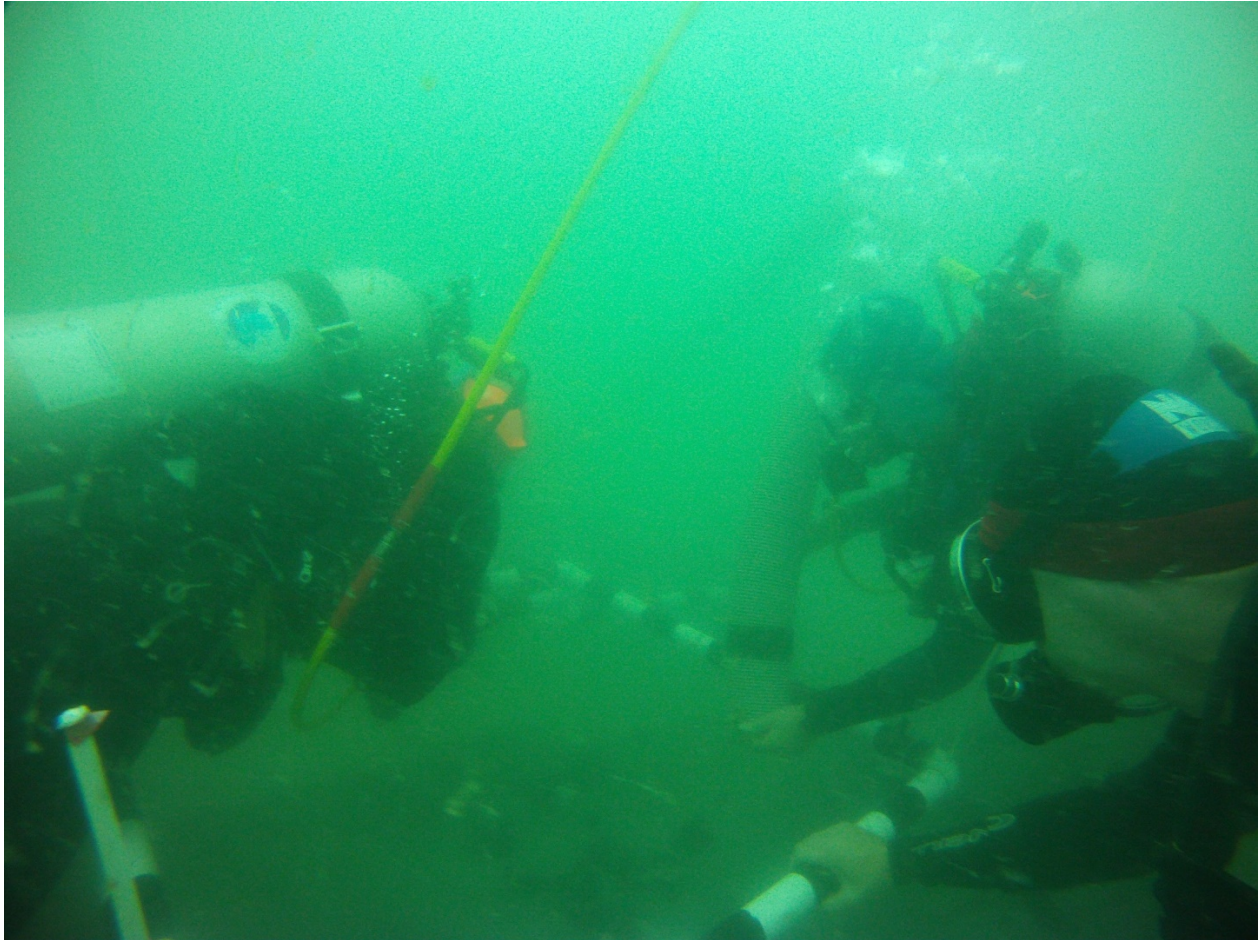


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Carolane Veilleux



ST. AUGUSTINE  
LIGHTHOUSE  
ARCHAEOLOGICAL  
MARITIME PROGRAM

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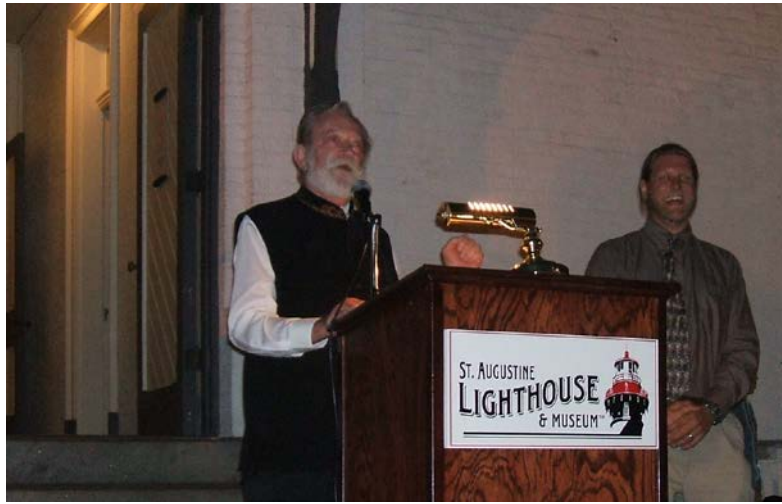


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St. Augustine Lighthouse & Maritime Museum  
St. Augustine, Florida

## Dedication



The Lighthouse Archaeological Maritime Program (LAMP) and the St. Augustine Lighthouse & Museum would like to dedicate this report to George Fischer. George was my teacher and mentor, as he was for countless other archaeologists who took his classes at Florida State University. George founded the underwater archeology program in the U.S. National Park Service, which was first operated from the Southeast Archeological Center in Tallahassee before the formation of the Submerged Cultural Resources Unit (now the Submerged Resources Center). He was also a founding member of the Advisory Council on Underwater Archaeology, which currently exists as an international committee of the Society for Historical Archaeology. He began teaching underwater archaeology classes at Florida State University in 1974, and was named a Courtesy Assistant Professor in 1988 upon his retirement from the National Park Service. He taught underwater archaeology and scientific diving classes at FSU every year for almost 30 years. He was an inspiration for at least two generations of underwater archaeologists, who now work professionally in the private sector, as government archaeologists, in the museum community, and in academia.

