises; the anchors of other countries may have had different characteristics. The similarities and differences in anchors for use on military or commercial vessels could provide another diagnostic tool. Anchors contain valuable data that, if properly studied and categorized, have great potential in assisting in maritime archaeological research. Identifying the maker,

dates, and national origin of an anchor may lead to greater certainty in identifying shipwrecks, thus contributing to a more complete overall understanding of the archaeological record.

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## Appendices

### Appendix A: Historical Resources by Year and Country of Origin

YEAR	British	American	Other
PRE-1789	1784 Falconer Multiple Lloyd's Registers		Diderot's 1751, 1769, & 1787: <i>Recueil de Planches</i> and 1783 <i>Fabrique des Ancres</i>
1789	Lloyd's <i>Register of British and Foreign Shipping</i>		
1790	Lloyd's <i>Register of British and Foreign Shipping</i>	Buckner's <i>The American Sailor</i>	
1791	Lloyd's <i>Register of British and Foreign Shipping</i>		
1792	Lloyd's <i>Register of British and Foreign Shipping</i>		
1793	Lloyd's <i>Register of British and Foreign Shipping</i>		
1794	Steel; Lloyd's <i>Register of British and Foreign Shipping</i>		
1795	Lloyd's <i>Register of British and Foreign Shipping</i>		
1796	Lloyd's <i>Register of British and Foreign Shipping</i>		
1797	Lloyd's <i>Register of British and Foreign Shipping</i>		
1798	Lloyd's <i>Register of British and Foreign Shipping</i>		
1799	Lloyd's <i>Register of British and Foreign Shipping</i>		
1800	Lloyd's <i>Register of British and Foreign Shipping</i>		
1801	Lloyd's <i>Register of British and Foreign Shipping</i>		
1802	Lloyd's <i>Register of British and Foreign Shipping</i>		
1803	Lloyd's <i>Register of British and Foreign Shipping</i>		
1804	Lloyd's <i>Register of British and Foreign Shipping</i>		
1805	Lloyd's <i>Register of British and Foreign Shipping</i>		

1806	Lloyd's <i>Register of British and Foreign Shipping</i>		
1807	Lloyd's <i>Register of British and Foreign Shipping</i>		
1808	Lloyd's <i>Register of British and Foreign Shipping</i>		
1809	Lloyd's <i>Register of British and Foreign Shipping</i>		
1810	Lloyd's <i>Register of British and Foreign Shipping</i>		
1811	Lloyd's <i>Register of British and Foreign Shipping</i>		
1812	Lloyd's <i>Register of British and Foreign Shipping</i>		
1813	Lloyd's <i>Register of British and Foreign Shipping</i>		
1814	Lloyd's <i>Register of British and Foreign Shipping</i>		
1815	Burney's <i>Table of the dimensions of anchors, as made in his Majesty's dockyards, from 1 cwt to 90 cwt, which is the largest anchor used in First Rates, 1809 from Marine Dictionary;</i> Lloyd's <i>Register of British and Foreign Shipping</i>		
1816	Lloyd's <i>Register of British and Foreign Shipping</i>		
1817			
1818	Lloyd's <i>Register of British and Foreign Shipping</i>		
1819	Lever <i>The Young Officer's Sheet Anchor</i> ; Pering; Lloyd's <i>Register of British and Foreign Shipping</i>		
1820	Lloyd's <i>Register of British and Foreign Shipping</i>		
1821	Lloyd's <i>Register of British and Foreign Shipping</i>		
1822	Lloyd's <i>Register of British and Foreign Shipping</i>		
1823	Lloyd's <i>Register of British and Foreign Shipping</i>		
1824	Lloyd's <i>Register of British and Foreign Shipping</i>		



1825	Fincham's <i>Weight and Length of Anchors supplied to the different Classes of Ships;</i> Lloyd's <i>Register of British and Foreign Shipping</i>		
1826	Lloyd's <i>Register of British and Foreign Shipping</i>		
1827	Lloyd's <i>Register of British and Foreign Shipping</i>		
1828	Lloyd's <i>Register of British and Foreign Shipping</i>		
1829	Lloyd's <i>Register of British and Foreign Shipping</i>		
1830	Hedderwick's <i>Treatise;</i> Lloyd's <i>Register of British and Foreign Shipping</i>		
1831	Lloyd's <i>Register of British and Foreign Shipping</i>		
1832	Lloyd's <i>Register of British and Foreign Shipping</i>		
1833	Lloyd's <i>Register of British and Foreign Shipping</i>		
1834	Lloyd's <i>Register of British and Foreign Shipping</i>		
1835	Lloyd's <i>Register of British and Foreign Shipping</i>		
1836	Lloyd's <i>Register of British and Foreign Shipping</i>		
1837	Lloyd's <i>Register of British and Foreign Shipping</i>		
1838	Lloyd's <i>Register of British and Foreign Shipping</i>		
1839	Lloyd's <i>Register of British and Foreign Shipping</i>		
1840	Lloyd's <i>Register of British and Foreign Shipping</i>		
1841	Lloyd's <i>Register of British and Foreign Shipping</i>		
1842	Lloyd's <i>Register of British and Foreign Shipping</i>		
1843	Lloyd's <i>Register of British and Foreign Shipping</i>	Lever and Blunt's <i>American Edition Sea Officer's Anchor</i>	
1844	Lloyd's <i>Register of British and Foreign Shipping</i>		

1845	Lloyd's <i>Register of British and Foreign Shipping</i>		
1846	Lloyd's <i>Register of British and Foreign Shipping</i>		
1847	Lloyd's <i>Register of British and Foreign Shipping</i>	Brady's <i>The Kedge Anchor</i>	
1848	White <i>Theory and Practice</i> ; Lloyd's <i>Register of British and Foreign Shipping</i>		
1849	Murphy, John McLeod and W.N. Jeffers; <i>Spars and Rigging from Nautical Routine</i> ; Lloyd's <i>Register of British and Foreign Shipping</i>		
1850	Cutters; Lloyd's <i>Register of British and Foreign Shipping</i>		
1851	Lloyd's <i>Register of British and Foreign Shipping</i>		
1852	Montagu's <i>Naval Architecture</i> ; Fincham's <i>Outline on Shipbuilding</i> ; Lloyd's <i>Register of British and Foreign Shipping</i>		
1853	Lloyd's <i>Register of British and Foreign Shipping</i>		
1854	Lloyd's <i>Register of British and Foreign Shipping</i>		
1855	Lloyd's <i>Register of British and Foreign Shipping</i>		
1856	Cotsell's <i>A Treatise on Ships Anchors</i> ; Lloyd's <i>Register of British and Foreign Shipping</i>		
1857	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>New York Marine Register</i>	
1858	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>New York Marine Register</i>	
1859	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1860	Lloyd's <i>Register of British and Foreign Shipping</i>		
1861	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1862	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	

1863	Lloyd's <i>Register of British and Foreign Shipping</i>		
1864	Lloyd's <i>Register of British and Foreign Shipping</i>		
1865	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1866	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1867	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1868	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1869	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1870	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1	
1871	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1; <i>Record of American and Foreign Shipping</i>	
1872	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1; <i>Record of American and Foreign Shipping</i>	
1873	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1874	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1; <i>Record of American and Foreign Shipping</i>	
1875	Lloyd's <i>Register of British and Foreign Shipping</i>	Lloyd's <i>Register of American and Foreign Shipping</i> , Vol. 1; <i>Record of American and Foreign Shipping</i>	
1876		Lloyd's <i>Register of American and Foreign</i>	

		<i>Shipping, Vol. 1; Record of American and Foreign Shipping</i>	
1877	British Patent Sale Office	Lloyd's Register of American and Foreign Shipping, Vol. 1; Record of American and Foreign Shipping	
1878	British Patent Sale Office	Lloyd's Register of American and Foreign Shipping, Vol. 1; Record of American and Foreign Shipping	
1879	British Patent Sale Office	Lloyd's Register of American and Foreign Shipping, Vol. 1; Record of American and Foreign Shipping	
1880	British Patent Sale Office		
1881	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1882	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1883	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1884	Lloyd's Register of British and Foreign Shipping; British Patent Sale Office	<i>Record of American and Foreign Shipping; Hamersley Naval Encyclopedia</i>	
1885	Lloyd's Register of British and Foreign Shipping; British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1886	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1887	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1888	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1889	Lloyd's Register of British and Foreign Shipping; British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1890	Lloyd's Register of British and Foreign Shipping; British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	<i>Paasch Illustrated Marine Encyclopedia</i>
1891	British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	

1892	Lloyd's <i>Register of British and Foreign Shipping</i> ; Lloyd's <i>Rules and Regulations</i> ; British Patent Sale Office	<i>Record of American and Foreign Shipping</i>	
1893	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1894	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1895	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1896	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1897	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1898	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1899	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1900	Lloyd's <i>Register of British and Foreign Shipping</i>	<i>Record of American and Foreign Shipping</i>	
1901	Lloyd's <i>Rules and Regulations</i>		
1902	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1903	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1	<i>Record of American and Foreign Shipping</i>	
1904	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1905	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1906	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1907	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1908	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1909	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	

1910	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1911	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1912	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1913	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
1914	Lloyd's <i>Register of British and Foreign Shipping</i> , Vol. 1; Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	
POST-1914	Lloyd's <i>Rules and Regulations</i>	<i>Record of American and Foreign Shipping</i>	

## Appendix B: Recording Guidance for Stocked Anchors from Big Anchor Project (Nautical Archaeology Society 2008)

Submit your anchor record to  
[www.biganchorproject.com](http://www.biganchorproject.com)



### Iron Stocked Anchor

Recording Guidance Notes Section 1: General Information

#### Recorders

##### Names

Please add the names of the people completing the form

##### Date

Please add the date the form is completed. Record as day month year (dd/mm/yyyy)

##### Group/Organisation

Please add the name of the group or organisation undertaking the survey, if appropriate (eg. NAS, Weymouth Lunar Society, etc)

##### Big Anchor ID

Do not complete this field – this unique number will be allocated by the project moderators

#### Context

##### Category

This defines the general context regarding the present status of this anchor. One of the following choices:

Wreck	Anchor is still in situ on a wreck site (submerged or beached).
Isolated site	Anchor is still in situ but forms an isolated site (submerged or beached).
Museum	Anchor is at a museum (exhibited inside/outside of).
Land	Anchor is on land (front lawn, park, etc.) but not associated with a wreck or a museum.
Publication	Only known occurrence is in a publication (give reference in the illustration field on the Drawing and Photograph Form).
Treatise	Presented in a historical shipbuilding or maritime treatise (give reference in the illustration field on the Drawing and Photograph Form).
Other	None of the above (details in the illustration field on the Drawing and Photograph Form).

**Site**

Name attributed to the site to which anchor is related. In the case of a wreck, it could be the name of the ship (if identity is known) or what the site is known as (for example: Channel wreck). In the case of a “land” anchor, this may be left blank.

**Location**

Where the site or anchor is geographically located. This comprises the name of the city/town, province/state/county, country and could include possible landmark (for example: Queens Road, Portsmouth, England; or Lighthouse Point, Louisbourg, Nova Scotia, Canada).

**GPS coordinates** – if you are providing positional information derived from a GPS please provide latitude and longitude in decimal degrees.

**Reference #**

Archaeological or museum reference number if anchor has been excavated or catalogued. Left blank if not referenced.

**Ship name**

Name of ship to which this anchor was associated, if known.

**Ship type**

Type of ship (barque, frigate, schooner, etc.) associated with anchor, if known.

**Ship size**

Size of ship (in tons) associated with anchor, if known. If not in tons, specify unit of measurement.

**Function**

What was the anchor used for on board the vessel (only if the information is known with certainty).

Bower Anchor located at the bow, usually one on each side, used for normal anchoring procedures of the vessel.

Sheet Larger anchor of the vessel used in case of emergency, often placed between decks.

Kedge Smaller anchor used in support of bower anchors or for lighter manoeuvres.

Stream Anchor carried as a spare in some large ships, smaller than the bower and sheet anchor, but larger than the kedge.

Grapple Small anchor with multiple arms used for small vessels or light manoeuvres.

Other Specify.

**Anchor type**

Attributed name of anchor type for patented model (for example; Trotman, Porter).



## Date and Origin

### Date

Absolute date of the anchor: in the case of a wreck, date of sinking; in the case of a treatise, date of publication. Can be left blank.

### Period

Time period of the anchor, in half century (ex. 1<sup>st</sup> half of 18<sup>th</sup> century; 2<sup>nd</sup> half of 19<sup>th</sup> century), if known

### Nationality

Country of origin of the anchor (where the ship was built or outfitted, nation targeted by author of a treatise). Enter name of country (eg. France, and not French).

### Certainty

Degree of confidence in the date and origin of the anchor.

Confirmed	There is no doubt as to the date and/or origin of the anchor (if it is definitely associated with an identified wreck).
Probable	Evidence, information or knowledge is indicating that it seems to be associated with a ship, but there information has not or cannot be verified.
Tentative	Information is fragmentary, hypothetical.
Unknown	No information.

## Features Present

### Stock

Is the original stock in place or partly in place? (Check box if yes).

### Squaring of shank

Does the shank become square where the stock would have been located? (Check box if yes).

### Ring

Is the ring still in place? (Check box if yes).

Anchor Ring



### Shackle

Is a shackle still in place? (Check box if yes).

Anchor shackle



### Number of arms

Number of arms of the anchor.

### Inscriptions

Are there any inscriptions present on the anchor? (Check box if yes). Provide details of inscription in the illustration field on the Drawing and Photograph Form.

