GOING ON THE ACCOUNT: EXAMINING GOLDEN AGE PIRATES AS A DISTINCT

CULTURE THROUGH ARTIFACT PATTERNING

by

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Pirates of the Golden Age (1650-1726) have become the stuff of legend. The way they looked and acted has been variously recorded through the centuries, slowly morphing them into the pirates of today's fiction. Yet, many of the behaviors that create these images do not preserve in the archaeological environment and are just not good indicators of a pirate. Piracy is an illegal act and as a physical activity, does not survive directly in the archaeological record, making it difficult to study pirates as a distinct maritime culture. This thesis examines the use of artifact patterning to illuminate behavioral differences between pirates and other sailors. A framework for a model reflecting the patterns of artifacts found on pirate shipwrecks is presented. Artifacts from two early eighteenth century British pirate wrecks, *Queen Anne's Revenge* (1718) and *Whydah* (1717) were categorized into five groups reflecting behavior onboard the ship, and frequencies for each group within each assemblage were obtained. The same was done for a British Naval vessel, HMS *Invincible* (1758), and a merchant vessel, the slaver *Henrietta Marie* (1699) for comparative purposes. There are not enough data at this time to predict a "pirate pattern" for identifying pirates archaeologically, and many uncontrollable factors negatively impact the data that are available, making a study of artifact frequencies difficult. This research does, however, help to reveal avenues of further study for describing this intriguing sub-culture.

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CHAPTER ONE: PIRACY AND ARCHAEOLOGY

The word "pirate" brings to mind the characters of Robert Louis Stevenson's *Treasure Island* – men with peg-legs, eye patches, and parrots in search of buried treasure – or the dirty and rough but comical characters of Disney's *Pirates of the Caribbean* franchise. Throughout history they have been a flamboyant and rambunctious sub-culture, captivating the imagination of story-writers. Yet, many of the pirate stereotypes – "the [Jolly Roger] flag, eye patch, wooden leg, and hook" (Babits et al. 2006:274) – are just not good indicators of a pirate, and would not preserve in the harsh underwater environment anyway. Piracy is a behavior, which does not survive directly in the archaeological record (Babits, et al. 2006:276). As they were all men of the sea, the difference in what was owned by a pirate and what was owned by a merchant sailor is difficult to discern. In clothing and personal effects, pirate objects appear very similar to those of other sailors. Pirates followed the changing fashions just as merchants and naval officers did (Babits 2001:9). Tobacco pipes and wine bottles may not look any different on a pirate ship than they do on a merchant ship.

The question is, therefore, how does one study the culture and behavior of piracy archaeologically? This research explores the possible utility of an examination of the differences in artifact frequency, or artifact patterning, to illuminate the behavioral differences between the crews of pirate and non-pirate vessels. This will be done by looking at the artifact assemblages of two English pirate vessels dating to the Golden Age of Piracy (ca. 1650-1730) and operating in the Atlantic Ocean: *Queen Anne's Revenge* (1718) and *Whydah* (1717), and contemporary non-pirate ships (also English crews operating in the Atlantic Ocean): the naval ship HMS *Invincible* (1758), and the slave ship *Henrietta Marie* (1700).

At this time, there are only two confirmed Golden Age pirate shipwrecks in the world, and these two sites cannot represent the entirety of pirate behavior. Similarly, there are very few contemporary wrecks that have been fully documented to serve as comparative examples. This thesis, therefore, is intended to develop the framework for a model to facilitate the study of behavioral differences between seafaring cultures through the artifacts they left behind.

Pattern Recognition in Archaeology

The use of artifact patterning for studying the functions and behaviors of an archaeological site was popularized in historical archaeology by Stanley South, and has its origins in the study of prehistoric cultural processes through pattern recognition. South explains that the importance in recognizing patterns lies in the building of theories explaining why the pattern exists and describing the dynamics of cultural systems (South 1977:31). Through archaeological work conducted at eighteenth and nineteenth century sites in North and South Carolina, South created the Carolina Artifact Pattern, a set of frequencies for artifact categories based on artifact form and function that an archaeologist would expect to find on an eighteenth-century British colonial domestic site in the Carolinas. Any deviations in artifact frequencies from this pattern may suggest a difference in function or behavior on a site (South 1977:92-93, 110-112).

The Carolina Artifact Pattern is based on two main assumptions. The first is that each eighteenth-century British colonial household is a system within a larger complex system which imposes a "degree of uniformity" in behaviors on that and other household systems, resulting in a uniform pattern of refuse. Second, as part of a larger system, British families in America would carry the same set of behaviors, attitudes, and artifacts regardless of the colony in which they

live. Therefore, any variation in artifact frequency must mean differing or specialized behaviors occurred at the site (South 1977:86-88).

In a paper from the Proceedings of the 14th Conference on Underwater Archeology, Richard Johnson and Russell Skowronek (1986) address the use of quantitative patterning analysis in maritime archaeology. Their aim was to explore the use of pattern analysis to establish relationships between 10 shipwrecks of various functions, dating from the sixteenth to eighteenth centuries. To create an analogous relationship between the use of artifact patterning on shipwreck sites and terrestrial sites, they suggest ships represent "floating frontiers," unique elements of a larger system, separated from, but still an integral part of, the society from which they originated (Johnson and Skowronek 1986:85). The authors therefore divided the artifacts of the 10 shipwrecks into the nine groups of South's Frontier Pattern (based on the same theory as the Carolina Artifact Pattern), creating their own additional categories and subdividing others when necessary to make them applicable to the types and functions of artifacts recovered from shipwrecks. They point out that shipwrecks represent a very different form of archaeological data than terrestrial sites, as land sites are generally evidence of refuse from longer periods of occupation while shipwreck sites are "the valued and the necessary" deposited in a brief moment of wrecking (Johnson and Skowronek 1986:86). They also acknowledge the effects site formation processes, preservation dynamics, site looting and salvage, and the use of second-hand sources will have on any resulting pattern. Regardless of these complicating factors, the authors conclude that a "tendency towards patterning" exists in their analysis, supporting the potential for the use of artifact patterning in the study of shipwrecks, and they encourage further use in the field of maritime archaeology (Johnson and Skowronek 1986:86-87).

In her Master's thesis *Arrrchaeology: Investigating Piracy in the Archaeological Record* (2006), Heather Hatch explores the use of artifact frequencies to examine behavioral patterns in the material culture recovered from terrestrial pirate sites. Because of the lack of terrestrial sites with pirate associations, her goal was to create a model that can be used to create a pattern of pirate behavior as more data become available (Hatch 2006:2-4). She re-analyzed the data from the *Barcadares* logwood camp in Belize, a site with strong pirate associations occupied during the Golden Age of Piracy, placing artifacts into seven functional categories created to "test for patterns suggested by the historical record" (Hatch 2006:69). Based on the frequencies of various artifact types, Hatch concluded that occupants of the site regarded the socio-cultural role of smoking as important due to the large percentage of pipes. She also discovered that the presence of high-quality ceramics may be indicative of pirate behavior on a site (Hatch 2006:76). Hatch reinforces the uniqueness of her findings by comparing the frequencies of artifact categories obtained from the *Barcadares* site with those of two sites on the Caribbean island of Nevis, with no known pirate associations (Hatch 2006:115).

This thesis will apply this artifact patterning research to the study of English pirates operating in the Atlantic during the latter half of the Golden Age of Piracy. It is hypothesized that those artifacts representing illicit commercial and aggressive behavior will stand out as differentiating pirates from other sailors. Also, utilizing Hatch's results in studying terrestrial sites, it is hypothesized there will also be a preponderance of kitchen artifacts and personal artifacts, particularly objects related to smoking.

Contents

      Chapter two, *The Golden Age of Piracy*, provides a historical and political context of piracy in the Golden Age, out of which many popular beliefs about pirate behavior originate. The third chapter, *Historical and Archaeological Background*, discusses the background of each of the four shipwrecks used in this study, from construction and use to wreck discovery and excavation three centuries later. This chapter begins to address the variety of factors at play in the creation of a shipwreck as a unique archaeological collection. Chapter four, *Method for Discerning a Pattern*, covers the methods of this study, including the sources of the data, the artifact groups developed and how they relate to shipboard behaviors, and the analysis conducted. The *Results of Research* chapter presents frequencies of the artifact groups of each shipwreck and preliminary comparison and observations of these data. Finally, *Discussion of A "Pirate Pattern"* addresses the model of artifact patterning, examining the similarities and differences between the three types of ships, presenting areas of further research, and expanding upon the variables that affect shipwrecks and the difficulties encountered in this kind of analysis.

CHAPTER TWO: THE GOLDEN AGE OF PIRACY

Introduction

The Golden Age of Piracy is a glorified topic in popular culture, with the lives and adventures of pirates like Blackbeard, Henry Morgan, and Captain Kidd romanticized in literature and on the screen, often blurring the lines between fact and fiction. As far back as Alexander Exquemelin's *The Buccaneers of America* in the seventeenth century and Charles Johnson's *A General History of the Pyrates* in the mid-eighteenth century, authors and historians have been writing about these intriguing and rambunctious men who operated outside the legal system. However, letters and journals written from the perspective of these men are practically non-existent, so much of what is known about their lives comes from the memoires and depositions of those captured by pirates or the court documents of those on trial for piracy.

Piracy was a response to social and political conditions, and many men felt it was a logical decision to make. Authors of historical accounts and popular fiction often characterize pirate culture as a democracy, where captains were elected and crew had equal say in plans and received fair pay according to each member's position, a culture appealing to many sailors living under the stringent rules of their trade. While some evidence exists to suggest such a society, pirates were also robbers of the sea, freely and violently taking the property and lives of others to support their own. Whether they were privateers acting in support of their home governments or pirates of the early eighteenth century rebelling against those governments, historical information can only provide so much truth on the motivations, behaviors, and fantastic lives of these men and women.

The Golden Age of Piracy, spanning from 1650 to 1726, can be divided into three "generations" of pirates, each characterized by differing political and social pressures and motivations: the buccaneers of 1650 to 1680, the pirates of the 1690s, and the pirates of 1716-1726 (Rediker 2004:8).

Buccaneers

As an increasing number of European powers began to explore and claim the outer reaches of the known world in the mid-seventeenth century, Spain began to lose its grasp on global political and economic dominance. To retain its stronghold on colonies in the West Indies and the Caribbean, the country placed prohibitions on its colonists, restricting trade between its colonies and other foreign powers, and only permitting them to associate with Catholics and obtain supplies from Spain (Bradford 2007:81; Gosse 1932:141). The colonists, however, often chose to defy this, buying from or bartering with French and English merchants for necessities that were not provided by Spain (Bradford 2007:81). As France and England recognized the potential in the New World, they began pushing into Spanish territory, while also covertly encouraging their own citizens to attack Spanish ships, compromising Spain's supplies to their colonies. Claiming to be punishing piracy, Spain attacked British and French ships regardless of the actual threat; meanwhile, the British and French claimed their ships were manned by honest colonists and merchants and that any acts of piracy were committed by individuals unassociated with the governments (Bradford 2007:81-82). Out of this conflict and retaliation, piracy was born.

Known as "The Brotherhood of the Coast" in the mid-seventeenth centuries, the first pirates, buccaneers, were a group of French merchants who settled on the Spanish island of

Hispaniola, modern-day Haiti and Santo Domingo (Figure 2-1). Between 500 and 600 men set

up camps in small groups, hunting wild cattle and pigs left behind by Spaniards who had

abandoned the area. The meat and hides of the animals they killed was dried and sold to passing

ships. The name "buccaneer" comes from the grills used to dry the meat, called "boucans"

(Bradford 2007:82; Gosse 1932:141-143). Their work brought in enough income to justify the

working conditions, as French, British, and Spanish colonists alike wanted the fresh meat, jerky,

and hides the buccaneers provided (Bradford 2007:83).

Figure 2-1. The Caribbean in the mid-seventeenth century, showing Hispaniola to the west of
Puerto Rico (Sanson 1656).

Spain attempted to remove these hunters from Spanish territory, but in doing so created

the groups of buccaneers that hunted not cattle, but men (Gosse 1932:144). In an attempt to deter

further defiance of the Spanish government, Spanish soldiers searched for the hunters, often

burning them at the stake upon capture, an action that only increased their hatred toward Spain.

As encounters between the buccaneers and the Spanish became more violent, the buccaneers

became more effective at evading the Spanish, leading the Spanish to instead hunt the wild cattle

and pigs the buccaneers subsisted on, eventually driving them off Hispaniola. The buccaneers

settled on the island of Tortuga, north of Hispaniola, where Alfred Bradford suggests they set up

an egalitarian settlement, making a living by attacking local hide-trading ships and Spanish

merchants and selling the hides and plundered goods in the Tortuga market (Bradford 2007:83;

Gosse 1932:145).

Peter the Great

One grand and daring act by a settler of Tortuga, Peter Legrand, also known as "Peter the

Great," set the buccaneers on a track that would evolve into the romantic piracy of fiction.

Legrand was a Frenchman from Dieppe, captain of a small boat and a crew of 28 men, who

roamed the coast surprising Spanish ships and taking their riches to be sold in Tortuga.

Sometime during the mid-seventeenth century – although sources disagree upon the exact date

(Bradford 2007:85; Gosse 1932:147) – Legrand and his men were returning to Tortuga to

resupply when they spotted a Spanish treasure ship and instead pursued it. Legrand instructed

holes be drilled in his own boat to prevent escape by the Spanish crew and to keep his own crew

from turning back. As the buccaneers boarded the galleon, they killed the helmsman and those

who resisted, demanding surrender of the ship. Legrand placed most of his prisoners on shore,

keeping only enough men to sail the ship, before obtaining a privateers commission and heading straight to Dieppe to sell his prize and retire. This final act was most uncharacteristic for buccaneers of the time, who squandered their winnings almost immediately (Bradford 2007:85; Gosse 1932:147-148). News of Peter Legrand's actions spread rapidly, attracting those with harsh lives on shore to the possibility of great riches.

France and England found the buccaneers beneficial to the colonial economy; the small society provided employment for "rough men," generated profits from the maintenance of privateer ships, supplied goods to be sold cheaply in French and English markets, and acted as a means of removing Spanish merchants from the competition of trade (Earle 2003: 92-93). However, as the struggle for land and colonial success in the Caribbean decreased by the end of the seventeenth century, the need for and acceptance of buccaneer activity also decreased (Kuhn 2010:14). The Dutch ended all endorsed privateering activity with the Treaty of The Hague in 1673, and the English in 1680, with the Treaty of Windsor. The French finally withdrew from condoning privateering in 1697 with the Treaty of Ryswick (Kuhn 2010:14).

Pirates of the 1690s

By 1690, buccaneers had effectively disappeared from the Caribbean, but a new breed of pirate with larger crews, larger targets, and permission for their violence, began to venture out of the Caribbean to the coasts of Africa and the Indian Ocean (Kuhn 2010:14). New pirate havens were created in such far-away places as Madagascar and St. Mary's Island (Figure 2-2). Established as a trading post in 1691 by former buccaneer Adam Baldridge, St. Mary's Island supplied provisions to pirates and privateers in exchange for looted goods which were sent to merchants in New York. The island provided a natural harbor for pirates and privateers. In 1700,

a visitor to the island reported 17 pirate ships in the harbor and about 1500 men living in the town (Cordingly 1995:146-147). The best example of the behaviors of these pirates is Captain Kidd.
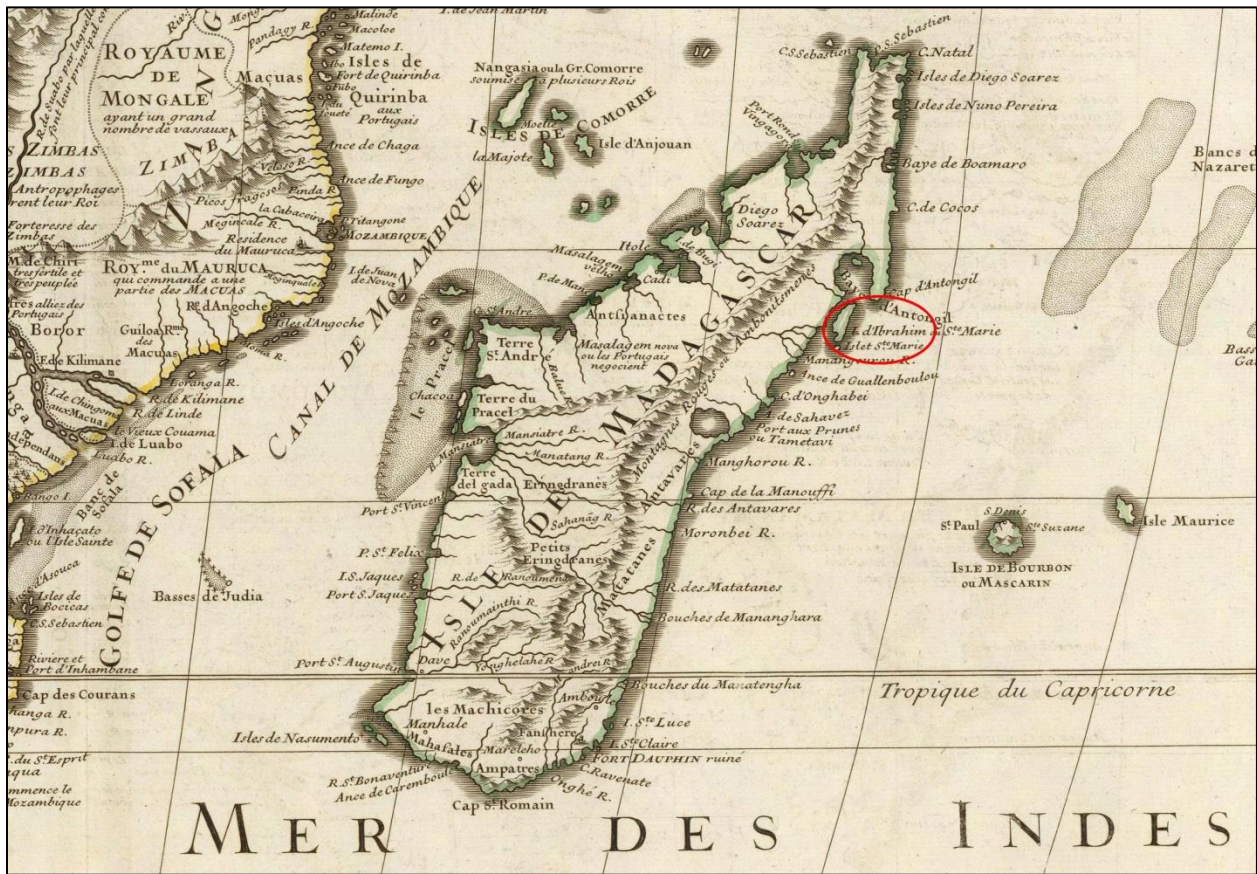
Figure 2-2. 1708 map of Madagascar, showing St. Mary's Island (Lisle 1708a).

Captain William Kidd

William Kidd was the son of a Calvinist minister in Scotland, but little is known of him before 1689, when he was in his mid-forties and was found on a ship crewed by the French and the English during the war against Spain. He was able to seize the ship by leading the English crew members against the French members. He sailed to Nevis, in the West Indies, and renamed

the ship *Blessed William*, gathering a crew of 80 men and receiving a commission to attack the French port at Mariegalante in the Caribbean. The crew plundered the island and then sailed to St. Martins to free an English force trapped there, but became involved in battle with a greater French fleet. The crew did not approve of Kidd's leadership and thus waited for him to go ashore before sailing off with his ship and his £2,000 prize from their expedition (Bradford 2007:111). Sent by the British in pursuit of the pirates who had taken his ship, Kidd followed *Blessed William* to New York, where he reclaimed his ship and reward and settled down (Bradford 2007:112).

In 1695, Kidd became involved with a patron in New York, who was backed by the King of England, and received a 34-gun ship, *Adventure Galley*, and a crew of 70 men, lured in by the promise of riches, to rid the New England coast of pirates (Gosse 1932:180). With a ship and crew (that he increased to 150 men) in hand, Kidd instead planned to sail along the African coast, making his way to Madagascar to profit from attacking the pirates who had congregated there (Bradford 2007:113). However, he lost much of his crew to disease and the fervor for capturing pirates left with them. Kidd found himself recruiting real pirates and would-be pirates. Instead of going after the most infamous pirates of the time, Kidd decided to imitate them and attempted to attack a pilgrim fleet in the Indian Ocean (Bradford 2007:114). Although his first attack was unsuccessful, he subsequently captured several ships, an act that was obviously not in the conditions of his commission, and he was legally declared a pirate (Bradford 2007:114).

Kidd arrived in Madagascar in 1698, having captured *Quedagh Merchant* as it sailed from Bengal to Surat. In the meantime, the East India Company was planning to make an example out of Kidd for his attack on their fleets and lobbied for the authorities to capture Kidd. The British government passed the "Act for the More Effectual Suppression of Piracy" in 1700,

allowing a court of seven officials or naval officers to try pirates in any location they can assemble, eliminating the need for transfer to England (Kuhn 2010:115). Learning of this Act while at sea, Kidd abandoned *Quedagh Merchant* for a smaller sloop and snuck into the New York harbor only to find out that his previous sponsors had abandoned him for their own posterity. Kidd's trial began on May 8, 1701 in England. He was charged with murder and piracy and found guilty on both counts and sentenced to hang. Kidd denied his guilt to his last moments on May 23, 1701 (Bradford 2007:117).

Pirates of 1716-1726

The War of Spanish Succession (1701-1713) provided temporary relief from piracy, as pirates were able to find legal employment as privateers for the government. However, when the war ended, piracy resumed. Discharged soldiers joined pirate crews by the thousands, and piracy in the Caribbean reached previously unparalleled heights. New Providence, Bahamas (Figure 2-3) served as the new pirate headquarters as of 1716, before the arrival of the British governor, Woodes Rogers in 1718. Rogers offered a pardon to all pirates which was not widely accepted (Kuhn 2010:15). Pirates resumed activity in the Indian Ocean, also raiding slave posts along the west coast of Africa. By 1720, there was an estimated 1,500 to 2,000 pirates operating in the Caribbean and North America (Kuhn 2010:16). The pirates of this generation attacked ships of all nations, wreaking havoc on the Atlantic trade system, focusing on strategic zones: the West Indies, North America, and West Africa. These pirates had a detrimental effect during a time of stabilization and expansion of the economy that funded the revival of imperial powers (Rediker 2004:9). As one of the most well-known pirates of the age, the man known as Blackbeard represents the epitome of the pirates and their behavior in the early eighteenth century.

Figure 2-3. Early eighteenth century map of the Caribbean, showing New Providence, modern-day Nassau, Bahamas (Popple 1733).

Blackbeard

Not much is known about the origins or life of Blackbeard before 1717, yet he is one of

the most iconic figures of the height of the Golden Age of Piracy. Accounts of his early life place

his birth in Jamaica, Bristol, Philadelphia, and London (Butler 2000:29-30). Similarly, his given

name is unknown; David Moore notes that over 90 percent of primary documents call

Blackbeard Edward "Thatch" or some phonetic variant, while the "Teach" widely used today,

first appears in a November 1717 issue of the *Boston News-Letter* (Moore 1997a:31). According

to Charles Johnson's first edition of *A General History of the Pyrates*, Blackbeard's name was

Edward Thatch and he was born in Jamaica, while his second and later editions call Blackbeard

Edward Teach of Bristol (Moore 1997a:31; Butler 2000:29-30). While his actions are occasionally documented in newspapers or journals of those he captured, information regarding who Blackbeard was comes primarily from Johnson's recounting of his tales in *A General History of the Pyrates*.

The first historical reference to Blackbeard was published in the *Boston News-Letter* in October 1717, taking a merchant vessel off the coast of Delaware, captaining the *Revenge*, sloop of the injured pirate Stede Bonnet, and possibly accompanied by Captain Benjamin Hornigold (Moore 1997a:32-33; Masters 2005). According to *A General History of the Pyrates*, Blackbeard's association with the former privateer Hornigold likely began during his time in Jamaica in 1716 (Defoe 1724:55). In November of 1717, Blackbeard's growing group of pirates took the French slave ship, *La Concorde*, on its way to Martinique, of which Blackbeard assumed control, renaming it *Queen Anne's Revenge*, and returning Bonnet's *Revenge* (Butler 2000:34-35).

Blackbeard and Bonnet sailed together for several months, taking several ships including *Adventure* in the Bay of Honduras, which Blackbeard decided to keep, increasing his fleet to three ships (Moore 1997a:34). Blackbeard had removed Bonnet from command of *Revenge* and placed his own men as captains of *Revenge* and their new capture *Adventure*. Sailing north toward the North American coast, the fleet took several ships, keeping a small Spanish sloop to carry supplies (Butler 2000:37). By May of 1718, the pirates arrived in Charles Towne (Charleston, South Carolina), blockading the port. Blackbeard demanded a ransom of medicine, twice threatening to kill his hostages (Defoe 1724:58; Butler 2000:37-38). Moore notes that it remains a mystery why Blackbeard would demand such a small ransom when he was in a position to request much more (Moore 1997a:34). With their medicine chest and between £1000

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and £1500 in gold, silver, and supplies taken from ships they seized, the pirates released the Charles Towne hostages and sailed up the North Carolina coast to Topsail Inlet, modern-day Beaufort, North Carolina, where Blackbeard either accidentally or intentionally ran *Queen Anne's Revenge* aground. He subsequently ordered *Adventure* to assist *Queen Anne's Revenge*, but the second ship became grounded as well (Butler 2000:38-39; Defoe 1999:59).

Suggesting his intentional grounding to reduce the size of his crew, the deposition of David Harriot, the captain of *Adventure* when it was captured by Blackbeard, states that he and sixteen other men were marooned when Harriot asked for restitution for the loss of his ship, before Blackbeard left the inlet on the Spanish sloop with only a select few of his original crew; Bonnet was not among them (Moore 1997a:34-35; Butler 2000:39). Blackbeard and his smaller crew sailed to Bath, North Carolina where they were pardoned by Governor Charles Eden, but Johnson notes that this was not done because of a change in behavior; the pirates were simply waiting for a better opportunity to perform piratical activities (Defoe 1724:59; Butler 2000:39-40). Blackbeard briefly settled into domestic life before returning to the sea in the fall of 1718, capturing two French ships, publically claiming they were empty when his crew happened upon them, but secretly sharing the spoils with the North Carolina governor and his crews. He had obviously resumed his pirate life, roaming the rivers and trading his stolen goods with passing sloops for provisions (Defoe 1724:60-62; Butler 2000:41-42).

In November of 1718, a decree from Governor Spotswood of Virginia offered a reward for capturing or killing a pirate, and secretly planned an invasion of the North Carolina colony to apprehend Blackbeard. On November 21, Lieutenant Robert Maynard and his crew came upon Blackbeard's ship at Ocracoke, and Maynard and his men boarded and engaged in combat. Johnson says Blackbeard was wounded 25 times, five of them being gunshots, before he fell

dead. Maynard ordered Blackbeard's head be removed and hung from the bowsprit of

Blackbeard's ship (Defoe 1724:64-67; Butler 2000:44-46). Nine of the 19 pirates survived the

attack and were put on trial for piracy in March 1719, and all but one were executed (Butler

2000:48).