The first underwater archaeology project George directed was a survey of Montezuma's Well in October 1968. This was one of the first such projects to be carried out in the U.S. George also served as the project coordinator for the excavation of the 1865 steamboat Bertrand in 1969, and was involved with the investigation of the Padre Island wrecks (1554) the following year. He directed research projects in the Dry Tortugas, including surveys of National Park waters and investigations at Fort Jefferson and at the alleged site of the 1622 galleon Rosario shipwreck, between the 1960s and 1980s. On July 4, 1980, Fischer's team discovered the remains of the British warship HMS Fowey, in the waters of Biscayne National Park. The subsequent investigation and identification of this shipwreck is considered by many of his students to be the highlight of George's career. Its story is told in the book co-authored by George and his former student, Dr. Russ Skowronek, "HMS Fowey Lost and Found," published in 2009.

At the end of his career, many of George's students were delighted to see him recognized for his contributions to the field. The St. Augustine Lighthouse & Maritime Museum and the Lighthouse Archaeological Maritime Program on March 21, 2007 honored him with a Lifetime Achievement Award for his "many contributions to the field of underwater archaeology, and to the education of this and future generations of underwater archaeologists." George's personal library is now part of the permanent

collections at the St. Augustine Lighthouse & Maritime Museum, which is fitting given that George directed the first underwater archaeological research in the Nation's Oldest Port. In 2008 a session of papers in honor of George Fischer were presented at the 41st annual Conference on Historical and Underwater Archaeology held in Albuquerque, New Mexico, located close to his earliest work on Montezuma's Well. On January 8, 2010 George was presented with the Society of Historical Archaeology's Award of Merit for "his many contributions to the development of underwater archaeology and for his exemplary service on the Advisory Council on Underwater Archaeology."