### Description of Features

#### Shape of flukes

To which of the following does the shape of the flukes correspond:

- Triangle Three straight sides with three points.
- Spade Straight lower side, rounded lateral sides with a pointed bill.
- Tipped spade Straight lower side, rounded lateral sides with an elongated bill.
- Almond Three rounded sides.
- Other

Triangle



Spade



Tipped Spade



Almond



Other



#### Stock type

- Wood over A wooden stock clamped over the exterior of the shank.
- Wood through A wooden stock inserted in an opening (square) in the shank.
- Metal over A metal stock clamped over the exterior of the shank.
- Metal straight A straight metal stock.
- Metal bent A metal stock with one retractable bent arm.

Wood Over



Wood through



Metal over



Metal straight

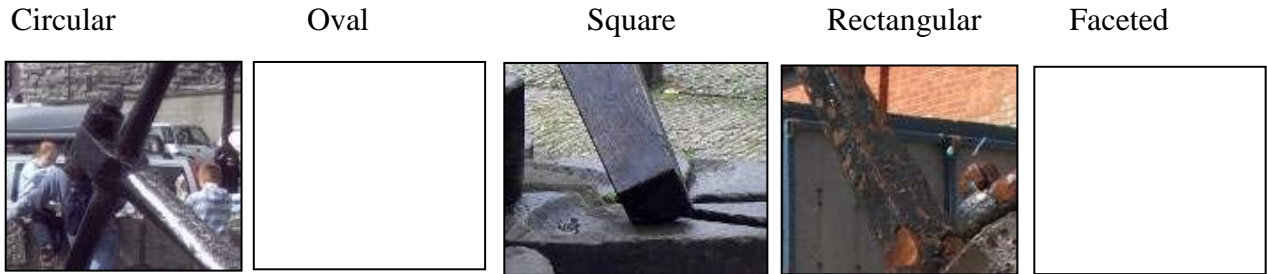


Metal bent



**Stock section**

- Circular Section is a circle.
- Oval Section is oval.
- Square All sides of section are of equal dimensions.
- Rectangular Lateral sides are of different dimensions than upper and lower sides.
- Other Define.
- Faceted edges If the section is square or rectangular, part or all of the edges have been faceted or shaved to remove square edge. This can be checked in addition to another box.



**Stock shape**

- Straight The stock is straight and even throughout its length.
- Upturned The stock arms are both turned upwards to give the stock a very open V shape.
- Tapered The stock tapers out on each side to give a smaller section/diameter at the ends. This can be checked in addition to another box.
- Convex The stock's upper surface is straight but the lower surface is convex.
- Other Define.



**Stock fasteners** (more than one method can be evident)

- Trunnels Wooden dowels.
- Nails Iron nails.
- Metal straps Strips of iron wrapped around the stock. Insert total number.
- Cotter Pin Metal pin used to stop the stock moving (see picture)
- Other Define.



**Stock key**

The stock key is formed by small tenons on the shank with the purpose of locking a wooden stock in place to avoid pivoting movement around the shank.

- Parallel      The axis of the key is the same as the axis of the arms (same orientation as the arms).
- Perpendicular      The axis of the key is perpendicular to the axis of the arms (90 degree orientation to the arms).
- None      There is definitely no stock key.
- Unknown      It is impossible to determine if there was a stock key on the shank.



Perpendicular stock key

**Shank form**

To which of the following forms corresponds the shank's circumference:

- Round/oval      Completely round / oval
- Facetted      Multiple facets (give number).
- Flattened      Flat top with rounded sides.
- Unknown      Impossible to determine.
- Other      Define.



**Crown shape**

To which of the following forms corresponds the base of the anchor where the arms join:

- Rounded      No visible point or tip.
- Pointed      The arms form an angle.
- Tip      There is a small tip at the angle formed by the arms.
- Fishbuckle      The crown has a hole with or without a shackle device. This can be checked in addition.
- Swivel      The crown and the shank are joined by a swivel.
- Other      Define.

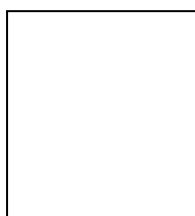
Rounded



Pointed



Tip



Fishbuckle



Swivel



**Arms**

To which of the following form correspond the arms:

- Straight                      Each arm forms a straight line.
- Angled sections            Each arm is formed by two straight sections slightly at angle.
- Arc                            Both arms are part of one continuous arc.
- Segmented arc              Each arm forms an arc but both arms do not form a continuous arc.
- Mobile                        Arms can pivot or swing up and down in relation to the shank.
- Other                         Define.



**Weight**

Present weight of the anchor, if available.



**Section 2: Dimensions** Note: All measurements should be taken in centimetres / millimetres eg 10.5cm (10cm 5mm) or 182.5cm (eg 1m 82cm 5mm)

## Shank

### Length of shank

Length of shank from the extremity of the crown upper finished end of the shank.

### Max width at top of shank

Maximum width of shank at point just below the position of the stock.

### Max width at bottom of shank

Maximum width of shank at lowest point, just above the arms.

### Dimensions of eye of stock

If an iron stock goes through a round eye, the diameter of the eye. If a wooden stock goes through a square eye, dimensions of the sides of the eye.



## Arms

### Length of one arm

Distance of a straight line between the tip of the crown to the tip of the bill.



### Amplitude of arms

Distance between the two bills measured around the exterior (bottom) of the arms.



### Height of bills

Distance measured on the shank from the tip of the crown (lowest point of the anchor) to the point where a projected line from the bill would meet the centre of the shank at a straight angle.

### Distance between bills

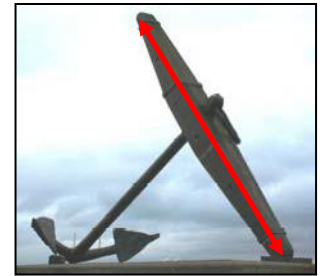
Distance of a straight line between both bills.



## Stock

### Length of stock

If the stock is complete, total length of the stock from one extremity to the other. If the stock is a bent stock, length from the extremity of the straight side to the outside of the straight angle of the bent side.

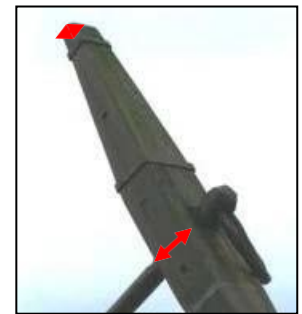


### Max circumference of stock

If the section of the stock is round or oval, greatest circumference of the stock, usually close to the shank.

### Min circumference of stock

If the section of the stock is round or oval and tapers, smallest circumference of the stock, usually close to the extremities. If stock does not taper, leave blank.



### Max thickness of stock

If the section of the stock is square or rectangular, greatest thickness of the stock, usually close to the shank. Thickness is taken on the front or back face of the stock.

### Min thickness of stock

If the section of the stock is square or rectangular and tapers, smallest thickness of the stock, usually close to the shank. If stock does not taper, leave blank. Thickness is taken on the front or back face of the stock.

### Max width of stock

If the section of the stock is square or rectangular, greatest width of the stock, usually close to the shank. Width is taken on the upper or lower face of the stock.

### Min width of stock

If the section of the stock is square or rectangular and tapers, smallest width of the stock, usually close to the shank. Width is taken on the upper or lower face of the stock.



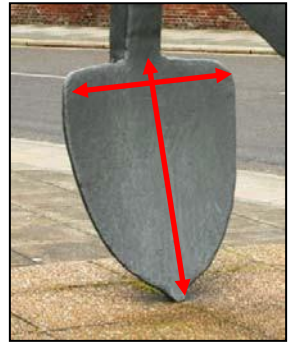
**Fluke**

**Width of fluke**

Widest dimension of fluke.

**Length of fluke**

Distance from the bill to centre of the bottom side of the fluke.



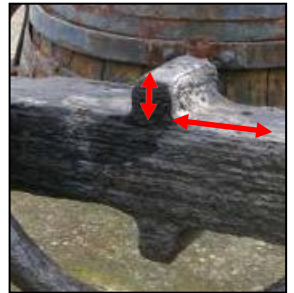
**Key**

**Height of key**

Distance between the top of the key to the bottom of the key along the shank.

**Distance of key**

Distance of the top of the key to the highest point of the shank.



**Ring** (record only if present at the top of the shank)

**Diameter of ring**

Widest diameter of the interior of the ring.

**Diameter of eye of ring**

Diameter of the eye for the ring in the shank.

**Thickness of ring**

Width or thickness of ring.





**Shackle** (record only if present at the top of the shank)

**Diameter of shackle**

Widest diameter of the interior of the shackle.

**Diameter of eye of shackle**

Diameter of the eye for the shackle in the shank.

**Thickness of shackle pin**

Width or diameter of shackle pin if still present.

**Opening of shackle**

Smallest distance between the lower tabs of the shackle giving its smallest opening.



**Photographs**

It is recommended to complement the data with a selection of photographs with scale. Ideally, five photographs are suggested, the most important one being an overall view of the anchor. The five suggested views are as follows:

- 1- Overall view showing the entire anchor from the front (both arms visible on each side).
- 2- View of the interior face (palm) of one fluke showing its shape.
- 3- Close-up view of one arm showing the shape of the arm.
- 4- Close-up view of the crown showing the welding of the two arms.
- 5- Close-up view of the upper area of the shank showing the ring, the stock key and other features.

*NB: The max dimension of any image will be cropped to 150px (thumbnails) and 500px (main image). For best results, prepare a square photo cropped fairly tight on your subject. We can accept JPEG (.jpg), PNG (.png) and GIF (.gif) format images. For best results we recommend JPEG for photos and PNG for Black & White line drawings. Large files (bigger than 100kB) will take a long time to process, MAX file size = 500kB*

## Appendix C: Letter of Intent to Anchor Owners



3 September 2015

Dear anchor owner,

### Request for access to anchors for CSI educational program

The UNC-Coastal Studies Institute in Wanchese is planning on teaching an *Anchor Recording Workshop* (see attached flyer) in conjunction with the MA thesis research of Ms. Bettie Pratt. We are seeking your permission to access your property to record (draw, photograph, and video) anchors that we've noticed.

The education program is offered to the public—its intention is to help preserve the maritime heritage of the Outer Banks by teaching people about the history and anatomy of anchors, and also how to research them. The work we do is totally non-invasive – **we do not move, damage, deface, or remove the anchor from where it is.** All participants in the workshop will be over 21 years of age (or under the supervision of an adult). No one will be allowed to climb on your anchor, and all students will receive a safety briefing as part of the workshop.

The training is a part of the Nautical Archaeology Society (NAS) initiative – the anchor recording workshop is our newest offering – though we have also offered workshops on artifact photography, artifact illustration, and photogrammetry in the past. Participation in our training is open to any member of the public (to learn more see [facebook.com/nasnca](https://facebook.com/nasnca), and [nauticalarchaeologysociety.org](http://nauticalarchaeologysociety.org)).

In return for your assistance, we are happy to provide you copies of all photographs, drawings, or information regarding your anchor(s) upon request.

If you have any questions about this project, or the NAS initiative, I am more than happy to correspond via email or telephone (details below). Thanks in advance for any assistance you can provide.

Regards,



Nathan Richards PhD  
Program Head, Maritime Heritage  
UNC Coastal Studies Institute  
Mailing Address: PO Box 699, Manteo, NC 27694  
Physical Address: 850 NC 345, Wanchese, NC 27891  
Direct Line: 252-475-5408  
<http://csi.northcarolina.edu>

## **Appendix D: Anchor Pro-forma from Washington Naval Yard and North Carolina**

The following pages contain the digital versions of the pro-forma for the anchors recorded in the course of this study. The pro-forma from the Washington Naval Yard are first, followed by the pro-forma from North Carolina.

<b>Name:</b> Bettie & Emily (NHHC)	<b>Date Recorded:</b> 28 July 2015	<b>Site #:</b> WNY001
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Shank: US Navy "77 4 41 181 2 44" Back: MD 4-01 MA Possible golden anchor?

<b>Photos Taken:</b>	
Number:	3
Range:	WNY001-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	14		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	1.2		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	1		Shank Length:	N/A		
Key Height:	9	Dist. b/w Bills:	8.67	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	6.83	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	6.83	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.33			
1 Arm Length:	6.83					
Arm Amplitude:	21.67	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Emily (NHHC)	<b>Date Recorded:</b> 28 July 2015	<b>Site #:</b> WNY002
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Possible golden anchor Back: 4-01 Side of shank: US Navy 747 P8F 2- B

<b>Photos Taken:</b>	
Number:	4
Range:	WNY002-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	14		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	1.2		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	1		Shank Length:	N/A		
Key Height:	9	Dist. b/w Bills:	8.67	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	6.83	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	6.83	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.33			
1 Arm Length:	6.83					
Arm Amplitude:	21.67	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY003
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Builders crest? Baltd NY 10 P

<b>Photos Taken:</b>	
Number:	3
Range:	WNY003-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Baltd NY 10 P
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	<b>METAL BENT</b>	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.08	Shank Min. Thickness:	0.42			
Stock Max. Diameter:	0.25	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.42			
Shank Max. Thickness:	0.58	Shank Length:	6.1			
Key Height:	N/A	Dist. b/w Bills:	5.5	Ring Dia.:	N/A	
Shackle Dia.:	0.25	Height of Bills:	1.92	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.42	Bills (LxW):	0.42 x 0.25	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	1.83	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	1.38			
1 Arm Length:	3.33					
Arm Amplitude:	6.83	Throat Angle(s):	54.79°			

<b>Name:</b> Bettie & Leon	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY004
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Builders crest? Baldt NY 10 P

<b>Photos Taken:</b>	
Number:	2
Range:	WNY004-1 to -2
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Baldt NY 10 P
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	<b>METAL BENT</b>	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.2		Shank Min. Thickness:	0.5		
Stock Max. Diameter:	0.33		Shank Max. Width:	0.5		
Stock Min. Diameter:	0.2		Shank Min. Width:	0.43		
Shank Max. Thickness:	0.67		Shank Length:	6.1		
Key Height:	N/A	Dist. b/w Bills:	5.42	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.42	Bills (LxW):	0.42 x 0.25	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	1.83	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	1.42			
1 Arm Length:	3.2					
Arm Amplitude:	6.92	Throat Angle(s):	51.318°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY005
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	1858
Vessel Type and Name:	USS Hartford
Nationality:	US Navy
Additional Information:	Steam sloop of war built at Boston Navy Yard.  Admiral Farragut's flagship at Mobile Bay and New Orleans.

