Queen Anne’s Revenge
Shipwreck Project

RESEARCH REPORT AND BULLETIN SERIES
QAR-R-09-03

Archaeological Investigations at the
Queen Anne’s Revenge Shipwreck Site

[Reprint of Chapter IV from Mark U. Wilde-Ramsing’s 2009 Dissertation “Steady as She Goes…A test of the Gibbs’ Model using Queen Anne’s Revenge”, Program in Coastal Resource Management, East Carolina University.]

Mark Wilde-Ramsing
NC Underwater Archaeology Branch

August, 2009

Underwater Archaeology Branch
Office of State Archaeology
Department of Cultural Resources
State of North Carolina
www.QARonline.org

Cover photo: Queen Anne coin weight for 1 guinea gold coin. Recovered from site Fall 2006
Introduction

Archaeological investigations at the Queen Anne’s Revenge shipwreck site and surrounding areas have been ongoing since its discovery on November 21, 1996 (Table 1). Collectively this work has provided wide-ranging and comprehensive data to apply toward the Gibbs’ (2006) cultural site formation model. Archaeological research related to the Queen Anne’s Revenge site has located other shipwrecks in Beaufort Inlet, determined the layout of wreckage lying at and immediately around the main site, and analyzed the artifact assemblage recovered from this shipwreck.

<table>
<thead>
<tr>
<th>Period</th>
<th>Research Activity</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978 - 2001</td>
<td>Channel margin and disposal area survey and site assessment</td>
<td>Dames and Moore; Tidewater Atlantic Research, Mid-Atlantic Technology and Environmental Research</td>
</tr>
<tr>
<td>1982, 1985, and 2002</td>
<td>Random survey in vicinity of Beaufort Inlet; Survey of inlet throat and behind Shackleford Banks</td>
<td>East Carolina University</td>
</tr>
<tr>
<td>1987 - 1996</td>
<td>Random survey and site assessment on the ocean side of Beaufort Inlet</td>
<td>Intersal Inc.</td>
</tr>
<tr>
<td>1997 - 2004</td>
<td>Detailed survey and site assessment of western side of Beaufort Inlet</td>
<td>Intersal Inc.</td>
</tr>
<tr>
<td>1996</td>
<td>Discovery of 31CR314, QAR site</td>
<td>Intersal Inc.</td>
</tr>
<tr>
<td>1997 - 1999</td>
<td>Archaeological assessment and site testing</td>
<td>NC Underwater Archaeology Branch</td>
</tr>
<tr>
<td>2000</td>
<td>Emergency recovery of exposed hull structure</td>
<td>NC Underwater Archaeology Branch</td>
</tr>
<tr>
<td>2001-2004</td>
<td>Detailed site monitoring</td>
<td>NC Underwater Archaeology Branch</td>
</tr>
<tr>
<td>2005 - 2006</td>
<td>Stratified sampling recovery program</td>
<td>NC Underwater Archaeology Branch</td>
</tr>
<tr>
<td>2006 - 2008</td>
<td>Full scale site recovery</td>
<td>NC Underwater Archaeology Branch</td>
</tr>
</tbody>
</table>

Table 1: Cultural resource surveys and shipwreck investigations at Beaufort Inlet.

Remote sensing surveys to locate shipwrecks in the vicinity of Beaufort Inlet have employed magnetometers, which detect disturbances in the earth’s magnetic field caused by the ferrous metal. These instruments are particularly useful where cultural debris is buried, which is the case for many sites at Beaufort Inlet. Surveys have been conducted by commercial firms searching for shipwrecks under permit with the state of North Carolina, by East Carolina University students and professors, and by archaeological contractors working for the US Army Corps of Engineers. Collectively, these magnetometer surveys have provided thorough coverage, particularly for the western portion of the inlet in the vicinity of the Queen Anne’s Revenge site. In many cases, subsequent investigations of magnetic targets, either by visual inspection or excavation, determined their nature and origin. The
extensive coverage by survey and site assessment investigations around the wreckage of Queen Anne’s Revenge is especially relevant in determining any contemporary attempts either to prevent its loss or save it during wrecking. Site-specific data acquisition at the wreck site has been conducted under the direction of cultural resource managers from the North Carolina Underwater Archaeology Branch. Employing archaeological techniques and theory provided through cultural resource management guidelines, state archaeologists developed and carried out a systematic action plan to assess and manage the shipwreck site (Wilde-Ramsing and Lawrence 2004).

One research focus was determining site significance based on existing knowledge within established themes in American history and prehistory (U.S. Department of the Interior, National Park Service 2002; also see Neumann and Sanford 2001; Hardesty and Little 2000). Through this process the Queen Anne’s Revenge site has been listed on the National Register of Historic Places in 2004 under Criteria A, B, and D. According to Criteria A, the site derives significance from its association with a nationally important event, namely piracy in the Americas during the proprietary period. The shipwreck’s connection to Blackbeard who epitomizes anti-authoritarian behavior of the period invokes Criteria B, which recognizes a site’s association with an important person. The site’s archaeological significance falls under Criteria D. Remains recovered from the shipwreck are considered likely to reveal substantial insight into early eighteenth-century maritime activities in the New World by shedding light on naval armament and warfare, ship construction and repair, colonial provisioning, shipboard life, and perhaps elements of piratical behavior and the slave trade. The high profile nature of this shipwreck, given its association with the internationally recognized pirate Blackbeard, has enhanced funding and public support enabling site managers to employ techniques and methodologies well beyond the norm.

During assessment of the Queen Anne’s Revenge shipwreck, site specific remote sensing, exploratory trenching of the debris field, and mapping of all exposed remains provided a thorough understanding of the extent and layout of the shipwreck. The initial retrieval from 1996 to 2004 involved minimal disturbance techniques that limited recovery to artifacts likely to reveal age, origin, or ownership. Complete recovery of artifacts did occur when excavating a subsurface test unit in 1997 and during the 2000 emergency recovery of a portion of the ship’s hull. By 2004, approximately 20,000 individual items from the wreck site had been recovered, cleaned and analyzed.

Recoveries in May 2005 and May 2006 were carried out under the auspices of a stratified sampling program during which 23 test units were fully excavated. Archaeologists mapped and recovered all visible artifacts. Remaining sediments from the units were sampled and panned for small artifacts. Collection methods intensified in 2006 when full recovery began. At that time the use of a gravity sluice and hand panning became standard procedure for processing all artifact-bearing sediments. This resulted in the near complete recovery of shipwreck-related items, such as specks of
gold, fragments of lead, glass bead shards, and brass pinheads and shafts. All artifacts were transferred to the *Queen Anne’s Revenge* conservation laboratory on the campus of East Carolina University for storage, cleaning, analysis, and stabilization as they were rehabilitated from their years in seawater.