In his description of Blackbeard as a man, Johnson (Defoe 1724:70) describes his

appearance and the fear it strikes in his victims at length (Figure 2-4):

> This Beard was black, which he suffered to grow of an extravagant Length; as to Breadth,
> it came up to his Eyes; he was accustomed to twist it with Ribbons, in small Tails, after
> the Manner of our Ramilies Wiggs, and turn them about his Ears; In Time of Action he
> wore a Sling over his Shoulders, with three brace of Pistols, hanging in Holster like
> Bandaliers; and stuck lighted Matches under his Hat which appearing on each Side of his
> Face, his Eyes naturally looking fierce and wild, made him altogether such a Figure, that
> Imagination cannot form an Idea of a Fury, from Hell, to look more frightful.

While Blackbeard's recorded career lasted less than two years, his ruthless, larger-than-life

character persists as the ultimate image of pirate today.

Captain Teach commonly call'd Black Beard.

Figure 2-4. Blackbeard as he appeared in the 1734 folio edition of *A General History of the Pyrates* (Johnson 1734).

End of the Golden Age

The Golden Age of Piracy effectively ends in 1726, with the hanging of the last prominent pirate captain, Captain William Fly, in Boston (Kuhn 2010:17). Beginning around 1722, the struggle between pirates and those seeking to destroy them – the Royal Navy and English merchants – became murderous, and hundreds of pirates were killed in battle or on the gallows. The pirates who remained became more violent in their endeavors, killing many of their captives. With the knowledge of his fate, the pirate became more concerned with fighting for survival than obtaining goods (Rediker 2004:37). The pirates of the Golden Age completely disappeared from the Atlantic by the 1730s (Bradford 2007:118).

A Pirate's Life

Records of the day-to-day life of a pirate are sparse, especially those pertaining to the latter part of the Golden Age of Piracy. Sailors' encounters with pirates, reported in newspapers such as the *Boston News-Letter* (Masters 2005), or depositions from crews captured by pirates, like those of the French officers of *La Concorde*, paint a picture of pirates in action, seizing ships and blockading towns, even providing specifics on what pirates took from ships they captured and how they treated crew and passengers. Court records of the trials of pirates like the surviving crew of Samuel Bellamy and Stede Bonnet and his men provide even greater details of the pirates' actions (Judiciary Court of Admiralty 1718; South Carolina Court of the Vice-Admiralty 1719). The book *The Buccaneers of America* by Alexander Exquemelin recounts his experiences working as a surgeon for a buccaneer crew, and represents one of the few first-hand accounts of life among the pirates, despite its inaccuracies (Cordingly 1995:40). Much of what is known about pirates of the Golden Age comes from Johnson's *A General History of the Robberies and*

Murders of the Most Notorious Pirates, parts of which have been verified as accurate, but others clearly inflated or fictitious. Many authors and scholars agree that *A General History of the Pyrates* contains many inaccuracies, but it still serves as one of the few contemporary accounts of pirates of the Golden Age (Cordingly 1995:xix-xx; Kuhn 2010:2-3; Moore 1997a:31).

Referencing many of these sources and the works of other historians throughout the centuries, historian David Cordingly suggests that, while the pirates surely participated in activities considered highly inappropriate, routines onboard the ship tended to be very organized, no different than merchant ships. Cooperation and discipline in performing activities such as establishing watches, taking water depths (soundings), and keeping the ship repaired, were required of all crews to ensure their own safety. The daily life of a pirate, however, was considerably easier than that of a merchant, as the latter contended with pressures from demanding owners, the need for a fast voyage, and fewer men to do the work (Cordingly 1995:90-91).

From accounts presented by Exquemelin and Johnson, Cordingly suggests that pirate communities were democracies; the captain was elected by a majority vote, and the crew could remove him if they were dissatisfied. While the captain had complete control in times of action, it was the crew, who made up the pirate council, which decided the voyage destinations and whether to attack a ship or town (Cordingly 1995:96, 98; Kuhn 2010:88). The power of the captain was also kept in check by the quartermaster, a man elected as a representative of members of the crew, who had final say before any captain's orders were performed (Cordingly 1995:98; Kuhn 2010:88). Men were also elected to serve the functions carried out by officers on merchant and naval ships, including the positions of boatswain, carpenter, gunner, and cook (Cordingly 1995:98).

Articles were drawn up at the start of each voyage or with the election of a new captain.

Much like the Royal Navy's Articles of War of 1653 served as a disciplinary code that defined

maritime crimes and punishment, the pirate articles detailed the division of prizes, compensation

for battle injuries, and ship-board rules and punishments for breaking them (Cordingly 1995:96;

Dear and Kemp 2006). Each member of the crew was expected to sign the articles, often referred

to as "going on the account." Each ship would have an individual set of articles, but they

generally followed the same lines. Exquemelin first describes these articles of pirate crews in

The Buccaneers of America (Cordingly 1995:96-97). The articles of John Phillips, Bartholomew

Roberts, and George Lowther survive in *A General History of the Pyrates* (Johnson 1724). A set

of articles identical to those of Lowther are attributed to Edward Low in the *Boston News-Letter*

(1723:2), and articles of John Gow are recorded in a book by Daniel Defoe (1725:52-53) about

Gow's trial.

Cordingly explains that men within the pirate community often developed "macho"

identities that were expressed through heavy drinking, constant cursing, threatening behavior,

and occasional cruelty. Drinking was excessive, and the report of the trial of Bartholomew

Roberts' crew suggests the crew spent most of their time entirely inebriated (Cordingly 1995:93).

Alcohol consumption, however, was a problem that inflicted all sailors at the time, and Marcus

Rediker points out several reasons for this. Many sailors believed beer and liquor provided

nutrition and filling provisions they did not otherwise receive, and was often better than the

drinking water available. Drinking provided a relief from the general hardness of life at sea.

Drinking also served a social function, providing situations for sailors to interact and get to know

one another, performing a central role in ritualized community building through toasts (to the

king and God in the case of the Navy and merchants, and to the "pretender," as they saw the

king, and the devil in the case of the pirates), and helping to resolve and prevent disputes through the temporary relief from hard life (Rediker 1987:192-193).

Gambling was another frequent activity in which all seamen participated. Games such as backgammon, cards, and dice were played, and men were known to gamble away all of their possessions, even their clothing. Several captains, pirate and non-pirate alike, found it necessary to ban gambling for the sake of their crew (Cordingly 1995:94, 99). Music was also relatively regular on naval and merchant vessels in the form of musicians, but it is unclear the extent to which pirates employed them. The pirate code of Bartholomew Roberts's crew mentions the time off allotted to musicians. While professional musicians may not have been present, witness and trial accounts suggest there was much time spent singing and dancing, particularly after heavy drinking (Cordingly 1995:94-95).

The line between fact and fantasy is hard to place when it comes to pirates. So much of what we know about them is based on unsubstantiated stories and biased account. Their day-to-day behavior may not have been that different from those of other sailors, but their actions were certainly more violent than their seafaring counterparts, and they operated outside the law. The pirates of the early-eighteenth century and the image of them that persists into the twenty-first century present an intriguing enigma for study historically and archaeologically.

CHAPTER THREE: HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Introduction

Each shipwreck is an individual complex shaped by events from the building of the ship to the excavation and preservation of its remains. To better understand how the wrecks utilized in this study relate to each other, one needs to understand the cultural and physical contexts they have occupied in the last three centuries. The following is intended to provide a brief description of the history of each ship, from its origin and function, to the wrecking, and finally the discovery, excavation, and maintenance of the archaeological collection.

Queen Anne's Revenge

Ship History

Queen Anne's Revenge (*QAR*) was originally the French ship *La Concorde*, a privateer during the Queen Anne's War and then a slaver, built sometime before 1710, most likely in France. Compilation of information related to *La Concorde*'s history has been done by Jacques Ducoin from archives in Nantes, France (Wilde-Ramsing 2009:107). The ship first appears in a July 21, 1710 record, where it is mentioned as a "French frigate of 300 tons, armed with 26 cannon," owned by Rene Montaudoin, a Nantes businessman (Wilde-Ramsing 2009:109). This record indicates that Montaudoin sent *La Concorde* on a privateer mission under the command of Captain Le Roux. The crew captured a Portuguese and a Dutch slaver before sailing to Martinique for repairs in February of 1711. In Martinique, Le Roux sold the slaves that had been taken from the Dutch slaver. The ship remained in the Caribbean for most of 1711, capturing

many English vessels, before returning to Nantes in November 1711 (Wilde-Ramsing 2009:111-112).

At the end of the Queen Anne's War, Montaudoin transferred *La Concorde* to the slave service. At first, the ship remained heavily armed due to the threat of pirates, but by its third slaving voyage, *La Concorde* was armed with 14 to 16 guns. Between 1713 and 1717, the ship completed two successful voyages, bringing 418 and 331 slaves to the French Caribbean, respectively (Wilde-Ramsing 2009:112). Researchers gained information on the final voyage and capture of *La Concorde* from depositions of two of the ship's crew, Captain Pierre Dosset and Lieutenant Francois Ernaut, upon their return to France (Lawrence and Wilde-Ramsing 2001:2). In March of 1717, *La Concorde* left on its third voyage from Nantes to the trading center of *Whydah*. It was on the second leg of the journey, about 60 miles from their Martinique destination, that the ship met with two sloops containing around 250 men, captained by Edward Teach (or Thatch), better known as the pirate Blackbeard, on November 17, 1717 (Wilde-Ramsing 2009:113-114). *La Concorde* offered little resistance, as 16 of the original 75 crewmembers had died, and another 36 were too ill to work (Lawrence and Wilde-Ramsing 2001:2; Moore and Daniel 2001:24).

Four members of the French crew volunteered to join the pirate crew, and an additional ten were forced into service (Lawrence and Wilde-Ramsing 2001:2; Moore and Daniel 2001:25). The pirates also plundered the stash of gold dust the crew had been hiding and kept the slaver and probably between 60 and 160 slaves; researchers and records disagree on the number of slaves retained by Blackbeard. They left the remaining crew and slaves on the island of Bequia with the smaller of the two sloops that had been in the command of the pirates (Moore and Daniel 2001:25, 27; Wilde-Ramsing 2009:114). The French crew transported the slaves

remaining in their possession to Martinique in two trips, using the ship they aptly named

Mauvaise Rencontre (*Bad Encounter*) (Lawrence and Wilde-Ramsing 2001:2; Moore and Daniel

2001:25).

Blackbeard's prize was renamed *Queen Anne's Revenge* and the armament of the ship

was increased from 14 or 16 guns to 40. The ship's crew sailed toward the eastern end of Puerto

Rico by December, and a captive reported plans to sail to Samana Bay in Hispaniola to hunt

Spanish treasure ships, but there is no official record of this occurring (Moore 1997a:34;

Lawrence and Wilde-Ramsing 2001:3). No record of the crew's activities exists until March of

1718, when they captured several ships near Honduras, including *Adventure*, under the command

of David Herriot, who was forced to join the pirates. Blackbeard added *Adventure* to his growing

fleet, which continued to grow with captures from the Caymans, Cuba, and the Bahamas headed

to Charleston, SC in May 1718 (Lawrence and Wilde-Ramsing 2001:3).

In May of 1718, the pirates had sailed their fleet to Charles Town (present-day

Charleston), South Carolina, laying siege to the town and taking several ships as they entered or

exited the port. As ransom for the town's freedom, Blackbeard and his crew received liquor,

food, and "a chest of medicines of the value of three or four hundred pounds," as well as "1500

pounds of sterling, in gold and pieces of eight" taken from the ships they captured leaving the

harbor (South Carolina Court of the Vice-Admiralty 1719:338; Wilde-Ramsing and Ewen

2012:114).

According to information provided by David Herriot during his trial in South Carolina,

which provides the most detailed account of the following events, Blackbeard and his fleet sailed

to Topsail (now Beaufort) Inlet in North Carolina (Figure 3-1) (South Carolina Court of the

Vice-Admiralty 1719:375; Wilde-Ramsing 2009:131). All ships safely entered the inlet, except

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Blackbeard and the *Queen Anne's Revenge*, which had run around on a sandbar about a mile from land (South Carolina Court of the Vice-Admiralty 1719:375; Wilde-Ramsing 2009:132). Blackbeard sent for his quartermaster to assistant him in the *Adventure*, but this ship also ran aground a short distance from *Queen Anne's Revenge*. Herriot states that it was generally believed at the time that the grounding of *Queen Anne's Revenge* was an intentional act to break up the large band of pirates Blackbeard had accumulated; "that said Thatch run his vessel a-ground on purpose to break up the companies, and to secure what moneys and effects he had got for himself and such other of them as he had most value for" (South Carolina Court of the Vice-Admiralty 1719:376). Further supporting this claim, there is no mention of lost lives or extenuating circumstances that may have led to the wrecking of the ships in Herriot's deposition or by those pirates from Blackbeard's crew that were later put on trial in South Carolina (Wilde-Ramsing 2009:131). Blackbeard left Topsail Inlet with the goods he had taken for himself and the best-fit pirates, a crew of 100, leaving some of Bonnet's men marooned on a nearby island and allowing the rest to scatter into the remote countryside. He sailed north to Ocracoke Inlet, North Carolina, and toward his death five months later.
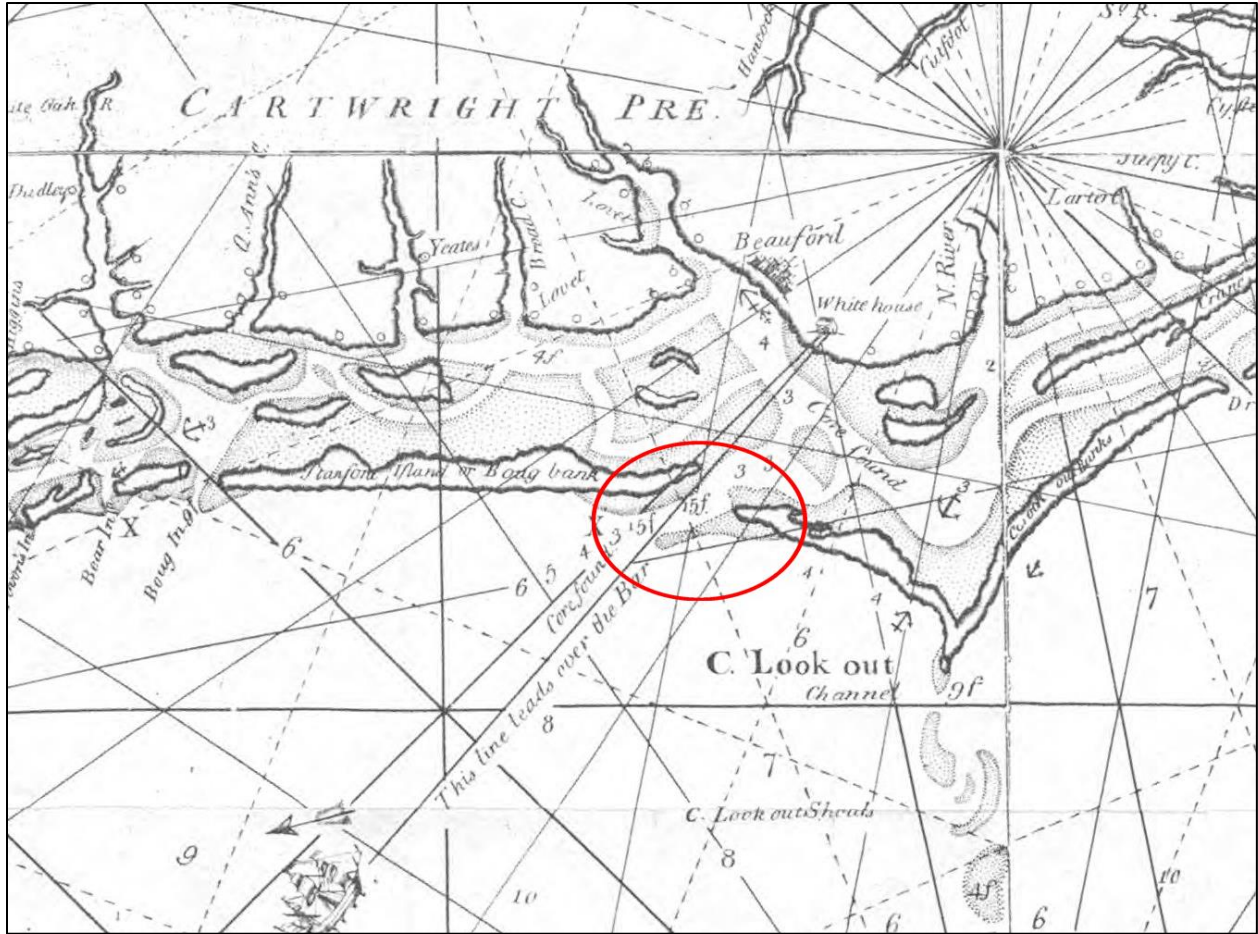
Figure 3-1. Approximate location of the wreck of *Queen Anne's Revenge* on James Wimble's 1738 map of eastern North Carolina. (Wimble 1738)

Salvage of goods beyond those taken while the crew was rescued is not mentioned in the historical record. Wilde-Ramsing suggests that extensive salvage of *Queen Anne's Revenge* and *Adventure* was not possible, evidenced by the fact that both Blackbeard and Stede Bonnet, who intended to sail with a small crew to Bath to receive the King's pardon, needed to obtain provisions and arms from elsewhere before leaving Topsail Inlet. There is similarly no record of local salvage of *Queen Anne's Revenge*, as Beaufort was a poor town, and likely had few resources to conduct an off-shore salvage (Wilde-Ramsing 2009:131-134).

Discovery and Excavation

With an interest in finding the Spanish treasure ship *El Salvador*, Phil Masters and his treasure hunting company, Intersal Inc., applied for a permit to search the Beaufort Inlet area from the North Carolina Underwater Archaeology Branch (then the Underwater Archeology Unit), which was granted January 1, 1987. A second permit was granted in 1989. The original permit was for the search of *El Salvador*, but *Queen Anne's Revenge* and *Adventure* were later added to the permit. With little success, the area was surveyed until 1996, when Mike Daniel was hired as director of operations in a last ditch effort to find an appropriate wreck before the expiration of the permit in 1996 (Lawrence and Wilde-Ramsing 2001:3; Wilde-Ramsing 2009:72). On November 21, a large pile of concreted debris was found on the western end of the original eighteenth century inlet, with anchors and three cannon visible. The size of the anchors indicated a ship the size of *Queen Anne's Revenge*. More cannon were discovered, along with a bronze bell, a gun barrel, lead items, barrel hoops, and cannon shot (Butler 2001:42). Once concretion was removed, the bell bore the inscription "IHS MARIA" and the date 1709 (later corrected to 1705), identifying it as of Spanish origin. It was during a press conference in March of 1997, that the tentative identification of the wreck as *Queen Anne's Revenge* was announced (Butler 2001:42; Wilde-Ramsing 2009:80). This identification was based on historical research of known wrecks in the Beaufort area during the eighteenth century (Wilde-Ramsing and Ewen 2012:113).

With a tentative identification, the Underwater Archaeology Branch began an assessment of the wreck with the intent of determining the wrecks natural and cultural context. The pile discovered in 1996 was exposed and mapped during the 1997 season. A portion of the hull structure was exposed prior to the 1998 season by Hurricane Bonnie, which was mapped and

examined. A permanent reference grid system and elevation datum were also established in that season (Wilde-Ramsing 2009:80-81). Results of the UAB's site assessment recommended complete excavation of the site due to environmental threats to the site, once funding for proper excavation, conservation, and curation of the artifacts could be obtained. These requirements were not completely met until 2006, resulting in an implementation of plans to survey the site and recover only those materials severely threatened (Wilde-Ramsing and Lusardi 1999; Wilde-Ramsing 2009:80).

Full-scale excavation of the site began in 2006. Units of 5x5 feet were established in reference to the baseline and datum. Six-inch induction dredges were used to remove the sand overburden until artifacts were encountered. The outflow was displaced to the edges of the site. Once the top of artifacts and concretions were defined and a reasonable area around the unit was exposed to prevent slumping of the sand back into the unit, a three-inch dredge was used to remove the sand around the artifacts for mapping purposes. The outflow of the three-inch dredge was directed to the surface, where it was sent through sluice boxes to retain any micro-artifacts present in the sand (Southerly et al. 2006:9). Each artifact greater than 0.5 feet and/or with diagnostic features, clusters of smaller artifacts, and features were mapped to provide exact provenience, and when possible photographed, before being labeled with tags containing an artifact number and placed outside the unit for recovery. Clusters of artifacts were given a single provenience and artifact number and bagged together on the site floor. Ballast stones were also only given the provenience of the unit and a single artifact number. Artifacts were transferred to the dock in wet storage containers, photographed, and then placed in temporary wet storage before being prepared for transfer to the conservation laboratory (Southerly et al. 2006:10).

With the discovery of the wreck and involvement of the UAB, a partnership was formed between the Department of Cultural Resources, Intersal, Inc., and Maritime Research Institute (MRI), in 1998. Through this agreement, DCR retains the rights to all artifacts recovered, while Intersal was granted the rights to the profits from the sales of artifact replicas and commercial documentaries relating to the *Queen Anne's Revenge* project (Wilde-Ramsing and Lusardi 1999:82).

The site was listed on the National Register of Historic Places as *Queen Anne's Revenge* in 2004 (National Register of Historic Places 2004; Wilde-Ramsing and Ewen 2012:110), sparking several scholars to publish an article stating that there was no concrete evidence to support the identification of the wreck as *Queen Anne's Revenge*. Bradley Rodgers, Nathan Richards, and Wayne Lusardi (2005:24-25) believed that the identification of the wreck without this evidence would cause archaeologists and researchers to make conclusions about the artifacts and wreck that coincided with the identification, rather than letting the evidence speak for itself, what they call Ruling Theory. The authors pointed out several pieces of information, such as the wreck location, the measurements of the hull remains, a cannon that appears to have the date "1730" etched into its surface, non-specific dendrochronological data, and a non-unique cultural material assemblage, to show that the wrecks identification cannot be made so easily and definitely (Rodgers, et al 2005:27-33).

In coordination with Richard Lawrence and Mark Wilde-Ramsing, David Moore published an immediate commentary response to the statements, addressing misinterpretation of records and misunderstanding of data. He points out that the authors of the "Ruling Theory" article "stretched certain boundaries in their efforts to use this project 'as a case study in the

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dangers of Ruling Theory and how it can compromise scholarly objectivity,' as we feel certain

that most professional archaeologists will be able to recognize" (Moore 2005:338).

The evidence presented by Moore in support of the ship's identification was reiterated

and built upon in a 2012 article by Mark Wilde-Ramsing and Charles Ewen. After presenting

many lines of evidence that fail to disprove the identification of the wreck as *Queen Anne's*

Revenge, the authors conclude that, while the evidence is not proof, the identification is a "time-

testing working hypothesis; and often in archaeology, that is as good as it gets" (Wilde-Ramsing

and Ewen 2012:129).

Excavation has continued since 2006, and is still ongoing. Following the fall 2013 field

season, 6,625 square-feet had been excavated, which is approximately 60% of the entire

identified site. Over 280,000 artifacts were recovered between 1996 and 2011, of which just over

244,000 can be utilized in this study.

Conservation and Curation

Between 1997 and 2003, artifacts recovered from the wreck were taken to various

temporary conservation facilities in North Carolina, located at UAB headquarters Fort Fisher,

Beaufort, and Morehead City. In 2003, however, a Memorandum of Agreement was created

between East Carolina University and the Department of Cultural Resources, providing a

location for a conservation laboratory where necessary conservation procedures could be

completed (Watkins-Kenney 2010:4-5). Each artifact recovered goes through a "Twelve-Step

Program," in which it is documented post-recovery (both written and photographic), cleaned,

consolidated, analyzed and repaired, and documented again before being transferred to the North

Carolina Maritime Museum in Beaufort, NC for permanent curation and display (Watkins-

Kenney 2010:6-7). All information pertaining to an artifact is recorded in a database, belonging

to the North Carolina Department of Cultural Resources Office of State Archaeology.

The *Queen Anne's Revenge* Shipwreck Project also strives to provide public outreach and

education. Reports and bulletins pertaining to archaeology, conservation, and artifact research

are available to the public on their website, www.qaronline.org. The North Carolina Maritime

Museum was designated as the repository for the *Queen Anne's Revenge* assemblage by

Department of Cultural Resources' Secretary Betty Rae McCain. Artifacts are displayed both in

the Beaufort museum, as well as other North Carolina state-owned museums, and in traveling

exhibits to private and national museums and schools. In June 2011, a large permanent exhibit

opened at the Beaufort museum, displaying many artifacts and teaching visitors about the ship,

Blackbeard, and the archaeology and conservation involved in the project. A small travelling

exhibit was opened in the summer of 2013, travelling from west to east through North Carolina.

Whydah

Ship History

Before being captured and outfitted as a pirate ship, *Whydah* operated as a slaver. The

name most likely came from an Anglicized version of its route and African trading port, Ouidah.

The life of *Whydah* as a slave ship is not well documented. A ship called *Weedaw Friggot* occurs

in a 1699 paper on lead sheathing practices in London. Another mention occurs in a 1704

insurance record of the Royal African Company, stating the *Widah* was in transit on a journey

from London, to Guinea, to Jamaica. A reference to Captain Lawrence Edward Prince in 1713,

says he was in command of the *Whidan* or ye *Whidah Galley* through 1715. It is unclear if Prince

was operating the vessel under the control of the Royal African Company or in competition as an

independent slaver (Hamilton 1992b:49-50). It is considered unlikely that any of these ships was the ship captured by Bellamy, as his prize was described as a new London-built vessel of 300 tons. It may have been a replacement for Prince's vessel, or experienced a significant overhaul as to make it almost entirely new. The ship bell dated 1716 makes these claims plausible (Hamilton 1992b:50).

In February of 1717, the pirate Samuel Bellamy was positioned in the "Windward passage" off the coast of Jamaica, where he sighted *Whydah* on the third and last leg of its voyage. The ship was on return to London with sugar, indigo, Jesuit's bark (quinine), silver, and gold. Bellamy and the two ships under his command, the *Sultana* and *Mary Ann*, chased *Whydah*, captained by Lawrence Prince, for three days, losing sight of the ship several times. When *Whydah* was finally captured without violence, Bellamy loaded *Whydah* with the goods on *Sultana* and kept 8 to 12 members of Prince's crew for his own. He then provided Prince with twenty pounds in silver and gold "to bear his charges", and set Prince and the remainder of his crew free in the *Sultana* (Hamilton 1992b:63-64).