<b>Photos Taken:</b>	
Number:	7
Range:	WNY005-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<b>TIP</b>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<b>OTHER</b>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	<i>Other</i>	
Key:	Parallel	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	12	Shank Min. Thickness:	0.67			
Stock Max. Diameter:	N/A	Shank Max. Width:	N/A			
Stock Min. Diameter:	N/A	Shank Min. Width:	N/A			
Shank Max. Thickness:	0.75	Shank Length:	11			
Key Height:	11	Dist. b/w Bills:	5	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	3.33	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.67 x 0.42	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.55	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.63			
1 Arm Length:	5.67					
Arm Amplitude:	12	Throat Angle(s):	54.034°			



<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY006
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNY006-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<i>Circular</i>	<b>OVAL</b>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.25	Shank Min. Thickness:	0.42			
Stock Max. Diameter:	0.33	Shank Max. Width:	0.33			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.33			
Shank Max. Thickness:	0.5	Shank Length:	5.92			
Key Height:	6.33	Dist. b/w Bills:	4.1	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	1.67	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.67	Bills (LxW):	0.25 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	1.33	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	0.92			
1 Arm Length:	2.5					
Arm Amplitude:	5.67	Throat Angle(s):	48.087°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY007
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNY007-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	AWS Baldt A. Co. 8049
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	<b>METAL BENT</b>	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	<b>PERPENDICULAR</b>	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.83	Shank Min. Thickness:	0.42			
Stock Max. Diameter:	0.25	Shank Max. Width:	0.33			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.33			
Shank Max. Thickness:	0.5	Shank Length:	6.33			
Key Height:	5.42	Dist. b/w Bills:	4.75	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	1.75	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.33	Bills (LxW):	0.33 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	1.75	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	1.2			
1 Arm Length:	3					
Arm Amplitude:	6.33	Throat Angle(s):	54.315°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY008
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	1938
Vessel Type and Name:	USS Enterprise CV-6
Nationality:	US Navy
Additional Information:	In service 12 May 1938 to 17 February 1947 Builders Crest 5 1779 Bethlehem, US

<b>Photos Taken:</b>	
Number:	12
Range:	WNY008-1 to -12
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	12		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	1.25		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	1		Shank Length:	9		
Key Height:	N/A	Dist. b/w Bills:	10.5	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	7	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.33			
1 Arm Length:	7.67					
Arm Amplitude:	17.33	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY009
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	US Navy
Additional Information:	On chain: USN Baldt 2 ¼ inches

<b>Photos Taken:</b>	
Number:	5
Range:	WNY009-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	10		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	1.25		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	0.92		Shank Length:	10		
Key Height:	N/A	Dist. b/w Bills:	6.58	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	8.33	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	6.58	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.25			
1 Arm Length:	6.58					
Arm Amplitude:	21.17	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY010
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNY010-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.33	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.1	Shank Max. Width:	0.3			
Stock Min. Diameter:	0.1	Shank Min. Width:	0.1			
Shank Max. Thickness:	0.2	Shank Length:	4			
Key Height:	3.75	Dist. b/w Bills:	2.75	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	0.83	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.1	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1	Chain Link:	N/A	
Shackle Opening:	0.1	Fluke Width:	0.75			
1 Arm Length:	1.58					
Arm Amplitude:	3.33	Throat Angle(s):	58.31°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 27 July 2015	<b>Site #:</b> WNY011
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNY011-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.33	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.1	Shank Max. Width:	0.3			
Stock Min. Diameter:	0.1	Shank Min. Width:	0.1			
Shank Max. Thickness:	0.2	Shank Length:	4			
Key Height:	3.75	Dist. b/w Bills:	2.75	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	0.83	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.1	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1	Chain Link:	N/A	
Shackle Opening:	0.1	Fluke Width:	0.75			
1 Arm Length:	1.58					
Arm Amplitude:	3.33	Throat Angle(s):	58.31°			

<b>Name:</b> Bettie	<b>Date Recorded:</b> 16 July 2015	<b>Site #:</b> WNY012
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	1919
Vessel Type and Name:	N/A
Nationality:	US Navy
Additional Information:	Not all inscriptions visible

<b>Photos Taken:</b>	
Number:	13
Range:	WNY012-1 to -13
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	787 L85 1919 US Navy
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	<b>METAL BENT</b>	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	<b>PARALLEL</b>	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.67		Shank Min. Thickness:	0.21		
Stock Max. Diameter:	0.25		Shank Max. Width:	0.38		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.21		
Shank Max. Thickness:	0.29		Shank Length:	5.21		
Key Height:	3.21	Dist. b/w Bills:	4.29	Ring Dia.:	N/A	
Shackle Dia.:	0.15	Height of Bills:	1.79	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.29	Bills (LxW):	0.29 x 0.21	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.15	Fluke Length:	1.58	Chain Link:	N/A	
Shackle Opening:	0.5	Fluke Width:	1			
1 Arm Length:	2.58					
Arm Amplitude:	5.79	Throat Angle(s):	46.068°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY013
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNY013-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel <i>Other</i>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	Mobile <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<b>METAL BENT</b> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other
Key:	Parallel	<b>PERPENDICULAR</b>	None	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	9.5	Shank Min. Thickness:	0.5		
Stock Max. Diameter:	0.38	Shank Max. Width:	0.58		
Stock Min. Diameter:	0.2	Shank Min. Width:	0.42		
Shank Max. Thickness:	0.67	Shank Length:	7.67		
Key Height:	7.5	Dist. b/w Bills:	5.38	Ring Dia.:	N/A
Shackle Dia.:	0.2	Height of Bills:	2.33	Ring Eye Dia.:	N/A
Shackle Eye Dia.:	0.67	Bills (LxW):	0.42 x 0.2	Ring Thickness:	N/A
Shackle Pin Thick.:	0.33	Fluke Length:	1.83	Chain Link:	N/A
Shackle Opening:	0.33	Fluke Width:	1.5		
1 Arm Length:	2.67				
Arm Amplitude:	7.33	Throat Angle(s):	29.231°		



<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY014
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	10
Range:	WNY014-1 to -10
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<b>PERPENDICULAR</b>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.42	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.42	Shank Max. Width:	0.67			
Stock Min. Diameter:	0.25	Shank Min. Width:	0.42			
Shank Max. Thickness:	0.75	Shank Length:	7.75			
Key Height:	7.2	Dist. b/w Bills:	6.25	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.42 x 0.25	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.33	Fluke Length:	2.2	Chain Link:	N/A	
Shackle Opening:	0.33	Fluke Width:	1.5			
1 Arm Length:	3.5					
Arm Amplitude:	7.67	Throat Angle(s):	55.15°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY015
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	11
Range:	WNY015-1 to -11
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<b>CONVEX</b>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<b>UNKNOWN</b>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	9.58		Shank Min. Thickness:	0.58		
Stock Max. Diameter:	0.5		Shank Max. Width:	N/A		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.42		
Shank Max. Thickness:	0.75		Shank Length:	9		
Key Height:	N/A	Dist. b/w Bills:	6.58	Ring Dia.:	N/A	
Shackle Dia.:	0.25	Height of Bills:	2.25	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.88	Bills (LxW):	0.42 x 0.25	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.25	Fluke Length:	2.2	Chain Link:	N/A	
Shackle Opening:	0.33	Fluke Width:	1.58			
1 Arm Length:	4					
Arm Amplitude:	8.2	Throat Angle(s):	55.771°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY016
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNY016-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Baldt Anchor Co. Chester PA
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	<b>METAL BENT</b>	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	<b>NONE</b>	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8		Shank Min. Thickness:	0.42		
Stock Max. Diameter:	0.42		Shank Max. Width:	0.5		
Stock Min. Diameter:	0.33		Shank Min. Width:	0.42		
Shank Max. Thickness:	0.58		Shank Length:	7.33		
Key Height:	N/A	Dist. b/w Bills:	5.5	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2.33	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.83	Bills (LxW):	0.42 x 0.25	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	1.58			
1 Arm Length:	3.75					
Arm Amplitude:	7.5	Throat Angle(s):	51.586°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY017
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNY017-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	<b>TRIANGLE</b>	<i>Spade</i>	Tipped Spade	<i>Almond</i>	Other	
Crown:	Rounded	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<b>ANGLED</b>	Segmented Arc	<i>Arc</i>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<b>PERPENDICULAR</b>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	14.1		Shank Min. Thickness:	0.5		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.33		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.25		
Shank Max. Thickness:	0.5		Shank Length:	12.2		
Key Height:	12.58	Dist. b/w Bills:	7.92	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	2.75	Ring Eye Dia.:	1.5	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.42 x	Ring Thickness:	0.15	
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.58			
1 Arm Length:	4.58					
Arm Amplitude:	9.2	Throat Angle(s):	53.099°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY018
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNY018-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<b>TRIANGLE</b>	<i>Spade</i>	<i>Tipped Spade</i>	<b>ALMOND</b>	<b>OTHER</b>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<b>NONE</b>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.5	Shank Min. Thickness:	0.33			
Stock Max. Diameter:	0.25	Shank Max. Width:	0.25			
Stock Min. Diameter:	0.1	Shank Min. Width:	0.33			
Shank Max. Thickness:	0.5	Shank Length:	6.33			
Key Height:	N/A	Dist. b/w Bills:	4.67	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	*	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	*	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	*			
1 Arm Length:	3					
Arm Amplitude:	6	Throat Angle(s):	48.19°	* see images 2 flukes		

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b> WNY019
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNY019-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	<b>NONE</b>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.42	Shank Min. Thickness:	0.42			
Stock Max. Diameter:	0.42	Shank Max. Width:	0.33			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.2			
Shank Max. Thickness:	0.63	Shank Length:	7.58			
Key Height:	N/A	Dist. b/w Bills:	5.42	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.67	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.33	Fluke Length:	1.05	Chain Link:	N/A	
Shackle Opening:	0.25	Fluke Width:	0.88			
1 Arm Length:	3.67					
Arm Amplitude:	7.42	Throat Angle(s):	53.169°			

<b>Name:</b> Bettie & Leon (NHHC)	<b>Date Recorded:</b> 22 July 2015	<b>Site #:</b>
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	1944 (or earlier)
Vessel Type and Name:	US Anzio CHVE 57
Nationality:	US Navy
Additional Information:	6 ton starboard anchor; originally named USS Coral Sea; renamed Oct 1944; built Vancouver (?) Washington 1943

<b>Photos Taken:</b>	
Number:	4
Range:	WNY020-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	43 (8?) Navy 4717 5195
Weight:	6 tons

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	10		Shank Min. Thickness:	0.75		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.83		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.75		
Shank Max. Thickness:	0.92		Shank Length:	8		
Key Height:	N/A	Dist. b/w Bills:	7.25	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	6	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	4	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.92			
1 Arm Length:	6					
Arm Amplitude:	18	Throat Angle(s):	N/A			

<b>Name:</b> Kate Morrand (NHHC)	<b>Date Recorded:</b> 3 April 2001	<b>Site #:</b> WNY021
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Currently undergoing conservation at NHHC UAB

<b>Photos Taken:</b>	
Number:	1
Range:	WNY021-1
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	N/A		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	N/A		Shank Length:	N/A		
Key Height:	N/A	Dist. b/w Bills:	4.58	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.92			
1 Arm Length:	2.2					
Arm Amplitude:	3.75	Throat Angle(s):	N/A			



<b>Name:</b> Kate Morrand (NHHC)	<b>Date Recorded:</b> 3 April 2001	<b>Site #:</b> WNY022
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Currently undergoing conservation at NHHC UAB