The majority of artifacts arriving at the laboratory were covered with a heavy layer of corrosion and marine growth. Some artifacts could be identified during physical examination, however, most concretions required x-radiography to reveal the individual items contained within. This process allowed researchers to identify, count, and add thousands of additional artifacts to the total assemblage bringing the total *Queen Anne’s Revenge* assemblage used in this study to a quarter of a million individual artifacts.

Figure 1: Beaufort Inlet in 2000 (NOAA Chart 11547 Morehead City Harbor).
Beaufort Inlet Surveys

Cultural resource surveys of Beaufort Inlet have been widespread. They were undertaken because of environmental requirements, academic research, and commercial interests that were primarily looking for the Spanish treasure ship *El Salvador* (Lawrence 2007) (Figure 1).

**Government Archaeological Investigations**

Beginning in 1978 the US Army Corps of Engineers (USACE) contracted several archaeological firms to conduct remote sensing surveys prior to channel dredging at Beaufort Inlet. These surveys located cultural resources using a magnetometer, occasionally with side scan sonar, which shows the seabed texture and protruding objects. Areas of concern were channel margins and several near-shore dredge disposal areas. Surveys conducted along channel margins failed to locate any sites of historical significance (Dames and Moore 1978; Watts 1989; and Watts 1992). Within dredge disposal areas numerous magnetic targets were recognized, but only one, the Civil War transport *Quinnebaug*, was identified as an historic shipwreck (Watts 1992; Watts 1997; Watts 2002). Ironically, during a 1991 survey on the west side of the inlet channel, government contractors came within 600 feet (182.9 m) of the *Queen Anne’s Revenge* site (Lawrence 2007).

Recently, potential sand borrow areas immediately south and west of the *Queen Anne’s Revenge* site were examined for significant cultural resources. The results of the combined magnetometer and sonar survey confirmed the presence of numerous magnetic sites seaward of the *Queen Anne’s Revenge* site, many of which had previously been recorded and investigated by Intersal Inc (Hall 2007).

**University Projects**

During East Carolina University’s 1982 field school a random magnetometer survey was conducted throughout the area, including runs along the shores of Shackleford and Bogue Banks on either side of Beaufort Inlet (Watts 1983). ECU student projects examined the estuarine side of Shackleford Banks for evidence of a Revolutionary War ship burned there (Reedy 1985) and the throat of Beaufort Inlet for *Adventure*, which was lost with *Queen Anne’s Revenge* (Overfield 2002). These university-sponsored investigations produced some significant survey targets; however, none were further investigated to determine if they represented shipwreck remains.

**Intersal Search and Site Investigations**

In 1996, when the *Queen Anne’s Revenge* shipwreck site was discovered, Intersal Inc. held two search permits at Beaufort Inlet. Their survey area extended three miles to either side of the inlet’s shipping channel and offshore to the 30-foot contour. The first permit, BUI549, issued by the state...
on January 1, 1987 was to search for *El Salvador*. This Spanish treasure ship was lost in 1750 was carrying a shipment of Mexican silver for Europe. The merchantman fell victim to a hurricane and was one of several ships violently cast upon the North Carolina coast.

Two years later, Intersal applied for and received a second permit, BUI565, which designated *Queen Anne’s Revenge* as their focus. Although the group conducted controlled magnetometer surveys over a large portion of the inlet, efforts to identify promising targets were unsuccessful until 1996. From November 9th to November 22nd, the company concentrated on areas corresponding to the eighteenth century outer inlet shoal. More importantly, they followed their surveys immediately with target evaluation, which resulted in the identification of five shipwrecks, one of which was the *Queen Anne’s Revenge* site (Lawrence 2007).

From 1997 until 2004, Intersal continued investigations at Beaufort Inlet with increasing sophistication and intensification in their effort to locate *El Salvador*. They also searched for *Adventure*, an 8-gun sloop lost within a ‘gunshot’ (<3,000 feet (<914.4 m)) of *Queen Anne’s Revenge* (South Carolina Court of Vice-Admiralty 1719:45). Intersal Inc.’s ability to detect clues that might lead them to these eighteenth century vessels was enhanced by the purchase of a survey vessel outfitted with a cesium magnetometer, a differential GPS navigation system, and sophisticated computer equipment. By dividing the company’s search area into survey blocks measuring 787 feet

---

**Figure 2: Intersal survey blocks on west side of Beaufort Inlet (Courtesy of Intersal Inc.).**

*QAR-R-09-03* Wilde-Ramsing 6
(240 m) on a side, Intersal Inc. covered a large area surrounding Queen Anne’s Revenge (Figure 2). The company employed survey lane spacing of 30 feet (9.14 m) and was able to locate very small anomalies, for example an isolated iron kettle (Masters 2005a).

Intersal divers used visual inspection, underwater metal detectors, hand-held magnetometers, and conducted excavations with a prop wash deflector and an induction dredge system to examine magnetic targets. The company used evidence, such as the presence of copper fasteners, iron stock anchors, and steel cable, to eliminate sites that were too recent in time to be El Salvador or Adventure. Over the course of their search divers found dozens of anchors, thirteen dating to the nineteenth century or earlier based on their stocks and positively identified seven shipwrecks (Figure IV-3). Some of these have been tentatively identified by comparing their characteristics with records of 110 ships lost in or near Beaufort Inlet. Reports of ship losses come from the North Carolina Underwater Archaeology Branch shipwreck archive, which contains over 5,000 shipwreck entries statewide (Lawrence 2008).

![Shipwreck sites located in Beaufort Inlet.](image)

Figure 3: Shipwreck sites located in Beaufort Inlet.
Shipwrecks lost at Beaufort Inlet represent three centuries of shipping traffic. Their positions within the inlet landscape and circumstances of loss, collectively comment on navigation, channel location and movement, and environmental factors at play. Each shipwreck reported by Intersal Inc. will be discussed from the most recent to the oldest, which happens to be the early eighteenth century shipwreck of Queen Anne’s Revenge.

Shipwreck Site 0021BUI - Shipwreck 0021BUI was discovered Intersal Inc.’s 1999 diving operations (Masters 2005a) and recently examined in detail using sonar (Hall 2007). This site represents a steel-hulled ship approximately 60 feet (18.28m) in length. It lies in 27 ft (8.23m) seaward of the historic inlet bar and at that depth likely sank rather than ran aground. The vessel may be Maside a 39-ton, screw steamer that was lost during due to high seas on December 14, 1920 (US Department of Commerce and Labor, Bureau of Labor 1921:453).