After the capture of *Whydah*, Bellamy and his band of pirates captured the English *Tanner Frigate*, taking one crewmember and 5000 French coins before releasing the ship. *Whydah* and *Mary Ann* returned to Crooked Island in the Bahamas to check the condition of the ships before setting out for Richmond Island, near present-day Portland Maine for careening the vessels (Hamilton 1992b:64-65). The two separated off the Capes of Virginia in April, both operating in the area capturing small vessels for several weeks. With the company of the *Anne Galley* and its crew, a prize of Bellamy kept to assist with careening of *Whydah*, Bellamy headed northward toward Richmond's Island (Hamilton 1992b:66).

On the morning of April 26, 1717, *Whydah* captured the *Mary Ann* (a different ship from the one that Bellamy and his were meeting at Richmond's Island) just east of Cape Cod. The captain and five crewmen were ordered onboard *Whydah*, and a crew of seven pirates was sent to the *Mary Ann*, assuring the remaining crew steered the ship to follow *Whydah*. In the afternoon a second ship, the *Fisher*, was taken, and Captain Robert Ingols was ordered to board *Whydah* and provide direction for the crew, as he knew the waters and *Whydah* had become disoriented in the growing fog. With the company of the three ships, *Whydah* continued to sail northward as the weather continued to worsen (Hamilton 1992b:71-72).

After 10:00 pm, the nor'easter had become so strong that the *Mary Ann* and *Fisher* lost sight of *Whydah*. *Mary Ann* ran aground, but the crew was unable to leave the vessel. Near midnight, Bellamy realized the orientation of his vessel was dangerous for the waves created by the storm, and in an attempt to save *Whydah*, either the sail or the bow anchor was dropped, spinning the ship and capsizing it, 500 feet from the shore (Figure 3-2). Only two men, Thomas Davis and John Julian, were confirmed survivors of the wreck. Davis' witness account states that *Whydah* has been beaten to pieces by the morning (Hamilton 1992b:72-73). Davis sought shelter at the home of Samuell Harding, and the two made several trips to the wreck to salvage materials, bringing them back to Harding's home. These items were never again to be located or identified. The two men, and the five pirates stationed on the grounded *Mary Ann* were arrested on the 27th of April and tried for piracy (Hamilton 1992b:74).

The wreck was immediately salvaged by locals, but Cyprian Southack, a well-known cartographer, wreck salvager, and privateer, was sent by the Massachusetts governor to officially locate and salvage the wreck under warrant and to recover any materials salvaged by locals. Pieces of the wreck and bodies of the crew also continued to wash ashore, and Southack ordered

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that pieces of the hull that had washed ashore be burned for the iron. All other salvaged material

and goods were sent to Governor Shute in Boston.

Figure 3-2. Location of the wreck of *Whydah* off the coast of Cape Cod on Cyprian Southack's map of the New England coast. The specific location of the wreck was marked by Southack, just east of Eastham. (Southack 1735)

Discovery and Excavation

Barry Clifford's search for the wreck of *Whydah* began in 1978 (Hamilton 2006:134).

After gathering clues from historical records and maps, and stories of local citizens, Barry

Clifford had enough evidence to be granted a reconnaissance permit by the Massachusetts Board

of Underwater Archaeological Resources (Clifford and Perry 1999:50-51). In mid-1982,

Clifford, accompanied by five men, including fellow treasure salvor Mel Fisher, and John F. Kennedy Jr., took a magnetometer to the area where Clifford believed the *Whydah* wreck was located to map all the detections of iron materials (Clifford and Perry 1999:58). The reconnaissance permit limited the amount of investigating the team could do without an excavation permit, and Clifford felt the mandates of both permits were unfair. The excavation permit required that artifacts must be sold within one year of completion of the report, and 25% of the proceeds belonged to the State of Massachusetts. Attempts to change these provisions were unsuccessful, but the title to *Whydah*'s remains was granted to Clifford in December of 1982 (Clifford and Perry 1999:82).

Once enough funds were raised through private investors, the official search for the wreck began in mid-1983. With no success, the project was suspended in September, when the project archaeologist quit. The MBUAR required the hiring of a new archaeologist before the project could continue (Clifford and Perry 1999:132). The second season began in May of 1984, with no success until July 20, when three cannon were uncovered. On October 7, 1985, a large cast iron bell was recovered from the site, and on October 30, conservators revealed lettering around the top that read "THE WHYDAH GALLY 1716," providing definitive proof that the wreck being excavated was in fact *Whydah*. This discovery also provided evidence that the spelling of the ship was "Whydah," rather than the assumed "Whidah" (Clifford and Perry 1999:186-188).

In 1986, Clifford's attorney won complete control of the site management and ownership of the artifacts by Maritime Explorations, as well as the ownership of all *Whydah* materials found outside the boundaries of their claim. The Abandoned Shipwreck Act was passed in 1987, but did not apply to the *Whydah* site because the site was claimed before its passing (Clifford and

Perry 1999:196-197). Due to diminishing funding, excavation on the site was discontinued in 1989, although Clifford stated he believed there was still 85% of the site unexcavated, and the remaining funds were redirected to the creation of a museum (Clifford and Perry 1999:210-211). An unsuccessful season was attempted in 1997, with the crew finding "only a few objects" (Clifford and Perry 1999:244). A highly successful season began in May of 1998, with the recovery of a swivel gun, as well as the hull of *Whydah* (Clifford and Perry 1999:279-280, 295). No record or official report can be found relating to any field seasons and the results in the subsequent years.

The site is located approximately 1500 feet from the coastline under water at a depth of 10 to 25 feet. The artifacts covered an area of approximately 24,000 square-feet and were buried beneath 15 to 25 feet of coarse beach sand (Reedy 1991:53-54). During 1984 and 1985, the main objective was to remove the sand overburden, which was done using propwash deflection, an unsuccessful attempt at small-scale coffer-damming, and airlift and water-induction dredging. The propwash continued to be used throughout the remainder of the project as a means of removing overburden (Reedy 1991:55-56). Reedy states that the need to complete quick and efficient recovery due to unfavorable excavation conditions (large quantities of highly mobile sand, extensive debris field, turbulent waters, etc.) necessitated the use of the propwash, and that it proved to be the most effective form of sand-removal (Reedy 1991:54). Test excavations were conducted during 1986 and 1987 to delineate site boundaries and explore locations of high artifact density. Units of 8 x 8 feet were subdivided into quadrants of 4 x 4 feet and marked with steel grids demarcated with 1-foot sections, painted an alternating red and white (Reedy 1991:54).

Data recovery began in 1988. A Cartesian grid system was used for mapping of artifacts, which were divided into three categories: large items (cannon, anchors, and large concretions), medium artifacts located within a few 1-foot squares, and small artifacts located within a single 1-foot square. The propwash was used in each unit excavated until a depth of 2 feet above the cultural layer was reached, after which a dredge was used to reach the artifact layer. Gold-mining sluice boxes on board the recovery vessel collected the smallest artifacts brought up through the dredge. The large and medium artifacts were recorded, mapped, and tagged *in situ* and then recovered. The small artifacts were found and recorded by hand within each 1-foot square and then sent to the surface with the dredge (Reedy 1991:57-58). At the end of 1989, approximately 7500 square-feet had been excavated (Hamilton 1992b:108-136). By the same year, an accumulation of approximately 106,700 artifacts useful to this study were excavated.

Conservation and Curation

A temporary conservation laboratory was established in South Chatham, Massachusetts in 1985, where all artifacts were sent through the middle of 1988. In 1987, through a business agreement with *Whydah* Partners, L.P., Maritime Explorations Inc. created the *Whydah* Joint Venture, which secured funding for more-permanent conservation operations, which began in May of 1988 with the hiring of a laboratory director (Muncher 1991:335). All artifacts acquired by the laboratory were photographed, x-rayed, treated by the standards of the American Institute for Conservation's Code of Ethics and Standards, further documented after treatment through photographs and illustrations, and stored in climate-controlled facilities (Muncher 1991:336).

The entire artifact collection was officially purchased from the *Whydah* Joint Venture by Clifford, Bob Lazier, and Phil Crane in 1994, and a museum exhibiting the artifacts was opened

the following year (Clifford and Perry 1999:220,234). A traveling exhibit of many *Whydah* artifacts, in cooperation with National Geographic, was launched in 2007 (Expedition *Whydah* 2012). As of 1999, all artifacts have been kept as a single collection, remaining unsold.

HMS *Invincible*

Ship History

 HMS *Invincible* began its life as *L'Invincible*, a French warship, constructed beginning in 1741, and launched on October 21, 1744. It was the second of three new "74-gun ships," designed by Pierre Morineau. This new design was larger than the British second rate warships and had two, rather than three, decks, but carried fewer and larger guns than a second rate. The 36-pounder guns, placed on the lowest deck, were situated six feet above the waterline, which differed from the British first and second rate ships, whose guns on the lowest deck were placed three to four feet above the waterline, making them difficult to use on rough seas. The ship also sported a fuller bow and slimmer stern, providing a greater speed capacity. Finally, *L'Invincible* contained an innovative rudder angle indicator at the helm to display the ship direction to the quartermaster and the officer of the watch (Bingeman 2010a:5, 10-11).

 During a short service in the French Navy, *L'Invincible* was deployed to the West Indies, successfully fought a British force of three larger ships single-handedly, and returned safely to France. It was during the second deployment, in support of an East India convoy in 1747, that *L'Invincible* became caught amidst a battle with fourteen British ships under the direction of Admiral of the Fleet Lord George Anson. The ship was captured near Cape Finsterre on the west coast of Spain on May 3, 1747. Lord Anson recognized the uniqueness of the ship compared to

his own fleet and ordered that it be measured while in tow on return to Portsmouth (Bingeman 1981:154, 2010a:6-7).

Renamed HMS *Invincible*, the ship served as a model for new British 74-gun ships. The first incident of the ships rather disastrous life occurred in 1752, when it came very close to exploding and remained out of service for the next four years (Bingeman 1981:154). The second incident occurred in September 1757, during the first Louisbourg Expedition. In an effort to remove the French from the Fortress of Louisbourg in Nova Scotia, Canada, a fleet of the British Navy, under the command of Vice Admiral the Honourable Edward Boscawen, set out for the expedition too late in the year and encountered bad weather. Captained by John Bentley, *Invincible* sailed through a hurricane, in which the mainmast and rudder were lost and the ship became seriously flooded (Bingeman 2010a:15, 19). However, the crew managed to sail the ship back to Portsmouth where it was re-rigged and prepared for second expedition to Louisbourg, again under the command of Admiral Boscawen. The squadron left port at 2:30 am on February 19, 1758, but *Invincible'*s anchor became stuck on the seabed. Once loose from the seabed, the anchor became stuck on the bow cutwater. While crewmembers tried once again to free the anchor, strong east-south-easterly winds pushed the ship back toward Portsmouth, and efforts to correct failed because the rudder became jammed when items in the gunroom fell on the cable. Regardless of the struggle to right all the wrongs, *Invincible* had run aground on Horse Sand Tail in the Solent Strait of England (Figure 3-3) (Bingeman 2010a:15-16).

Figure 3-3. Approximate location of the wreck of HMS *Invincible* in the Solent Strait near Portsmouth, England on Thomas Kitchin's 1758 map of the English Channel (Kitchin 1758).

At daylight, efforts to remove *Invincible* from the sand bar were unsuccessful due to uncontrollable flooding in the hull, which was caused by either a puncture by the anchor or opened seams caused in grounding. Guns and much of the cargo were salvaged immediately, before the ship fell on its port side and was deemed un-savable. Over the following three weeks and into the summer, much more of the stores, ship structure, rigging, and guns were salvaged. It was believed that the hull damage sustained during the hurricane in 1757 was to blame for the quick downfall of the ship after a grounding that should have been easy to right (Bingeman 2010a:18-19).

Discovery and Excavation

The wreck of *Invincible* was discovered in May of 1979 by fisherman Arthur Mack when the net he and a friend were trawling became caught on a large underwater obstruction while they were fishing in the Solent. In the net, he found a large piece of timber with trunnels and corroded iron bolts. Mack returned to the area with his own boat and searched for the wreck for several days with no luck. After finding and losing the site once more, exact coordinates of the wreck were taken when it was found a third time, and divers John Broomhead and Jim Boyle confirmed that it was indeed a shipwreck. Over several months, artifacts were retrieved from the site, kept wet and photographed by Mack. The site was brought to the attention of Commander John Bingeman in March of 1980 to begin the process of protecting the site from sport diver salvaging. The wreck was positively identified as *Invincible* by Bingeman in 1981, when excavations revealed a tally stick with an inscription reading, "Invinc… Flying Jib 26. 26 N°6," with the remained or "Invincible" faded away (Bingeman 2010a:22-24).

A pre-disturbance survey was conducted in May of 1980 as part of the application for a Government Protection Order of the site under the 1973 Protection of Wrecks Act. This protection was officially gained September 30, 1980 (Bingeman 2010a:41-42). With the appropriate permissions granted, official excavation of the site began in 1981, with an excavation policy stating that the hull structure would be recorded after all artifacts were removed from within the structure, but the hull remains would not be removed from their location. This was decided because the ship plans still existed in archives in Paris, and therefore, the team felt nothing additional could be learned from removing the hull. After a hiatus for the 1982 season, excavation continued through 1990 (Bingeman 2010a:44, 46). Approximately 29,000 square-feet

were excavated (Hampshire & Wight Trust for Maritime Archaeology 2011). Excavations

yielded over 11,400 artifacts, of which just over 10,000 are useful to this study.

Conservation and Curation

Artifacts recovered in 1979 and 1980 were conserved under the direction of Christopher

O'Shea, Conservation Officer for the City of Portsmouth Museums Service in Portsmouth. Iron

artifacts recovered during the remainder of the excavation were also conserved by the

Portsmouth City Museums. However, in 1982, "Invincible (1744-1758) Conservations Limited"

was created as a company to back the excavation and conservation of the *Invincible* artifacts, and

this company directed the operations of the temporary conservation laboratory created for the

project in Portsmouth between 1983 and 1990 (Bingeman 2010a:45).

After failed attempts to secure a resting place for the artifacts with the Portsmouth

Museums Service, a deal was made with the Chatham Historic Dockyard Trust. In return for

project funding, the Chatham Dockyard would select at least one of every type of artifact

recovered from the site for permanent curation. However, throughout the project, additional

funding was gained through the sale of what the project leaders felt were less significant

artifacts, mainly musket shot and lengths of tarred rope mounted on pieces of *Invincible*'s wood.

Even with private donations, this was still not enough funding to cover the entire cost of the

project, and so it was decided that "surplus duplicate artefacts" (Bingeman 2010a:38) that had

not been selected by the Chatham Dockside would be sold at auction. This was done through

Christie's South Kensington Limited on March 10, 1988 (Bingeman 2010a:37-38). Each artifact

was recorded with the same level of detail as those that were chosen for permanent curation

before selling, the details of which are provided in the artifact inventory spreadsheet.

Henrietta Marie

Ship History

   Henrietta Marie first appears in the documentary record in 1697, marking the ship's

voyage from London to the Bight of Biafra and then Barbados. It is mentioned in the October 18,

1697 will of John Scorch, who states that he sailed on "the Ship Heneretta whereof Capt.

William Deacon is Commander in her now intended Voyage to Guinea in Africa in which I am

now bound out to Sea in" (Moore 1997b:III-7; Moore and Malcom 2008:26). *Henrietta Marie*

arrived in Barbados in July of 1698 with 188 slaves, successfully returning to London at the end

of that year (Moore 1997b:III-1, III-5; Moore and Malcom 2008:26). The Barbados shipping

records state that *Henrietta Marie* was a foreign-built, London-registered vessel. At this time, the

ship was considered an "interloper," or an independent slave ship operating outside the

monopoly of the Royal African Company. In 1698, however, the "Act to settle the trade to

Africa" imposed a 10% tax on the cargo of all independent slave ships to be paid to the Royal

African Company (Moore and Malcom 2008:26-27).

   Documents providing a tentative timeline of *Henrietta Marie*'s operations suggest that an

extended layover in London between the two known voyages was a time of overhaul or refit,

when a bell dated 1699 was added to the ship (Moore 1997b:III-8). Under the new tax and with

the command of a new captain, John Taylor, *Henrietta Marie* left for a second slave voyage in

September of 1699. An issue of a London newspaper suggests the ship was headed for Guinea.

Henrietta Marie arrived in Jamaica in May of 1700, with a new captain, Thomas Chamberlain

and 190 slaves (Moore 1997b:III-8; Moore and Malcom 2008:27). On June 25, 1700, *Henrietta

Marie* left Jamaica with "81 hogsheads of muscavado sugar, 11 barrels of indigo, 14 bags of

cotton, and 21 tons of logwood," (Moore and Malcom 2008:27-28) according to the Jamaica

shipping returns. It was during the return voyage to England that the ship ran aground on New

Ground Reef in the Dry Tortugas, off Key West (Figure 3-4). The only record that acknowledges

this loss is the settling of the estate of Thomas Chamberlain in London, November 1700, but

does not provide details (Moore and Malcom 2008:21, 28).

Figure 3-4. Approximate location of the wreck of *Henrietta Marie* on a 1708 map of Florida and the Caribbean (Lisle 1708b).

Discovery and Excavation

In the summer of 1972, operating under an exploration license from the Florida Division

of Archives, History, and Records Management, Armada Research Corporation was conducting

remote sensing surveys in the Florida Keys, in search of the remains of the Spanish treasure ship,

Nuestra Señora de Atocha. Armada Research was a subsidiary of Treasure Salvors, Inc., which was owned by Melvin Fisher. They located a wreck on New Ground Reef, approximately 12 nautical miles (14 statute miles) from the Marquesas Keys. The wreck was immediately identified as English, due to diagnostic artifacts recovered. While search for *Atocha*, continued, a team was sent to investigate the English wreck and several artifacts were located and/or removed, including two cannon and coherent ship structure. Because the permit only allowed the removal of a few artifacts for wreck identification, all artifacts had to be returned to the site. The proper salvage license was obtained in June of 1973, and fourteen days of recovery occurred that summer, during which most of the artifacts discovered in 1972 were recovered along with newly discovered material. It was noted that some of the material discovered in 1972 was missing, most likely as a result of storms (Moore 1997b:I-1).

Excavation operations were suspended after the summer of 1973 to focus all attention on the discovered *Atocha* wreck to the south. However, in 1983, Henry Taylor of Neptune Explorations subcontracted with Treasure Salvors to resume work on the abandoned excavation to the north. His primary interest was in the pewter previously recovered from the wreck. The 1983 season was mainly devoted to reestablishing the site and surveying of the perimeters, locating several structural components and collecting many artifacts from surface scatter of previous work. The 1983 season was, however, also a momentous season, as the identity of the wreck was discovered on a bronze watch bell with the words "THE HENRIETTA MARIE 1699" stamped on it (Moore 1997b:I-3; Moore and Malcom 2008:21).

Excavations continued under a subcontract between Treasure Salvors and Anton Kopp in October of 1984 through March of 1985. During this season, the south end of the site was survey and recovered, and the previously located articulated ship structure was re-exposed, examined,

photographed, and recorded. Artifacts were mapped on the seabed within a grid system and from points along a north-south baseline. Artifacts were then recovered with the use of air lifts and induction dredges (Moore 1997b:I-3; Moore and Malcom 2008:23). A final recovery expedition took place in September of 1991, with plans to recover the two located cannon, survey areas surrounding the site, and take more photographs. The area north of the site was surveyed with metal detectors, and several artifacts were found in both the northern area and the area surrounding the recovered cannon (Moore 1997b:I-3; Moore and Malcom 2008:23).

While no additional excavation has taken place since 1991, it is believed that many artifacts, including six cannon, ballast, the lower hull structure, and other miscellaneous artifacts, still remain un-located on the site, and a 1998 magnetometer and sidescan sonar survey was meant to help locate these items. Anomalies to the south-southeast and east-northeast were identified for further exploration (Moore and Malcom 2008:25). In 2001, the Mel Fisher Maritime Heritage Society and the RPM Nautical Foundation relocated and excavated the ship structure to take detailed measurements, photographs, and video footage, and recovered a few small artifacts (Malcom 2002:1; Moore and Malcom 2008:26). The site is protected under the Florida Keys National Marine Sanctuary since 1996 and is managed by the National Oceanic and Atmospheric Administration. The site is also accessible to sport divers, and a concrete monument containing a plaque honoring the victims of the slave trade was placed on the site in 1993 by the National Association of Black SCUBA Divers. Two concrete guns, replicas of the ones recovered in 1991, were placed nearby by the Mel Fisher Maritime Heritage Society in 1998, simulating the feel and environment of the wreck for visitors (Moore and Malcom 2008:24-26). As of 2003, approximately 14,000 artifacts useful for this study had been identified in the latest available publication.

Conservation and Curation

The artifacts recovered in 1973, including those discovered in 1972, were divided in 1976, with 25% of the recovered material going to the State of Florida per the license agreement. Conservation was conducted under the Mel Fisher Maritime Heritage Society. The artifact collection remains intact, with the exception of the artifacts turned over to the State of Florida. The story of *Henrietta Marie* and its objects are on display at the Mel Fisher Maritime Museum in Key West, Florida, and many artifacts are included in a traveling exhibit titled "A Slave Ship Speaks: The Wreck of the *Henrietta Marie*," which began touring museums in the United States in 1995 (David D. Moore 2013, pers. comm.).

CHAPTER FOUR: METHOD FOR DISCERNING A PATTERN

Introduction

To effectively compare the functions of the ship and the behaviors performed onboard, each assemblage must be divided into groups based on the functional attributes of the artifacts that will reflect behavioral activity. The groups for this study are based on the organizational groups from the *Queen Anne's Revenge* project (Mark Wilde-Ramsing 2009:95-100) and those of South's patterns, with some modifications made to better account for behavioral attributes. The groups and their contents are discussed below.

Assemblage inventories utilized in this study are complete lists of artifacts obtained from the wreck, each find given its own entry, description of type and material, and count. The inventories come from the published project reports of the *Whydah* (Hamilton 1992a, 1992b), HMS *Invincible* (Bingeman 2010a, 2010b), and *Henrietta Marie* (Moore 1997b; Malcom 2002, 2003). The inventory of the *Queen Anne's Revenge* wreck comes from the author's access to the artifact database, for which permission was granted by the North Carolina Department of Cultural Resources, Underwater Archaeology Branch (North Carolina Underwater Archaeology Branch 2014). Each assemblage inventory was reorganized to achieve compatibility between the assemblages. This was done because the categorizing schemes of each shipwreck project varied slightly from the categorization scheme of this study, and a standard needed to be created.

Based on the definitions of artifacts in each group discussed below, all of the appropriate artifacts were sorted and totals for each artifact type, class, and group were obtained. A percent value was obtained for each class within the overarching group for intra-site comparisons. This was calculated by taking the total of the class and dividing by the total of the group to which that

class belongs. A percent value of the entire assemblage was also obtained for each group for inter-site comparisons. This was calculated by taking the total of the group and dividing by the total count of the assemblage. Each assemblage was considered independently to obtain these values (Appendix).

It is important to note that artifact counts are based on the number of pieces found rather than the number of complete objects. Therefore, a count of one does not mean a complete object, nor does a count of five necessarily mean five individual objects. It is likely that many pieces included in an artifact count come from the same original object. Without personal examination of each artifact by the author, a minimum number of artifacts is not possible to obtain. In addition, many types of artifacts are prone to breakage in an aquatic environment, and therefore would be likely to be found in pieces on any wreck under normal circumstances. Therefore, the overall count of pieces rather than a count of complete artifacts is appropriate for this study.

Artifact Groups

Arms and Armament

Arms and Armament are those things related to weaponry, including ammunition, artillery (cannon and cannon accessories), and personal arms (firearms and bladed weapons). This group reflects the fighting function of the ship and its crew (Table 4-1). Artillery consists of the cannon and cannon accessories associated with the firing of the gun, but this group does not include the objects that are shot from the cannon. Artifacts in this group include cannon of various sizes, cannon equipment, cannon carriages, cartridge cases, grenade boxes, and gunner's tools. Cannon are cast iron or brass guns that are mounted on a carriage or a deck rail, rather than being held by an individual during firing.

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Table 4-1. Classes of the Arms and Armament Group and artifacts contained within each.

Class	Artifact Type
Artillery	Cannon, Cannon Equipment, Gunner's Tools, Cannon Mounts, Cartridge Case, Grenade Box
Ammunition	Cannon Projectiles, Grenade, Individual Lead Shot, Paper Cartridge, Wadding
Personal Arms	Personal Firearms, Firearm Accessory, Swords and Blades

Cannon equipment includes breech chamber, cannon apron, gun worm, leather bucket, powder ladle, quoin and Sampson bar, ramrod, sponge cylinder, tompion, vent pick or priming wire, and vent stopper. A breech chamber is a reusable container that holds the powder of a swivel or rail gun and is loaded into the back of the cannon, rather than the muzzle (Brown and Smith 2009). Cannon aprons are a sheet of lead used to cover the touchhole of the cannon to keep it clean and dry when the cannon was not in use (Blackmore 1976:218). Gun worms are coiled pieces of metal used for cleaning the barrel of a gun (Hamilton 1992b:254). Gun worms are included in both Artillery and Personal Arms, as there are smaller gun worms for personal guns. Leather buckets would have held the water in which the sponge would be submerged for cleaning the cannon (Bingeman 2010a:122). They are placed in the Arms and Armament Group because of their very specific primary function. A powder ladle was used to load a charge into the bore of a cannon. Elevating quoins and Sampson bars are utilized for raising and aiming the cannon (Bingeman 2010a:130, Blackmore 1976:240). A ramrod is used for packing a cartridge or gunpowder and projectile as far down the barrel as possible. Ramrods are also included in both Artillery and Personal Arms, as there are ramrods for personal guns. Sponge cylinders are the underlying structure of a cannon sponge, used to quell hot embers and clean any remaining residue after firing the gun. A tompion or tampion is a wooden plug that fits the muzzle of a

cannon to keep the bore of the gun dry and free of dust. Vent picks, also called priming wires, are used to clear the vent and to pierce the powder bag or cartridge before lighting the gun (Blackmore 1976:240). A vent stopper was used to plug the vent hole of the cannon after firing while the bore was sponged to prepare for the next firing (Bingeman 2010a:126).

Gunner's Tools include calipers, Gunner's rule, and slow-match pouch. Calipers were used for measuring the diameter of cannon shot and performing functions related to artillery. The Gunner's rule is uses for aiming and determining trajectory of cannon (Hamilton 1992b:222-223). The slow-match pouch serves as a lighter for grenades in combat. It is composed of a slow-burning wick within a pouch of "fearnought," a heat resistant fabric, which would be kept lit for the duration of its use.

Cannon mounts include both carriages and parts. A gun carriage is the wooden, wheeled structure within which a cannon rested. The wheels of the carriage allowed for easy aiming of the gun and smooth movement from the firing recoil. The trunnion strap is an iron strap that holds the trunnions of the cannon in place in the carriage. Additional artifacts in the Artillery Class are cartridge cases and grenade boxes. The cartridge cases are hollow poplar cylinders used to carry gunpowder from the powder magazine to cannon during battle (Bingeman 2010a:107-109). Grenade boxes are lead-lined storage containers for primed grenades (Bingeman 2010a:121). These artifacts are included in the Artillery Class because of their specialized function as part of the cannon firing and grenade launching process.