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## 2013 Investigation of the Storm Wreck (8SJ5459)

### Introduction

The colonial shipwreck known as the “Storm Wreck” was discovered at the close of LAMP’s 2009 field season, during the initial, grant-funded phase of the First Coast Maritime Archaeology Project (Meide et al 2010:184-186; Turner and Kennedy 2010). It has been the subject of an intensive archaeological excavation every summer from 2010-2015 (Turner and Kennedy 2010; Meide 2013, 2015b, 2015c; Meide et al. 2011:104-190; Meide et al. 2014:143-322, Veilleux and Meide 2016). The site is located within a mile (1.6 km) of shore, near the historic (18th-19th century) entrance to the St. Augustine Inlet (Figure 62), a notorious ship trap that claimed as many as 24 vessels annually in the 1780s (Schoepf 1911[1788]:226-229,248; Meide 2015b:356-357). It is about 4.8 km (3 mi.) south of the present inlet and in about 7.6 to 9.1 m (25-30 ft.) of water.



**Figure 62. Location of the Storm Wreck, off St. Augustine’s relict 18th-19th century inlet.**

The physical nature of the site can be characterized as a dense scatter of buried concretions and other artifacts covering an area of about 10 m by 6 m, with more sporadically scattered and buried material expanding outwards from this core of the site. No articulated hull remains have been encountered to date, though a few individual hull members have been unearthed. Cultural material is typically buried under at least 30 to 60 cm of sand, though periods of erosion periodically expose artifacts on the surface. When first discovered in 2009, all wreckage was buried. Subsequent excavation activities—including suction dredging and the practice of leaving grids, lines, and equipment throughout the site—have affected and exacerbated the natural instances of sand erosion and accretion, so that previously unknown areas of the site have been scoured free of sand, sometimes becoming buried again and sometimes remaining exposed for months or longer, while at the same time areas previously excavated have

become buried, leaving no trace of the excavation unit or grids. This is a dynamic underwater landscape, prone to shifting sands, and it is possible that portions of the site may have been occasionally exposed in the past, though no evidence has been encountered thus far to suggest that any individuals have ever dived or disturbed this site before its 2009 discovery.

Conditions on this wreck can be adverse, with a propensity for sudden storms and characterized sometimes by heavy surge and frequently by extremely poor or non-existent visibility. Despite these challenges, after four seasons of fieldwork at the end of summer 2013 archaeologists had excavated 33 m<sup>2</sup> of the site. Excavations are carried out in conjunction with LAMP's annual 4-week field school, usually held in June, with the research vessel *Roper*, a 36 ft. ex-trawler generously loaned by David Howe and the Institute of Maritime History, serving as the main diving platform.

At the close of the 2013 season, 903 dives had been completed on the wreck for a total of 736 hours and 6 minutes of bottom time. Ninety-two numbered field specimens were collected in 2013, making a total of 398 collected through that year. Because many of these were concretions containing multiple artifacts which were eventually separated in the lab, conservation activity has increased the artifact count. At the time of this writing there are 189 catalogued field specimens from the 2013 season and a total of 581 from 2009-2013. Including tiny lead pellets or Rupert shot which have not been individually counted, thousands of artifacts have been recovered and have completed or are currently undergoing or awaiting conservation treatment. The Storm Wreck assemblage has proven particularly rich and diverse, comprising a wide range of well-preserved and often diagnostic artifacts representing ship's equipment, military gear, and personal possessions.

The archaeological data collected to date, along with extensive archival research carried out in the British National Archives, has led to the identification of this shipwreck as one of 16 refugee ships lost in December 1782, on route from Charleston, South Carolina to St. Augustine. Charged with the evacuation of Charleston at the end of the American Revolution, the fleet carried troops, Loyalist civilians, their slaves, and whatever possessions they could manage to bring with them to East Florida, which was at the time still a loyal British colony (McNamara 2014; Meide 2015b,2015c; Meide et al. 2014:311-322; Trivelpiece and Meide 2016). In 2017, the Storm Wreck was placed on the National Register of Historic Places.

The remainder of this report summarizes in detail the methodology and results of the work carried out on this historically significant shipwreck site during the 2013 field season, and the preliminary analysis of artifacts recovered at that time.

## **Previous Research, 2009-2012**

### ***2009 Discovery***

The Storm Wreck was discovered in August 2009 when target testing magnetic anomalies identified during LAMP's 2009 remote sensing survey in June of 2009 (Turner and Kennedy 2009:11-13). The Storm survey area had produced one 20 gamma magnetic anomaly, designated Target STM001. Its exact location was refined using a handheld magnetometer on 17 August, and it was tested using a hydraulic probe on 24 August. On this day, the diver used a 10 ft. (3.05 m) long probe to jet beneath the sand, encountering material on the second probe test. Using the probe to clear sand in what would the following year be designated U1-U2 and U5, a wooden plank, several concretions, two ballast stones, and a large, concreted cauldron were encountered in zero visibility conditions. Five field specimens were recovered for analysis. As the discovery had been made on the last week of the field season, the site was marked with a submerged buoy and other than a brief clean-up dive it was not visited again until summer 2010.