<b>Photos Taken:</b>	
Number:	1
Range:	WNY022-1
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<i>Spade</i>	<i>Tipped Spade</i>	<i>Almond</i>	<b>OTHER</b>	
Crown:	Rounded	<b>TIP</b>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<b>STRAIGHT</b>	<i>Angled</i>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	<i>Other</i>	
Shape:	Straight	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	<i>Other</i>	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	9.46		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.47		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.33		
Shank Max. Thickness:	N/A		Shank Length:	N/A		
Key Height:	N/A	Dist. b/w Bills:	N/A	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	1.48	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.15			
1 Arm Length:	3.25					
Arm Amplitude:	N/A	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> BNC001
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	9
Range:	BNC001-1 to -5 & BNC-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input checked="" type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.55		Shank Min. Thickness:	0.15		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.2		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.125		
Shank Max. Thickness:	0.25		Shank Length:	5.25		
Key Height:	5.85	Dist. b/w Bills:	3.2	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	1.3	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.2 x 0.1	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.1	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	2.3					
Arm Amplitude:	4.6	Throat Angle(s):	55.583°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> BNC002
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	9
Range:	BNC001-1 to -5 & BNC-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	Rounded	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	Straight	<b>ANGLED</b>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input checked="" type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	<i>Other</i>	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	<i>Other</i>	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.7		Shank Min. Thickness:	0.2		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.25		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.2		
Shank Max. Thickness:	0.3		Shank Length:	6		
Key Height:	6.9	Dist. b/w Bills:	4.2	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	1.6	Ring Eye Dia.:	1.1	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.3 x 0.1	Ring Thickness:	4.5	
Shackle Pin Thick.:	N/A	Fluke Length:	1.55	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.1			
1 Arm Length:	2.9					
Arm Amplitude:	5.4	Throat Angle(s):	56.515°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> MHNC001
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	15
Range:	MHNC001-1 to -15
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<b>TIP</b>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input checked="" type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	<b>WOOD OVER</b>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<b>TAPERED</b>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<b>TRUNNELS</b>	<b>METAL STRAPS</b>	<b>NAILS</b>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<b>UNKNOWN</b>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	10.1	Shank Min. Thickness:	0.7			
Stock Max. Diameter:	1.7	Shank Max. Width:	0.65			
Stock Min. Diameter:	1.4	Shank Min. Width:	0.6			
Shank Max. Thickness:	0.7	Shank Length:	6.9			
Key Height:	N/A	Dist. b/w Bills:	7.1	Ring Dia.:	0.3	
Shackle Dia.:	0.2	Height of Bills:	2.7	Ring Eye Dia.:	1.25	
Shackle Eye Dia.:	0.35	Bills (LxW):	0.5 x 0.2	Ring Thickness:	0.75	
Shackle Pin Thick.:	0.2	Fluke Length:	2.6	Chain Link:	L: 0.75	
Shackle Opening:	0.2	Fluke Width:	2		W: 0.5	
1 Arm Length:	4.5					
Arm Amplitude:	9.7	Throat Angle(s):	53.13°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> MHNC002
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	MHNC002-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.6	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.3	Shank Max. Width:	0.3			
Stock Min. Diameter:	0.15	Shank Min. Width:	0.2			
Shank Max. Thickness:	0.4	Shank Length:	3.7			
Key Height:	N/A	Dist. b/w Bills:	4	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	1.5	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.25	Bills (LxW):	0.2 x 0.15	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.05	Fluke Length:	1.2	Chain Link:	L: 0.3	
Shackle Opening:	0.05	Fluke Width:	1		W: 0.2	
1 Arm Length:	2.5					
Arm Amplitude:	5.8	Throat Angle(s):	53.13°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> MHNC003
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	9
Range:	MHNC003-1 to -9
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	8.5	Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.4	Shank Max. Width:	0.4		
Stock Min. Diameter:	0.25	Shank Min. Width:	0.35		
Shank Max. Thickness:	0.5	Shank Length:	5.4		
Key Height:	N/A	Dist. b/w Bills:	5.8	Ring Dia.:	0.1
Shackle Dia.:	N/A	Height of Bills:	1.6	Ring Eye Dia.:	0.8
Shackle Eye Dia.:	N/A	Bills (LxW):	0.4 x 0.2	Ring Thickness:	0.6
Shackle Pin Thick.:	N/A	Fluke Length:	1.9	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	1		
1 Arm Length:	3.6				
Arm Amplitude:	8	Throat Angle(s):	63.612°		

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> MNC001
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	MNC001-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	Arc	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.1		Shank Min. Thickness:	0.2		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.3		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.2		
Shank Max. Thickness:	0.2		Shank Length:	6.5		
Key Height:	N/A	Dist. b/w Bills:	4.3	Ring Dia.:	0.1	
Shackle Dia.:	0.1	Height of Bills:	1.4	Ring Eye Dia.:	1	
Shackle Eye Dia.:	0.3	Bills (LxW):	0.3 x 0.1	Ring Thickness:	0.4	
Shackle Pin Thick.:	0.05	Fluke Length:	1.3	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.9			
1 Arm Length:	2.6					
Arm Amplitude:	5.2	Throat Angle(s):	57.421°			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> MNC002
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	10
Range:	MNC002-1 to -10
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<b>NONE</b>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.9	Shank Min. Thickness:	0.25			
Stock Max. Diameter:	0.3	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.15	Shank Min. Width:	0.3			
Shank Max. Thickness:	0.3	Shank Length:	4.8			
Key Height:	N/A	Dist. b/w Bills:	4.3	Ring Dia.:	N/A	
Shackle Dia.:	0.15	Height of Bills:	1.6	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.3	Bills (LxW):	0.4 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	L: 0.4	
Shackle Opening:	N/A	Fluke Width:	1		W: 0.25	
1 Arm Length:	2.7					
Arm Amplitude:	5.4	Throat Angle(s):	53.659°			



<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> MNC003
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	MNC001-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	4.2	Shank Min. Thickness:	0.2		
Stock Max. Diameter:	0.15	Shank Max. Width:	0.1		
Stock Min. Diameter:	0.15	Shank Min. Width:	0.1		
Shank Max. Thickness:	0.25	Shank Length:	3.4		
Key Height:	N/A	Dist. b/w Bills:	2.9	Ring Dia.:	0.1
Shackle Dia.:	N/A	Height of Bills:	0.9	Ring Eye Dia.:	0.4
Shackle Eye Dia.:	N/A	Bills (LxW):	0.2 x 0.1	Ring Thickness:	0.2
Shackle Pin Thick.:	N/A	Fluke Length:	1.1	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	0.6		
1 Arm Length:	1.75				
Arm Amplitude:	3.5	Throat Angle(s):	59.05°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2016	<b>Site #:</b> MNC004
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	MNC001-1 to -4
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<i>Spade</i>	<i>Tipped Spade</i>	<i>Almond</i>	<b>OTHER</b>	
Crown:	Rounded	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	Swivel	<b>OTHER</b>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.5		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	N/A		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	N/A		Shank Length:	4.3		
Key Height:	0.8	Dist. b/w Bills:	N/A	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	0.7	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.2	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:				
1 Arm Length:	2.8					
Arm Amplitude:	6	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> MNC005
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	1
Range:	MNC005
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<i>Spade</i>	<i>Tipped Spade</i>	<i>Almond</i>	<b>OTHER</b>	
Crown:	Rounded	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	Swivel	<b>OTHER</b>
Arms:	Straight	<i>Angled</i>	<i>Segmented Arc</i>	<i>Arc</i>	Mobile	<b>OTHER</b>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	Bent	<b>OTHER</b>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.8		Shank Min. Thickness:	0.1		
Stock Max. Diameter:	1.5		Shank Max. Width:	0.1		
Stock Min. Diameter:	1		Shank Min. Width:	0.1		
Shank Max. Thickness:	0.2		Shank Length:	3.8		
Key Height:	N/A	Dist. b/w Bills:	N/A	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	0.5	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	0.3	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	N/A					
Arm Amplitude:	N/A	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> NHNC001
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	NHNC001-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.4		Shank Min. Thickness:	0.1		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.4		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.2		
Shank Max. Thickness:	0.2		Shank Length:	3.6		
Key Height:	N/A	Dist. b/w Bills:	3.25	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	1.6	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.25 x 0.1	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.05	Fluke Length:	1.35	Chain Link:	L: 0.3	
Shackle Opening:	N/A	Fluke Width:	1		W: 0.2	
1 Arm Length:	2.35					
Arm Amplitude:	4.9	Throat Angle(s):	47.09°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC002
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	NHNC002-1 to -7
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	7.9	Shank Min. Thickness:	0.3		
Stock Max. Diameter:	0.4	Shank Max. Width:	0.5		
Stock Min. Diameter:	0.25	Shank Min. Width:	0.4		
Shank Max. Thickness:	0.55	Shank Length:	5.1		
Key Height:	N/A	Dist. b/w Bills:	2.8	Ring Dia.:	0.2
Shackle Dia.:	0.1	Height of Bills:	1.8	Ring Eye Dia.:	0.75
Shackle Eye Dia.:	0.4	Bills (LxW):	0.25 x 0.25	Ring Thickness:	0.6
Shackle Pin Thick.:	N/A	Fluke Length:	1.6 0.95	Chain Link:	L: 0.5
Shackle Opening:	N/A	Fluke Width:	N/A		W: 0.3
1 Arm Length:	3.5				
Arm Amplitude:	7	Throat Angle(s):	59.05°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC003
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	NHNC005-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<b>TIP</b>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	11.9	Shank Min. Thickness:	0.7			
Stock Max. Diameter:	N/A	Shank Max. Width:	0.8			
Stock Min. Diameter:	N/A	Shank Min. Width:	0.7			
Shank Max. Thickness:	0.9	Shank Length:	7.4			
Key Height:	10.3	Dist. b/w Bills:	6.9	Ring Dia.:	0.4	
Shackle Dia.:	0.3	Height of Bills:	3.2	Ring Eye Dia.:	1.2	
Shackle Eye Dia.:	0.4	Bills (LxW):	0.6 x 0.2	Ring Thickness:	0.9	
Shackle Pin Thick.:	N/A	Fluke Length:	2.3	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.6			
1 Arm Length:	4.3					
Arm Amplitude:	9.7	Throat Angle(s):	41.911°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC004
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	9
Range:	NHNC004-1 to -9
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	<b>TRIANGLE</b>	<i>Spade</i>	Tipped Spade	<i>Almond</i>	Other	
Crown:	Rounded	<b>TIP</b>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<b>PERPENDICULAR</b>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	13.5		Shank Min. Thickness:	0.3		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.5		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	0.7		Shank Length:	12.6		
Key Height:	12.7	Dist. b/w Bills:	8.8	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	3.5	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.6	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2.4			
1 Arm Length:	5.7					
Arm Amplitude:	10.4	Throat Angle(s):	52.118°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC005
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	NHNC005-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.5	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.4			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.4			
Shank Max. Thickness:	0.6	Shank Length:	5			
Key Height:	N/A	Dist. b/w Bills:	5.6	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.7	Bills (LxW):	0.4 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.9	Chain Link:	L: 0.6	
Shackle Opening:	N/A	Fluke Width:	1.2		W: 0.4	
1 Arm Length:	3.7					
Arm Amplitude:	8	Throat Angle(s):	53.516°			



<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC006
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	US Navy
Additional Information:	ON FLUKE: 632594 2 LWT 4215 RS A1 NORFOLK NY UL 1945 SENO 58960 US NAVY

<b>Photos Taken:</b>	
Number:	3
Range:	NHNC006-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	Flattened	<i>Unknown</i>	<b>OTHER</b>	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<i>Almond</i>	<b>OTHER</b>	
Crown:	Rounded	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	<b>SWIVEL</b>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<i>Arc</i>	<b>MOBILE</b>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	N/A		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	N/A		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	N/A		Shank Length:	N/A		
Key Height:	N/A	Dist. b/w Bills:	N/A	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	N/A	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	N/A					
Arm Amplitude:	N/A	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 14 Nov 2015	<b>Site #:</b> NHNC007
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	1
Range:	NHNC001
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<i>Spade</i>	<i>Tipped Spade</i>	<b>ALMOND</b>	<i>Other</i>	
Crown:	Rounded	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<b>STRAIGHT</b>	<i>Angled</i>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	Straight	<i>Upturned</i>	<i>Tapered</i>	<b>CONVEX</b>	<i>Bent</i>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	<i>Other</i>	
Key:	Parallel	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.4	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.3	Shank Max. Width:	0.3			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.25			
Shank Max. Thickness:	0.3	Shank Length:	5.2			
Key Height:	N/A	Dist. b/w Bills:	3.2	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	1.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	2.4					
Arm Amplitude:	3.9	Throat Angle(s):	60°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 16 Nov 2015	<b>Site #:</b> WANC001
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WANC001-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<b>ANGLED</b>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.4	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.1	Shank Max. Width:	0.35			
Stock Min. Diameter:	0.1	Shank Min. Width:	0.25			
Shank Max. Thickness:	0.45	Shank Length:	6.2			
Key Height:	N/A	Dist. b/w Bills:	4	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	1.7	Ring Eye Dia.:	0.95	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.3 x --	Ring Thickness:	0.45	
Shackle Pin Thick.:	N/A	Fluke Length:	1.35	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.1			
1 Arm Length:	2.9					
Arm Amplitude:	6.4	Throat Angle(s):	54.112°			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC001
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Baldt on crown of anchor

<b>Photos Taken:</b>	
Number:	13
Range:	WNC001-1 to -13
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Baldt
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.8		Shank Min. Thickness:	0.3		
Stock Max. Diameter:	0.35		Shank Max. Width:	0.55		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.35		
Shank Max. Thickness:	1		Shank Length:	6.9		
Key Height:	N/A	Dist. b/w Bills:	7	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	2.4	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.35 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.15	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.55			
1 Arm Length:	4.1					
Arm Amplitude:	8.4	Throat Angle(s):	54.171°			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC002
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Painted Pink with undercoat of blue Shackle partially buried

<b>Photos Taken:</b>	
Number:	12
Range:	WNC001-1 to -12
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<b>PERPENDICULAR</b>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	10.3		Shank Min. Thickness:	0.35		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.8		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.5		
Shank Max. Thickness:	0.7		Shank Length:	10.1		
Key Height:	N/A	Dist. b/w Bills:	6.55	Ring Dia.:	0.3	
Shackle Dia.:	N/A	Height of Bills:	2.5	Ring Eye Dia.:	0.9	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.4 x 0.3	Ring Thickness:	0.8	
Shackle Pin Thick.:	N/A	Fluke Length:	2.4	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.6			
1 Arm Length:	4.2					
Arm Amplitude:	8.6	Throat Angle(s):	53.47°			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC003
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Wooden stock still attached but slipped down towards flukes (see images).