Ammunition are the objects that are shot out of cannon or personal guns onboard the ship, including both the projectile itself and the components of a charge. Artifacts include cannon projectiles, individual lead shot, paper cartridges, and pistol and cannon wadding. Cannon projectiles are bag shot, bar shot, breech chamber, cannon shot (variously called cannon balls),

casting sprue, langrage, and lead cannon shot. Bag shot are hemp packages containing multiple cannon shot or smaller lead shot (Hamilton 1992b:239, 271). Bar shot are used to tangle or take down rigging of the opposing ship in combat. They consist of two cast iron heads, in the form of round shot, half round shot, or hammer shot, connected by an iron shaft. Cannon shot are round, cast iron projectiles. Iron casting sprues are the cork-shaped product of the cannon shot molding process and are often used as cannon projectiles or melted down to cast more cannon shot. As iron casting requires too much head to be performed onboard, it is assumed these objects are present for use as projectiles. Langrage is scraps of metal loaded into a cannon and used as projectiles. This artifact type is only noted in the *Queen Anne's Revenge* assemblage, and is represented by three iron spikes found inside a loaded cannon. Lead cannon shot, recovered from *Whydah* are generally bagged lead shot found in a cannon context (Hamilton 1992:237-238).

Grenades are round explosive shells, containing a wooden fuse plug that ignites when the cannon is fired. Grenades can also be lit and launched by hand. Individual lead shot are fired from personal arms and are manufactured by dripping molten lead into cold water through a sieve, or pouring the molten lead into a mold. Lead shot are represented by various sizes and caliber. Paper cartridges contain the powder charge for cannon or the powder charge and the projectile for personal arms. Pistol wadding of paper and cannon wadding of hemp or oakum are used to keep the powder charge and projectile in place before firing and protect from accidental early ignition if hot shot is used.

Personal Arms are the weapons and their accessories that an individual sailor would possess on the ship, regardless of the actual ownership of the object. Personal firearms and parts, firearm accessories, and swords and blades are included in this class. Personal firearms are those that can be carried, loaded, and fired by a single individual. These firearms include blunderbuss,

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pistol, musket, and musket-like arms (i.e. musketoon and carbine). Many guns are found as parts rather than the whole. These parts are included in the firearms collection, but are not identified as to what type of personal firearm they belong. Personal firearm accessories are those things that are used in the preparation and firing of the personal firearms and also include artifacts used for ammunition storage and holding and carrying the weapons. Wooden cartridge formers are used as a mold around which the cartridge paper was formed to create complete cartridges for personal firearms (Bingeman 2010a:138). Gun worms, ramrods, vent picks are similar to those discussed in the Artillery Class, but are smaller to be used on personal firearms. Chert is the raw material from which gunflints are knapped and the gunflints are placed in the gunlock to create the spark that fires the gun. These two artifact types are included in the Personal Arms accessories because the gunflint is not permanently attached to the gun. Cloth handle wraps may have been used for suspending the pistol around the neck or improving the grip of the handle (Hamilton 1992b:252). These pieces of fabric are included in the Arms and Armament Group rather than the Personal Effects Group (discussed later) because of their direct association with, and often attachment to, personal arms. This association was determined by archaeologists associated with each project. Holsters and sling retainers are used for carrying guns, and gun rests are used as support while firing a gun, particularly long-barreled guns. Cartouche boxes strap to an individual's side and hold the individual cartridges for their firearm (Bingeman 2010a:134). A powder horn holds the gunpowder for reloading personal arms or forming cartridges, and a shot bag carries a supply of lead shot not yet formed into a cartridge.

Swords and blades are also possessed and utilized by a single individual. This artifact type is overwhelmingly represented by pieces rather than whole weapons. Scabbards for covering a bladed weapon as well as belt hooks for carrying bladed weapons are included. A

pike is a bladed, hooked tool used variously for reaching or pulling. The *Whydah* and *Invincible*

projects, where pikes were recovered, categorized them as weapons.

Cargo

Cargo items are the storage containers, treasure (coins, gold dust, ingots, etc.), and

commodities carried on the ship (Table 4-2). Containers are large storage vessels for keeping

large quantities of items during a voyage. Containers include wooden casks and their individual

parts (wooden staves, iron or wooden hoops, and wooden ends), used for the storage of food

items, liquids, gunpowder, or anything needing large-quantity storage during a voyage.

Accessories for these casks, such as bungs, spigots or taps, are included in the Containers Class,

as well as baskets and buckets made of leather, wood, and other plant materials and used for

carrying and storing items. Powder boxes and powder measures associated with gunpowder

storage are included in the Containers Class. These items are known to be associated with

ammunition storage because of their context on-site and were classified as such by the project on

which they were found. Ceramic classification was conducted using the primary function of

various vessel types defined by Dr. Linda Carnes-McNaughton from the *Queen Anne's Revenge*

ceramic assemblage. Ceramic vessels categorized as Cargo Containers are Large Oil Jars (Vessel

Type I), Large Jar Forms (Vessel Type II), and Medium-Sized Oil Jars (Vessel Type IV), all of

which have a primary function of storage and shipment (Carnes-McNaughton 2008:4-7, 9).

Table 4-2. Classes of the Cargo Group and artifacts contained within each.

Class	Artifact Type
Containers	Cask, Cask Accessory, Ceramic Vessel, Basket, Bucket
Treasure	Coin, Precious Metal Fragment, Elephant Tusk, Bead, Pendant, Ornamentation, Manilla
Merchandise	Bale Seal, Rosehead Nail, Mirror Frame, Restraining Device

Merchandise are those objects that are sold or traded and are represented by bale seals, rosehead nails, mirror frames, and restraining devices. Bale seals are folded over the binding of a wrapped shipment package to demonstrate the package had not been tampered with (Hamilton 1992b:338). Rosehead nails were recovered in conglomerate bulk quantities from *Queen Anne's Revenge*. Lead mirror frames recovered from *Henrietta Marie* are believed to be valuable trade items (Malcom 2003:6). Restraining devices are artifacts used to keep individuals onboard a ship in a single location or to keep them out of a private location. Shackles and leg irons are used to immobilize individuals, be they crewmembers, prisoners, or slaves. Padlocks and keys are used with these shackles and leg irons or to limit access to areas of the ship or storage containers.

Treasure is defined as those artifacts that are precious metals and/or would have been used as currency by the crew, either personally, as part of a greater business transaction, or stolen. Coins of silver, gold, and copper as well as ingots of silver, gold, and lead represent the most likely currency items. Gold bits and nuggets, and gold and silver dust are also included as Treasure. Individual bits, nuggets, and dust from each assemblage were assigned their identification and classification by their respective projects and were not considered individually by this author. Elephant tusks would be obtained through trade of goods or slaves.

Jewelry in the form of glass and gold beads, and gold pendants and ornamentation, as well as a copper bracelet called a "manilla," are included in the Treasure Class. These jewelry artifact types are placed under the Cargo Group, rather than the Personal Effects Group, because of their significant quantity and historical context. According to Carnes-McNaughton, the glass beads found on *Queen Anne's Revenge* are historically associated with the slave trade (Carnes-McNaughton 2007:7-8). Hamilton suggests the gold beads and pendants, the majority of which are Akan African gold, were already onboard *Whydah* when it was captured by Samuel Bellamy (Hamilton 1992b:320). These artifacts were, therefore, unlikely possessed by single individuals and qualify as Treasure.

Kitchen

The Kitchen Group includes artifacts involved in food preparation and consumption: i.e. cooking and serving materials (Table 4-3). The volume of these objects found on a ship may represent its purpose as a short-term transportation vessel or a living space for extended periods. Galley/Storage items are those things that would have been used in food preparation or to store food items within the galley. Ceramic and stone bricks and tiles are associated with a galley stove and food preparation. Whole kettles and cauldrons and components, as well as teapots are also associated with the galley stove. All ceramic vessel types defined as "jugs," as well as jugs made of metals, and glass case bottles (thin-walled, square-base bottles stored in cases of 12 bottles) are included in the Galley/Storage Class (Carnes-McNaughton 2008:14-16, 18; Carnes-McNaughton and Wilde-Ramsing 2008:6). While these artifact types were also likely used as tableware, their primary function is storage. Grinding stones for preparing various food products are also included in the Galley/Storage class.

Table 4-3. Classes of the Kitchen Group and artifacts contained within each.

Class	Artifact Type
Tableware	Dish, Utensil, Drinking Vessel, Jar
Galley/Storage	Brick/Tile, Kettle/Cauldron, Teapot, Ceramic Vessel, Glass Bottle, Grinding Stone
Miscellaneous	Glass Shard, Ceramic Sherd, Bottle Stopper

Tableware items include dishes and bowls, utensils, drinking vessels, and jars used during dining. Dishes are the flat plates and chargers made of pewter, ceramic, or wood. Bowls are the rounded, concave serving dishes made of ceramic, wood, pewter, and gourd. Utensils are the forks, spoons, and dining knives (identified and categorized as such by archaeologists associated with each project), and butter pats. Drinking vessels include a variety of glass, pewter, and ceramic vessels. Glass stemware, cups, and pewter tankards are the artifacts specifically designed for the drinking of liquids. Glass wine bottles and pewter bottles are included in the Tableware class because of their function of serving during dining. Ceramic jars used for serving are also included in the Tableware class. A Miscellaneous Class is also included in the Kitchen Group. This class contains glass shards of unidentifiable bottle type, ceramic sherds, and individual bottle stoppers unassociated with an identifiable bottle.

Personal Effects

Personal Effects are those things that would have been privately owned and used, excluding small arms. Personal attire in the form of apparel and accessories, smoking and recreational materials, and toiletries are all included in this group (Table 4-4). These artifacts may suggest the type of entertainment or status enjoyed by the crew or the types of personal belongings they possessed and how they may vary by the type of crew. Apparel are those things

that made up the basic, everyday clothing of a sailor or were required for fastening clothing, excluding any embellishments or clothing accessories. Clothing is represented by cloth pieces made of wool and linen, too thin to be sailcloth, as well as socks or stockings. Metal fittings and buttons are used for fastening clothing and are included in this group because they would be attached to clothing and function as part of it. Footwear is the shoes, boots, or any other type of foot cover other than socks. Shoe buckles are also included in this class because of their function in fastening the shoe or boot.

Table 4-4. Classes of the Personal Effects Group and artifacts contained within each.

Class	Artifact Type
Apparel	Buckle, Button, Clothing, Fitting, Footwear, Sock
Accessories	Cufflink, Hat, Jewelry, Necktie, Patten, Sack or Bag, Studs, Swagger Stick
Toiletries	Wig Curler, Flea Comb, Chamber Pot
Pastime	Gaming Piece, Reading Material
Tobacco Use	Pipe, Tamper

Accessories are objects that would have been carried by an individual or adorned their person or clothing, but do not serve a primary function of necessary clothing. Clothing accessories include hats, neckties, cufflinks, spangles, and studs. Hats are categorized as Accessories rather than Apparel because they are not necessarily used on a daily basis as primary clothing items. Neckties, cufflinks, and spangles are aesthetic additions to uniforms and clothing. Pattens are an early form of galoshes, worn to protect one's shoes in muddy conditions (Bingeman 2010a:161-162). The function of lead and pewter studs is not entirely understood, but the strongest evidence suggests they were used to fastened together pieces of some kind of animal horn decoratively (Welsh 2008:8-9; Welsh et al. 2012:193). Additional objects included

in Accessories are things that would have been carried or utilized by an individual. Sacks and bags, canes, and jewelry are the non-clothing artifacts included in this group. Although their contents are unknown, bags and sacks would most likely have been carried by an individual. A cane (called a "swagger stick" by archaeologists of the *Invincible* project) belonging to various crewmembers symbolized higher ranking is also included in this group. Complete pieces of jewelry, as opposed to fragmented pieces of gold and silver, would have been worn, or at least possessed, by an individual. The rings recovered from both *Whydah* and *Invincible* can be associated with a particular individual onboard.

Pastime artifacts are those things related to the entertainment of the sailors and would be owned by an individual or a few sailors. Artifacts included in the Pastimes Class are gaming pieces and reading material. Gaming pieces are lead or wood pieces used in both gambling and board games. Gaming boards are also included in gaming pieces. Reading material is represented by books. Tobacco Use items are those used for smoking. Whole kaolin pipes and broken stems and bowls are included in this group, as well as tampers used to pack the unburned tobacco in the pipe (Carnes-McNaughton 2007:12). Toiletries artifacts would have been used by a single sailor or several individuals as part of personal maintenance. Wig curlers, flea combs, and chamber pots are the artifacts in this class.

Tools and Instruments

The Tools and Instruments Group covers a wide variety of materials associated with activities aboard the ship. Tools related to fabric working, medicine, navigation and surveying, ship maintenance, and writing are included in this group (Table 4-5). The proportions of these groups of artifacts may suggest the extent to which the crew had to keep their tools and ship

functional. Fabric Working includes artifacts related to sewing sailcloth, clothing, and footwear.
Sail needles and sail maker's palms are the sail-making artifacts. A sail maker's palm is worn on
the hand and used as a large thimble for pushing a needle through the sail fabric. Shoe formers
are wooden foot-shaped blocks used as a mold when making shoes. Clothing sewing materials
include brass straight pins for holding fabric in place, scissors, and thread.

Table 4-5. Classes of the Tools and Instruments Group and artifacts contained within each.

Class	Artifact Type
Fabric Working	Sail Needle, Sail Maker's Palm, Canvas, Straight Pin, Scissors, Thread, Shoe Former
Medicine	Mortar/Pestle, Ointment Jar, Pharmaceutical Bottle, Scale/Nesting Weight, Syringe
Navigation	Chart Compass, Directional Compass, Divider, Log Line, Ring Dial, Sandglass, Sector, Sight, Sounding Weight, Survey Chain Marker
Ship Maintenance	Brush, Broom, Mop, Holystone, Carpentry Tool
Writing	Inkwell, Pencil, Seal, Slate, Slate Pencil, Writing Kit
Miscellaneous	Candle Holder, Coin Weight, Shod Shovel, Tally Stick, Various Weight

Medicinal artifacts serve primarily in the storage, preparation, and administration of
medicinal treatment, even though they may have been secondarily used for food or currency
purposes. Ceramic ointment jars and glass pharmaceutical bottles store medicines. Mortar and
pestle, and weights positively identified as scale or nesting weights are used in the crushing,
mixing, and weighing of doses. Pewter urethral and clyster syringes are used to administer
treatment for venereal disease and enemas.

Navigation and Surveying items are used in the directing of the ship and planning of a voyage. Instruments include chart compasses, directional compasses, dividers, log lines, ring dials, sandglasses, sectors, sights, sounding weights, and survey chain markers. The compass is used to determine direction and the ring dial determines time of day and latitudinal location (Hamilton 1992b:220). A chart compass is used to determine and mark arcs and circles on a map. Dividers measure the distance between two points and scales, and dividing distances into equal parts on a map. Both the chart compass and the divider can be used interchangeably (Hamilton 1992b:217). A log line is pulled behind the ship and used with the sand glass to estimate the speed of the ship in knots (Bingeman 2010a:99-101). Sectors are used for a wide range of calculations including determining firing trajectory, enabling astrological navigation, and measuring degrees (Hamilton 1992b:222-223; Bingeman 2010a:97-98). Sights are used for aligning the ship with or determining the location of a distant object. Lead sounding weights are attached to a rope and lowered into the water to determine depth, which aids in determining location and navigability. Sandglasses keep time for both watch-keeping shifts and ship speed estimation. While survey chains have only been recovered from *Queen Anne's Revenge* as corroded voids in concretion, the tally markers that would have attached to the chain at certain intervals, have been recovered intact. Interestingly, survey chains are not generally considered nautical tools.

Ship maintenance artifacts include brushes, brooms, and mops for cleaning the ship, as well as holystones, sandstone used for scouring the ship decks (Bingeman 2010a:166-167). The Ship Maintenance Class also includes carpentry and metalworking tools for repair of the ship and objects onboard, as well as the creation of new supplies. Writing tools and instruments include ink wells, pencils, seals, slate, slate pencils, and writing kits. Writing kits are miniature barrels of

dry black powder or a powder cake, and sand to soak up excess ink from the writing surface (Bingeman 2010a:152). Wax seals are used for sealing letters and bear symbols with various meanings (Hamilton 1992b:225). Pencils are utilized for writing on both paper products and slate. Slate is used as a writing surface. While they would appropriately fit in the Personal Effects Group, Writing Implements artifacts are included in the Tools and Instruments Group because they represent an activity that may vary by crew type, and the artifacts cannot definitively be identified as owned by a single individual or a select few.

Artifacts categorized as Miscellaneous are considered Tools and Instruments, but can have varying functions or do not fit in any other Tools and Instruments class. Coin weights and weights of various functions are categorized as miscellaneous. Various weights may have served as fishing, medicinal, coin weights, or some other unknown function. Tally sticks serve as labels for bags and packages, particularly those containing ammunition (Bingeman 2010a:114). Candle holders held the candles that provided light. Shod shovels were used for moving ballast stones, which balance the ship (Bingeman 2010a:153).

Other Artifacts

The remaining artifacts present in the assemblage inventories of the four shipwrecks are not included in this study for various reasons. Artifacts related to ship architectures, such as the wooden structure of the ship, fasteners, rope, and sailcloth, are not included because they are necessary to the function of all ships. All of these artifacts are found fragmentary and the chance of decomposition or floating away is so great that this artifact group cannot offer any information about behavior for this study. Ballast stones are also excluded from this study because they are related to ship function, much like the structure of the ship, and are not reported by all

assemblage inventories. Artifacts listed in the assemblage inventories with tentative

identifications or unknown functions (with the exception of lead weights because all lead

weights are categorized under Tools and Instruments, regardless of their class) are not included

in this study because their identification is subject to change upon further analysis. Fabrics not

classified as clothing were not included in this study because their identity and function is

unknown. While faunal remains and fuel in the form of coal are useful to this study, there have

been no official positive identifications of these materials by an expert, and therefore they are not

included in this study. Mercury and gunpowder remains are not reported, as their quantifying

method is primarily weight rather than count. There are other artifacts which are difficult to

categorize, such a storage vessels, as it is unclear where they would have been stored or used (for

example, casks may have served as storage in the hull or in the kitchen, and they could have

stored a wide variety of objects). Artifacts whose primary identification is concretion were

excluded from this study. Many of the *Queen Anne's Revenge* concretions have been x-rayed,

and identifications of artifacts adhering to the outside of concretions have been made. The

inventory of artifacts seen in x-ray, however, provides only tentative identifications and count is

subjective. The artifacts on the outside of concretions are not given a separate count from the

concretion itself, they are merely noted. In addition, the results of any such analysis on

concretions of the other assemblages are not reported.

CHAPTER FIVE: RESULTS OF RESEARCH

Introduction

In the study of ship artifact frequencies and pattern recognition, South's (1997:88) basic postulates for artifact patterning can be applied.

> (1) British colonial behavior should reveal regularities in patterning in the archaeological record from British colonial sites; and (2) specialized behavioral activities should reveal contrasting patterns on such sites. These patterns will be recognized through quantification of the behavioral by-products which form the archaeological record.

If early eighteenth century pirates represent a system within the larger system of the English global economy, that system should impose some uniformity in behavior, resulting in regularities in the archaeological record. Similarly, because of their similar set of behaviors and attitudes, and the regularities in the archaeological record, any deviation from the artifact frequencies of pirate vessels (i.e. the artifact frequencies of merchant and naval vessels) indicates differing behaviors occurring on those vessels.

It is important to reiterate Johnson and Skowronek's point regarding the difference between the contexts of land and maritime sites. Land sites are generally evidence of refuse from longer periods of occupation while shipwreck sites are "the valued and the necessary" deposited in a brief moment of wrecking. Therefore, the "behavioral by-products" South refers to are objects that were retained by sailors, rather than thrown away; a study of artifact patterning on shipwrecks reveals the things and behaviors valued by a crew.

With a small set of data available for study, several variables were difficult to control, possibly accentuating differences between assemblages. The wrecks needed to be of known

identity, limiting the data available to work with. While location of operation was limited to Atlantic voyages, the date these voyages occurred was more difficult to constrain. *Invincible* operated several decades after the wrecking of the other three ships. Completeness of excavation is inconsistent among the assemblages, as only approximately 60% of the *Queen Anne's Revenge* site has been recovered, and the wreck of *Whydah* was so widely scattered that exact site boundaries were difficult to determine.

These data also presented a statistical challenge. Each data set varied in size, the largest assemblage, *Queen Anne's Revenge*, being over 20 times larger than the smallest, *Invincible.* Statistical analysis of vastly different sample sizes is difficult because of the affect sample size has on any resulting differences between sites and the strength of significance of those differences. Smaller samples have a greater chance of producing statistically significant differences from the population than larger samples, simply because of the nature of sampling (Drennan 2009:189). This effect is compounded in the study of shipwrecks by the many variables that affect artifact preservation.

Attempts to determine a relationship between size of the assemblage and characteristics of the ships and their wrecks were unsuccessful. There is not a strong correlation between either artifact count and area of excavation (line of best fit R^2=0.285) or artifact count and tonnage of the ship (line of best fit R^2=0.155). Therefore, ship size and excavation area cannot account for the variation in assemblage size. Other variables that affect assemblage size will be more thoroughly addressed in the next chapter.

The data analyzed represent only a small fraction of ships that sailed and wrecked in the early- to mid-eighteenth century by English crews. One or two wrecks cannot represent the behavior of a whole subculture of seafarers; they can, however, serve as a beginning point to

explore how these subcultures compare to each other and to how the historical records understand them.

Queen Anne's Revenge

A total of 244,284 out of over 280,000 artifacts recovered from *Queen Anne's Revenge* can be utilized in this study. The remaining artifacts are modern intrusive artifacts, those related to ship structure, or have only a tentative identification. The Arms and Armament group is represented by 225,386 artifacts or 92.26% of the entire assemblage. A total of 17,484 artifacts are categorized as Cargo, 7.16% of the assemblage. Kitchen artifacts total 967, 0.40% of the entire assemblage. The Personal Effects group is comprised of 163 artifacts, 0.07% of the entire assemblage. Finally, there are 284 Tools and Instruments artifacts representing 0.12% of the entire assemblage (Figure 5-1).

The Arms and Armament group is made up, overwhelmingly, of Ammunition artifacts, of which 99.95% are lead shot. The Ammunition class represents 99.95% of the Arms and Armament group. The remaining classes, Artillery and Personal Arms, represent an incredibly small percentage (0.02% for both) of this group (Table 5-1).

The majority of the Cargo group is represented by Treasure, with 93.61% of the group classified as such. Commodity artifacts make up 4.57% of the group, while the frequency of Container artifacts is 1.82% (Table 5-1). The majority of Kitchen group artifacts were Galley/Storage artifacts (65.84%), 86% of which are glass bottle fragments. The remainder of the Kitchen group is comprised of 21.33% Tableware artifacts and 12.84% unidentifiable bottle and ceramic fragments (Table 5-1).
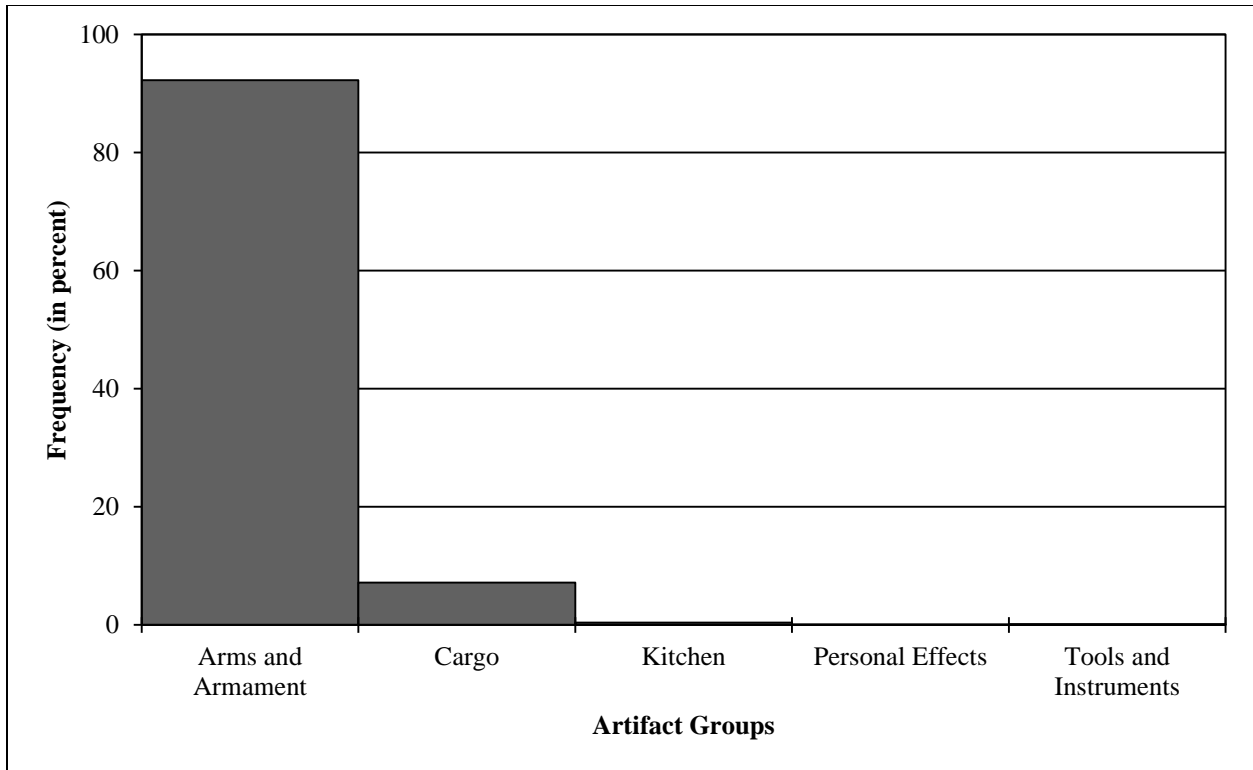
Figure 5-1. Frequency of each group of artifacts from the *Queen Anne's Revenge* assemblage.

Personal Effects artifacts are spread more throughout the group's classes. Accessory artifacts make up 54.60% of the Personal Effects group. The Tobacco Use class represents 22.09% of the group. The frequency of Apparel artifacts is 17.18%, and the frequency of Pastime artifacts is 6.14%. There are no artifacts classified as Toiletries in this assemblage (Table 5-1). Fabric Working artifacts represent the highest portion of the Tools and Instruments group, at 38.60%. Miscellaneous artifacts, consisting almost entirely of lead fishing weights, represent 29.47%. Navigation, Medicine, and Writing classes have smaller frequencies (11.93%, 11.58%, and 6.32% respectively), while the remainder of the artifacts in the Tools and Instruments is represented by Ship Maintenance artifacts, at 2.11% (Table 5-1).

Table 5-1. Artifact counts and frequencies of the *Queen Anne's Revenge* assemblage. The frequencies on the class rows are the frequency that class represents of its group. The frequency given on the "Group Total" row represents the frequency the group represents within the entire assemblage.