### **2010 Season**

The 2010 season began with a pre-disturbance sidescan sonar survey of the site, the first use of sonar to image the site in a regular monitoring effort that continues to this day (Burke 2016). Diving began immediately afterwards, starting with a handheld magnetometer survey. Divers surveyed a 10 m<sup>2</sup> area, centered on the original anomaly STM001, recording the magnetic field in gammas every meter along eleven transect lines. The 121 readings were plotted using Surfer software to generate a magnetic contour map of the immediate site environs (Meide 2013:Figure 3).

A total of 181 dives were completed over thirty days between June and August, and six units (U0-U5) were excavated (Figure 63). The 2 x 3 m excavation area revealed the 2.7 m (8.9 ft.) long plank and large cauldron encountered previously, and a dense scatter of concretions (Figure 64). Additional wreckage, exposed by eroding sand, was encountered around four meters to the west of this excavation area, which was designated Unit 6. The exposed artifacts in Unit 6 were collected but no excavation was carried out in that unit. Ninety-four field specimens were recovered, including the cauldron (the largest found), three smaller cauldrons, the plank and a timber, and numerous concretions and small finds including a brass buckle, wine glass base, and vast numbers of tiny lead shot (Meide et al. 2011; Meide 2013). Post-season x-ray analysis revealed many interesting objects within concretions, including clothing irons, ship fittings, tools, a coin (deconcreted in 2014 and found to be a gold guinea dated 1774), navigational dividers, and a small boxlock pistol (Hanks 2013; Cox 2013, 2016). Amazingly, an intact green pea was found embedded within the concreted contents of the smallest cauldron (Carter 2016).

On 17 December, LAMP archaeologists conducted an off-season visit to the site for monitoring purposes. To their surprise, divers found five cannons and the ship's bell, recently exposed by shifting sands. Given its rarity and vulnerable exposure, the bell was immediately documented and recovered. It was almost completely intact, missing only part of its wooden headstock and its clapper. These two missing components would be located the following year. The bell was cleaned in January but it bore no inscription or indication of the year or ship's name (Jasper 2013:51-53; Meide et al. 2014:201-208; Andes 2016).