<b>Photos Taken:</b>	
Number:	9
Range:	WNC003-1 to -9
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input checked="" type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	<b>WOOD OVER</b>	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<b>OVAL</b>	Square	<i>Rectangular</i>	Other	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<b>METAL STRAPS</b>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<b>PERPENDICULAR</b>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	9.1		Shank Min. Thickness:	0.5		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.65		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.55		
Shank Max. Thickness:	0.6		Shank Length:	8.3		
Key Height:	7.85	Dist. b/w Bills:	6.3	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	2.3	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.4 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	4					
Arm Amplitude:	8.1	Throat Angle(s):	54.9°			

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC004
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Not sure if chain is associated with anchor or later addition by owner

<b>Photos Taken:</b>	
Number:	9
Range:	WNC004-1 to -9
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood Over</i>	<i>Wood Through</i>	<i>Metal Over</i>	<b>METAL STRAIGHT</b>	<i>Metal Bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<b>NONE</b>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	8.9	Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.25	Shank Max. Width:	0.7		
Stock Min. Diameter:	0.2	Shank Min. Width:	0.5		
Shank Max. Thickness:	0.5	Shank Length:	8.1		
Key Height:	N/A	Dist. b/w Bills:	5.9	Ring Dia.:	N/A
Shackle Dia.:	0.2	Height of Bills:	2.9	Ring Eye Dia.:	N/A
Shackle Eye Dia.:	0.65	Bills (LxW):	0.3 x 0.2	Ring Thickness:	N/A
Shackle Pin Thick.:	0.2	Fluke Length:	1.8	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	1.4		
1 Arm Length:	3.5				
Arm Amplitude:	7.8	Throat Angle(s):	34.048°		

<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC005
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Chain intact

<b>Photos Taken:</b>	
Number:	10
Range:	WNC005-1 to -10
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	Rounded	<b>TIP</b>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	Arc	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood Over	<i>Wood Through</i>	Metal Over	<b>METAL STRAIGHT</b>	Metal Bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	Oval	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	Metal Straps	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	Perpendicular	<b>NONE</b>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.6		Shank Min. Thickness:	0.2		
Stock Max. Diameter:	0.2		Shank Max. Width:	0.15		
Stock Min. Diameter:	0.2		Shank Min. Width:	0.15		
Shank Max. Thickness:	0.2		Shank Length:	4.45		
Key Height:	N/A	Dist. b/w Bills:	3.9	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	1.4	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.3	Bills (LxW):	0.3 x --	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	L: 0.4	
Shackle Opening:	N/A	Fluke Width:	N/A		W: 0.25	
1 Arm Length:	2.6					
Arm Amplitude:	4.8	Throat Angle(s):	57.421°			



<b>Name:</b> Bettie & Mitch	<b>Date Recorded:</b> 18 Oct 2015	<b>Site #:</b> WNC006
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNC006-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<b>OTHER</b>
Arms:	<b>STRAIGHT</b>	<i>Angled</i>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4	Shank Min. Thickness:	0.3			
Stock Max. Diameter:	N/A	Shank Max. Width:	0.3			
Stock Min. Diameter:	N/A	Shank Min. Width:	0.3			
Shank Max. Thickness:	0.3	Shank Length:	3			
Key Height:	N/A	Dist. b/w Bills:	3.9	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	1.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.25	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.05	Fluke Length:	1.7	Chain Link:	L: 0.3	
Shackle Opening:	0.1	Fluke Width:	1.5		W: 0.2	
1 Arm Length:	2.25	1 Arm Length:	2.15	Throat Angle(s):	N/A	
Arm Amplitude:	5	Arm Amplitude:	5.2	Throat Angle(s):	N/A	

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC007
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC007-1 to -8
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<i>Metal Straight</i>	<b>METAL BENT</b>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7		Shank Min. Thickness:	0.5		
Stock Max. Diameter:	0.3		Shank Max. Width:	0.5		
Stock Min. Diameter:	0.2		Shank Min. Width:	0.4		
Shank Max. Thickness:	0.5		Shank Length:	7		
Key Height:	N/A	Dist. b/w Bills:	4.6	Ring Dia.:	N/A	
Shackle Dia.:	0.15	Height of Bills:	N/A	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.75	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	0.15	Fluke Width:	N/A			
1 Arm Length:	N/A					
Arm Amplitude:	N/A	Throat Angle(s):	N/A			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC008
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC008-1 to -6
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.4	Shank Min. Thickness:	0.7			
Stock Max. Diameter:	0.5	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.4			
Shank Max. Thickness:	0.6	Shank Length:	7.9			
Key Height:	N/A	Dist. b/w Bills:	6	Ring Dia.:	1	
Shackle Dia.:	0.15	Height of Bills:	2	Ring Eye Dia.:	0.4	
Shackle Eye Dia.:	0.3	Bills (LxW):	0.4 x 0.2	Ring Thickness:	0.2	
Shackle Pin Thick.:	0.2	Fluke Length:	2	Chain Link:	L: 0.6	
Shackle Opening:	N/A	Fluke Width:	1.3		W: 0.4	
1 Arm Length:	3.6					
Arm Amplitude:	7.5	Throat Angle(s):	56.251°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC009
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNC009-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	US
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	Unknown	Other	
Fluke Shape:	Triangle	Spade	Tipped Spade	Almond	<b>OTHER</b>	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	<b>SEGMENTED ARC</b>	Arc	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	<b>METAL STRAIGHT</b>	Metal bent	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.4	Shank Min. Thickness:	0.3			
Stock Max. Diameter:	0.1	Shank Max. Width:	0.3			
Stock Min. Diameter:	0.1	Shank Min. Width:	0.3			
Shank Max. Thickness:	0.3	Shank Length:	3.75			
Key Height:	N/A	Dist. b/w Bills:	2.5	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	0.9	Ring Eye Dia.:	0.25	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	0.1	
Shackle Pin Thick.:	N/A	Fluke Length:	0.875	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.54			
1 Arm Length:	1.8					
Arm Amplitude:	3.9	Throat Angle(s):	60°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC010
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNC010-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	Unknown	Other	
Fluke Shape:	Triangle	Spade	Tipped Spade	Almond	<b>OTHER</b>	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	<b>SEGMENTED ARC</b>	Arc	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	Metal Straight	Metal bent	Other
Section:	Circular	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	Bent	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.4		Shank Min. Thickness:	0.3		
Stock Max. Diameter:	0.1		Shank Max. Width:	0.3		
Stock Min. Diameter:	0.1		Shank Min. Width:	0.3		
Shank Max. Thickness:	0.3		Shank Length:	3.75		
Key Height:	N/A	Dist. b/w Bills:	2.5	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	0.9	Ring Eye Dia.:	0.25	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	0.1	
Shackle Pin Thick.:	N/A	Fluke Length:	0.875	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.54			
1 Arm Length:	1.8					
Arm Amplitude:	3.9	Throat Angle(s):	60°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC011
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC011-1 to -7
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	11	Shank Min. Thickness:	0.6			
Stock Max. Diameter:	0.5	Shank Max. Width:	2			
Stock Min. Diameter:	0.5	Shank Min. Width:	0.6			
Shank Max. Thickness:	0.8	Shank Length:	7.9			
Key Height:	N/A	Dist. b/w Bills:	7.7	Ring Dia.:	0.3	
Shackle Dia.:	0.2	Height of Bills:	3.2	Ring Eye Dia.:	1	
Shackle Eye Dia.:	0.6	Bills (LxW):	0.3 x 0.5	Ring Thickness:	0.3	
Shackle Pin Thick.:	N/A	Fluke Length:	2.75	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	2			
1 Arm Length:	5					
Arm Amplitude:	9.8	Throat Angle(s):	50.208°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC012
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNC012-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<b>OVAL</b>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<b>COTTER PINS</b>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<b>NONE</b>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	9.6	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.75			
Stock Min. Diameter:	0.25	Shank Min. Width:	0.45			
Shank Max. Thickness:	0.75	Shank Length:	7.3			
Key Height:	N/A	Dist. b/w Bills:	6.6	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2.4	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.8	Bills (LxW):	0.25 x 0.6	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.2	Chain Link:	L: 0.6	
Shackle Opening:	N/A	Fluke Width:	1.7		W: 0.375	
1 Arm Length:	4					
Arm Amplitude:	8.3	Throat Angle(s):	53.13°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC013
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Baldt Stockless Anchor

<b>Photos Taken:</b>	
Number:	5
Range:	WNC013-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Chester PA
Weight:	

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	Tipped Spade	<b>ALMOND</b>	Other	
Crown:	Rounded	Tip	Pointed	Fishbuckle	<b>SWIVEL</b>	Other
Arms:	Straight	Angled	Segmented Arc	Arc	<b>MOBILE</b>	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	Wood through	Metal over	Metal Straight	Metal bent	Other
Section:	Circular	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	Bent	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.2		Shank Min. Thickness:	N/A		
Stock Max. Diameter:	N/A		Shank Max. Width:	N/A		
Stock Min. Diameter:	N/A		Shank Min. Width:	N/A		
Shank Max. Thickness:	N/A		Shank Length:	N/A		
Key Height:	N/A	Dist. b/w Bills:	4	Ring Dia.:	N/A	
Shackle Dia.:	0.16	Height of Bills:	1	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.4	Bills (LxW):	0.8	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	0.125	Chain Link:	L: 0.5	
Shackle Opening:	N/A	Fluke Width:	0.25		W: 0.35	
1 Arm Length:	3.1					
Arm Amplitude:	N/A	Throat Angle(s):	71.181°			



<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC014
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC014-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	11.4	Shank Min. Thickness:	0.6			
Stock Max. Diameter:	0.4	Shank Max. Width:	1			
Stock Min. Diameter:	0.375	Shank Min. Width:	0.6			
Shank Max. Thickness:	0.7	Shank Length:	8.4			
Key Height:	N/A	Dist. b/w Bills:	7.5	Ring Dia.:	N/A	
Shackle Dia.:	0.3	Height of Bills:	3.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.75	Bills (LxW):	0.45 x 0.33	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.75	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.9			
1 Arm Length:	5					
Arm Amplitude:	10.6	Throat Angle(s):	50.208°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC015
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Chain is not associated.

<b>Photos Taken:</b>	
Number:	8
Range:	WNC015-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<b>TRIANGLE</b>	<i>Spade</i>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.75		Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.3		Shank Max. Width:	0.45		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.375		
Shank Max. Thickness:	0.6		Shank Length:	4.8		
Key Height:	N/A	Dist. b/w Bills:	5	Ring Dia.:	0.25	
Shackle Dia.:	N/A	Height of Bills:	2	Ring Eye Dia.:	0.66	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.25			
1 Arm Length:	2.9					
Arm Amplitude:	6.3	Throat Angle(s):	46.397°			

<b>Name:</b> Bettie & Tyler	<b>Date Recorded:</b> 7 Nov 2015	<b>Site #:</b> WNC016
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNC016-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<i>Tipped Spade</i>	<b>ALMOND</b>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.7	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.16	Shank Max. Width:	0.25			
Stock Min. Diameter:	0.16	Shank Min. Width:	0.2			
Shank Max. Thickness:	0.25	Shank Length:	4.25			
Key Height:	N/A	Dist. b/w Bills:	3.6	Ring Dia.:	0.125	
Shackle Dia.:	N/A	Height of Bills:	1.5	Ring Eye Dia.:	0.5	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.75			
1 Arm Length:	2.3					
Arm Amplitude:	4.8	Throat Angle(s):	49.294°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC017
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Was told by owner that this anchor was removed from the ocean within last two weeks.

<b>Photos Taken:</b>	
Number:	16
Range:	WNC017-1 to -16
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.1		Shank Min. Thickness:	0.5		
Stock Max. Diameter:	0.6		Shank Max. Width:	0.6		
Stock Min. Diameter:	0.45		Shank Min. Width:	0.5		
Shank Max. Thickness:	0.6		Shank Length:	5.7		
Key Height:	N/A	Dist. b/w Bills:	5.8	Ring Dia.:	N/A	
Shackle Dia.:	0.25	Height of Bills:	2.3	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.4	Bills (LxW):	0.4 x 0.3	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	L: 0.75	
Shackle Opening:	N/A	Fluke Width:	1.5		W: 0.5	
1 Arm Length:	3.8					
Arm Amplitude:	8.1	Throat Angle(s):	52.752°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC018
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC018-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	Triangle	<b>SPADE</b>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<b>UPTURNED</b>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>			<b>Dia.=Diameter</b>		
Overall Length:	10	Shank Min. Thickness:	0.5		
Stock Max. Diameter:	0.45	Shank Max. Width:	0.5		
Stock Min. Diameter:	0.25	Shank Min. Width:	0.4		
Shank Max. Thickness:	0.7	Shank Length:	6.2		
Key Height:	N/A	Dist. b/w Bills:	5.3	Ring Dia.:	N/A
Shackle Dia.:	0.35	Height of Bills:	2	Ring Eye Dia.:	N/A
Shackle Eye Dia.:	0.85	Bills (LxW):	N/A	Ring Thickness:	N/A
Shackle Pin Thick.:	0.2	Fluke Length:	1.5	Chain Link:	L: 0.7
Shackle Opening:	0.2	Fluke Width:	1.45		W: 0.4
1 Arm Length:	3.4				
Arm Amplitude:	6.9	Throat Angle(s):	53.968°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC019
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC019-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	7.5	Shank Min. Thickness:	0.6		
Stock Max. Diameter:	0.4	Shank Max. Width:	0.5		
Stock Min. Diameter:	0.25	Shank Min. Width:	0.45		
Shank Max. Thickness:	0.7	Shank Length:	5.6		
Key Height:	N/A	Dist. b/w Bills:	5.8	Ring Dia.:	0.2
Shackle Dia.:	N/A	Height of Bills:	1.8	Ring Eye Dia.:	0.9
Shackle Eye Dia.:	N/A	Bills (LxW):	0.5 x 0.25	Ring Thickness:	0.6
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	1.6		
1 Arm Length:	3.6				
Arm Amplitude:	7.5	Throat Angle(s):	60°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC020
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC020-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.4	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.5	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.4	Shank Min. Width:	0.5			
Shank Max. Thickness:	0.8	Shank Length:	5.4			
Key Height:	N/A	Dist. b/w Bills:	6.3	Ring Dia.:	N/A	
Shackle Dia.:	0.3	Height of Bills:	2.3	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.8	Bills (LxW):	0.3 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	2.2	Chain Link:	N/A	
Shackle Opening:	0.2	Fluke Width:	1.45			
1 Arm Length:	3.8					
Arm Amplitude:	8.1	Throat Angle(s):	52.752°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC021
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	2
Range:	WNC021-1 to -2
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5		Shank Min. Thickness:	0.3		
Stock Max. Diameter:	0.2		Shank Max. Width:	0.25		
Stock Min. Diameter:	0.1		Shank Min. Width:	0.2		
Shank Max. Thickness:	0.4		Shank Length:	3.2		
Key Height:	N/A	Dist. b/w Bills:	3.35	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	1.25	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.3	Bills (LxW):	0.2 x 0.15	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1.15	Chain Link:	N/A	
Shackle Opening:	0.1	Fluke Width:	0.9			
1 Arm Length:	2.1					
Arm Amplitude:	4.45	Throat Angle(s):	53.47°			