GROUP	CLASS	ARTIFACT COUNT	FREQUENCY
Arms and Armament	Ammunition	225,281	0.9995
	Artillery	54	0.0002
	Personal arms	51	0.0002
	GROUP TOTAL (compared to whole assemblage)	225,386	0.9226
Cargo	Container/Storage	318	0.0182
	Merchandise/Commodity	799	0.0457
	Treasure	16,367	0.9361
	GROUP TOTAL (compared to whole assemblage)	17,484	0.0716
Kitchen	Galley/Storage	636	0.6577
	Tableware	207	0.2141
	Miscellaneous	124	0.1282
	GROUP TOTAL (compared to whole assemblage)	967	0.0040
Personal Effects	Accessory	89	0.5460
	Apparel	28	0.1718
	Pastime/recreation	10	0.0613
	Tobacco use	36	0.2209
	Toiletries	0	0.0000
	GROUP TOTAL (compared to whole assemblage)	163	0.0007
Tools and Instruments	Fabric Working	110	0.3873
	Medicinal	32	0.1127
	Navigation and Surveying	34	0.1197
	Ship Maintenance	6	0.0211
	Writing	18	0.0634
	Miscellaneous	84	0.2958
	GROUP TOTAL (compared to whole assemblage)	284	0.0012
ASSEMBLAGE ARTIFACT TOTAL		244,284	1.0000

The *Queen Anne's Revenge* assemblage is made up almost entirely of Arms and Armament, specifically pieces of lead shot, which account for only a fraction less than 100% of the group. Compared to some of the more fragile items, such as glass and ceramics, lead shot is heavy and would easily find its way into the sediments around the wreck and is unlikely to float away in strong currents. It also suggests the predominant need of the vessel to be prepared for battle at all times.

The next largest collection of artifacts is Treasure, within the Cargo group, lending credence to the stereotypical image of the pirate. The 17,484 pieces of treasure consist of 15,291 pieces of gold dust, 5 pieces of silver dust, 4 coins, 791 glass beads, and 275 fragments of gold jewelry. It is important to note that over 90% of the treasure recovered from this wreck is pieces no larger than a grain of sand, so that the large quantity does not represent a large volume. There was surely treasure onboard, as the pirates had just collected between £1500 and £2000 worth during the blockade of Charleston. This lack of large pieces of treasure is most likely a factor of the non-violent nature of the wrecking/grounding and the ability of the sailors to obtain the valuable objects before rescue, a characteristic to be discussed in the next chapter.

The remainder of the groups of the *Queen Anne's Revenge* assemblage are very small in comparison to the Arms and Armament and Cargo groups, all representing less than 1% of the total assemblage. Interestingly, over 75% of the Kitchen artifacts are fragments of glass bottles, once again lending to the idea of drunken, fighting pirates. The lack of personal artifacts as well as tools can again be attributed to the non-violent wrecking, with sailors taking their personal belongings and important or expensive equipment with them.

Whydah

As the second pirate wreck analyzed, the *Whydah* assemblage was expected to be the most similar to the *Queen Anne's Revenge* assemblage, likely containing high frequencies of Arms and Armament artifacts. The *Whydah* assemblage provided a total of 106,673 artifacts that can be utilized in this study, out of just fewer than 109,500 artifacts recovered from the site (including modern intrusive, ship architecture, and unidentifiable artifacts). The Arms and Armament group contains 89,181 artifacts, 83.60% of the entire assemblage. The Cargo group is represented by 16,746 artifacts, 15.70% of the entire assemblage. The Kitchen group consists of 177 artifacts, 0.17% of the whole assemblage. There are 323 artifacts categorized as Personal Effects, 0.30% of the entire assemblage. Finally, the Tools and Instruments group is comprised of 246 artifacts, 0.23% of the entire assemblage (Figure 5-2).
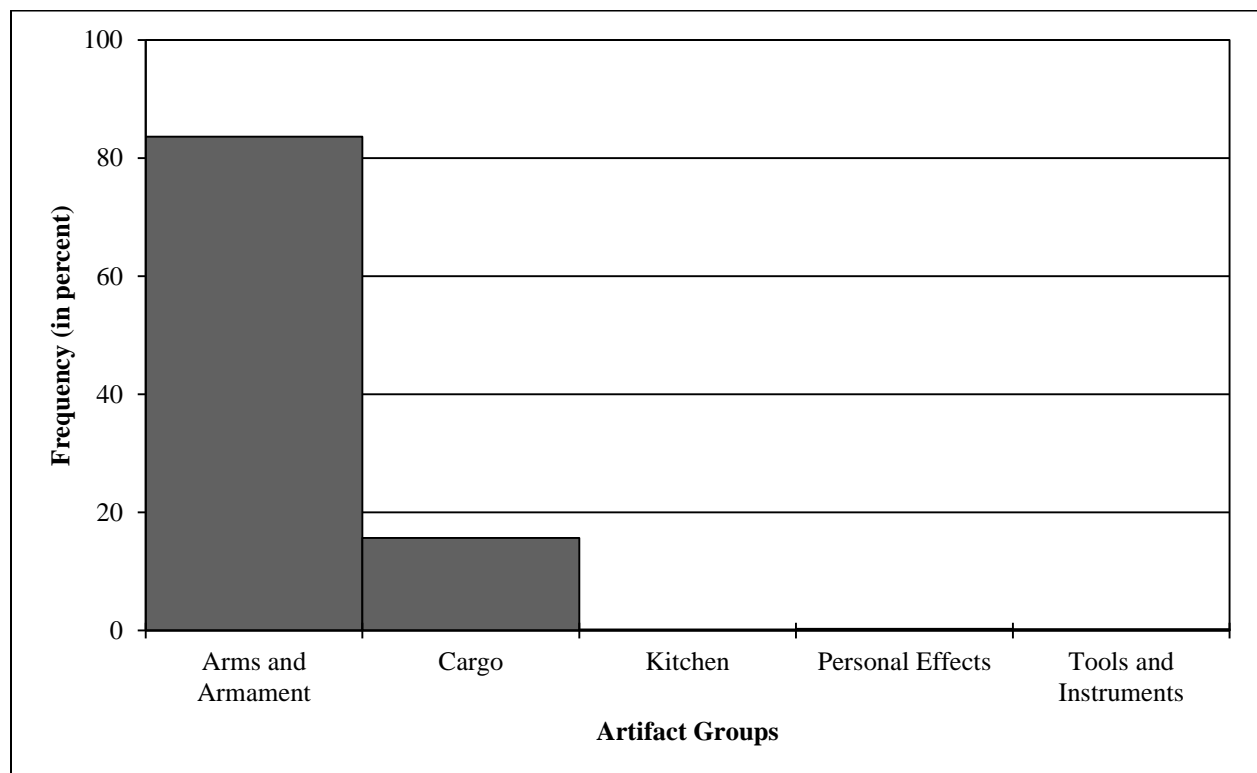
Figure 5-2. Frequency of each group of artifacts from the *Whydah* assemblage.

The majority of the Arms and Armament group consists of Ammunition; the class represents 99.51% of the Arms and Armament group. Lead shot makes up 99.72% of all Ammunition artifacts. Personal Arms artifacts represent 0.38% of the Arms and Armament group, while Artillery artifacts make up the remaining 0.11% (Table 5-2). Artifacts categorized as Cargo are overwhelmingly of the Treasure class, which represents 99.74% of the group. Fifty percent of the Treasure is coins. Merchandise and Commodity artifacts represent a mere 0.20%, while Containers and Storage complete the group with 0.06% (Table 5-2). The majority of the Kitchen group is represented by Tableware artifacts, which have a frequency of 84.75%. Galley/Storage artifacts comprise 14.12% of the group. Only two bottle stoppers classified as Miscellaneous make up the remaining 1.13% (Table 5-2).

Of the Personal Effects artifacts recovered from the *Whydah* wreck, 80.19% of them are classified as Apparel. The Pastime class represents 8.67% of the group, while the Accessory class represents 5.88%. Artifacts belonging to the Tobacco Use class represent 5.26% of the Personal Effects group. No Toiletries artifacts were recovered from this wreck (Table 5-2). Within the Tools and Instruments group, Miscellaneous tools are represented almost entirely by fishing weights and make up 39.84% of the group, while Fabric Working artifacts represent 35.37%. Ship Maintenance artifacts and Navigation and Surveying artifacts comprise 10.98% and 9.35% of the group, respectively. Finally, Medicinal artifacts make up 3.25% of the Tools and Instruments group, while the Writing class represents 1.22% (Table 5-2).

Table 5-2. Artifact counts and frequencies of the *Whydah* assemblage. The frequencies on the class rows are the frequency that class represents of its group. The frequency given on the "Group Total" row represents the frequency the group represents within the entire assemblage.

GROUP	CLASS	ARTIFACT COUNT	FREQUENCY
Arms and Armament	Ammunition	88,741	0.9951
	Artillery	97	0.0011
	Personal arms	343	0.0038
	GROUP TOTAL (compared to whole assemblage)	89,181	0.8360
Cargo	Container/Storage	9	0.0005
	Merchandise/Commodity	34	0.0020
	Treasure	16,703	0.9974
	GROUP TOTAL (compared to whole assemblage)	16,746	0.1570
Kitchen	Galley/Storage	25	0.1412
	Tableware	150	0.8475
	Miscellaneous	2	0.0113
	GROUP TOTAL (compared to whole assemblage)	177	0.0017
Personal Effects	Accessory	19	0.0588
	Apparel	259	0.8019
	Pastime/recreation	28	0.0867
	Tobacco use	17	0.0526
	Toiletries	0	0.0000
	GROUP TOTAL (compared to whole assemblage)	323	0.0030
Tools and Instruments	Fabric Working	87	0.3537
	Medicinal	8	0.0325
	Navigation and Surveying	23	0.0935
	Ship Maintenance	27	0.1098
	Writing	3	0.0122
	Miscellaneous	98	0.3984
	GROUP TOTAL (compared to whole assemblage)	246	0.0023
ASSEMBLAGE ARTIFACT TOTAL		106,673	1.0000

Just as with *Queen Anne's Revenge*, the majority of the *Whydah* assemblage is Arms and Armament artifacts, and just under 100% of the group represented by lead shot. The Cargo group is also the second largest group, with 99.7% of the group represented by Treasure. Unlike *Queen Anne's Revenge*, the quantity of the treasure items is represented by a greater weight of artifacts. Of the 16,747 Treasure artifacts, half (8,358) are coins of silver, gold, and copper, while the remaining half are gold and silver bits, gold dust and nuggets, and Akan African gold jewelry fragments. The frequency of the Cargo artifacts is also twice that of the *Queen Anne's Revenge* assemblage, which may be a factor of the wrecking process, as *Whydah* experienced a violent wreck with few survivors.

The remaining groups each represent less than 1% of the assemblage. Although Personal Effects artifacts represent only 0.30% of assemblage, the frequency and quantities are relatively higher than those of *Queen Anne's Revenge*, especially apparel, most likely because of the many bodies which remained with the wreck of *Whydah*. Similar to *Queen Anne's Revenge*, just less than 75% of the Kitchen group is represented by glass bottles. The Tools and Instruments group of *Whydah* is also similar to *Queen Anne's Revenge* in frequency.

HMS *Invincible*

The HMS *Invincible* assemblage presents a difficulty as a comparative assemblage because it is significantly smaller than both the *Queen Anne's Revenge* and *Whydah* assemblages, with a total of 10,193 artifacts out of just under 11,500 artifacts (including ship architecture and unidentifiable artifacts) recovered from the wreck that can be utilized in this study. This assemblage was expected to contain a high frequency of Arms and Armament artifacts, as the primary function of the vessel is combat. It was, however, also expected to have

a lower frequency of Cargo artifacts, particularly Treasure, relative to the pirate assemblages because of that combat function, as opposed to the plundering function of the pirate vessels.

Of those artifacts pertinent to this study, 8,272 are categorized as Arms and Armament, 81.15% of the assemblage. Cargo and Kitchen groups contain 612 (6.00%) and 332 (3.26%) artifacts respectively. A count of 398 artifacts represents the Personal Effects category, which is 3.90% of the assemblage. Finally, Tools and Instruments artifacts comprise 5.68% of the group, with a count of 579 artifacts (Figure 5-3).
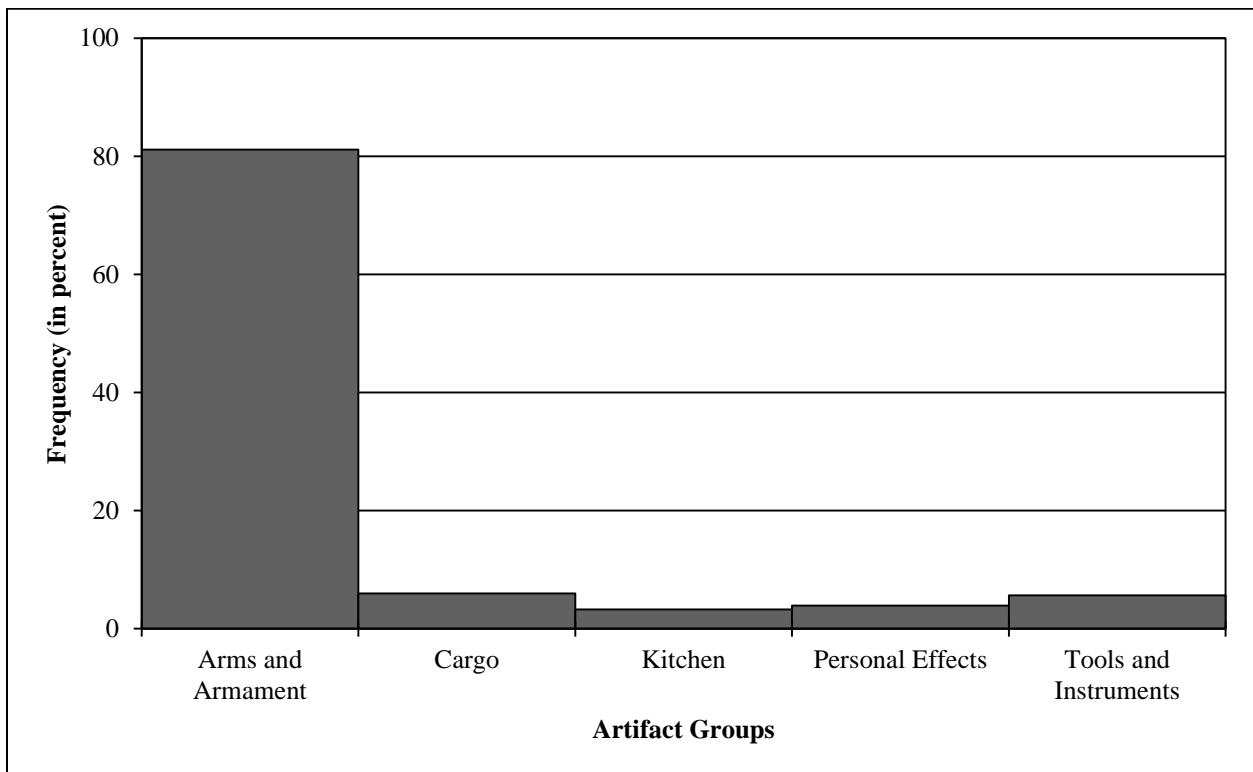
Figure 5-3. Frequency of each group of artifacts from the HMS *Invincible* assemblage.

Of the Arms and Armament group, 72.86% of the artifacts are classified as Ammunition, with 97% of Ammunition artifacts being lead shot. Personal Arms artifacts make up 23.38% of the group, while Artillery artifacts represent the remaining 3.76% (Table 5-3). The Cargo group

is represented overwhelmingly by Container artifacts, which comprise 99.67% of the Cargo group. The Commodity class represents a very small 0.33% of the group. There were no Treasure artifacts recovered from this wreck (Table 5-3). The Kitchen group is comprised of 52.71% Tableware artifacts, and only 5.72% Galley/Storage artifacts. Miscellaneous Kitchen artifacts make up 41.57% of the group, with approximately 50/50 unidentifiable bottle fragments and ceramic sherds (Table 5-3).

The majority, 91.21%, of the Personal Effects group is represented by Apparel artifacts, about two-thirds of which are shoes and boots. The remainder of the classes are relatively equal in frequency; Accessories represent 3.77%, Pastime artifacts represent 2.01%, Toiletries represent 1.76%, and Tobacco Use artifacts represent 1.26% (Table 5-3). The Ship Maintenance class makes up 57.34% of the Tools and Instruments group. The Miscellaneous class makes up 18.31%, while Navigation and Surveying artifacts represent 13.82% of the group. The Writing class represents 5.18% of the group. The Medicinal and Fabric Working classes represent 2.94% and 2.42% of the group, respectively (Table 5-3).

As with the two pirate assemblages, *Invincible* is represented by mostly Arms and Armament, with a frequency very similar to the *Whydah* assemblage. Lead shot only represents 71% of the group, and there is a much higher frequency of Personal Arms, although 99.4% of the Personal Arms artifacts are gunflints. Unlike the pirate assemblages, the remaining groups have more even frequencies. The majority of the Cargo group is storage containers, mainly wooden barrels, and no Treasure was recovered from this wreck, likely because the ship was on a military mission rather than trade, differentiating it from the pirate vessels.

Table 5-3. Artifact counts and frequencies of the HMS *Invincible* assemblage. The frequencies on the class rows are the frequency that class represents of its group. The frequency given on the "Group Total" row represents the frequency the group represents within the entire assemblage.

GROUP	CLASS	ARTIFACT COUNT	FREQUENCY
Arms and Armament	Ammunition	6,027	0.7286
	Artillery	311	0.0376
	Personal arms	1,934	0.2338
	GROUP TOTAL (compared to whole assemblage)	8,272	0.8115
Cargo	Container/Storage	610	0.9967
	Merchandise/Commodity	2	0.0033
	Treasure	0	0.0000
	GROUP TOTAL (compared to whole assemblage)	612	0.0600
Kitchen	Galley/Storage	19	0.0572
	Tableware	175	0.5271
	Miscellaneous	138	0.4157
	GROUP TOTAL (compared to whole assemblage)	332	0.0326
Personal Effects	Accessory	15	0.0377
	Apparel	363	0.9121
	Pastime/recreation	8	0.0201
	Tobacco use	5	0.0126
	Toiletries	7	0.0176
	GROUP TOTAL (compared to whole assemblage)	398	0.0390
Tools and Instruments	Fabric Working	14	0.0242
	Medicinal	17	0.0294
	Navigation and Surveying	80	0.1382
	Ship Maintenance	332	0.5734
	Writing	30	0.0518
	Miscellaneous	106	0.1831
	GROUP TOTAL (compared to whole assemblage)	579	0.0568
ASSEMBLAGE ARTIFACT TOTAL		10,193	1.0000

Henrietta Marie

The *Henrietta Marie* assemblage was expected to be the most different of the four compared assemblages. Based on the function of the vessel, it is expected that the highest frequencies of artifacts from the wreck would be Cargo and Kitchen artifacts, as the vessel made long trans-Atlantic voyages with its merchandise, including human cargo. Similar to the *Invincible* assemblage, this is also a difficult assemblage for comparative purposes because it is much smaller than the pirate assemblages, with only 14,293 of just over 15,100 artifacts (including ship architecture and unidentifiable artifacts) pertaining to this research.

A total of 477 artifacts in the Arms and Armament category represent 3.34% of the whole assemblage. The 13,329 artifacts categorized as Cargo dominate the assemblage, representing 93.26%. Kitchen artifacts represent 3.16% of the assemblage, 451 artifacts. Only nine artifacts represent Personal Effects, 0.06% of the assemblage. Finally, there are 27 Tools and Instruments artifacts, making up the remaining 0.19% (Figure 5-4).

Within the Arms and Armament group, 90.78% of artifacts are classified as Ammunition, of which just over 86% are lead shot. The remainder of the group is represented by 7.76% Personal Arms and 1.47% Artillery (Table 5-4). The majority of the Cargo group is overwhelmingly Treasure artifacts, which make up 97.86% of the group, and are almost entirely glass beads. Merchandise artifacts represent 1.94% of the class, while Container/Storage artifacts represent only 0.20% (Table 5-4). The Kitchen group is comprised almost entirely of Tableware artifacts (83.81%), with the remaining classes, Miscellaneous and Galley/Storage, representing 10.64% and 5.54%, respectively (Table 5-4).
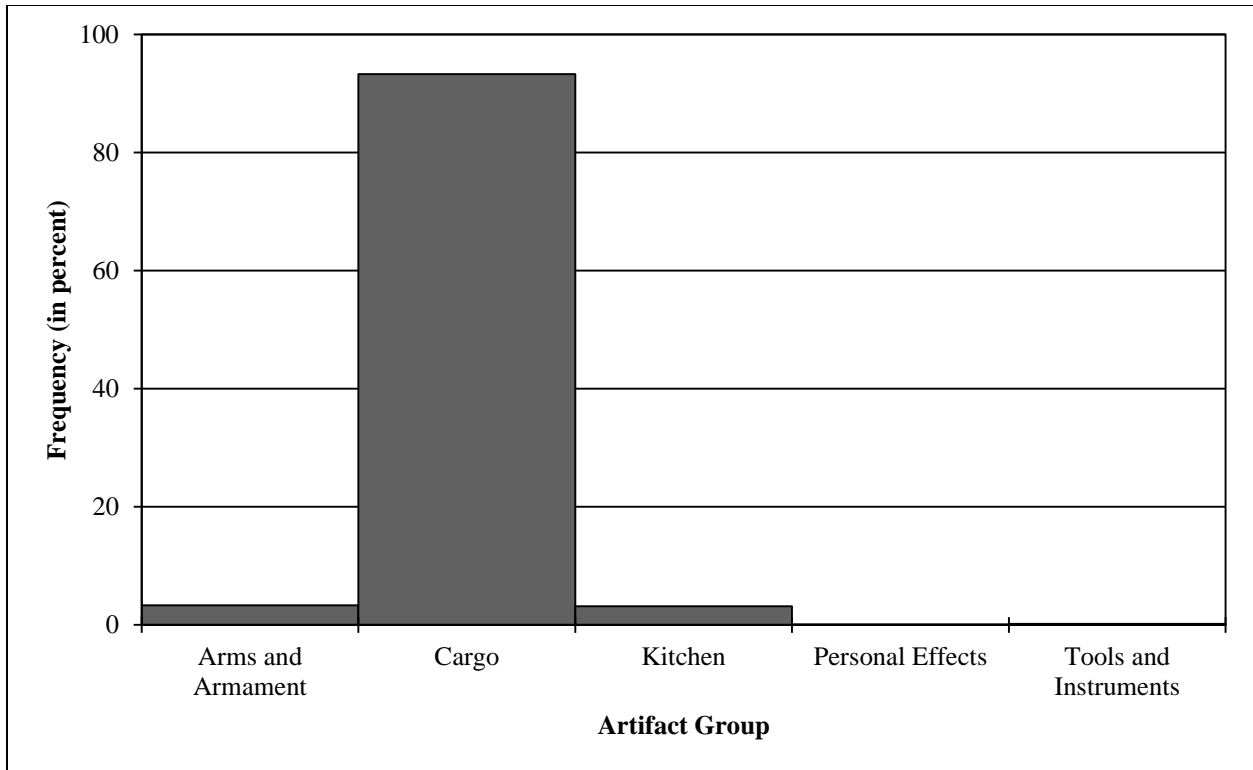
Figure 5-4. Frequency of each group of artifacts from the *Henrietta Marie* assemblage.

Only two Personal Effects classes contain artifacts; 88.89% of the group (four buttons and four buckles) is classified as Apparel, and 11.11% (a single pipe stem) is classified as Tobacco Use (Table 5-4). Over half of the Tools and Instruments group is represented by Ship Maintenance artifacts (62.96%). The Navigation and Survey class and Miscellaneous class both represents 14.81% of the group, while the Fabric Working and Medicinal classes both represent 3.70% (Table 5-4).

Table 5-4. Artifact counts and frequencies of the *Henrietta Marie* assemblage. The frequencies on the class rows are the frequency that class represents of its group. The frequency given on the "Group Total" row represents the frequency the group represents within the entire assemblage.

GROUP	CLASS	ARTIFACT COUNT	FREQUENCY
Arms and Armament	Ammunition	434	0.9099
	Artillery	6	0.0126
	Personal arms	37	0.0776
	GROUP TOTAL (compared to whole assemblage)	477	0.0334
Cargo	Container/Storage	27	0.0020
	Merchandise/Commodity	258	0.0194
	Treasure	13,044	0.9786
	GROUP TOTAL (compared to whole assemblage)	13,329	0.9326
Kitchen	Galley/Storage	25	0.0554
	Tableware	378	0.8381
	Miscellaneous	48	0.1064
	GROUP TOTAL (compared to whole assemblage)	451	0.0316
Personal Effects	Accessory	0	0.0000
	Apparel	8	0.8889
	Pastime/recreation	0	0.0000
	Tobacco use	1	0.1111
	Toiletries	0	0.0000
	GROUP TOTAL (compared to whole assemblage)	9	0.0006
Tools and Instruments	Fabric Working	1	0.0370
	Medicinal	1	0.0370
	Navigation and Surveying	4	0.1481
	Ship Maintenance	17	0.6296
	Writing	0	0.0000
	Miscellaneous	4	0.1481
	GROUP TOTAL (compared to whole assemblage)	27	0.0019
ASSEMBLAGE ARTIFACT TOTAL		14,293	1.0000

When considered across all categories, the assemblage of *Henrietta Marie* appears the most different of the four vessels. While similarities are apparent between the pirate and naval ship assemblages, *Queen Anne's Revenge* and *Whydah* are more similar to each other than either is to *Invincible* (Figure 5-5). An Arms and Armament artifact frequency of greater than 80% shared by *Queen Anne's Revenge*, *Whydah*, and *Invincible* seems to suggest their similar aggressive function. *Henrietta Marie*, on the other hand, has an Arms and Armament artifact frequency of less than 5%. While merchant ships would need to be armed enough for defense, their main purpose was commerce, and they traded cannon space for larger cargo capacity.
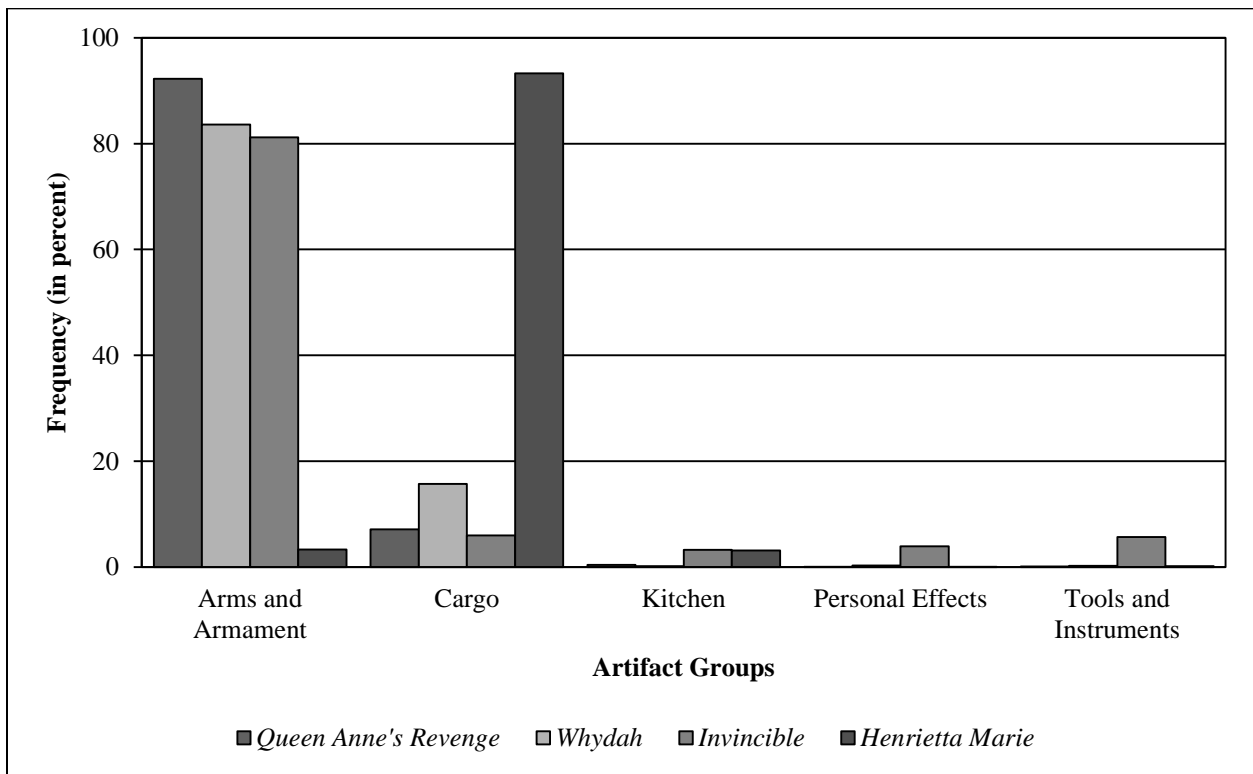
Figure 5-5. Frequencies of groups of each assemblage.