Shipwreck site 0002BUI - Also known as the Ballast Pile Wreck, shipwreck 0002BUI exhibits an exposed debris field of large cut rock, heavy iron chain, and sail rigging attachments spread over an area approximately 40 feet (12.19 m) by 15 feet (4.57 m). The shipwreck was found during Intersal Inc.’s 1996 expedition, revisited in 1999, and further examined by state archaeologists in 2006 (Masters 2005a; Wilde-Ramsing 2007). The remains are most likely that of the schooner Louise Howard lost in 1921 while attempting to enter Beaufort Inlet during a southwest gale with a cargo of rock for jetty construction. The crew was rescued, but due to the presence of explosives onboard, no salvage was attempted (Evening Dispatch 1921).

Shipwreck site 0005BUI - Two concentrations of debris lying less than 80 feet (24.38 m) apart are probably related and have been designated site 0005BUI. The most recognizable artifact is a large, rectangular piece of machinery that appears to be a steam winch dating to the late nineteenth/twentieth century (Wilde-Ramsing 2007). The equipment is partially exposed above the seabed and likely represents a shipwreck. Not enough site data has been gathered to make an informed guess concerning its identity.

Shipwreck site 0004BUI - Known as the Railroad Iron Wreck, site 0004BUI was first found by Intersal Inc. in 1996 and examined by state archaeologists in 2006 using sonar and dive inspections (Masters 2005a; Wilde-Ramsing 2007). The exposed remains lie at a depth of 20 feet (6.1 m) and extend up to 5 feet (1.52 m) off the bottom. The wreckage is approximately 77 feet (23.47 m) in length and 24 feet (7.31 m) wide and exhibits a large number of 30-foot lengths of iron railroad track. This is probably the two-masted schooner Lucinda A. Bailey that was sailing from New York to Savannah with a cargo of railroad iron when it attempted to come through Beaufort Inlet. Historical documents provide only sketchy details of the ship’s grounding on Beaufort bar in late November 1870 (Wilmington Star 1870).
Shipwreck site 0001BUI - The Quinnebaugh, a US naval transport, was lost shortly after the Civil War ended when it experienced mechanical difficulties while passing out Beaufort Inlet in heavy surf conditions (U.S.C.G. Court of Inquiry 1865). Seas overwhelmed the vessel’s engines and the ship subsequently grounded along the channel’s edge. At that time the channel was aligned on the east side of Beaufort Inlet adjacent to Shackleford Banks. The vessel was abandoned and became a total loss. Today the ship’s iron steam machinery, which was located and investigated during a dredge disposal area survey, is the site’s most prominent feature (Watts 1992).

Shipwreck site 0020BUI - Designated the September site by Intersal Inc. in November 2000, shipwreck 0020BUI lies in 11 feet (3.35 m) of water and is buried beneath several feet of sand. The company intensified its efforts at the site in 2004 and discovered a well-preserved portion of a wooden ship’s hull including its rudder. Copper alloy fasteners and a 1798 British penny support its identity as Catharine and William reportedly grounded in September 1814 on Beaufort bar as it was coming in the inlet (Masters 2005a). The copper-bottomed brig was a prize of the American privateer Grampus and carried a valuable cargo of South American goods. It was said to have been a total loss (Carolina Federal Republican 1814).

Shipwreck Site 007BUI Complex - During survey work in November 1999, Intersal Inc. began to find widely scattered debris west of the Queen Anne’s Revenge site. Much of the material appeared to date to the eighteenth century. The first site found consisted of three anchors and was farthest offshore. One thousand feet (304.8m) shoreward was a group of four cannon, with three more cannon found a short distance away. As Intersal Inc. located and investigated other anomalies they found two more wooden stock anchors, ballast stones, a hearth brick, rudder hardware, a bilge pump piston, a cast iron kettle, and a carriage axle. The seven cannon, all of which were recovered and cleaned, as well as a spoon and a shoe buckle, date the site to the mid-eighteenth century or later. The entire complex of debris, which was strewn in a line NNE from the cluster of anchors over a mile offshore all the way to the beach, has been interpreted as a single, eighteenth century ship lost during a catastrophic wrecking event (Masters 2005a).

The 0007BUI site complex may represent El Salvador, the Spanish merchantman cast ashore during the hurricane of 1750. Only four survivors were reported. The handful of other shipwreck candidates from the eighteenth century were small, unarmed coasting vessels and in each of those cases, the vessels were lost while their crews and sometimes part of their cargos were saved (Masters 2005a).

Examination of the Area Immediately around Queen Anne’s Revenge

In November 1996, while investigating a magnetometer target about a mile off Ft. Macon, North Carolina, divers discovered a large mass of iron cannon and anchors that turned out to be the
wreckage of *Queen Anne's Revenge*. Over the following eight years, the area immediately surrounding the site was the subject of intensive magnetometer and target assessment as Intersal Inc. attempted to locate additional portions of the flagship, the remains of her sister ship, *Adventure*, and *El Salvador*.

The company’s survey maps show a lack of outlying debris in a shoreward direction for over 2000 feet (600 m) from the *Queen Anne's Revenge* site (Figure 4a). Lying within 1,000 feet (300m) seaward and on either side of the *Queen Anne's Revenge*, a number of magnetic targets were detected (Figure 4b). The only magnetic anomaly that might represent a shipwreck is 590.55 feet (180 m) directly east and its source is associated with a modern piece of manufactured steel that does not indicate eighteenth century wreckage (Masters 2005a, Wilde-Ramsing 2007). Each of the other magnetic targets post-dated the eighteenth century with the exception of a wooden stock anchor lying 420 feet (128 m) directly offshore (Masters 2005a). The anchor has a shaft length just under 9 feet (2.74 m) and lies in a set position with its ring and stock extended toward the *Queen Anne's Revenge* site.
Queen Anne's Revenge Field Investigations

The Queen Anne's Revenge site was discovered on November 21, 1996 when divers from Intersal Inc. located a cluster of cannon and anchors. A handful of artifacts gathered that day was evidence of an armed, early eighteenth century vessel, which led to its tentative identification as Queen Anne's Revenge. Although this vessel was not widely known, the discovery was expected to attract public interest because of its association with the pirate Edward Thatch (Teach) and more commonly known as Blackbeard. The announcement four months later that a shipwreck from the height of the Golden Age of Piracy (1715-1726) might have been found at Beaufort Inlet brought worldwide attention to the discovery.