<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC022
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNC022-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	6.8	Shank Min. Thickness:	0.3		
Stock Max. Diameter:	0.3	Shank Max. Width:	0.3		
Stock Min. Diameter:	0.2	Shank Min. Width:	0.2		
Shank Max. Thickness:	0.5	Shank Length:	5		
Key Height:	N/A	Dist. b/w Bills:	4.45	Ring Dia.:	0.1
Shackle Dia.:	0.1	Height of Bills:	1.7	Ring Eye Dia.:	0.75
Shackle Eye Dia.:	0.35	Bills (LxW):	0.4 x 0.15	Ring Thickness:	0.5
Shackle Pin Thick.:	0.075	Fluke Length:	1.5	Chain Link:	L: 0.45
Shackle Opening:	0.075	Fluke Width:	1		W: 0.3
1 Arm Length:	2.9				
Arm Amplitude:	6.1	Throat Angle(s):	54.112°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC023
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNC023-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.8	Shank Min. Thickness:	0.3			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.35			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.25			
Shank Max. Thickness:	0.2	Shank Length:	3.4			
Key Height:	N/A	Dist. b/w Bills:	4.2	Ring Dia.:	0.15	
Shackle Dia.:	N/A	Height of Bills:	1.7	Ring Eye Dia.:	0.6	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.3 x 0.15	Ring Thickness:	0.5	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	2.7					
Arm Amplitude:	5.5	Throat Angle(s):	50.977°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC024
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC024-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	<i>Circular</i>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.1		Shank Min. Thickness:	0.35		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.4		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.35		
Shank Max. Thickness:	0.5		Shank Length:	5.6		
Key Height:	N/A	Dist. b/w Bills:	5.4	Ring Dia.:	0.2	
Shackle Dia.:	N/A	Height of Bills:	2.1	Ring Eye Dia.:	0.8	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.3 x 0.15	Ring Thickness:	0.5	
Shackle Pin Thick.:	N/A	Fluke Length:	1.8	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.3			
1 Arm Length:	3.4					
Arm Amplitude:	7.6	Throat Angle(s):	51.855°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC025
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC025-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	6.8	Shank Min. Thickness:	0.4			
Stock Max. Diameter:	0.2	Shank Max. Width:	0.35			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.35			
Shank Max. Thickness:	0.5	Shank Length:	5			
Key Height:	N/A	Dist. b/w Bills:	4.5	Ring Dia.:	0.2	
Shackle Dia.:	0.1	Height of Bills:	1.7	Ring Eye Dia.:	0.7	
Shackle Eye Dia.:	0.25	Bills (LxW):	0.2 x 0.1	Ring Thickness:	0.55	
Shackle Pin Thick.:	0.15	Fluke Length:	1.5	Chain Link:	N/A	
Shackle Opening:	0.15	Fluke Width:	1			
1 Arm Length:	2.8					
Arm Amplitude:	6	Throat Angle(s):	52.617°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC026
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNC026-1 to 05
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.7	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.2	Shank Max. Width:	0.25			
Stock Min. Diameter:	0.15	Shank Min. Width:	0.2			
Shank Max. Thickness:	0.3	Shank Length:	4			
Key Height:	N/A	Dist. b/w Bills:	3.4	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	1.3	Ring Eye Dia.:	0.5	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.2 x 0.1	Ring Thickness:	0.35	
Shackle Pin Thick.:	N/A	Fluke Length:	1	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	0.85			
1 Arm Length:	2.2					
Arm Amplitude:	4.45	Throat Angle(s):	53.776°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC027
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC027-1 to-6
Redundancy?	<input checked="" type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>Arc</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7		Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.3		Shank Max. Width:	0.45		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.4		
Shank Max. Thickness:	0.6		Shank Length:	4.6		
Key Height:	N/A	Dist. b/w Bills:	4.6	Ring Dia.:	N/A	
Shackle Dia.:	0.15	Height of Bills:	1.55	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.65	Bills (LxW):	0.2 x 0.1	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1.4	Chain Link:	L: 0.4	
Shackle Opening:	0.1	Fluke Width:	N/A		W: 0.25	
1 Arm Length:	2.8					
Arm Amplitude:	6	Throat Angle(s):	56.338°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC028
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC028-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.1	Shank Min. Thickness:	0.3			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.4			
Stock Min. Diameter:	0.25	Shank Min. Width:	0.35			
Shank Max. Thickness:	0.4	Shank Length:	5			
Key Height:	N/A	Dist. b/w Bills:	4.7	Ring Dia.:	0.15	
Shackle Dia.:	N/A	Height of Bills:	1.6	Ring Eye Dia.:	0.8	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.3 x 0.2	Ring Thickness:	0.5	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.6			
1 Arm Length:	3					
Arm Amplitude:	5.9	Throat Angle(s):	45.291°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC029
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNC029-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.5	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.35	Shank Max. Width:	N/A			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.5			
Shank Max. Thickness:	0.6	Shank Length:	4.7			
Key Height:	N/A	Dist. b/w Bills:	5.2	Ring Dia.:	0.2	
Shackle Dia.:	0.2	Height of Bills:	2	Ring Eye Dia.:	0.9	
Shackle Eye Dia.:	0.35	Bills (LxW):	0.3 x 0.2	Ring Thickness:	0.6	
Shackle Pin Thick.:	0.15	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	0.15	Fluke Width:	1.2			
1 Arm Length:	3.1					
Arm Amplitude:	7.2	Throat Angle(s):	49.822°			



<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC030
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	4
Range:	WNC030-1 to -4
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	Wood through	Metal over	Metal Straight	Metal bent	Other
Section:	Circular	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	Bent	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.7		Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.4		Shank Max. Width:	N/A		
Stock Min. Diameter:	0.3		Shank Min. Width:	0.35		
Shank Max. Thickness:	0.7		Shank Length:	5.2		
Key Height:	N/A	Dist. b/w Bills:	5.4	Ring Dia.:	N/A	
Shackle Dia.:	0.3	Height of Bills:	2.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.5	Bills (LxW):	0.4 x 0.15	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.4			
1 Arm Length:	3.4					
Arm Amplitude:	8	Throat Angle(s):	49.68°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC031
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC031-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	Facetted	<b>FLATTENED</b>	Unknown	Other	
Fluke Shape:	Triangle	Spade	<b>TIPPED SPADE</b>	Almond	Other	
Crown:	<b>ROUNDED</b>	Tip	Pointed	Fishbuckle	Swivel	Other
Arms:	Straight	Angled	Segmented Arc	<b>ARC</b>	Mobile	Other
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	Wood through	Metal over	<b>METAL STRAIGHT</b>	Metal bent	Other
Section:	<b>CIRCULAR</b>	Oval	Square	Rectangular	Other	
Shape:	Straight	Upturned	Tapered	Convex	<b>BENT</b>	Other
Fasteners:	Trunnels	Metal Straps	Nails	Cotter Pins	Other	
Key:	Parallel	Perpendicular	None	Unknown		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.9	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.45			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.4			
Shank Max. Thickness:	0.6	Shank Length:	5.6			
Key Height:	N/A	Dist. b/w Bills:	5.6	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.5	Bills (LxW):	0.4 x 0.175	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	2.05	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.6			
1 Arm Length:	3.5					
Arm Amplitude:	7.7	Throat Angle(s):	55.15°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC032
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNC032-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	Tipped Spade	<i>Almond</i>	<b>OTHER</b>	
Crown:	Rounded	<b>TIP</b>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.3		Shank Min. Thickness:	0.2		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.2		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.1		
Shank Max. Thickness:	0.3		Shank Length:	3.2		
Key Height:	N/A	Dist. b/w Bills:	3.5	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	1.2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	2					
Arm Amplitude:	4.3	Throat Angle(s):	53.13°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC033
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	Top missing—appears broken off

<b>Photos Taken:</b>	
Number:	7
Range:	WNC033-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<b>SPADE</b>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>	
Crown:	<i>Rounded</i>	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<b>ANGLED</b>	<i>Segmented Arc</i>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	<i>Metal bent</i>	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	4.9		Shank Min. Thickness:	0.3		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.4		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.25		
Shank Max. Thickness:	0.4		Shank Length:	4.3		
Key Height:	N/A	Dist. b/w Bills:	5.2	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	1.8	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.6	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.2			
1 Arm Length:	3.1					
Arm Amplitude:	6.45	Throat Angle(s):	54.504°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC034
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	6
Range:	WNC034-1 to -6
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input checked="" type="checkbox"/>
Inscription Details:	Unsure—see photos
Weight:	N/A

<b>Other Features:</b>					
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i> <i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i> <i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>		
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i> <i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b> <i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>	
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>	
Overall Length:	4.5	Shank Min. Thickness:	0.15		
Stock Max. Diameter:	0.1	Shank Max. Width:	0.2		
Stock Min. Diameter:	0.1	Shank Min. Width:	0.15		
Shank Max. Thickness:	0.2	Shank Length:	3.5		
Key Height:	N/A	Dist. b/w Bills:	2.85	Ring Dia.:	0.1
Shackle Dia.:	N/A	Height of Bills:	0.95	Ring Eye Dia.:	0.5
Shackle Eye Dia.:	N/A	Bills (LxW):	0.1 x 0.1	Ring Thickness:	0.35
Shackle Pin Thick.:	N/A	Fluke Length:	0.75	Chain Link:	N/A
Shackle Opening:	N/A	Fluke Width:	0.55		
1 Arm Length:	1.7				
Arm Amplitude:	3.5	Throat Angle(s):	56.026°		

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC035
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNC035-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<b>SPADE</b>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>	
Crown:	Rounded	<b>TIP</b>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	Straight	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	Parallel	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.3	Shank Min. Thickness:	0.2			
Stock Max. Diameter:	0.15	Shank Max. Width:	0.2			
Stock Min. Diameter:	0.15	Shank Min. Width:	0.2			
Shank Max. Thickness:	0.2	Shank Length:	3.8			
Key Height:	N/A	Dist. b/w Bills:	4.2	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	1.6	Ring Eye Dia.:	0.7	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	0.4	
Shackle Pin Thick.:	N/A	Fluke Length:	N/A	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	N/A			
1 Arm Length:	2.3					
Arm Amplitude:	5.2	Throat Angle(s):	45.291°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC036
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	3
Range:	WNC036-1 to -3
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<b>SPADE</b>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>	
Crown:	Rounded	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<b>OTHER</b>
Arms:	<i>Straight</i>	<i>Angled</i>	<b>SEGMENTED ARC</b>	<i>Arc</i>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.1	Shank Min. Thickness:	N/A			
Stock Max. Diameter:	0.2	Shank Max. Width:	N/A			
Stock Min. Diameter:	0.2	Shank Min. Width:	N/A			
Shank Max. Thickness:	N/A	Shank Length:	3.8			
Key Height:	N/A	Dist. b/w Bills:	3.1	Ring Dia.:	N/A	
Shackle Dia.:	0.1	Height of Bills:	1.4	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.4	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1.25	Chain Link:	N/A	
Shackle Opening:	0.1	Fluke Width:	1.2			
1 Arm Length:	2.3					
Arm Amplitude:	4.6	Throat Angle(s):	52.505°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC037
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC037-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.5		Shank Min. Thickness:	0.4		
Stock Max. Diameter:	0.35		Shank Max. Width:	0.5		
Stock Min. Diameter:	0.25		Shank Min. Width:	0.4		
Shank Max. Thickness:	0.6		Shank Length:	5		
Key Height:	N/A	Dist. b/w Bills:	5.3	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	1.9	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.8	Bills (LxW):	0.3 x 0.15	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	1.6	Chain Link:	L: 0.7	
Shackle Opening:	0.2	Fluke Width:	1.2		W: 0.4	
1 Arm Length:	3.3					
Arm Amplitude:	6.8	Throat Angle(s):	54.847°			