The Cargo-related artifact frequencies are more similar among *Queen Anne's Revenge, Whydah,* and *Invincible* than when compared to *Henrietta Marie.* However, a consideration of

the artifact frequencies within that category shows differences between the ship functions. Within this category, Treasure artifacts represent over 95% of the Cargo artifacts of the *Whydah* and *Queen Anne's Revenge* assemblages, while no Treasure artifacts were recovered from *Invincible*, whose Cargo category is comprised almost entirely of Container artifacts, suggesting a need for storage space, and particularly ammunition storage in the case of *Invincible*. *Henrietta Marie* Cargo is almost entirely represented by Treasure, specifically glass beads, but this is also the assemblage's largest group of artifacts, suggesting the commercial function of the merchant ship, while the pirate ships would need to balance cargo capacity with offensive capability.

Logarithmic Transformation

Logarithmic transformations of data sets can be used in archaeology when data that are skewed, contain outliers, or differ by orders of magnitude result in graphic representations absent of finer details. The quantity of lead shot recovered from *Queen Anne's Revenge* and *Whydah* severely skew the frequency of Arms and Armament artifacts, with the frequency of *Queen Anne's Revenge* artifacts of this group (92.3%) being 10 times larger (one order of magnitude) than that of the next group (Cargo, 7.2%). Similarly, glass beads skew the frequencies of the *Henrietta Marie* assemblage in favor of Cargo. These pieces of raw data make it difficult to discern any differences in the frequencies of the remaining groups. A logarithmic transformation has the effect of "normalizing" the data sets, making them more comparable, as well as providing greater graphical definition between groups of data obscured by the values of the raw data (Baxter 1994:38-41).

The result of a common logarithm of a percentage is the exponent to which 10 must be raised to achieve that percentage (Fenna 2002). For example, the logarithm of 92.26%

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(frequency of *Queen Anne's Revenge* Arms and Armament) is 1.9650, because $10^{1.9650}$ equals

92.26. The logarithm of each percentage between .01 and 100 results in a value between -2 and

+2, reducing the magnitude of difference between the frequencies of the larger groups (Baxter

1994:41). Any percentage less than one will have a negative log value. The following logarithm

values were obtained for the frequency of each group within each assemblage (Table 5-5).

Table 5-5. Logarithmic values of percent frequency of each artifact group for all shipwreck assemblages.

	Queen Anne's Revenge	Whydah	HMS Invincible	Henrietta Marie
Arms and Armament	1.9650	1.9222	1.9093	0.5234
Cargo	0.8549	1.1959	0.7784	1.9697
Kitchen	-0.3979	-0.7801	0.5128	0.4991
Personal Effects	-1.1549	-0.5189	0.5916	-1.2009
Tools and Instruments	-0.9208	-0.6371	0.7544	-0.7238

The resulting chart more clearly defines the differences between the groups of artifacts

not categorized as Arms and Armament within the pirate assemblages, as well as those groups

other than Cargo within the merchant assemblage. Visually, this logarithmic transformation

reinforces the fact that the pirate assemblages are more similar to each other than to the other

assemblages (Figure 5-6. Graphic representation of logarithms of the percent frequency for each

artifact group of all four assemblages.. The differentiation between the pirate vessels and the

naval vessel are also more apparent, as the log values for Kitchen, Personal Effects, and Tools

and Instruments groups of *Queen Anne's Revenge* and *Whydah* are negative while the log values

of these groups of *Invincible* are positive, resulting in a very different graphic distribution. This

logarithmic transformation of the data serves to further identify differences and similarities

among those groups with small frequencies, whose information was obscured by overpowering

quantities of artifacts. These similarities and differences will be examined further in the next

chapter.
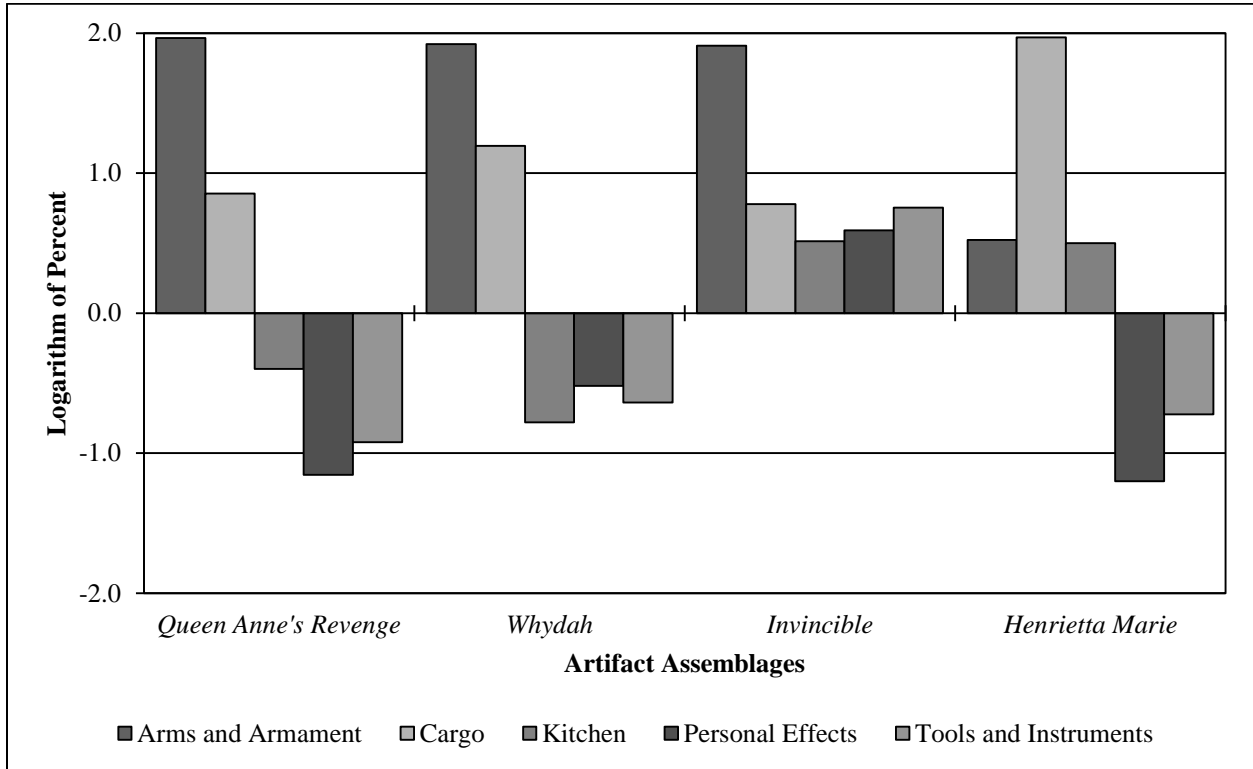
Figure 5-6. Graphic representation of logarithms of the percent frequency for each artifact group of all four assemblages.

CHAPTER SIX: DISCUSSION OF A "PIRATE PATTERN"

Inter-Site Comparison

In history and popular fiction, pirates are a colorful and distinctive group. Based on this initial study, however, there is not a clear pattern differentiating pirate archaeological assemblages as unique when compared to the assemblages of ships of other functions. There is a noticeable difference between the pirate vessels and the merchant vessel, but it is more difficult to distinguish between the pirate vessels and the naval vessel from the frequencies obtained through this study. Ultimately, the pirate vessels are more like each other than the other two vessel types, which itself suggests a discernable pattern, but more data are necessary to solidify the differences among the three functional types of assemblages. There are several avenues for further exploration resulting from this research that might provide a better picture of a possible "pirate pattern" when more data are available. These points are discussed below. There are many variables that affect the formation and recovery of an underwater archaeological site that have strong bearings on the results obtained in this study. These variables and their impact on this study are also discussed.

Arms and Armament

Pirate vessels cannot be differentiated from the naval vessel based on the frequency of Arms and Armament artifacts, as the frequencies are relatively the same (*Queen Anne's Revenge*: 93%; *Whydah*: 84%; *Invincible*: 81%). The frequency of this artifact type recovered from *Henrietta Marie* is minimal (3%) compared to the other assemblages (Figure 6-1). A more visible difference between the three like assemblages shows in the breakdown of the Arms and

Armament group. Both the *Queen Anne's Revenge* and *Whydah* assemblages are dominated by

Ammunition artifacts (in both cases, over 99% of Ammunition artifacts were lead shot). While

still almost entirely composed of lead shot, the Ammunition class of *Invincible* only represents

about 73% of the Arms and Armament group. Most of the remainder of the *Invincible* Arms and

Armament artifacts are classified as Personal Arms; however, 1,921 of the 1,933 artifacts in this

class are gunflints. *Invincible*'s frequency of Artillery artifacts is marginally higher (about 4%)

than those of *Queen Anne's Revenge* and *Whydah* (both of which are under 1%). While these

differences exist in frequency, the differences are created by an overwhelming quantity of a

single type of artifact (i.e. lead shot and gunflints) rather than a consistent pattern evident in

multiple types of artifacts (Figure 6-2, Figure 6-3). This presents of an overwhelming count of a

single artifact may, in fact, be part of a pattern. This skewing of the data by large counts could

also possibly be avoided by doing an analysis of weights, of both Arms and Armament artifacts

and other groups, such as glass beads or broken ceramics and glass.

Figure 6-1. Frequency the Arms and Armament group represents of each entire shipwreck assemblage.
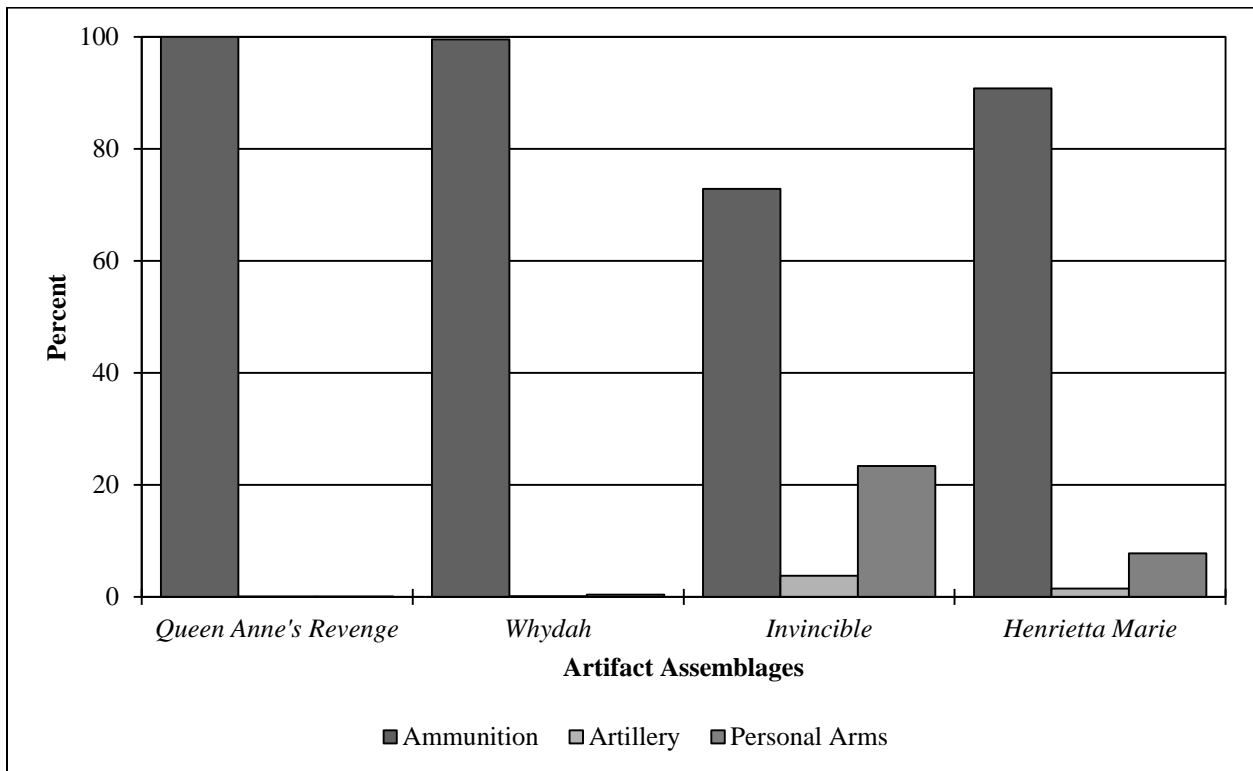
Figure 6-2. Frequency of each class within the Arms and Armament group for each shipwreck assemblage.

Figure 6-3. Logarithm of frequencies of each class within the Arms and Armament group for each shipwreck assemblage, showing greater visual differentiation between classes.

A possible characteristic differentiating pirate and naval vessels is the cannon themselves. For their size, the pirate vessels seemed to have a greater quantity of cannon. Historical accounts describe *Whydah* as a 300 ton vessel carrying 18 guns while operating as a merchant vessel. Bellamy increased the armament to between 28 and 30 cannon after he captured the vessel, 29 of which have been recovered both historically and during modern excavation, and at least one more has been identified but not yet recovered (Hamilton 1992:50, 269, 490). Various records mention *Queen Anne's Revenge* as being between 200 and 300 tons, carrying between 16 and 18 cannon, and possibly having the capacity to carry 26 during its life as *La Concorde*. Blackbeard increased the armament to as many as 40 cannon, of which 22 have been recovered, and eight have been identified but not yet recovered as of November 2013 (Ducoin 2006:11, 16; Kimberly Kenyon 2014, personal communication). As a comparison, a contemporary French vessel, *Le*

Triton, captured and used by the Royal Navy in 1702 during the War of Spanish Succession, carried 40 guns, but was over twice the size at 662 tons (Winfield 1997:31-33).

Cannon size also varies between the pirate and naval vessels. While no cannon were recovered from *Invincible* in present-day, as they were all removed from the wreck by the Royal Navy in the months following grounding, historical records state that the ship carried twenty-eight 32-pounders, thirty 18-pounders, replaced by thirty 24-pounders in 1756, and sixteen 9-pounders. Cannon recovered from both pirate wrecks are much smaller; *Whydah* cannon range from 3- to 6-pounders, and *Queen Anne's Revenge* cannon range from 0.5- to 6-pounders. As technology was rapidly changing in the eighteenth century, larger cannon were likely a factor of advances. The cannon recovered from the pirate vessels should be compared to the historical records of British military vessels in the early eighteenth century. The country of origin of the cannon found on these wrecks may point to another clue of pirate behavior. Guns of at least two nationalities (English and Swedish) have been recovered from *Queen Anne's Revenge* (North Carolina Underwater Archaeology Branch 2014; Henry 2009:15) and *Whydah* (Real Pirates Exhibit). Pirate crews would have been acquiring cannon to heavily arm their own ships from the vessels they captured, and there was no discrimination in the nationality of captured vessels. Naval vessels, on the other hand, would have most likely had uniform collections of guns onboard.

Several cannon recovered from both *Whydah* and *Queen Anne's Revenge* were still loaded, some with expected items and some with miscellaneous materials like heavy iron bolts, broken glass, and hand-made bags of lead shot (North Carolina Underwater Archaeology 2014; Hamilton 1992:271). While cannon being kept at the ready for action may not be solely a characteristic of pirate behavior, as Bingeman mentions it was common for warships to keep their guns loaded when away from home (Bingeman 2010a:114), what they were loaded with might point to a

differentiation in behavior. This is an avenue for future research. Hamilton also suggests that the "given the need to keep their weapons ready for action, it may be that the presence of a large number of weapon cleaning items is a trait of pirate behavior" (Hamilton 1992b:254). While this is not supported by the current data, as *Queen Anne's Revenge* does not have the high frequency of weapon cleaning items that *Whydah* has, this too may be an additional avenue for research.

Cargo

The frequencies of Cargo help to differentiate between the pirate vessels and merchant vessel. *Henrietta Marie* has the highest frequency of Cargo artifacts (93%), *Whydah* has a Cargo frequency (16%) over half that of *Queen Anne's Revenge* (7%), and *Invincible*'s Cargo frequency is very similar to *Queen Anne's Revenge* (6%) (Figure 6-4). An examination of the classes within the Cargo group presents an intriguing picture of differentiation between the pirate and non-pirate vessels. *Invincible* Cargo is composed almost entirely (over 99%) of Container/Storage artifacts, particularly gunpowder storage, emphasizing the non-commercial purpose of the vessel, while *Henrietta Marie* is dominated by Treasure (just under 98%), almost entirely represented by glass beads, currency used in its business as a slaver. In contrast, the Cargo group of both *Whydah* and *Queen Anne's Revenge* is mostly Treasure artifacts (over 99% and about 93%, respectively) of gold and silver (Figure 6-5, Figure 6-6). This is an interesting differentiation, as it seems to support the romantic idea of plundering pirates. Half of the *Whydah* Treasure is coins, mostly silver, while about 47% is gold and silver in other forms (such as bars, nuggets, and dust), and the remaining 4% is Akan African gold jewelry beads and fragments, remnants of the slave trade. *Queen Anne's Revenge* Treasure, on the other hand, is made up of about 95% gold dust and tiny jewelry fragments, and 5% glass beads, also reminiscent of the slave trade.
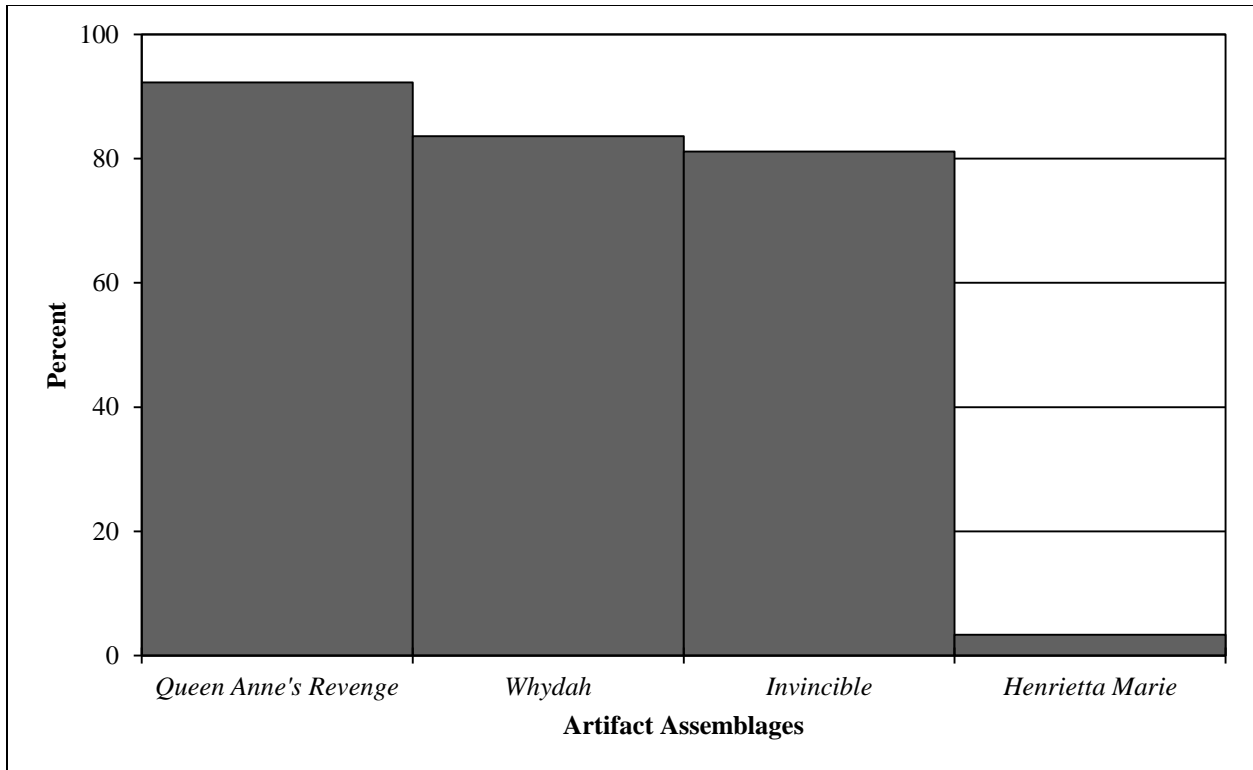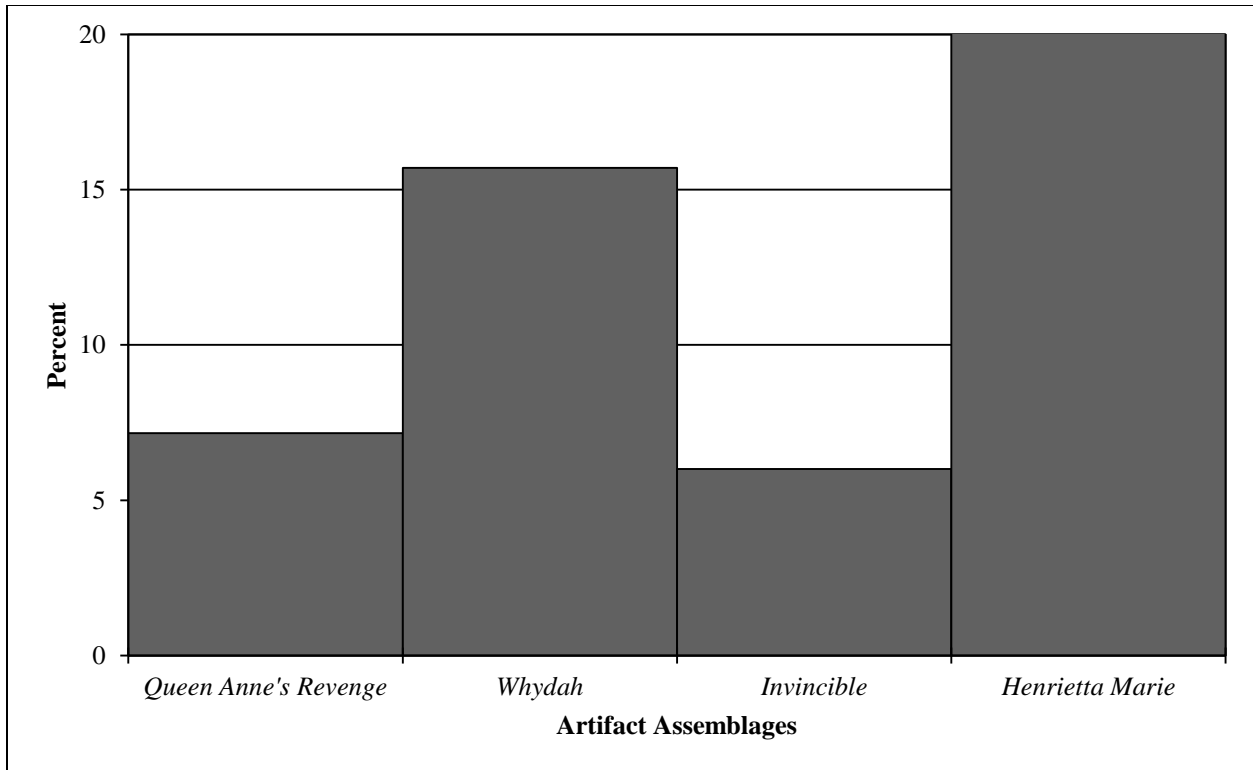
Figure 6-4. Frequency the Cargo group represents of each entire shipwreck assemblage.