The North Carolina Underwater Archaeology Branch initiated a two-year examination to assess the shipwreck's nature, origin, and significance. This investigation followed standard information-gathering procedures developed for cultural resource management (Wilde-Ramsing and Lawrence...
2004). Primary objectives were aimed at placing the shipwreck within its natural and cultural context. State archaeologists sought to determine working conditions, potential environmental impacts, extent of the site, condition and composition of its archaeological remains, and its potential significance to contribute toward understanding the past (Wilde-Ramsing 1997).

Based on data collected during the initial assessment phase, state archaeologists completed a management plan that recognized the significance of the Queen Anne’s Revenge site and expressed concern for mounting environmental threats to its integrity (Wilde-Ramsing and Lusardi 1999). The overall recommendation called for site mitigation through total site data recovery at such time that permanent staffing and an adequate conservation laboratory could be put into place. These conditions were not fully met until the fall of 2006. Prior to this, periodic investigations were designed to continue assessing the nature and extent of the shipwreck and recovering threatened artifacts as needed. These included diver-assisted gradiometer surveys conducted in 1999 and 2001, which located buried magnetic targets, such as individual cannon, and helped define debris field boundaries. In 2000, two expeditions documented and recovered threatened hull timbers and associated artifacts that had been exposed by hurricanes activity the year before. A fourth exploratory transect trench was opened in 2004.

**Mapping**

During the initial expedition to the Queen Anne’s Revenge site in the fall of 1997 archaeologists concentrated their efforts on examining and mapping the exposed main ballast pile. This feature measured 25 feet (7.62 m) by 15 feet (4.57 m) and consisted of eleven cannon, two anchors, a grapnel, iron cask hoops, rigging elements, cannon balls, and a large number of ballast stones and indeterminate concretions. Elevations taken from the site’s reference datum revealed that visible wreckage rose on average 2 feet (0.6 m) above the surrounding seabed. The highest point was anchor A-1, which protruded 4.6 feet (1.38 m) from the bottom. During a search of the immediate surroundings, anchor A-3 was found 50 feet (15.24 m) north of the main mound.

The 1998 field season was preceded by Hurricane Bonnie, which exposed a portion of the ship’s hull. Taking advantage of the situation presented by nature, the articulated frames, planks and sheathing were carefully mapped and fully examined. This procedure was later repeated for other artifacts lying adjacent to the main mound as they too became exposed during Hurricanes Isabel (2003), Charley (2004), and Ophelia (2005).

A permanent reference baseline installed in 1998 ran south to north along the seabed east of and next to the main mound. To encompass all projected site remains, a permanent reference control point was established in the southwest corner of the site and placed far enough away to be beyond all wreck-related artifacts. The southern origin of the baseline was set 50 feet (15.24 m) east and zero
feet north of this control point; the baseline extended 150-foot (45.72 m) in a northerly direction. Reference stakes placed every ten feet along the baseline served as points for mapping by triangulation (Figure 5). Large artifacts and exploratory trenches were tied directly to the baseline while individual; five- by five-foot excavation units provided reference for smaller artifacts.

![Figure 5: Site plan showing 1998 (blue) and 2004 (purple) exploratory transect excavations.](image)

**Exploratory Trenches**

In 1998 three exploratory trenches transecting the known site at its north, south and middle portions were employed. During this operation, mobile sand overburden was removed to permit examination of cultural materials with minimal disturbance. Transect trenches were used to define the extent and nature of buried artifacts that stretched away from the main site as part of the larger debris field. Researchers found that the further from the center of the site excavations extended, the deeper artifacts were buried. At the outer limits overburden was nearly four feet (2.22 m) in depth. It was also determined that artifacts were largely limited to an area 120 feet (36.58 m) by 60 feet (18.29 m).

In the fall of 2004, archaeologists returned to the site to conduct a fourth transect excavation on the site’s west side to compliment trench explorations conducted in 1998 (Figure 5). This exploration successfully tested the predicted location of the ship’s foremast as evidenced by the presence of rigging elements. It also confirmed the location of cannon C23 based on gradiometer survey data.
Collectively, exploratory transects opened up an estimated 15 percent of the buried area to permit examination, mapping, and collection of diagnostic artifacts prior to reburial of exposed site remains.

**Gradiometer Investigations**

In June and October 1999 and again in October 2001, diver-assisted remote sensing surveys were conducted using a magnetic gradiometer to examine buried artifacts and their distribution without disturbance. The objective was to test the magnetic gradiometer for accurately identifying large, ferrous objects buried beneath bottom sediments, specifically individual cannon, and determine outer margins of artifact dispersal without excavation.

![Figure 6: Gradiometer contour map.](image)

The gradiometer works the same way as the magnetometer by detecting distortions in the earth’s magnetic field caused by ferrous material. The gradiometer, however, receives signals from two separate sensors, approximately two feet apart, contained in a submersible casing. Because the instrument provides readings in terms of the difference, or gradient, between the two sensors it
registers only ferrous objects that affect one sensor more than the other. This minimizes distortion from the overall magnetic field because artifacts not directly under the two sensors will influence both equally and thus not register. Individual objects that lie directly under the two sensors give readings based on their size and mass. Before each reading, divers placed the gradiometer sensor at predetermined intervals of 2½ ft (0.76 m) or less over the entire site thus providing exceptional accuracy for mapping purposes. Furthermore, placing the sensor casing on the seabed directly over the buried objects insured that small ferrous objects lying on the site’s margins were recorded. The gradiometer picked up ballast stones composed of highly magnetic basalts, as well as iron objects throughout the shipwreck site.

During the fall 1999 survey, divers recorded 2,064 individual gradiometer readings over the entire site. After recording and contouring results, archaeologists were able to overlay the site map and relate magnetic disturbances with previously recorded artifacts, such as cannon, anchors, and barrel hoops (Lawrence and Wilde-Ramsing 2001:7). Several anomalies in previously unexcavated areas were subsequently investigated and found to represent individual cannon. The distribution of all artifacts was confined to a 110-foot (33.53 m) by 55-foot (16.76 m) area based on the results of the gradiometer survey (Figure 6).

Limited Excavation and Recovery

Without a facility and staff dedicated to conserving artifacts recovered from the Queen Anne’s Revenge site, archaeologists were cautious in recovering of artifacts. Prior to spring 2005, full excavation was employed only in two instances, Test Unit 1, an 18-square foot (5.49 m) excavation in 1997 and five, 5-foot x 5-foot (1.52 m x 1.52 m) units opened in 2000 to facilitate emergency recovery of the hull structure.