<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC038
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC038-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	Rounded	<i>Tip</i>	<b>POINTED</b>	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<b>ANGLED</b>	<b>SEGMENTED ARC</b>	<i>Arc</i>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input type="checkbox"/>		*No Stock Remains	
Type:	Wood over	<i>Wood through</i>	Metal over	<i>Metal Straight</i>	Metal bent	<i>Other</i>
Section:	Circular	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	Bent	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.2		Shank Min. Thickness:	0.2		
Stock Max. Diameter:	N/A		Shank Max. Width:	0.2		
Stock Min. Diameter:	N/A		Shank Min. Width:	0.2		
Shank Max. Thickness:	0.3		Shank Length:	6.1		
Key Height:	N/A	Dist. b/w Bills:	4.4	Ring Dia.:	0.1	
Shackle Dia.:	0.2	Height of Bills:	1.75	Ring Eye Dia.:	0.9	
Shackle Eye Dia.:	0.65	Bills (LxW):	0.35 x 0.2	Ring Thickness:	0.4	
Shackle Pin Thick.:	0.15	Fluke Length:	1.3	Chain Link:	N/A	
Shackle Opening:	0.15	Fluke Width:	1			
1 Arm Length:	2.8					
Arm Amplitude:	5.75	Throat Angle(s):	51.318°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC039
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC039-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<b>FACETTED</b>	Flattened	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	7.1	Shank Min. Thickness:	0.55			
Stock Max. Diameter:	0.3	Shank Max. Width:	0.4			
Stock Min. Diameter:	0.2	Shank Min. Width:	0.35			
Shank Max. Thickness:	0.9	Shank Length:	4.7			
Key Height:	N/A	Dist. b/w Bills:	5.2	Ring Dia.:	N/A	
Shackle Dia.:	0.15	Height of Bills:	2	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	0.65	Bills (LxW):	0.35 x 0.2	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.1	Fluke Length:	1.75	Chain Link:	N/A	
Shackle Opening:	0.1	Fluke Width:	1.2			
1 Arm Length:	3.4					
Arm Amplitude:	6.9	Throat Angle(s):	53.968°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC040
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	5
Range:	WNC040-1 to -5
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	Triangle	<b>SPADE</b>	<i>Tipped Spade</i>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<b>STRAIGHT</b>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<i>Bent</i>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	8.5	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.4			
Shank Max. Thickness:	0.7	Shank Length:	6			
Key Height:	N/A	Dist. b/w Bills:	5.8	Ring Dia.:	N/A	
Shackle Dia.:	N/A	Height of Bills:	2.4	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	N/A	Bills (LxW):	N/A	Ring Thickness:	N/A	
Shackle Pin Thick.:	N/A	Fluke Length:	1.7	Chain Link:	N/A	
Shackle Opening:	N/A	Fluke Width:	1.6			
1 Arm Length:	3.7					
Arm Amplitude:	7.5	Throat Angle(s):	49.56°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC041
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*All Measurements in Decimal Feet*

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	8
Range:	WNC041-1 to -8
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input checked="" type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	Round/Oval	<i>Facetted</i>	<b>FLATTENED</b>	<i>Unknown</i>	Other	
Fluke Shape:	Triangle	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	Other	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	Pointed	<i>Fishbuckle</i>	Swivel	<i>Other</i>
Arms:	Straight	<i>Angled</i>	Segmented Arc	<b>ARC</b>	Mobile	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	Wood over	<i>Wood through</i>	Metal over	<b>METAL STRAIGHT</b>	Metal bent	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	Square	<i>Rectangular</i>	Other	
Shape:	Straight	<i>Upturned</i>	Tapered	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	Trunnels	<i>Metal Straps</i>	Nails	<i>Cotter Pins</i>	Other	
Key:	Parallel	<i>Perpendicular</i>	None	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	5.7		Shank Min. Thickness:	0.35		
Stock Max. Diameter:	0.3		Shank Max. Width:	0.25		
Stock Min. Diameter:	0.2		Shank Min. Width:	0.3		
Shank Max. Thickness:	0.45		Shank Length:	4		
Key Height:	N/A	Dist. b/w Bills:	4.1	Ring Dia.:	0.1	
Shackle Dia.:	N/A	Height of Bills:	1.45	Ring Eye Dia.:	0.7	
Shackle Eye Dia.:	N/A	Bills (LxW):	0.4 x 0.1	Ring Thickness:	0.45	
Shackle Pin Thick.:	N/A	Fluke Length:	1.5	Chain Link:	L: 0.4	
Shackle Opening:	N/A	Fluke Width:	1.2		W: 0.2	
1 Arm Length:	2.4					
Arm Amplitude:	5.3	Throat Angle(s):	52.831°			

<b>Name:</b> Bettie & Scott	<b>Date Recorded:</b> 15 Nov 2015	<b>Site #:</b> WNC042
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All Measurements in Decimal Feet

<b>Contextual Information:</b>	
Date (as applicable):	N/A
Vessel Type and Name:	N/A
Nationality:	N/A
Additional Information:	N/A

<b>Photos Taken:</b>	
Number:	7
Range:	WNC042-1 to -7
Redundancy?	<input type="checkbox"/>

<b>Features:</b>	
Chain:	<input checked="" type="checkbox"/>
Ring:	<input type="checkbox"/>
Shackle:	<input checked="" type="checkbox"/>
Vis. Inscriptions:	<input type="checkbox"/>
Inscription Details:	N/A
Weight:	N/A

<b>Other Features:</b>						
Shank Form:	<b>ROUND/OVAL</b>	<i>Facetted</i>	<i>Flattened</i>	<i>Unknown</i>	<i>Other</i>	
Fluke Shape:	<i>Triangle</i>	<i>Spade</i>	<b>TIPPED SPADE</b>	<i>Almond</i>	<i>Other</i>	
Crown:	<b>ROUNDED</b>	<i>Tip</i>	<i>Pointed</i>	<i>Fishbuckle</i>	<i>Swivel</i>	<i>Other</i>
Arms:	<i>Straight</i>	<i>Angled</i>	<i>Segmented Arc</i>	<b>ARC</b>	<i>Mobile</i>	<i>Other</i>
<b>Stock:</b>	Wood Stock <input type="checkbox"/>		Iron Stock <input checked="" type="checkbox"/>			
Type:	<i>Wood over</i>	<i>Wood through</i>	<i>Metal over</i>	<b>METAL STRAIGHT</b>	<i>Metal bent</i>	<i>Other</i>
Section:	<b>CIRCULAR</b>	<i>Oval</i>	<i>Square</i>	<i>Rectangular</i>	<i>Other</i>	
Shape:	<i>Straight</i>	<i>Upturned</i>	<i>Tapered</i>	<i>Convex</i>	<b>BENT</b>	<i>Other</i>
Fasteners:	<i>Trunnels</i>	<i>Metal Straps</i>	<i>Nails</i>	<i>Cotter Pins</i>	<i>Other</i>	
Key:	<i>Parallel</i>	<i>Perpendicular</i>	<i>None</i>	<i>Unknown</i>		
<b>Anchor Measurements:</b>				<b>Dia.=Diameter</b>		
Overall Length:	10.1	Shank Min. Thickness:	0.5			
Stock Max. Diameter:	0.4	Shank Max. Width:	0.5			
Stock Min. Diameter:	0.3	Shank Min. Width:	0.4			
Shank Max. Thickness:	0.8	Shank Length:	6.5			
Key Height:	N/A	Dist. b/w Bills:	7.1	Ring Dia.:	N/A	
Shackle Dia.:	0.2	Height of Bills:	2.5	Ring Eye Dia.:	N/A	
Shackle Eye Dia.:	1	Bills (LxW):	0.4 x 0.3	Ring Thickness:	N/A	
Shackle Pin Thick.:	0.2	Fluke Length:	2	Chain Link:	L: 0.9	
Shackle Opening:	0.2	Fluke Width:	1.2		W: 0.55	
1 Arm Length:	4.1					
Arm Amplitude:	9.2	Throat Angle(s):	52.428°			

**Appendix E: Anchor Photographs from Washington Naval Yard and North Carolina**

*Washington Naval Yard, Washington D.C.*

WNY001



FIGURE 106. WNY001 outside Washington Naval Yard (Marlowe 2015).

WNY002



FIGURE 107. WNY002 outside Washington Naval Yard (Marlowe 2015).

WNY003



FIGURE 108. WNY003 top half on the Washington Naval Yard (Marlowe 2015).



FIGURE 109. WNY003 bottom half on the Washington Naval Yard (Marlowe 2015).



WNY004



FIGURE 110. WNY004 on the Washington Naval Yard (Marlowe 2015).

WNY005



FIGURE 111. WNY005 on the Washington Naval Yard (Marlowe 2015).



WNY006



FIGURE 112. WNY006 on the Washington Naval Yard (Marlowe 2015).

WNY007

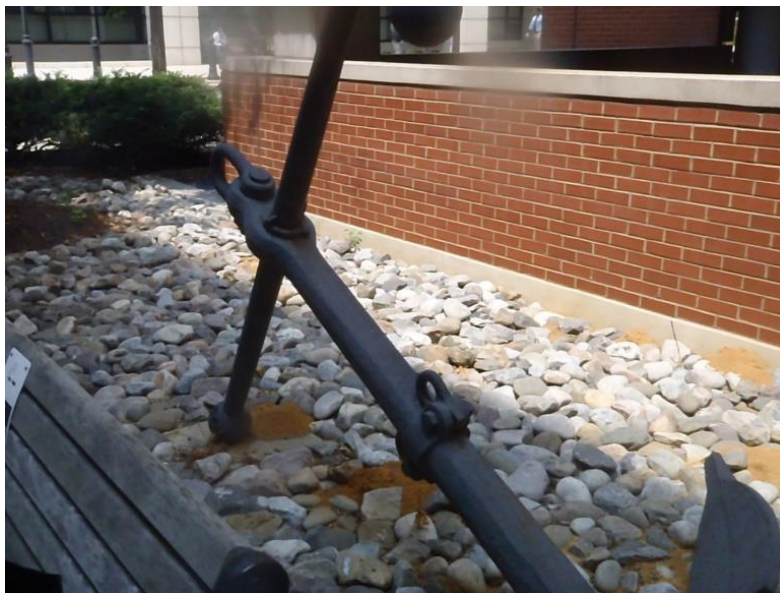


FIGURE 113. WNY007 top half on the Washington Naval Yard (Marlowe 2015).



FIGURE 114. WNY007 bottom half on the Washington Naval Yard (Marlowe 2015).

WNY008



FIGURE 115. WNY008 on the Washington Naval Yard (Marlowe 2015).

WNY009



FIGURE 116. WNY009 on the Washington Naval Yard (Marlowe 2015).

WNY010



FIGURE 117. WNY010 on the Washington Naval Yard (Marlowe 2015).



WNY011



FIGURE 118. WNY011 on the Washington Naval Yard (Marlowe 2015).

WNY012



FIGURE 119. WNY012 on the Washington Naval Yard (Marlowe 2015).

WNY013



FIGURE 120. WNY013 on the Washington Naval Yard (Marlowe 2015).

WNY014



FIGURE 121. WNY014 on the Washington Naval Yard (Marlowe 2015).



WNY015



FIGURE 122. WNY015 on the Washington Naval Yard (Marlowe 2015).

WNY016



FIGURE 123. WNY016 on the Washington Naval Yard (Marlowe 2015).

WNY017



FIGURE 124. WNY017 on the Washington Naval Yard (Marlowe 2015).

WNY018



FIGURE 125. WNY018 bottom half showing converted flukes on the Washington Naval Yard (Marlowe 2015).



FIGURE 126. WNY018 top half on the Washington Naval Yard (Marlowe 2015).

WNY019

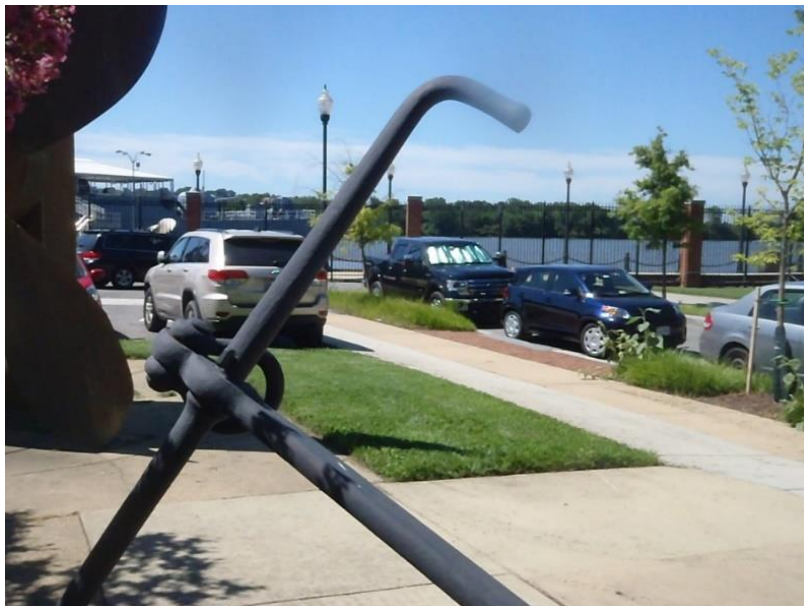


FIGURE 127. WNY019 top half on the Washington Naval Yard (Marlowe 2015).





FIGURE 128. WNY019 bottom half on the Washington Naval Yard (Marlowe 2015).

WNY020



FIGURE 129. WNY020 on the Washington Naval Yard (Marlowe 2015).

WNY021

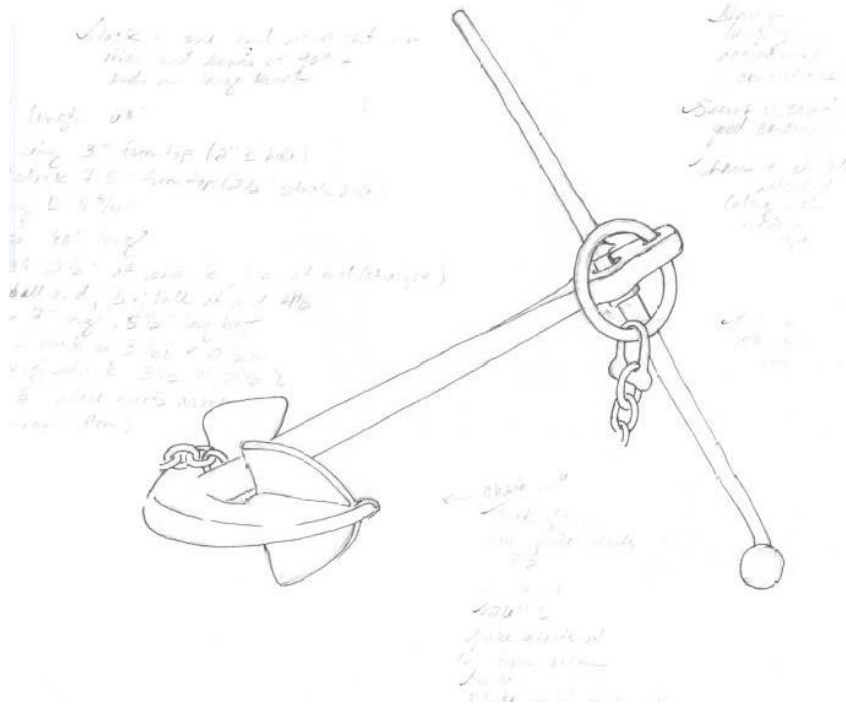


FIGURE 130. WNY021 illustration. Anchor is currently undergoing conservation (Illustration from 03 April 2001 by Kate Morrard).