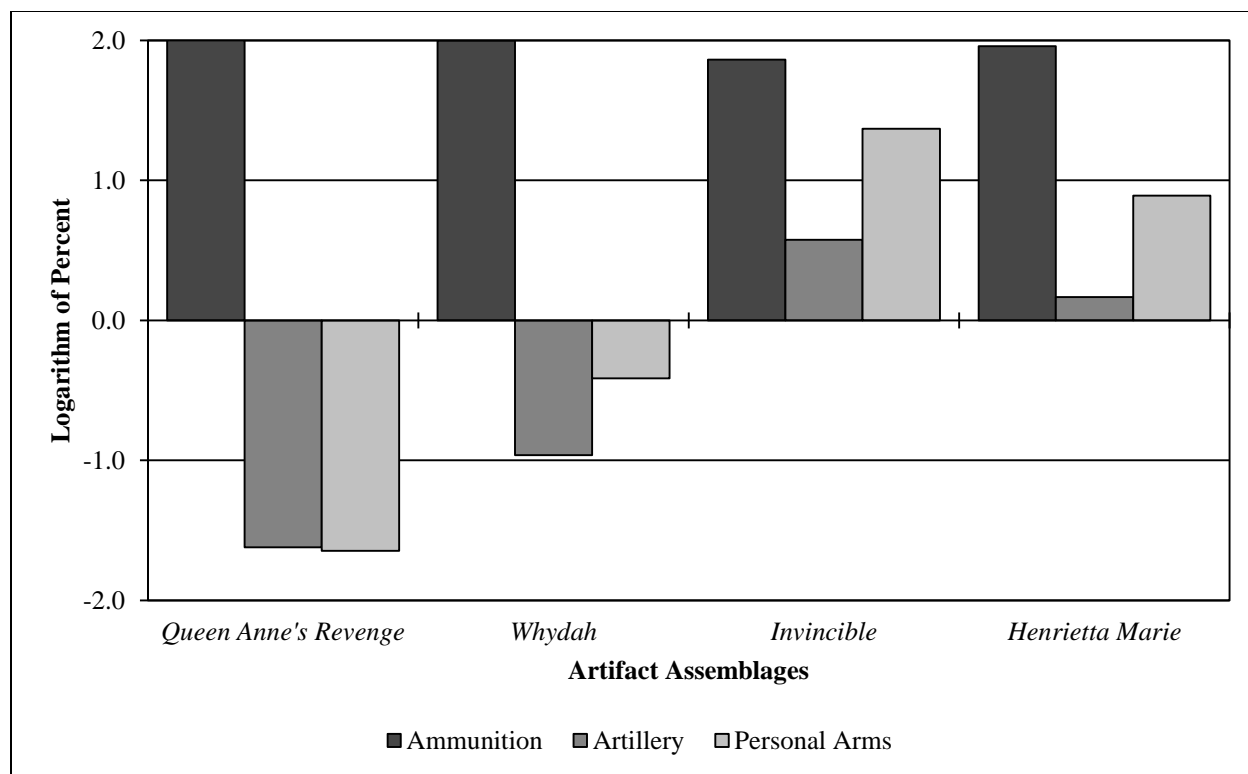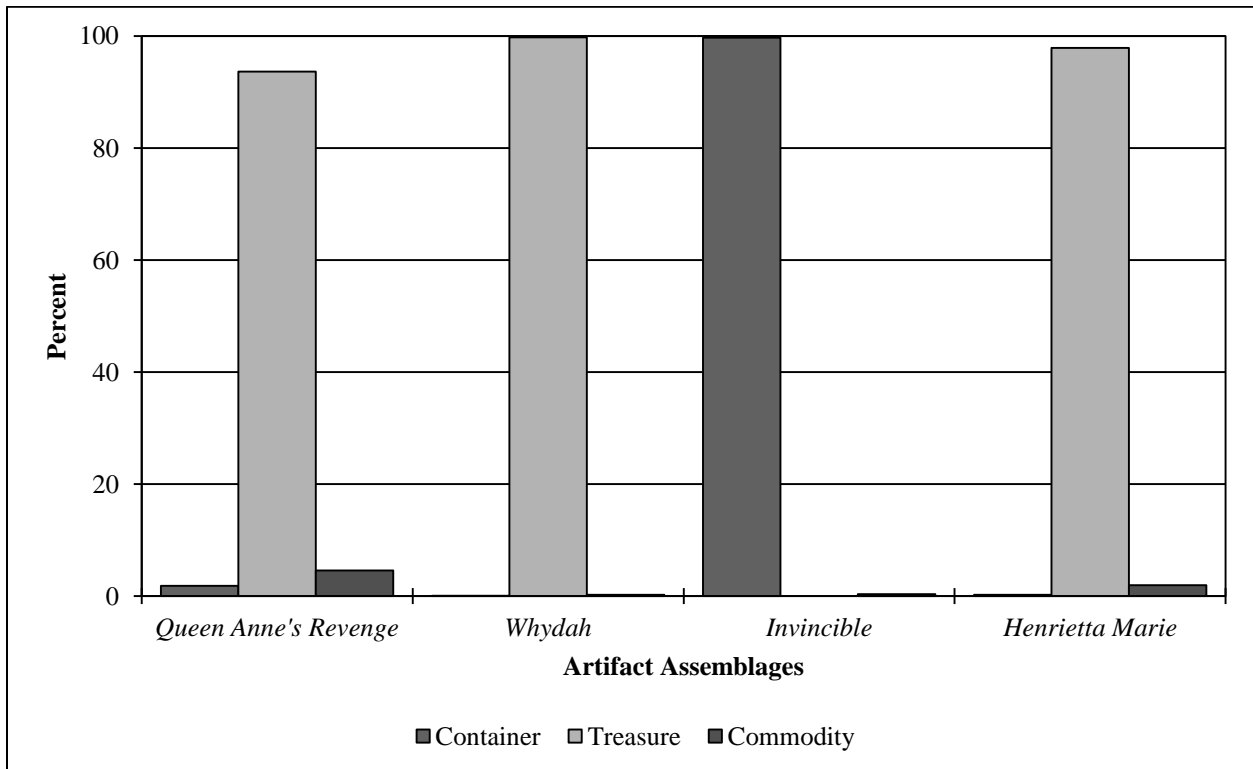Figure 6-5. Frequency of each class within the Cargo group for each shipwreck assemblage.
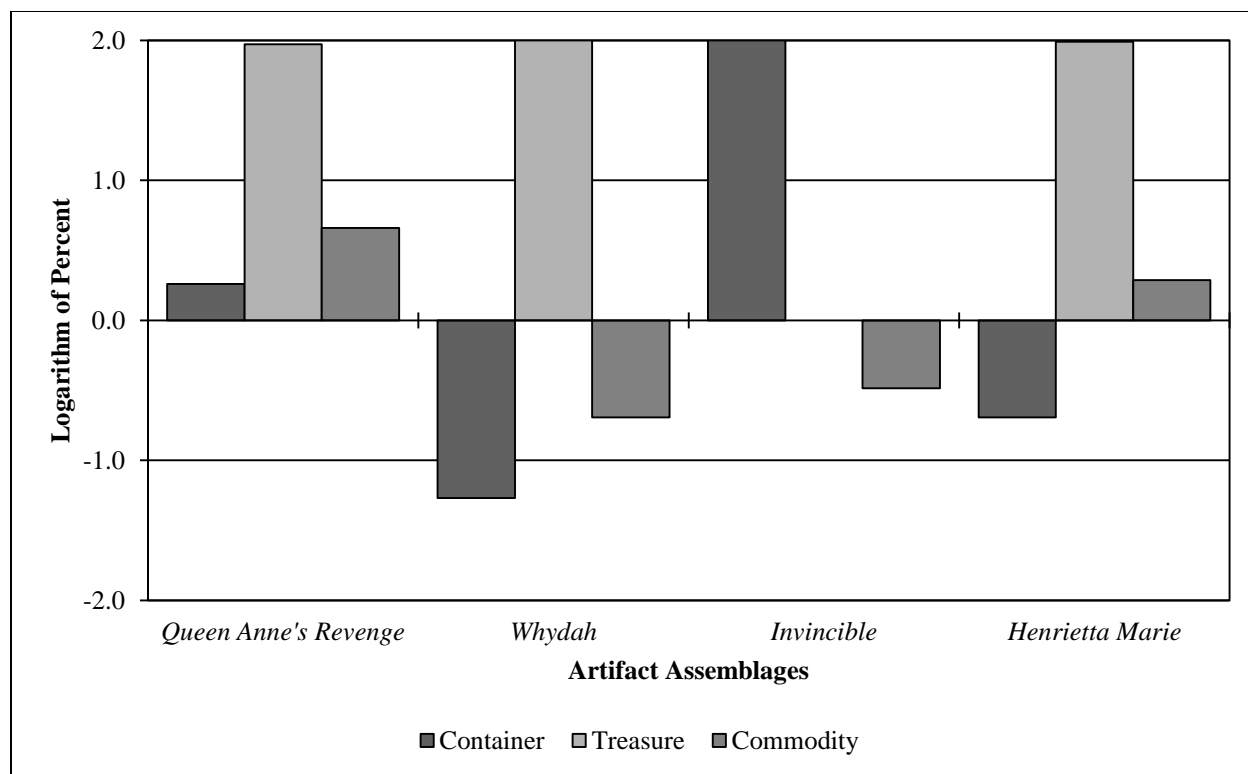
Figure 6-6. Logarithm of frequencies of each class within the Cargo group for each shipwreck assemblage, showing greater visual differentiation between classes.

There is a large disparity in the weight of the Treasure found on each wreck; the total weight of the 14,000 pieces of gold dust from *Queen Anne's Revenge* is only about 24 grams, while only 40 of the over 8,300 coins recovered from *Whydah* equals 24 grams. Comparing total weight of the Treasure artifacts, there is much less Treasure recovered from *Queen Anne's Revenge*, likely a factor of the wrecking and post-wrecking processes, which will be discussed in the next section. Further analysis involving the weights or perhaps the historical monetary value of all artifacts in this category might shed additional light on assemblage differentiation through the Treasure class.

It should be noted that this is a problematic artifact group because the function of some artifacts is not entirely clear. Storage containers such as casks or large ceramic vessels could serve as storage in the ship's hold, in the galley, or even on deck; what the containers stored is

also highly variable. In the case of *Queen Anne's Revenge* the large cask hoops recovered from the wreck do not appear to have even been in use as storage containers. Similarly, glass beads were placed in the Treasure class because of their function as currency in the slave trade, like the gold and silver coins served as currency, but they could also be placed in the Commodity class or be placed in their own class or group, as glass beads serve a different function on different ships.

Kitchen

The Kitchen group offers little differentiation between the pirate and merchant assemblages. Only 3% of the *Henrietta Marie* and *Invincible* assemblages are composed of Kitchen artifacts, and less than 0.5% of the *Queen Anne's Revenge* and *Whydah* assemblages (0.40% and 0.17% respectively) (Figure 6-7). There is no consistency in the class breakdown of these three assemblages, as 66% of the *Queen Anne's Revenge* Kitchen group is Galley/Storage artifacts, but only 14% of the *Whydah* Kitchen group and 5% of the *Invincible* and *Henrietta Marie* Kitchen groups are Galley/Storage artifacts. The majority of *Whydah* and *Henrietta Marie* Kitchen artifacts and about half of *Invincible* artifacts are classified as Tableware, while only a quarter of *Queen Anne's Revenge* Kitchen artifacts are classified as such.

Invincible exhibits many more artifacts classified as Miscellaneous (42% of the Kitchen group) than *Henrietta Marie*, *Queen Anne's Revenge*, and *Whydah* (11%, 6%, and 1% of the Kitchen group, respectively) (Figure 6-8). However, this class exists because of the difficulty in identifying small pieces of broken glass, ceramic, and cork. Within this data set, the *Invincible* assemblage had many more pieces of unidentified glass and ceramic than the other three assemblages. The frequencies obtained for the Kitchen group do not support the hypothesis that pirate assemblages have a higher frequency of Kitchen artifacts than non-pirate vessels.
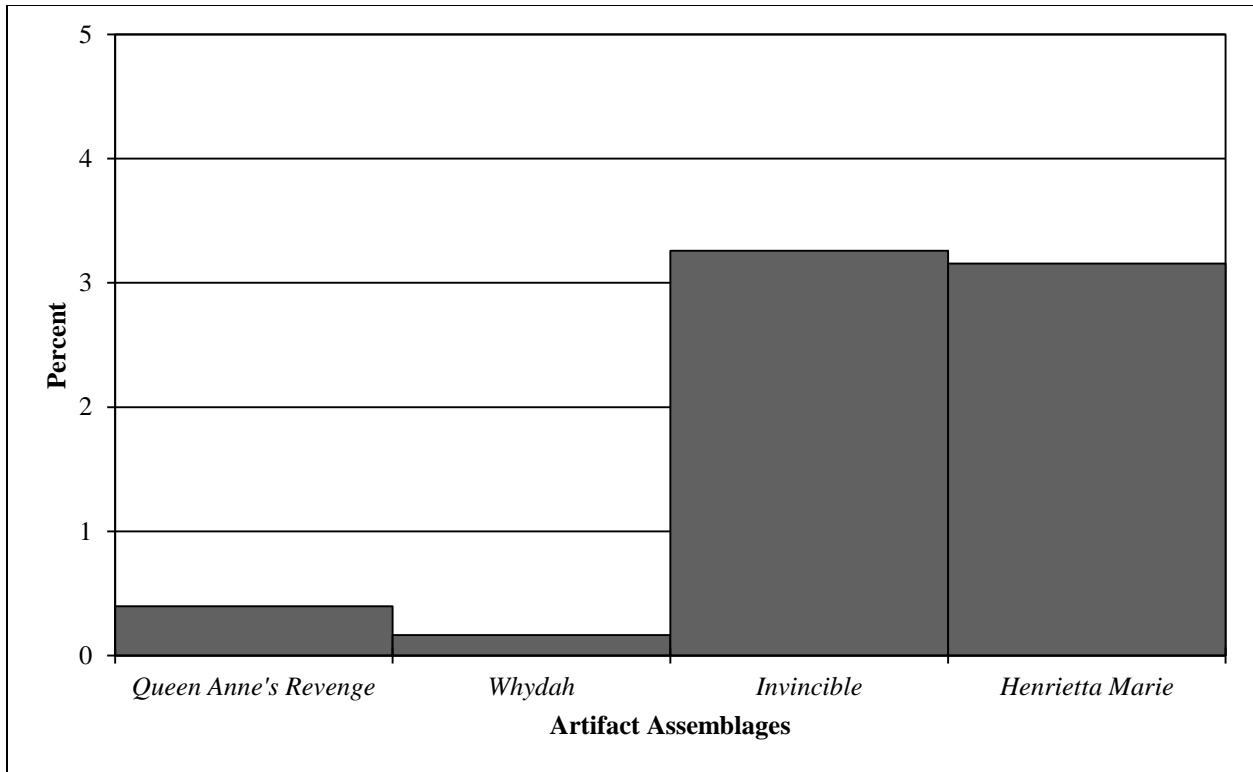
Figure 6-7. Frequency the Kitchen group represents of each entire shipwreck assemblage. As the highest frequency this group is just over 3%, only 0-5% is displayed.
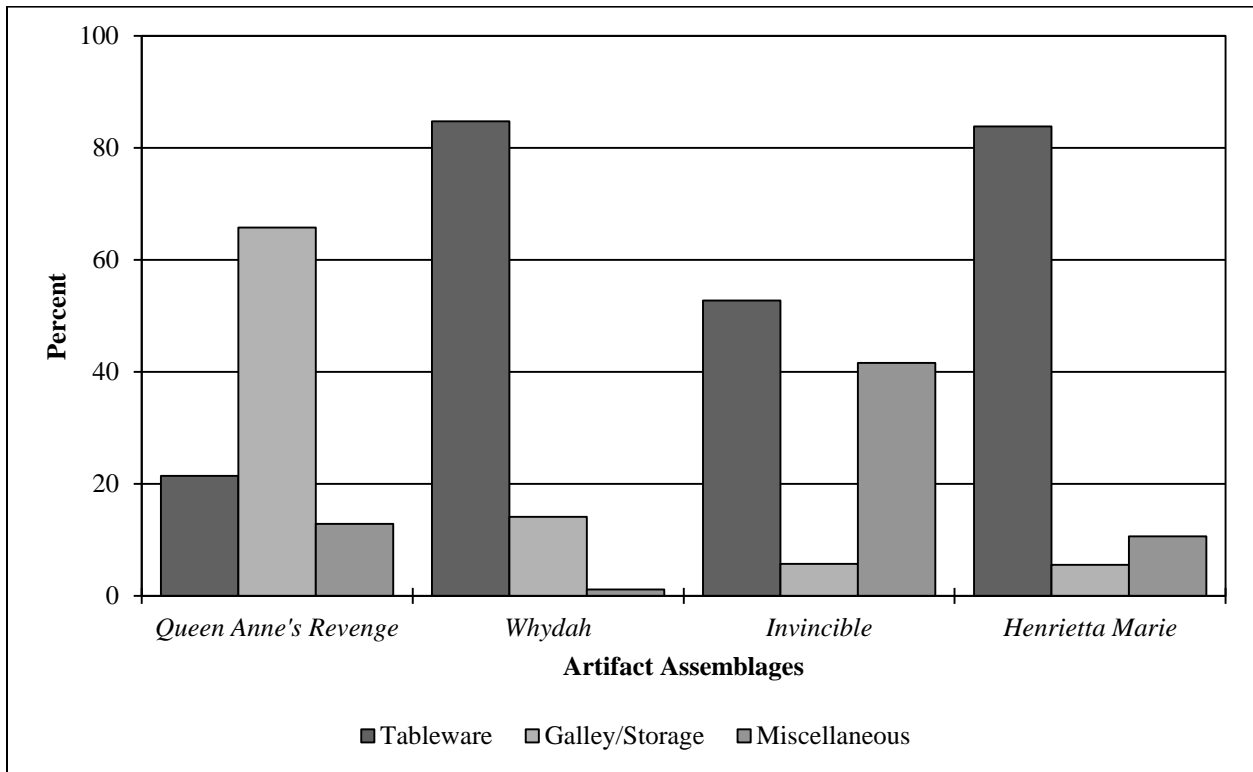
Figure 6-8. Frequency of each class within the Kitchen group for each shipwreck assemblage.

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Personal Effects

The Personal Effects group makes up a small percentage of all four assemblages, representing less than 1% of the *Queen Anne's Revenge*, *Whydah*, and *Henrietta Marie* assemblages, and just under 4% of the *Invincible* assemblage (Figure 6-9). This does not support the hypothesis that pirate assemblages have a higher frequency of Personal Effects artifacts than the non-pirate assemblages. Like the Kitchen group, there is little to indicate a pattern within the group, as the majority *Whydah* (80%), *Invincible* (91%), and *Henrietta Marie* (93%) Personal Effects artifacts are classified as Apparel, while only 17% of *Queen Anne's Revenge* Personal Effects artifacts are classified as such. About one-quarter (22%) of the *Queen Anne's Revenge* Personal Effects group is made up of Tobacco Use artifacts, while this class represents only 11% of the *Henrietta Marie* assemblage, and 5% of the *Whydah* and *Invincible* assemblages (Figure 6-10). This, too, does not support the hypothesis that the pirate assemblages have a higher frequency of Tobacco Use artifacts than the non-pirate assemblage; only *Queen Anne's Revenge* has a relatively large amount of Tobacco Use artifacts, however within the entire assemblage, these 33 artifacts represent a minute percentage. With the data utilized in this study, the Personal Effects group does not provide any differentiation for artifact patterning.
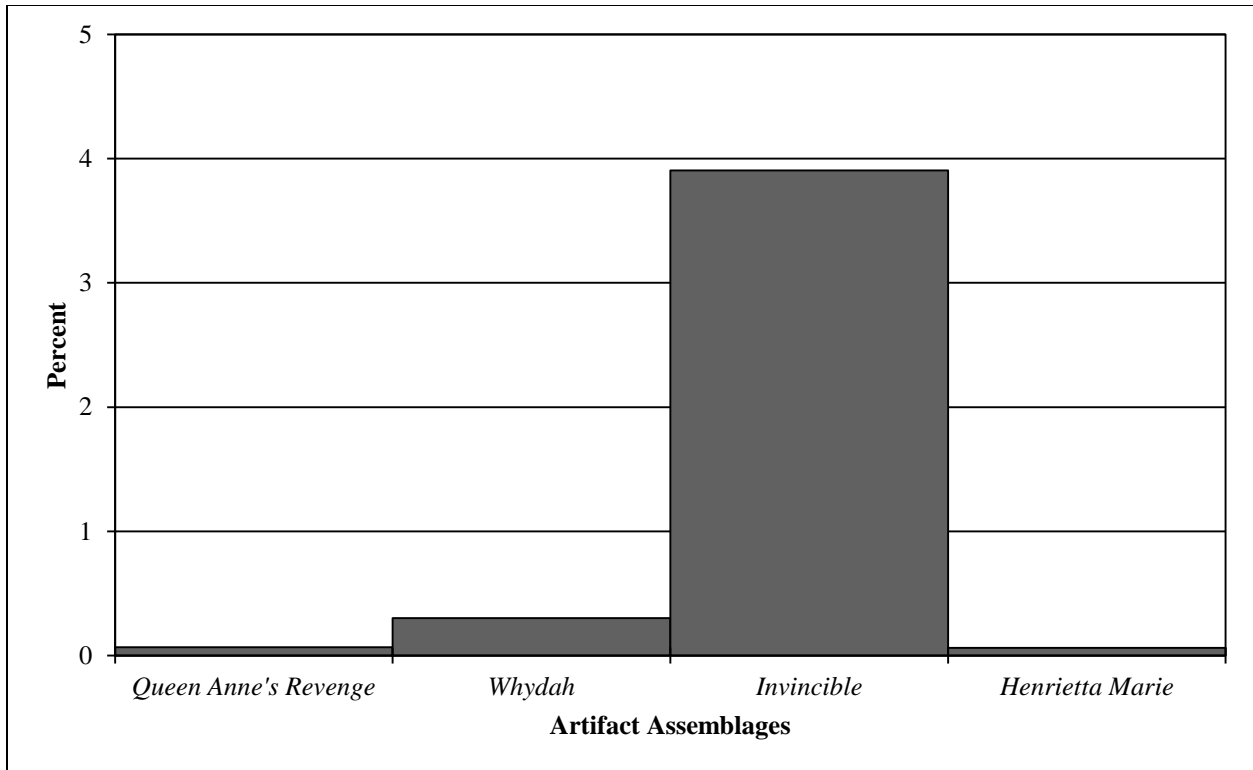
Figure 6-9. Frequency the Personal Effects group represents of each entire shipwreck assemblage. As the highest frequency this group is just under 4%, only 0-5% is displayed.
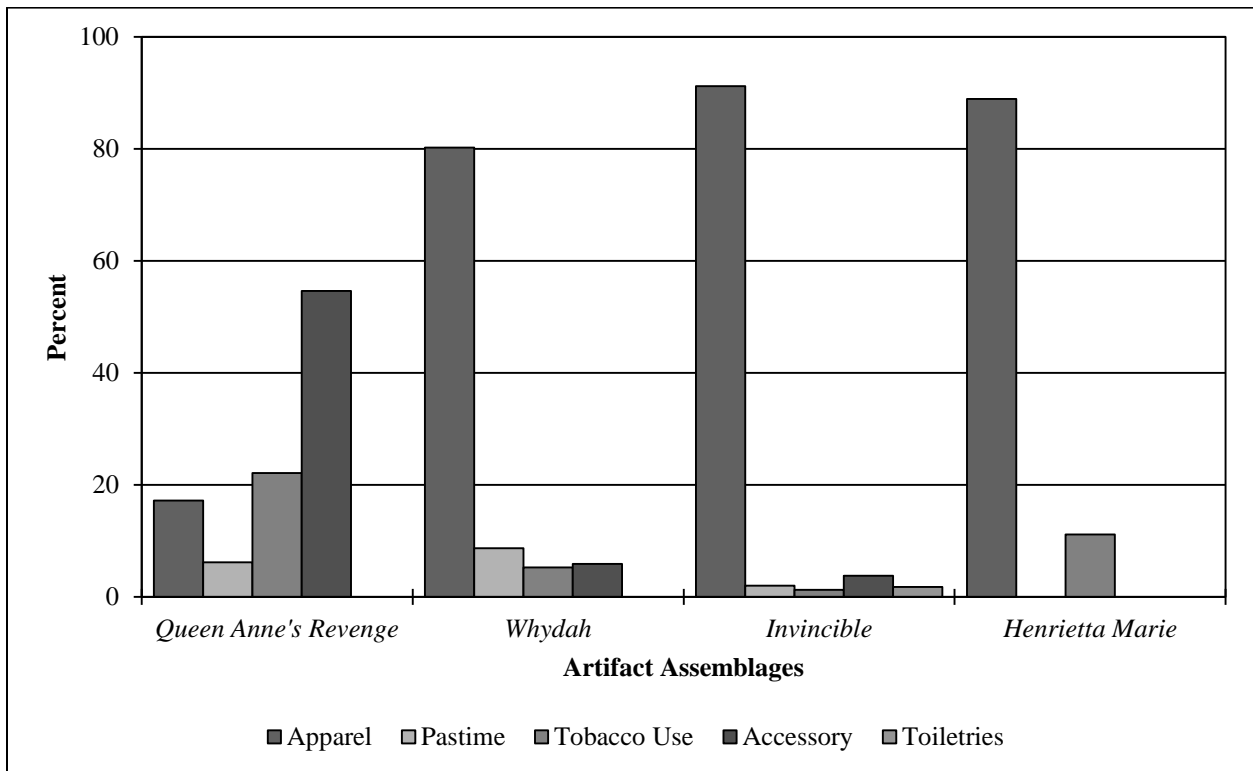
Figure 6-10. Frequency of each class within the Personal Effects group for each shipwreck assemblage.