Test Unit 1 - Test Unit 1, was placed over Cannon C-2 in preparation for its recovery and to document the nature of bottom sediments and the depth of buried remains. A hydraulic dredge and deck mounted sluice system were used to excavate sediments down to a culturally sterile zone. Three separate sediment horizons were detected (Figure 7). The upper zone, 0.75 feet (0.23m) to 1.25 feet (0.38m) in thickness, consisted of poorly sorted, fine-medium sand that represents highly mobile sand that constantly migrates across the seabed. Below this was a one-foot (0.3m) layer of very poorly sorted sand and coarse shell deposited during storm scour. This zone contained the vast majority of small artifacts, most of which dated to the eighteenth century, but also included some nineteenth and twentieth century materials. The bottoms of large objects lay directly on the lowest zone that consisted of well-sorted, stiff, silty sand. This basal layer was hard packed to the extent that
the process of vertical migration and burial of artifacts was disrupted. Lead shot and gold grains were concentrated there.

In addition to cannon C2, Test Unit 1 produced an array of artifacts including ceramics, glass, wood, bone remains, two pewter dishes, numerous lead shot, and a large quantity of ballast stones and concretions. Based on the number of items recovered from this relatively small excavation, archaeologists realized that hundreds of thousands of individual artifacts remained on the site. Furthermore, many would require a lengthy and costly conservation process.

Emergency Recovery - During the 1999 fall expedition, archaeologists found a great deal of damage as a result of hurricanes. The shoreward side of the exposed mound was scoured and a portion of the surviving hull structure was completely uncovered and undermined (Figure 8). In response, an emergency expedition was launched the next spring. Divers removed bottom sediment from ten frame timbers and associated hull planks and successfully recovered them. Hull planks were cut at the point where they disappeared under the main mound, as were three additional planks that served as sacrificial hull sheathing. While frames showed extensive damage from exposure to seawater, hull planks and sheathing that had remained buried under bottom sediments were found to be in a good state of preservation.
Archaeologists returned to the shipwreck in the fall of 2000 to complete the recovery of artifacts associated with the hull structure. For the first time, this project implemented a site grid system using five standardized 5-foot x 5-foot units for a total of 25 square foot (7.62 m²). Some artifacts, mostly ballast, had been found lying on top of the timbers when they were recovered in the spring, however, it was not known to what extent small items lay underneath the structure. It turned out that overall density of artifacts for the entire 125 square feet (38.1 m²) was considerably less than that recorded for Test Unit 1, suggesting that artifacts migrated under the hull structure during scouring and settling after the vessel wrecked.

**Stratified Sampling Program** - Recognizing the shortcomings of artifact recovery that totaled less than 2 percent and provided an inadequate representation, in 2004 a comprehensive sampling program was developed. During expeditions in the spring of 2005 and spring of 2006, a stratified sampling regime was employed to excavate an additional 9 percent of the shipwreck site (Wilde-Ramsing 2006). This program addressed limitations in the existing data while working within the constraints of available funding at the time. The goal was to recover a substantial sample of artifacts from across the *Queen Anne’s Revenge* site as a control collection in the event that a catastrophic hurricane severely impacted the shipwreck before full data recovery could be completed. At the same time, excavating these units enhances understanding of artifact densities and composition and aided in planning full recovery. Artifacts from across the site also facilitated an examination of intra-site distributions and provided a representative assemblage for inter-site comparison.
To gather comprehensive data, 23 five-foot by five-foot excavation units, a total of 575 square feet (190.5 m²), were opened to supplement previous excavations. Based on researchers’ knowledge of site layout, seven lateral zones (nearshore, bow, forward, midship, aft, stern, and offshore) were laid out to guide site sampling (Figure 9). The interior zones were 25 feet (7.62 m) wide while end zones were left open to include artifact scatter north (toward shore) and south (offshore). The placement of three excavation units across each zone provided evidence related to port and starboard. Two units were situated at the nearshore and offshore ends to seek the extent of artifact distribution. In order to further determine the margins of the debris field, additional units were placed adjacent to outer excavation units that were devoid of cultural materials (see Figure 9).

The stratified sampling program was successfully completed in May 2006. During the fieldwork cannon C24, a six-pounder situated further forward than any of the ship’s artillery was found and recovered from Unit 2. Two, four-pounders from either side of the site’s main mound, one in Unit 4 and the other in Unit 16, were also recovered. The lead liner for the officers’ toilet was brought up from Unit 7 at the offshore end and the extreme stern area. Unit 3 produced an intact wine bottle and a guimbard (Jew’s harp) among large amounts of ballast from the lower hold. A whole grinding stone was found just outside Unit 23. One of the most exciting finds was the stem of a coronation
glass commemorating King George I (Figure 10). An equally important discovery was a large portion of the lower sternpost that rested across Units 9 and 10.

Figure 10: Glass stemware from *Queen Anne's Revenge*.

Preliminary analysis of distributions revealed some artifact groups could be related to activity areas within the ship’s original layout. Most notably, lead shot concentrated at the aft end of the vessel where the shot locker apparently was located. Cannon balls appeared mostly along the western side of the site in association with the scatter of cannon. Both were on the upper deck and together spilled overboard as the vessel heeled onto its port side. Lead hull patching was found in the central portion of the site that corresponded to the length of the lower hull (Units 17, 8, 16 and 21). Glass beads, while most abundant in the stern, were found in units throughout the site while cask hoop parts concentrated in the forward and aft hold zones. While stratified sampling suggested activity areas and potential wrecking behavior, a fuller inventory and more detailed examination was needed to distinguish the more subtle distributions related to shipboard activities.

*Full Recovery*

By 2006, staff, facilities, and funding were in place to begin total recovery of *Queen Anne's Revenge* remains. Efforts began in September with a major expedition followed by another the next year.
during which collectively a total of 156 excavation units were completed. Excavation and recovery began at the offshore end of the site and proceeded toward the center of the shipwreck (Figure 11). Previous field observations showed a distinct edge in artifact distribution at the offshore side.

![Site plan showing completed excavation units.](image)

Figure 11: Site plan showing completed excavation units.

created by the dominant ocean breezes and subsequent currents that moved sediment and artifacts shoreward. Units were extended to the margins of the site until they no longer produced cultural materials. At the end of 2007, the midship zone had been reached and the recovery project neared the halfway point in terms of area covered and artifacts brought to the surface.

During full recovery operations, a 3-inch induction dredge system brought all sediment surrounding and underlying artifacts to the deck of the recovery vessel where dredge outflow was directed through a gravity sluice and screening system. After small artifacts were removed from the sluice, spoils were emptied into containers and hand panned to recover minute items.