WNY022

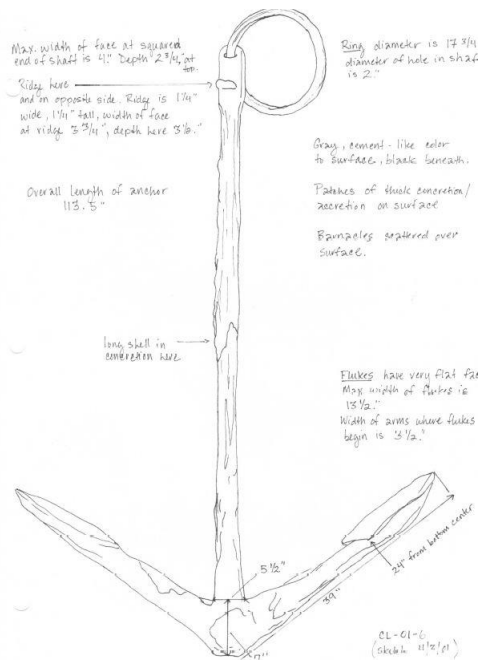


FIGURE 131. WNY022 illustration. Anchor is currently undergoing conservation (Illustration from 03 April 2001 by Kate Morrard).

*North Carolina*

Bath  
BNC001



FIGURE 132. BNC001 outside Historic Bath Visitor Center (Marlowe 2015).

BNC002



FIGURE 133. BNC002 outside Historic Bath Visitor Center (Marlowe 2015).



Nags Head  
NHNC001



FIGURE 134. NHNC001 in mini-golf course decor (Marlowe 2015).

NHNC002



FIGURE 135. NHNC002 outside restaurant (Marlowe 2015).

NHNC003



FIGURE 136. NHNC003 outside restaurant (Marlowe 2015).

NHNC004



FIGURE 137. NHNC004 outside restaurant (Marlowe 2015).

NHNC005



FIGURE 138. NHNC005 outside hotel (Marlowe 2015).



NHNC006



FIGURE 139. NHNC006 outside store (Marlowe 2015).

NHNC007



FIGURE 140. NHNC007 outside store (Marlowe 2015).

Mann's Harbor  
MHNC001



FIGURE 141. MHNC001 outside private residence (Marlowe 2015).

MHNC002



FIGURE 142. MHNC002 outside private residence, with assistant (Marlowe 2015).

MHNC003



FIGURE 143. MHNC003 outside private residence (Marlowe 2015).



Manteo  
MNC001



FIGURE 144. MNC001 outside private residence (Marlowe 2015).

MNC002



FIGURE 145. MNC002 outside private residence (Marlowe 2015).



MNC003



FIGURE 146. MNC003 outside private residence (Marlowe 2015).

MNC004



FIGURE 147. MNC004 outside private residence (Marlowe 2015).

MNC005



FIGURE 148. MNC005 outside private residence (Marlowe 2015).

Wanchese  
WNC001



FIGURE 149. WNC001 outside local business (Marlowe 2015).



WNC002



FIGURE 150. WNC002 outside local business (Marlowe 2015).

WNC003



FIGURE 151. WNC003 outside local business (Marlowe 2015).

WNC004

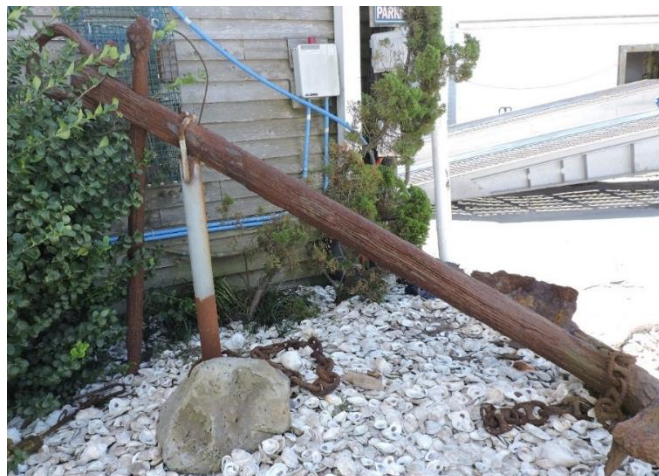


FIGURE 152. WNC004 outside local restaurant (Marlowe 2015).

WNC005



FIGURE 153. WNC005 outside private residence (Marlowe 2015).

WNC006



FIGURE 154. WNC006 inside private residence's basement (Marlowe 2015).



WNC007



FIGURE 155. WNC007 outside private residence (Marlowe 2015).

WNC008



FIGURE 156. WNC008 outside local business (Marlowe 2015).

WNC009



FIGURE 157. WNC009 outside local business (Marlowe 2015).

WNC010



FIGURE 158. WNC010 outside local business (Marlowe 2015).



WNC011



FIGURE 159. WNC011 outside private residence (Marlowe 2015).

WNC012



FIGURE 160. WNC012 outside private residence (Marlowe 2015).



WNC013



FIGURE 161. WNC013 outside private residence (Marlowe 2015).

WNC014



FIGURE 162. WNC014 outside private residence (Marlowe 2015).



WNC015



FIGURE 163. WNC015 outside private residence (Marlowe 2015).

WNC016



FIGURE 164. WNC016 outside private residence (Marlowe 2015).



WNC017



FIGURE 165. WNC017 outside private residence (Marlowe 2015).

WNC018



FIGURE 166. WNC018 outside private residence (Marlowe 2015).



WNC019



FIGURE 167. WNC019 outside private residence (Marlowe 2015).

WNC020



FIGURE 168. WNC020 outside private residence (Marlowe 2015).

WNC021

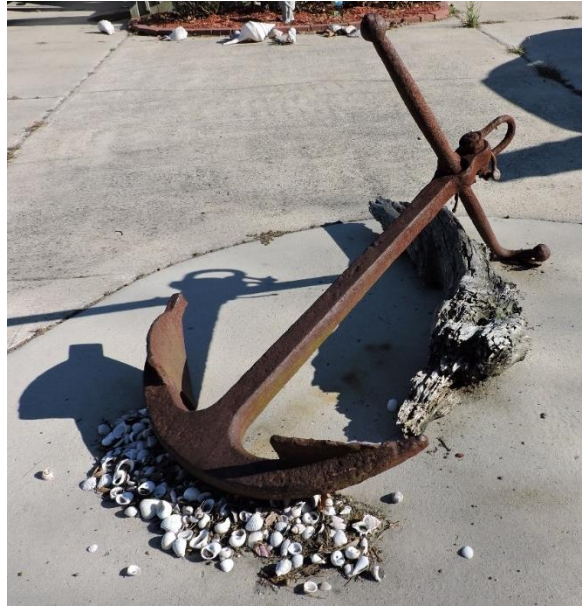


FIGURE 169. WNC021 outside private residence (Marlowe 2015).

WNC022



FIGURE 170. WNC022 outside private residence (Marlowe 2015).



WNC023



FIGURE 171. WNC023 outside private residence (Marlowe 2015).

WNC024



FIGURE 172. WNC024 outside local business (Marlowe 2015).



WNC025



FIGURE 173. WNC025 outside private residence (Marlowe 2015).

WNC026



FIGURE 174. WNC026 outside private residence (Marlowe 2015).



WNC027



FIGURE 175. WNC027 outside private residence (Marlowe 2015).

WNC028



FIGURE 176. WNC028 outside private residence (Marlowe 2015).



WNC029



FIGURE 177. WNC029 outside private residence (Marlowe 2015).

WNC030



FIGURE 178. WNC030 outside private residence (Marlowe 2015).



WNC031



FIGURE 179. WNC031 outside private residence (Marlowe 2015).

WNC032



FIGURE 180. WNC032 outside private residence (Marlowe 2015).

WNC033



FIGURE 181. WNC033 outside private residence (Marlowe 2015).

WNC034



FIGURE 182. WNC034 outside private residence (Marlowe 2015).



WNC035



FIGURE 183. WNC035 outside private residence (Marlowe 2015).

WNC036



FIGURE 184. WNC036 outside private residence (Marlowe 2015).

WNC037



FIGURE 185. WNC037 outside private residence (Marlowe 2015).

WNC038



FIGURE 186. WNC038 outside private residence (Marlowe 2015).



WNC039



FIGURE 187. WNC039 outside private residence (Marlowe 2015).

WNC040



FIGURE 188. WNC040 outside private residence (Marlowe 2015).

WNC041



FIGURE 189. WNC041 outside private residence (Marlowe 2015).

WNC042



FIGURE 190. WNC042 outside private residence (Marlowe 2015).



Washington  
WANC001



FIGURE 191. WANC001 covered in bushes (Marlowe 2015).

## Appendix F: Data Dictionary

Anchor—“The well known iron or steel implement of various patterns, lowered by means of a cable (usually chain) to the bottom of a river, bay or sea, where it enters and bites the ground; used for holding a ship stationary; or to offer a fixed point, to which a vessel may be drawn by means of the attached cable and some power obtained as through a windlass or capstan. . . . The anchors carried by merchant vessels are termed Bowers or Bower-anchors; Stream or Stream-anchor; Kedges, or Kedge-anchors” (Paasch 1890:149).

Arm— The part of the anchor which connects the fluke and shank, running perpendicular to the stock (if present).

Bill— The tip of the fluke.

Bower— Anchor located at the bow, usually one on each side, used for normal anchoring procedures of the vessel (NAS 2008).

Crown— The place where the shank and arms meet.

Fluke— The broad flat surface on the arm which enables the anchor to securely hold onto the bottom.

Grapnel—Small anchor with multiple arms used for small vessels or light maneuvers (NAS 2008).

Kedge— Smaller anchor used in support of bower anchors or for lighter maneuvers (NAS 2008).

Self-Canting— A style of anchor which had a shortened iron stock, which relied on the mobile crown and arms to attach to the ocean floor. This type of anchor can be considered the popular precursor to the stockless anchor.

Shackle— Two pieces of metal, one which passes through the other, which attaches to the anchor at either the end of the shank or at the ring, and to which chain is commonly attached.

Shank— The straight section of metal which connects to the arms at the crown, and, at the other end, is where the stock fits (if present). The end of the shank is commonly fitted with a shackle or ring, to which the cable is attached.

Sheet— Larger anchor of the vessel used in case of emergency, often placed between decks (NAS 2008).

Stocked—The metal anchor which has a cross beam at the top of the shank, either wood or iron, running perpendicular to the arms. The stock lies flat on the bottom allowing a fluke to dig into the bottom and hold the anchor in place.



Stockless (or Stockless-bowers)— “Terms given to bowers of a newer pattern viz, such as have moveable arms, and being without a stock, etc.; offering the advantage that the shank of the anchor can be hove into the hawse-pipe, so that the fluke only remain exposed outside the vessel; thus dispensing with the trouble of taking the anchor over the bow, and the use of cat-heads, or cat-davits, fish-davits, cat-tackles, fish-tackles etc.; the weight of such implements being usually 25% more than given...on account of their having no stock” (Paasch 1890:150).

Stream— Anchor carried as a spare in some large ships, smaller than the bower and sheet anchor, but larger than the kedge (NAS 2008).

Ring— The permanent loop of iron which passes through a hole in the end of the shank, which was commonly wrapped with cable, and to which cable was attached.

Anglo-American— For the purposes of this study: the United Kingdom and the United States and their protectorates.

Assemblage— A collection of archaeological material which was studied or analyzed.

Big Anchor Project— A section of the Nautical Archaeology Society which focuses on the locating, recording, and photographic documentation of anchors around the world.

Displacement— “The volume of water displaced by a vessel, a boat, or any other floating body; the weight of the water so displaced equaling exactly the total weight of the object causing its displacement” (Paasch 1890:245).

Evolution— In simplest terms: measureable change over time.

Hawse Hole— “One of the holes in the upper bow near the stem, into which the hawse-pipe is fitted” (Paasch 1890:61).

Hawse Pipe—“A cast iron pipe usually fitted in a hawse-hole, to prevent the chafing by the cables; but in iron and steel vessels the name of ‘Hawse-pipe’ is commonly given to the hawse-hole itself, whether a pipe is fitted or not” (Paasch 1890:61).

Material Culture— “Material culture is usually considered to be roughly synonymous with artifacts (objects used by humans to cope with the physical world, to facilitate social interaction, and to benefit state of mind) and ecofacts (nonartifactual natural remains that provide information about human behavior, such as remnants of wild and domesticated animals and plants). Material culture may be more broadly defined as that sector of our physical environment that we modify through culturally determined behavior” (National Park Service 2016).

Mooring— “To moor a vessel, is to make her stationary; if in a bay, river, etc. by means of anchoring; if alongside a quay or wharf by fastening her with chains, and/or hawsers, warps, etc.” (Paasch 1890:266).

Rigging— “The totality of a vessel’s masts, spars etc. with their standing and running ropes”  
(Paasch 1890:156).

Windlass— Commonly a mechanical “apparatus usually placed on the fore end of an upper-, or  
forecastle-deck, and employed for heaving up the bower-anchors” (Paasch 1890:156).