Tools and Instruments

Like the Personal Effects group, the Tools and Instruments group makes up a small percentage of all four assemblages, representing less than 0.5% of the *Queen Anne's Revenge*, *Whydah*, and *Henrietta Marie* assemblages and less than 6% of the *Invincible* assemblage (Figure 6-11). A comparison of classes within the Tools and Instruments group demonstrates that the Fabric Working and Miscellaneous classes contain the highest frequency of artifacts within the pirate assemblages, while these two classes contain low frequencies of artifacts from the merchant and naval assemblages. Over 80% of the Miscellaneous artifacts for both the *Queen Anne's Revenge* and *Whydah* assemblages are lead fishing weights. Both the *Invincible* and *Henrietta Marie* Tools and Instruments group are dominated by Ship Maintenance artifacts, while this class represents only 2% and 11% of the *Queen Anne's Revenge* and *Whydah* assemblages, respectively (Figure 6-12).
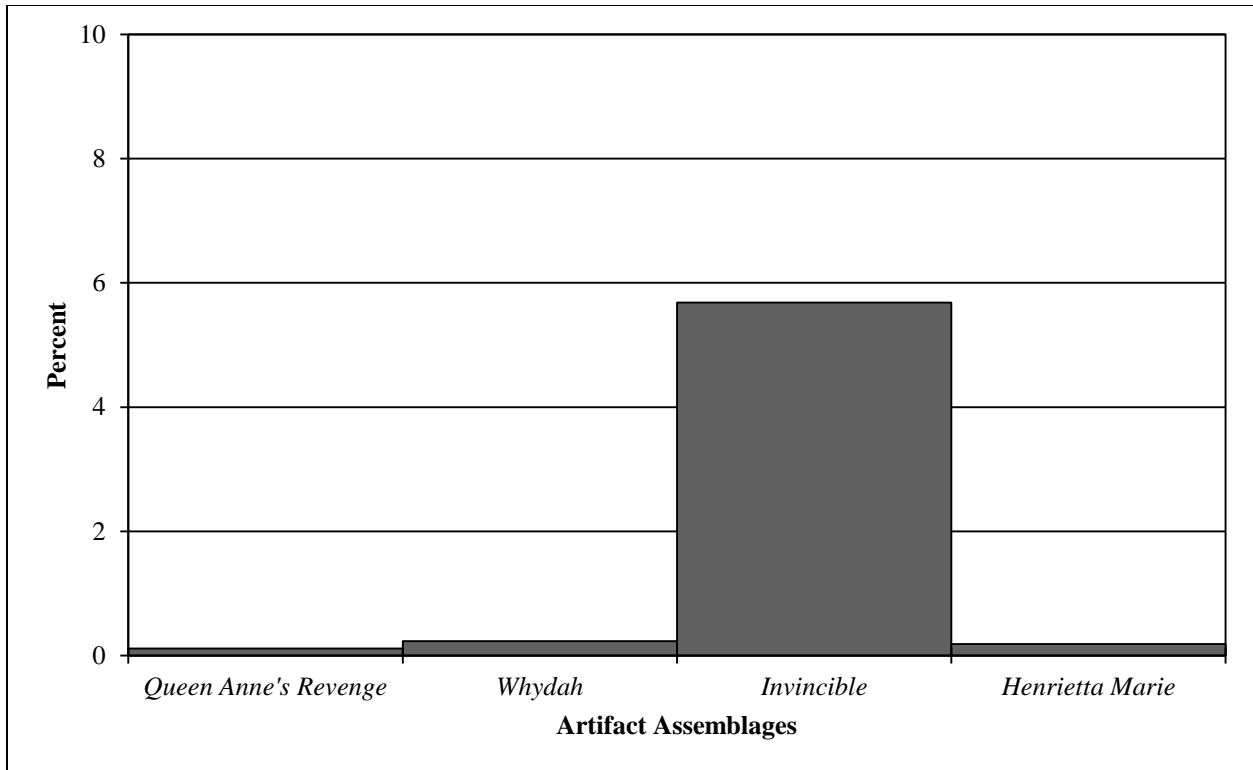
Figure 6-11. Frequency the Tools and Instruments group represents of each entire shipwreck assemblage. As the highest frequency this group is just over 3%, only 0-5% is displayed.
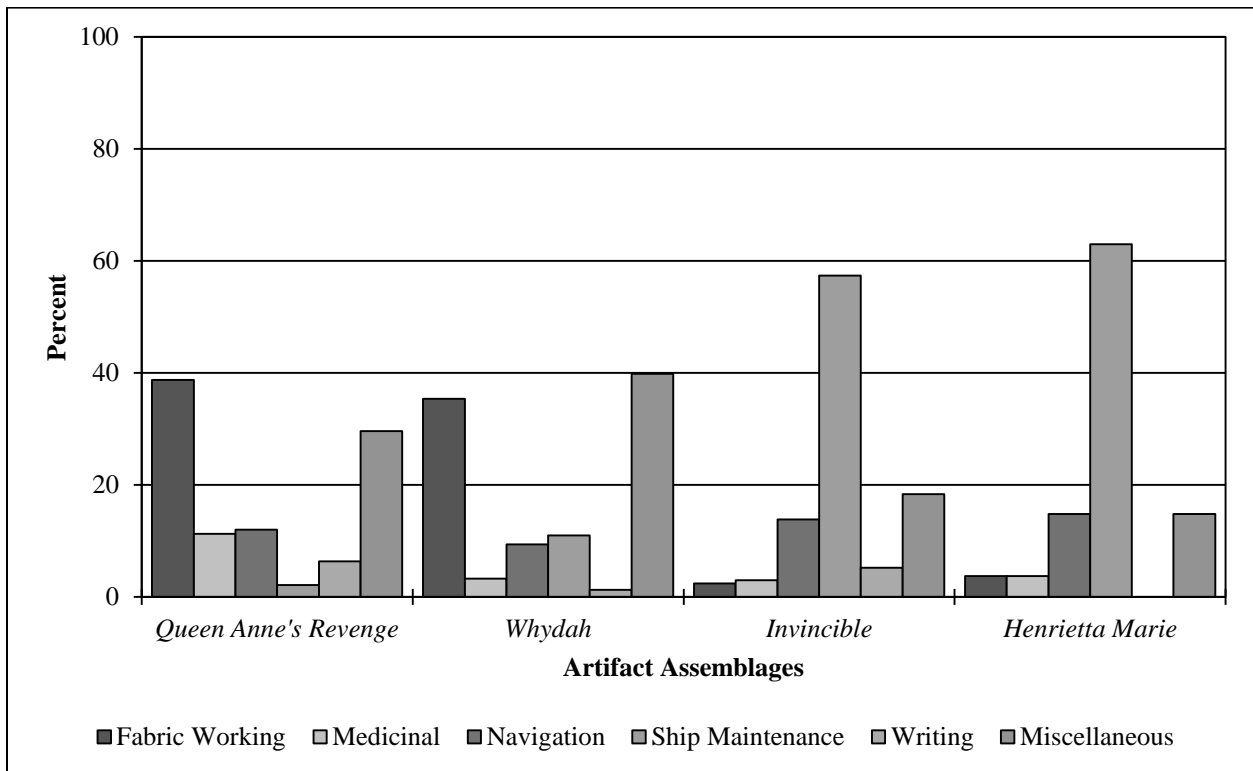
Figure 6-12. Frequency of each class within the Tools and Instruments group for each shipwreck assemblage.

The high frequency of Fabric Working and Miscellaneous artifacts and low frequency of Ship Maintenance artifacts recovered from the pirate vessels may be a sign of behavior for further research. The fixing of clothing and acquisition of their own food might have been a behavior that both naval officers and merchantmen would have performed while docked and therefore only needed a small quantity of these materials onboard, whereas the pirate crews would need these tools while at sea because they would were not allowed to enter established ports to purchase new clothing or food. Ship maintenance while at sea, on the other hand, may not have been of high priority to the pirates, as they were constantly taking new ships, while the naval and merchant crews would need to keep their ships in good functioning shape during the voyages between destinations. Again, this is a topic for further exploration.

Variables Affecting the Data

Each shipwreck represents a unique assemblage of artifacts resulting from many uncontrollable variables, beginning with the wrecking event and continuing through the recovery and documentation of the wreck as an archaeological site. Many of these variables and how they affect the data and results of this study are discussed here. The first goal of this study was to create some type of normalcy between the samples to allow for accurate inter-site comparison. This presented a few difficulties. Ethnicity has been limited to British crews, but the dates during which these ships operated and the locations to which they sailed were somewhat variable. The size of the artifact assemblage, inconsistencies in artifact count reporting, the completeness of excavation, and their operation and wreck dates were problematic given the limited availability of published reports on early 18th century wrecks. In her article about slave ships and maritime archaeology, Webster (2008:9) suggests that one reason historic wrecks, particularly slave

vessels, have not been frequently recovered is that search and excavation are very costly. She

states that, because of the cost, historic wrecks are often discovered by salvage companies, rather

than archaeologists, and these companies are in search of treasure ships, not the historically

significant, but financially invaluable, merchant and naval vessels.

Shipwrecks of known identity were essential to this study, and the identification of a

wreck can often be a problem, especially where there are no items bearing a name or date. *Queen*

Anne's Revenge, for example, has been identified based on a preponderance of evidence, but it is

still possible that the identification could change once excavation and analysis are complete.

Another complicating factor is that the ship's function may change depending on its purpose,

owner, of the leg of its voyage. For example, Webster (2008) notes that on an outward journey, a

slave ship would be carrying goods much like any other merchant vessel, but its archaeological

appearance would change as it traded these goods for slaves. She says that unfortunately many of

the structural characteristics that would differentiate a slave vessel from other merchant vessels

in the archaeological record have not survived on wrecks excavated to date. Both *Queen Anne's*

Revenge and *Whydah* served multiple functions, and although in the possession of pirates at the

time of wrecking, both assemblages exhibit lingering characteristics of the slave trade, through

shackles, trade beads, and Akan gold.

Artifacts recovered from a shipwreck are not necessarily representational of the objects

originally carried on the vessel. Factors such as how the ship wrecked and what happened to the

site in the ensuing years will alter the types and frequencies of artifacts that occur on each

shipwreck. Initially, the process of wrecking affects the number and distribution of artifacts. For

example, *Whydah* was torn apart in a violent storm and is now spread across an area of about one

acre (Hamilton 2006:131). In extreme cases of surface disintegration, the more buoyant items

that naturally float do not have a chance to become waterlogged and will float away from the wreck (Muckelroy 1978:166). *Queen Anne's Revenge* and *Invincible*, on the other hand, ran aground, making it possible for the crew to take objects with them as they left or return for important or valuable items shortly after the grounding. Wilde-Ramsing (2009:158-175) notes that the presence and absence of certain types of artifacts indicates that the crew of *Queen Anne's Revenge* was able to salvage those items they felt were necessary to "sustain them in the long term," rather than items necessary for survival, as the grounding occurred in a populated area and two of the four ships of the fleet remained undamaged. For example, the low presence of personal arms and valuables (coins and gold dust), but the high presence of fishing weights suggests the need to arm themselves and save their treasure surpassed the need for subsistence tools. After initial salvage, those porous items that remained trapped inside the ship as the water rose around it would become waterlogged, sink, and preserved in the archaeological record (Muckelroy 1978:166).

Muckelroy (1978:176-177) notes that there is generally an upper, semi-fluid layer of deposits above the more stable deposits of the seabed. The heavier objects will generally fall though this layer, but the lighter objects may remain there, more susceptible to movement and damage as currents move this layer around. Sites buried in shallow sediments are more likely to encounter artifact loss, differing states of preservation, and archaeological contamination.

A study by Muckelroy (1978:163-164) of wrecks in the British Isles suggests that the topography and the texture (coarse gravel or fine sand) of the sedimentary deposits of the seabed where the wreck occurred correlates strongly with the preservation quality of archaeological remains. Those sites deposited on a seabed with a low slope and finer sediments are more likely to preserve archaeological remains relatively intact (Muckelroy 1978:164). The general aquatic

environment, such as water temperature, will favor the preservation of some perishable artifacts, such as clothing or wooden objects. *Whydah* and *Invincible* are found in cooler waters in the northern Atlantic, while *Queen Anne's Revenge* and *Henrietta Marie* lie further south in the much warmer Gulf Stream, resulting in the preservation of a greater quantity of organic materials in the *Whydah* and *Invincible* assemblages.

Hurricanes, natural seabed movements, and dredging displace artifacts, which negatively affects their preservation and recovery. Monitoring of currents for six months in 1998 and post-hurricane visual surveys of the *Queen Anne's Revenge* site have indicated damage to the site, exposure and movement of artifacts, and even damage to artifacts themselves following each hurricane event (*Queen Anne's Revenge* Shipwreck Project 1998; *Queen Anne's Revenge* Shipwreck Project 1999; Southerly 2003; Southerly 2005; Wilde-Ramsing 2006). It became obvious in 2005, when only heavy artifacts exposed during Hurricane Ophelia remained in a scoured out area, that hurricanes and strong currents were negatively impacting the integrity of the archaeological site (Southerly 2005). The effects of dredging on the integrity of a site are also demonstrated at the *Queen Anne's Revenge* site. Dredging by the US Army Corps of Engineers began in 1904, and continued intermittently until 1933, when a fixed channel was established at a width of 400 feet and depth of 30 feet. By 1994, expansions of the dredged inlet reached 450 feet wide and 47 feet deep. The removal of large volumes of sand over time has resulted in the removal of approximately 48% of the sand from the inlet system, leaving no source of sediments for reburial of the wreck site within the natural cycle of seabed movements, making the site vulnerable to storms (Wilde-Ramsing 2009:51-53).

Scavenging or salvaging of the wrecks for valuable items by contemporary residents and later sport-divers during the 200-plus years since deposition also skews the artifact frequencies.

The degree to which salvaging will affect the site is related to its location and depth. Greater depths in remote locations would be more accessible in modern times with sophisticated methods, while a shallow and visible wreck would not likely be left alone (Muckelroy 1978:166). Muckelroy (1978:37-44) also notes issues that affect maritime archaeology as a whole. It takes longer for archaeologists to perform tasks underwater than it does for their land counterparts, and the amount of time a single diver can spend submerged is limited. A task cannot always be completed by the person who began it, and sometimes must remain incomplete for safety reasons, resulting in a loss of continuity. Communication between submerged divers, and between divers and those on the surface, can be limited without expensive equipment and results in inefficiency, although this is becoming less of an issue. Adverse weather more severely affects the working time of underwater archaeologists, and lack of visibility and the nature of water itself (movement and currents, visual distortion, etc.) can result in less-accurate data. Muckelroy (1978:48) suggests the cost of an underwater excavation is "likely to be between eight and thirty-two times more expensive than a comparable land site." Under time and budget restraints, the amount of work and data collected may be restrained as well. A corollary problem that arises from the cost and time involved in excavation is that threatened wrecks may not receive appropriate or extensive attention, or, as previously mentioned, historic wrecks are excavated by commercial treasure hunting or salvage companies.

Excavation by a salvage company influences how and what data are recorded and disseminated. Firstly, as mentioned earlier, the types of wrecks salvage companies excavated are those that are likely to yield treasure, resulting in a skewed representation of historic wrecks excavated. Excavation methods of these companies can also differ from those of non-commercial projects. The propwash is used to remove the layers of sand that have covered a wreck to allow

the divers easier access to the artifacts deemed valuable, such as coins and complete ceramic and glass vessels. The propwash, however, removes not only sand but also the small artifacts such as small artifacts, glass and ceramic sherds that would otherwise be discovered by systematic excavation. While detailed excavation reports and curation of data are generally required by permitting agencies in the United States, these data can often be difficult to obtain, and publications available to the public may not be produced at all.

All the variables discussed above affect each wreck to varying degrees, making underwater archaeological sites unique units within the archaeological record. Within the type of analysis attempted in this study, variables such as wrecking process, differential preservation, looting, and degree of archaeological recovery present difficulties to normalizing several sets of data. A larger data set, however, could make these factors less of a hindrance in the future.

Conclusions and Suggestions for Further Research

Ultimately, more data with controllable variables (ethnicity, time frame, ship function) are necessary to make more definitive conclusions about a "pirate pattern" based on artifact frequencies. Ideally, as additional early and mid-eighteenth century wrecks are discovered and identified, their excavation and documentation should be thorough. When possible, wrecks should be excavated fully and systematically, and all artifacts should be individually identified and conserved. However, in a field where there is never enough funding and time, and competing interests of the excavators result in the loss of artifacts and their data, complete excavation may be limited and the conservation and curation of artifacts and records may not meet professional standards. There have at least been movements in the right direction to protect underwater archaeological heritage both in situ and post-excavation.

For the purpose of inter-site comparison, it would be beneficial to use the artifact groups in this study for categorizing and organizing artifacts, as well as standardized names for artifacts for all underwater assemblages from specific periods, much like the artifact groups that exist for various types of land sites. From this research, it appears that each project determines the categorization system best suited for its assemblage, loosely based on those of other projects. The scheme used in this study is one example of the many schemes already in use by other projects. It would be a large undertaking, but one that this author feels would be beneficial to the research side of the field.

As more data become available from newly discovered wrecks, and as the excavation and analysis of the *Queen Anne's Revenge* artifacts is completed, the frequencies for pirate and non-pirate wrecks should be reassessed and the groups and classes reconsidered. Frequencies based on a greater sample or the adjusting of groups and artifacts included in them may provide new possibilities for assemblage characteristics that identify a wreck as that of a pirate crew. Patterns indicating pirate behavior may be found in the simple presence or absence of artifacts in a particular group or class. The differences in the artillery of vessels and a more detailed analysis of the gold and silver treasure should be explored further. Also, future research should focus on the pirates' inability to enter ports for provisioning, forcing them to steal or otherwise obtain the basic necessities while at sea, and how this behavior would be reflected in the archaeological record.

While there are currently too few sites to create a "pirate pattern," the differences that do exist between pirate and non-pirate vessels suggest such a pattern may exist as more data are compiled. This research serves to further demonstrate the potential for the use or patterning through artifact frequency in illuminating behavioral differences in maritime archaeology.

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APPENDIX: ARTIFACT INVENTORY TOTALS AND FREQUENCIES

Artifact counts organized by Group, Class, and Type. A total count for each Class is displayed, as well as the total count for each Group. Percentages for each Class, displayed next to the Class total, represent the proportion that Class represents within the whole Group. Percentages for each Group, displayed next to the Group total, represent the proportion that Group represents within the whole assemblage. Data are divided by assemblage for comparison.

AA = Arms and Armament

CA = Cargo

KT = Kitchen

PE = Personal Effects

TI   = Tools and Instruments

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
AA-Ammunition	Cannon	Bag Shot			12					
		Bar Shot	9		22				1	
		Round Shot	85		132		105		43	
		Casting Sprue	3							
		Langrage	3							
		Lead Cannon Shot			41					
		Paper Cartridge	3		4					
		Wadding	11		8		37			
	Personal Arm	Lead Shot	225159		88496		5847		376	
		Pistol Wadding			3					
	Explosive	Grenade	6		15		32		13	
		Grenade Fuse	2		8		6			
Class Total			**225281**	**99.953**	**88741**	**99.507**	**6027**	**72.860**	**433**	**90.776**
AA-Artillery	Cannon	0.5-Pounder	1							
		1-Pounder	5							
		3-Pounder			5					
		4-Pounder	4		17					
		6-Pounder	17		5					
		Unknown	2						2	
	Cannon Equipment	Apron	17		13		13			
		Apron Lash			42					
		Breech Chamber							1	
		Gun Worm							1	
		Leather Bucket					49			
		Powder Ladle	1							
		Quion or Sampson Bar					8		1	
		Ramrod					29			
		Spile	2							
		Sponge Cylinder					21			
		Tompion	2		7		23			
		Tompion Cord			1					
		Tompion Reel					10			
		Vent Pick/Priming Wire	1		2					
		Vent Stopper					1			

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
AA-Artillery (cont.)	Gunner's Tools	Gunner's Rule	1							
		Calipers	1							
		Slow Match Dispenser					1			
	Cannon Mount	Carriage			2		2			
		Gun Stool Bed					10			
		Truck					13			
		Trunnion Cap Retaining Key			2					
		Trunnion Strap			1				2	
	Ammunition Casing	Cartridge Case					130			
		Grenade Box					1			
Class Total			**54**	**0.024**	**97**	**0.109**	**311**	**3.760**	**7**	**1.468**
AA-Personal Arms	Firearm	Blunderbuss							3	
		Carbine			1					
		Hand Gun			2					
		Musket			3					
	Firearm Part	Butt Plate	3		2				3	
		Cock Vice Jaw Part			8					
		Escutcheon Plate			2				2	
		Forsight			4					
		Gun Barrel	1		44				10	
		Gun Stock	1		11				3	
		Gun Stock Plaque								
		Lock Parts	4		86				8	
		Side Plate	2		14					
		Trigger Guard	7		19				2	
		Trigger Plate			3					
	Firearm Accessory	Cartridge Former					2			
		Gun Worm			5					
		Ramrod			22					
		Vent Pick/Priming Wire			9					
		Chert Core	7							
		Lock Flint	22		4		1921			
		Cloth Handle Wrap			21					
		Holster			41					

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
AA-Personal Arms (cont.)	Firearm Accessory (cont.)	Musket Rest			2					
		Sling Retainer			2					
		Cartouche Box					7			
		Powder Horn					1			
		Shotbag			12					
	Sword or Blade	Blade			3				2	
		Crossguard	1							
		Cutlass			1					
		Grip	2		2					
		Hand Guard			10					
		Hilt			3					
		Pike Pole			3		1			
		Pommel			1					
		Scabbard					2			
		Sword							4	
		Sword/Blade Belt Hook	1		3					
Class Total			**51**	**0.023**	**343**	**0.385**	**1934**	**23.380**	**37**	**7.757**
AA Group Total			**225386**	**92.264**	**89181**	**83.602**	**8272**	**81.154**	**477**	**3.337**
CA-Container/Storage	Cask	Hoop	203						4	
		Stave or End	20		7		171		21	
		Whole			1		17			
	Cask Accessory	Bung					12			
		Spigot	1		1					
		Tap					4			
	Gunpowder Storage	Barrel					255			
		Cover					5			
		Hoop					1			
		Powder Measure					2			
	Other Container	Ceramic storage vessel	94				35			
		Bucket					70		2	
		Basket					21			
		Box					17			
Class Total			**318**	**1.819**	**9**	**0.054**	**610**	**99.673**	**27**	**0.203**

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE Count	%	WHYDAH Count	%	HMS INVINCIBLE Count	%	HENRIETTA MARIE Count	%
CA-Merchandise/Commodity	Commodity	Bale Seal	3		12					
		Rosehead Nail	795							
		Mirror Frame							10	
	Restraining Device	Shackle	1						245	
		Leg Iron			22					
		Lock					2		1	
		Key							2	
Class Total			**799**	**4.570**	**34**	**0.203**	**2**	**0.327**	**258**	**1.936**
CA-Treasure	Currency	Bit			6115					
		Coin	4		8358				8	
		Elephant Tusk							7	
		Gold Dust	15291		1518					
		Ingot/Bar			17					
		Nugget	1		14					
		Silver Dust	5							
		Voyage Iron							28	
	Jewelry/Ornamentation	Manilla							1	
		Bead	791		524				13000	
		Pendant			2					
		Other Ornament	275		155					
Class Total			**16367**	**93.611**	**16703**	**99.743**	**0**	**0.000**	**13044**	**97.862**
CA Group Total			**17484**	**7.157**	**16746**	**15.698**	**612**	**6.004**	**13329**	**93.255**
KT-Galley/Storage	Galley Stove	Ceramic Brick	23				6		4	
		Stone Tile	2				1			
	Cook Pot/Kettle	Kettle	3		23		5		2	
		Cauldron	27							
		Teapot	1		1					
	Storage Vessel	Case Bottle	547				4		13	
		Ceramic Vessel								
		Jug/Flagon	29						5	
	Food Preparation	Grindstone	4		1		3		1	
Class Total			**636**	**65.770**	**25**	**14.124**	**19**	**5.723**	**25**	**5.543**

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
KT-Tableware	Dish	Pewter	98		8		4		2	
		Ceramic	2							
		Wood					12			
		Bowl	5		3		34		110	
	Utensil	Fork			2					
		Spoon	9		7		25		131	
		Knife			2		5		1	
		Butter Pat					1			
	Drinking Vessel	Cup					2			
		Glass Stemware	2				1			
		Pewter Bottle							20	
		Tankard					37		100	
		Wine Bottle	90		128		44		14	
	Other Serving Vessel	Jar	1				10			
Class Total			**207**	**21.406**	**150**	**84.746**	**175**	**52.711**	**378**	**83.814**
KT-Miscellaneous		Bottle fragments	111				63		35	
		Bottle stopper			2					
		Ceramic fragments	13				75		13	
Class Total			**124**	**12.823**	**2**	**1.130**	**138**	**41.566**	**48**	**10.643**
KT Group Total			**967**	**0.396**	**177**	**0.166**	**332**	**3.257**	**451**	**3.155**
PE-Accessory	Accessory	Cravat					1			
		Cufflink	1		14		1			
		Filigree			4					
		Hat					6			
		Patten					3			
		Ring			1		1			
		Sack/Bag					2			
		Studs	88							
		Swagger stick					1			
Class Total			**89**	**54.601**	**19**	**5.882**	**15**	**3.769**	**0**	**0.000**
PE-Apparel	Apparel	Buckle	12		65		30		4	
		Button	11		35		87		4	
		Clothing			153		13			

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
PE-Apparel (cont.)	Apparel (cont.)	Fittings	5		4					
		Footwear			1		231			
		Sock			1		2			
Class Total			**28**	**17.178**	**259**	**80.186**	**363**	**91.206**	**8**	**88.889**
PE-Pastime/Recreation	Entertainment	Game Piece	10		28		7			
		Book					1			
Class Total			**10**	**6.135**	**28**	**8.669**	**8**	**2.010**	**0**	**0.000**
PE-Tobacco Use	Pipe	Bowl	4		5		2			
		Stem	30		12				1	
		Whole					3			
		Tamper	2							
Class Total			**36**	**22.086**	**17**	**5.263**	**5**	**1.256**	**1**	**11.111**
PE-Toiletries	Toiletries	Chamber pot					1			
		Flea comb					1			
		Wig curler					5			
Class Total			**0**	**0.000**	**0**	**0.000**	**7**	**1.759**	**0**	**0.000**
PE Group Total			**163**	**0.067**	**323**	**0.303**	**398**	**3.905**	**9**	**0.063**
TI-Fabric Working	Sail Maker/Rigger	Canvas					1			
		Sail Maker's Palm					1			
		Sail Needle	1		1		1			
	Sewing	Scissors	1		10				1	
		Straight Pin	108		75		1			
		Thread			1		8			
	Other Fabric Working	Shoe Former					2			
Class Total			**110**	**38.732**	**87**	**35.366**	**14**	**2.418**	**1**	**3.704**
TI-Medicinal	Medical Supplies	Mortar/Pestle	2		1		1		1	
		Ointment jar	6							
		Pharmaceutical bottle	1				15			
		Scale/Nesting weight	18		7					
		Syringe	5				1			
Class Total			**32**	**11.268**	**8**	**3.252**	**17**	**2.936**	**1**	**3.704**
TI-Navigation/Surveying	Navigation/Survey	Chart compass			12					
		Directional Compass	8				13		1	

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
TI-Navigation/Surveying (cont.)	Navigation/Survey (cont.)	Divider	5		4		2		1	
		Log line					4			
		Ring dial			1					
		Sandglass					50			
		Sector	1		3		1			
		Sight	4							
		Sounding weight	10		3		10		2	
		Survey chain tally marker	6							
Class Total			**34**	**11.972**	**23**	**9.350**	**80**	**13.817**	**4**	**14.815**
TI-Ship Maintenance	Cleaning	Besom Brush					268			
		Broom					4			
		Brush					41			
		Holystone					3			
		Mop					1			
	Carpenter	Adze			2		2			
		Anvil							1	
		Awl			2					
		Axe			2				4	
		Caulking iron			2				2	
		Chisel			3				5	
		Drilling								
		File			2					
		Gouge	1							
		Hammer Parts			6					
		Hooked Tool	1							
		Jack	2						1	
		Mallet					5			
		Maul			1					
		Muller stone	1							
		Paint brush					1			
		Plum			1					
		Prybar			1					
		Saw					1			
		Scraper							3	

GROUP/CLASS	TYPE	ARTIFACT	QUEEN ANNE'S REVENGE		WHYDAH		HMS INVINCIBLE		HENRIETTA MARIE	
			Count	%	Count	%	Count	%	Count	%
TI-Ship Maintenance (cont.)		Setter					2			
		Sledge hammer					1			
		Various carpenter tools			5		3			
		Whetstone	1						1	
Class Total			**6**	**2.113**	**27**	**10.976**	**332**	**57.340**	**17**	**62.963**
TI-Writing Implements	Writing Supplies	Ink well								
		Pencil					1			
		Seal			2					
		Slate	18				1			
		Slate pencil			1					
		Writing kit					28			
Class Total			**18**	**6.338**	**3**	**1.220**	**30**	**5.181**	**0**	**0.000**
TI-Miscellaneous		Candle Holder					5			
		Coin weights	5		3				4	
		Shod shovel					16			
		Tally stick					57			
		Various weights	79		95		28			
Class Total			**84**	**29.577**	**98**	**39.837**	**106**	**18.307**	**4**	**14.815**
TI Group Total			**284**	**0.116**	**246**	**0.231**	**579**	**5.680**	**27**	**0.189**
Grand Total			**244284**	**100.00**	**106673**	**100.00**	**10193**	**100.00**	**14293**	**100.00**

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