During the 2006 and 2007 expeditions, over 2000 QAR numbers were assigned to individual artifacts, artifact groups, and concretions. It was predicted that each concretion would produce an average of 100 individual artifacts (Southerly et al. 2007:10). Some easily recognized artifacts were quite remarkable, such as a brass bell that may have served as the watch bell located in the stern and a small brass, rail-mounted signal cannon. Numerous scale weights, a mapping compass (Figure 12), a
pestle to go with the apothecary mortar found in 2005, miscellaneous gun parts and gun flints, several intact wine bottles and dozens of straight pins were among the recovered items.

Figure 12. Mapping compass from the Queen Anne’s Revenge.

Queen Anne’s Revenge Artifact Conservation and Analysis

Conservation Facilities.

From the beginning state managers recognized the need for conservation and care of artifacts would be an essential element of any investigations undertaken at the Queen Anne’s Revenge site (Wilde-Ramsing and Lusardi 1999). Before the 2002 construction of the project’s conservation laboratory on the campus of East Carolina University, cleaning and conservation took place at several locations. In the early years work took place at the North Carolina Underwater Archaeology Branch’s conservation facility in Kure Beach.

In autumn of 1999, the North Carolina Department of Cultural Resources established an archaeological and conservation facility near the shipwreck site at the Institute of Marine Sciences, a University of North Carolina facility located in Morehead City. Large artifacts were housed nearby in a vacant warehouse on the campus of Carteret Community College. Under the direction of Queen Anne’s Revenge conservator Wayne Lusardi, in 2000 the facility accepted the threatened hull structure and associated artifacts.
Major building renovation at the Morehead City campus starting in 2002, forced the closure of the Queen Anne’s Revenge laboratory and transfer of artifacts back to the Underwater Archaeology Branch’s laboratory at Kure Beach. Over the next 12 months work took place on two fronts. Nathan Henry, North Carolina’s archaeological conservator, assisted by two assistants, undertook the task of breaking down, cleaning, and initiating conservation for the many artifacts removed from almost 200 concretions. At the same time, newly hired Queen Anne’s Revenge conservator Sarah Watkins-Kenney worked closely with East Carolina University staff to develop laboratory space at the school’s recently acquired property on the former Voice of America ‘Site C’ facility west of Greenville.

With the conservation facility officially opened in 2003, staff received all QAR artifacts from Kure Beach and then items collected during the stratified sampling expeditions of 2005 and 2006. By the time full recovery began in the fall of 2006, the laboratory consisted of more than 4000 square feet of heated space and a 4000 square-foot storage warehouse. Today the Queen Anne’s Revenge Archaeological Conservation Laboratory includes office and library space, treatment labs for both large and small artifacts, photography and illustration rooms, an x-radiography and film processing system, and space for record storage. At the facility three permanent conservation staff, two additional conservator technicians and several graduate student positions work on Queen Anne’s Revenge materials.

Artifact Processing

By 2004 nearly all of the artifacts recovered from the site had been cleaned and received preliminary physical and cultural analysis. With the exception of 39 modern, intrusive artifacts, all artifacts dated to the first quarter of the eighteenth century. Table 2 provides material type, description, and count for the 1996 to 2004 artifact assemblage (Watkins-Kenney 2006a).

During the stratified sampling program of 2005 and 2006, another 389 objects were assigned QAR numbers. Conservation staff took nearly all of those concretions to the North Carolina Museum of Art for X-radiography. This process enabled researchers to identify lead shot, glass beads, nails and other iron fittings, items of pewter and copper alloy and gold flakes (Welsh and Wilde-Ramsing 2008). X-ray imagery together with visual inspection resulted in the identification of an additional 8,230 artifacts.

As full recovery commenced, many more artifacts and concretions were delivered to the QAR conservation laboratory. By the end of 2007, 1,500 additional QAR numbers had been assigned and each object examined physically or with X-radiography. This resulted in a total of 237,716 individual artifacts that were available for dissertation research.
<table>
<thead>
<tr>
<th>Material Type (main)</th>
<th>Description</th>
<th>Total Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic</td>
<td>Vessel sherds, tobacco pipes</td>
<td>83</td>
</tr>
<tr>
<td>Chemical Compound</td>
<td>Gunpowder</td>
<td>6</td>
</tr>
<tr>
<td>Concretion</td>
<td></td>
<td>159</td>
</tr>
<tr>
<td>Glass</td>
<td>Shards, bottles</td>
<td>530</td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Copper Alloy</td>
<td>Sail needle (1) pins, sheet fragments</td>
<td>41</td>
</tr>
<tr>
<td>Gold</td>
<td>Dust, grains</td>
<td>111</td>
</tr>
<tr>
<td>Iron, Cast</td>
<td>Cannon (5), cannonballs (33), pot fragments</td>
<td>164</td>
</tr>
<tr>
<td>Iron, General</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Iron, Wrought</td>
<td>Nails (c790), barrel hoops (89), hooks, bars, jack (1)</td>
<td>928</td>
</tr>
<tr>
<td>Lead</td>
<td>Shot (11,910), weights, bilge strainers, draft marks</td>
<td>15,383</td>
</tr>
<tr>
<td>Lithic</td>
<td>Ballast, coal, clinker</td>
<td>1,808</td>
</tr>
<tr>
<td>Mercury</td>
<td>From medical syringe</td>
<td>1</td>
</tr>
<tr>
<td>Pewter</td>
<td>Silver</td>
<td>16</td>
</tr>
<tr>
<td>Steel</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Metal-Castings</td>
<td>(some of wrought iron =epoxy)</td>
<td>297</td>
</tr>
<tr>
<td>Tin</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Modern Synthetic</td>
<td>Intrusive items</td>
<td>17</td>
</tr>
<tr>
<td>Bone</td>
<td>Sustenance debris (most pig or cattle)</td>
<td>88</td>
</tr>
<tr>
<td>Hair</td>
<td>Caulking</td>
<td>21</td>
</tr>
<tr>
<td>Leather</td>
<td>Piece with lead tacks</td>
<td>2</td>
</tr>
<tr>
<td>Other Plant Product</td>
<td>Tar, resin, food</td>
<td>10</td>
</tr>
<tr>
<td>Plant Fiber</td>
<td>Rope, cordage, fabric</td>
<td>96</td>
</tr>
<tr>
<td>Wood</td>
<td>Hull planks (16), frames (16), sheathing (11), tompions C19&amp;C21 (2)</td>
<td>320</td>
</tr>
</tbody>
</table>

Table 2: Artifact assemblage by material type as of December 2004 (Watkins-Kenney 2006a).
Identifiable artifacts have been organized within functional categories in the manner proposed by Stanley South (1977), who promoted pattern analysis as a means to discern culturally significant trends on British Colonial settlements in the Carolinas. South’s functional categories provide a means to reflect behavioral patterns through comparison of artifact assemblages from contemporary archaeological sites. Maritime archaeologists over the last several decades have adapted similar systems, altered to fit shipwreck materials (e.g. Hamilton et al. 1992; Broadwater et al. 1996). State archaeologists have grouped Queen Anne’s Revenge artifacts into eight classes related to shipboard activities. These groups consist of Arms and Armament, Ballast (BA), Cargo (CA), Personal Effects (PE), Ship’s Architecture (SA), Sustenance (SU), Tools and Instruments (TI), and Miscellaneous (MI). The following is a summary description of artifact categories and items contained within them.

**Arms and Armament** - The Arms and Armament class is made up of categories related to the vessel’s military mission. The most prominent and readily identifiable artifacts on the Queen Anne’s Revenge shipwreck are the ship’s cannon, which total twenty-four cast iron artillery pieces and a small, rail-mounted brass gun (Figure 13). Each cannon has received a basic level of documentation and analysis with the greatest detail coming from those that have been thoroughly cleaned (Henry 2009).

Artillery artifacts also include cannon accoutrements, such as wooden plugs in the muzzle (tompions) and the touchholes (spiles) and lead sheets or aprons that draped the breech. All were essential in keeping out salt spray and water so that the cannon would remain serviceable. Cannon waddage falls within this class and is made up of pieces of rope used to hold the cannon ball in place. There are also likely to be iron fittings and wooden components from cannon carriages but because of their similarity with other ship’s fittings, only two long eyebolts have been identified as such.

Ammunition includes iron shot fired from cannons. Ninety solid round shot projectiles range in size from half-pound shot to six-pound balls, mostly the latter. Several examples of bar shot, as well as three wrought iron spikes extracted from one of the recovered cannon, were intended to disable sails and maim opposing crewmen rather than sink ships. Lead shot, both “Rupert Method” and mold-cast, were fired from cannon as bag or canister shot, or from personal weapons (Henry 2006). Several hand-launched, cast iron grenades have also been identified.

Brass and iron hardware from personal arms are represented by a blunderbuss barrel, several firing mechanisms, decorative side and heel plates, trigger guards, and a handful of gunflints (Figure 14). The only indication of bladed instruments is a single brass clasp that was part of a sword and scabbard assemblage.
Figure 13: Cannon from Queen Anne’s Revenge.
Ballast - Ballast recovered from the *Queen Anne’s Revenge* shipwreck site consists of stones that range in size from pebbles (4 to 64 mm) and cobbles (64 mm to 256 mm) to the occasional boulder (> 256 cm). They consisted predominantly of basalts and felsic volcanics, which are found at mid-oceanic islands, including most of those in the Caribbean (Callahan et al. 2001).

Cargo - No items have been characterized as cargo.

Personal Effects - This classification refers to artifacts, other than small arms and consumables, that would have been possessed by individuals and thus imply private ownership and use. These items are related to apparel, jewelry, smoking, gaming, musical activities, and currency for the crew, officers, and passengers (enslaved or otherwise). Items in the apparel category are related to clothing and footwear. Several examples of buttons and sleeve links have been identified, as well as dozens of brass straight pins. Several shoe buckles have also been found (Figure 15).
A large number of leaded glass beads have been revealed through X-ray imagery. The few that have been analyzed are tube drawn beads that date to the late seventeenth to mid-eighteenth century and may have been trade goods from earlier slave trading business (Carnes-McNaughton and Myers 2007). Recreational activities include a number of tobacco pipe stems and bowls, gaming pieces, and a Jew’s harp.

**Ship’s Architecture** - The Ship’s Architecture class includes items related to the hull and its fixtures and fittings, which were communal equipment related to the proper functioning of the ship. This classification includes hull timbers, treenails, caulking, and iron fasteners (Figure 16). The ship’s equipment consists of various types of iron bolts and bars, hinges, a bell, bilge strainers, draft marks, lead patches, rope and rigging hooks, and sailcloth.

**Sustenance** - This artifact class includes items used for food preparation and consumption. Food preparation consists of cast iron cooking pots, fuel (coal), and elements of the galley stove (ceramic tile) (Figure 17). Food remains and tableware items, including ceramic vessels, glass bottles, pewter flatware and pewter utensils, are related to consumption.
Figure 16: Iron nails from *Queen Anne's Revenge*.

Figure 17: Galley brick from *Queen Anne's Revenge*.
Tools and Instruments - The Tools and Instruments group reflects a wide range of behavior aboard the ship. Categories include: carpentry - gouge and jack; gunnery - gunner’s rule; medicinal – mortar and pestle, apothecary jar, syringe, scale weight (Figure 17); navigation - sector, slate, divider; restraining device -shackle; sail making - hook, needle; sharpening - grindstone, whetstone; and surveying - chain tag, transit sight and mount. Category analysis is particularly meaningful within the Tools and Instruments classification.

Preliminary Observations

_Queen Anne’s Revenge_ lies on the outer margin of the historic shoal that once guarded Beaufort Inlet, a likely spot for grounding as vessels attempted to navigate its channels (Wells and McNinch 2001:17). Extensive magnetometer coverage revealed only a few anomalies within several hundred feet of the _Queen Anne’s Revenge_ site and none located shoreward of the shipwreck where wave-generated currents would most likely have driven wreck-associated debris. Magnetic anomalies turned out to be modern with the exception of a wooden stock anchor 420 feet seaward of the main site. Because of its orientation it may have been deployed or jettisoned during the wrecking event.

The ship’s layout was determined by the location of artifacts across the site (Figure 19). The stern is the south end (offshore) based on items associated with the ship’s officers, who traditionally resided there. These items included pewter plates, scientific and medical instruments, and gold dust that generally were more varied and signified more affluence than artifacts found elsewhere on the
site. Conversely, a large anchor appears to represent the ship's main anchor once located on the ship's starboard bow. The distribution of cannon along a line and in paired sets indicate the vessel rolled onto its port side sometime after grounding and spilled its deck load that way.

A distinct cluster of ship's rigging elements found in the central portion of the site represents the mainmast while several other individual deadeye strops have been recorded forward and appear to be associated with the foremast. Three large anchors found within the main wreckage were rated for a vessel of 250 to 350 tons (Sutherland from Curryer 1999:53). Study of the surviving hull structure indicates the vessel was a relatively lightly built vessel and slightly smaller in tonnage (Moore 2001:62). Observations and measurements taken on the 24 iron cannon found on the Queen Anne's Revenge site indicated that it was equivalent to a late seventeenth/early eighteenth century English sixth-rate ship or French light frigate (Henry 2006).

Of the artifacts recovered between 1996-2004, manufacturing dates were assigned to 11 individual ceramic vessels, two types of glassware, the collective assemblage of pewter flatware pieces, four cannon, lead shot, three firearm pieces, and a handful of tobacco pipe bowls and stems (Carnes-McNaughton 2008; Carnes-McNaughton and Wilde-Ramsing 2008; Henry 2006). Two artifacts, a bell and a cannon, provided absolute dates of 1705 and 1713, respectively; the latter
provides a *terminus post quem* for the vessel’s loss. Based on historical and archaeological research no artifacts from the *Queen Anne’s Revenge* site had a production that post-dated its sinking in 1718.

![Range of Datable Materials](chart.png)

*Figure 20: Chart showing the range of datable materials from *Queen Anne’s Revenge*.*

Manufacturing date ranges for all diagnostic artifacts provide a mean date of 1704 (Figure 20). Artifact use-life would have varied depending on durability and composition. For instance, ceramic tableware might be expected to last a few years (Miller 2000:1), while pewter wares might remain viable for a decade or more (Hornsby et al. 1989). It is reasonable to conclude that the Beaufort Inlet shipwreck was lost within a few years after 1713, which agrees with the loss of *Queen Anne’s Revenge*. Radiocarbon dating of the site’s timbers point to vessel construction between 1690 and 1710 (Martens 2001; Baillie 2002).

Twenty-four artifacts or classes of artifacts from the site are linked to European manufacture and all but three could be tied to specific countries. The *Queen Anne’s Revenge* artifact assemblage is multinational representing eight countries. English and French goods, however, dominate the collection, each approximately one-third of the total (Figure 21).

The *Queen Anne’s Revenge* artifact assemblage is substantial and varied. Among the remains are less robust materials including fragmented elements of the wood hull structure, some pieces of cloth, and an array of other organic artifacts. Furthermore, the shipwreck site retains spatial integrity that
permits the delineation and observation of past shipboard activities, including behaviors that occurred as the pirate flagship was lost.

Figure 21: Chart showing national affiliation of the *Queen Anne's Revenge* assemblage.
References Cited

Baillie, Michael G.
2002 Final Report on Dating QAR Timbers. School of Archaeology/Palaeoecology Report on file, North Carolina Underwater Archaeology Branch, Kure Beach, NC.

Broadwater, John D., editor

Callahan, John E., J. William Miller, and James R. Craig

Carnes-McNaughton, Linda
2008 Shipwreck Ceramic Assemblage Analysis. Queen Anne’s Revenge Shipwreck Project Research Report and Bulletin Series, QAR-R-08-03, North Carolina Department of Cultural Resources, Raleigh, NC.

Carnes-McNaughton, Linda, and Susan G. Myers

Carnes-McNaughton, Linda, and Mark Wilde-Ramsing
2008 Preliminary Glassware and Bottle Analysis from Shipwreck 31CR314, Queen Anne’s Revenge Shipwreck Site. Queen Anne’s Revenge Shipwreck Project Research Report and Bulletin Series, QAR-R-08-02, North Carolina Department of Cultural Resources, Raleigh, NC.

Carolina Federal Republican
1814 Article concerning the sinking of Catharine & William, 9-24-1814, New Bern, NC.

Curryer, Betty Nelson

Dames and Moore

Evening Dispatch
1921 Article concerning the sinking of Louise Howard, 8-15-1921. Wilmington, NC.

Hall, Wes
Hamilton, Christopher E.

Hardesty, Donald L., and Barbara J. Little

Henry, Nathan
2006 Ship’s Armament. Draft report, 8/29/06, on file North Carolina Underwater Archaeology Branch, Kure Beach, NC.

Hornsby, P.R.G. and R. Weinstein R., R. Homer

Martens, Christopher S. and Ann P. McNichols

Masters, Philip
2005a Annual Draft Reports for Permit # BUI584 and #BUI585 submitted from 1996 to 2005. Reports on file, North Carolina Underwater Archaeology Branch, Kure Beach, NC.

Miller, J. William, Katherine M. Whatley, John E. Callahan, and James R. Craig

Miller, George

Moore, David

Neumann, Thomas W., and Robert M. Sanford

Overfield, Michael
2002 Search for Adventure. Master’s Thesis, Department of History, East Carolina University, Greenville, NC.
Reedy, James R., Jr.  

South, Stanley  

South Carolina Court of Vice-Admiralty  

Southerly, Chris, Sarah Watkins-Kenney and Mark Wilde-Ramsing  

U.S.C.G. Court of Inquiry  
1865 Proceedings of a Court of Inquiry Relative to the Loss of the Steamer Quinnebaugh, July 20th, August 4, 1865, Morehead City, NC. Proceedings on file, North Carolina Underwater Archaeology Branch, Kure Beach, NC.

U.S. Department of Commerce and Labor, Bureau of Navigation  

U.S. Department of Interior, National Park Service  

Watkins-Kenney, Sarah, editor  


Watts, Gordon  

Watts, Gordon  

1992 A Remote Sensing Survey and Reconnaissance Investigations to Identify and Assess Targets Located Along Range A, a Bar Channel Widener, a Channel Extension, and
Two Spoil Deposits at Beaufort Inlet, North Carolina. Tidewater Atlantic Research, Washington, NC.


Wells, John T., and Jesse E. McNinch
2001 Reconstructing Shoal and Channel Configuration in Beaufort Inlet: 300 years of Change at the Site of Queen Anne's Revenge. Southeastern Geology 40(1): 11-18.

Welsh, Wendy, and Mark Wilde-Ramsing
2008 Final Report on Peering into a Pirate’s Trove: A Proposal to Conduct High Definition Radiography on Concretions from the Queen Anne’s Revenge Shipwreck Site. National Geographic Expeditions Council Grant No. EC0259-05. Report on file, North Carolina Underwater Archaeology Branch, Kure Beach, NC.

Wilde-Ramsing, Mark U. and Richard W. Lawrence

Wilde-Ramsing, Mark
1997 Assessment Plan for Underwater Archaeology Branch site 003BUI. Manuscript on file, North Carolina Underwater Archaeology Branch, Kure Beach, NC.


2007 Target Analysis of Sites Surrounding the Queen Anne's Revenge shipwreck site. Independent course research conducted for the Anthropology Department, East Carolina University, Greenville, NC.

Wilde-Ramsing, Mark, and Wayne Lusardi

Wilmington Star
1870 Article about the sinking of the schooner Lucinda A. Bayles 12-1-1870, Wilmington, NC.