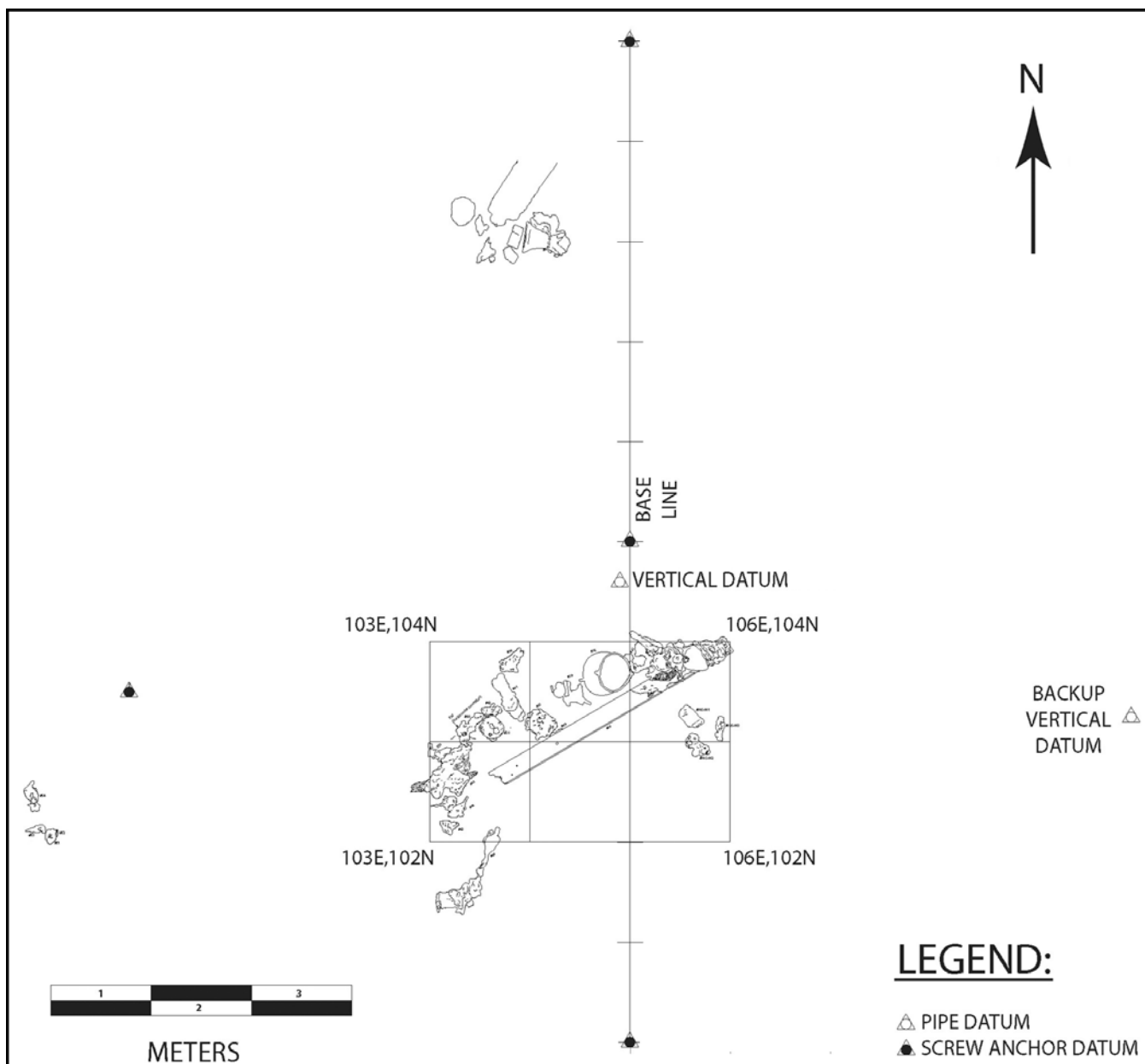
### **2011 Season**

Diving in 2011 was limited to three days in May, most of June, and three days in August. Over these 23 days, 247 dives were conducted, ten new units (U8-U10, U12-U18) were excavated, and 96 field specimens were recovered (Figures 65-66) (Meide et al. 2014:147-160). Most of the June field school was dedicated to fully exposing and recording the recently discovered cannons in order to select two for recovery (Turner and Meide 2013; Meide 2016). Excavation revealed a sixth gun, totaling four traditional cannons and two carronades. One of each type was raised, and the carronade was dated 1780, which remains the *terminus post quem* for the wrecksite. Dozens of concretions and finds such as iron and copper cookware, pewter spoons and plates, clothing irons, buttons, bricks, casks of nails, cannonballs, and a shoe buckle were also unearthed.

Another significant find was a heavy, lead deck pump. It displayed cut marks indicating that it was forcibly removed from the ship to jettison overboard in hopes of saving the grounded vessel, providing some of the first clues as to the circumstances of the wrecking event itself (Meide 2015b:375-376; Andes 2016).

### **2012 Season**

2012 saw unusually rough weather in June, preventing most work that month, and inundating the site with sand overburden. Two hundred twenty-six dives were completed over 22 days mostly in July and



**Figure 63. 2010 master site plan of the Storm Wreck, including baseline and datums. All cultural material depicted here was buried upon discovery of the site. The six grid squares represent excavations undertaken in 2010, and the other areas of cultural material to the west and north were exposed by erosion during and after the field season. The screw anchor datum in the center of the baseline, which marked the original magnetic anomaly STM001, was removed early in the 2010 field season and replaced with that west of the excavation area.**

August. Five new units (U7, U11, U19-21) were excavated, expanding outwards from the previous year's excavation area, along with two which had been partially excavated the year before (U8, U15), and 111 field specimens were collected (Figures 67-68) (Meide et al. 2014:147-160). Excavation also took place in the 2010 units, to repatriate a number of concretions from that season. Despite the heavy sand accretion in June, some areas underwent erosion in July, exposing several concretions, including the first musket found on site.

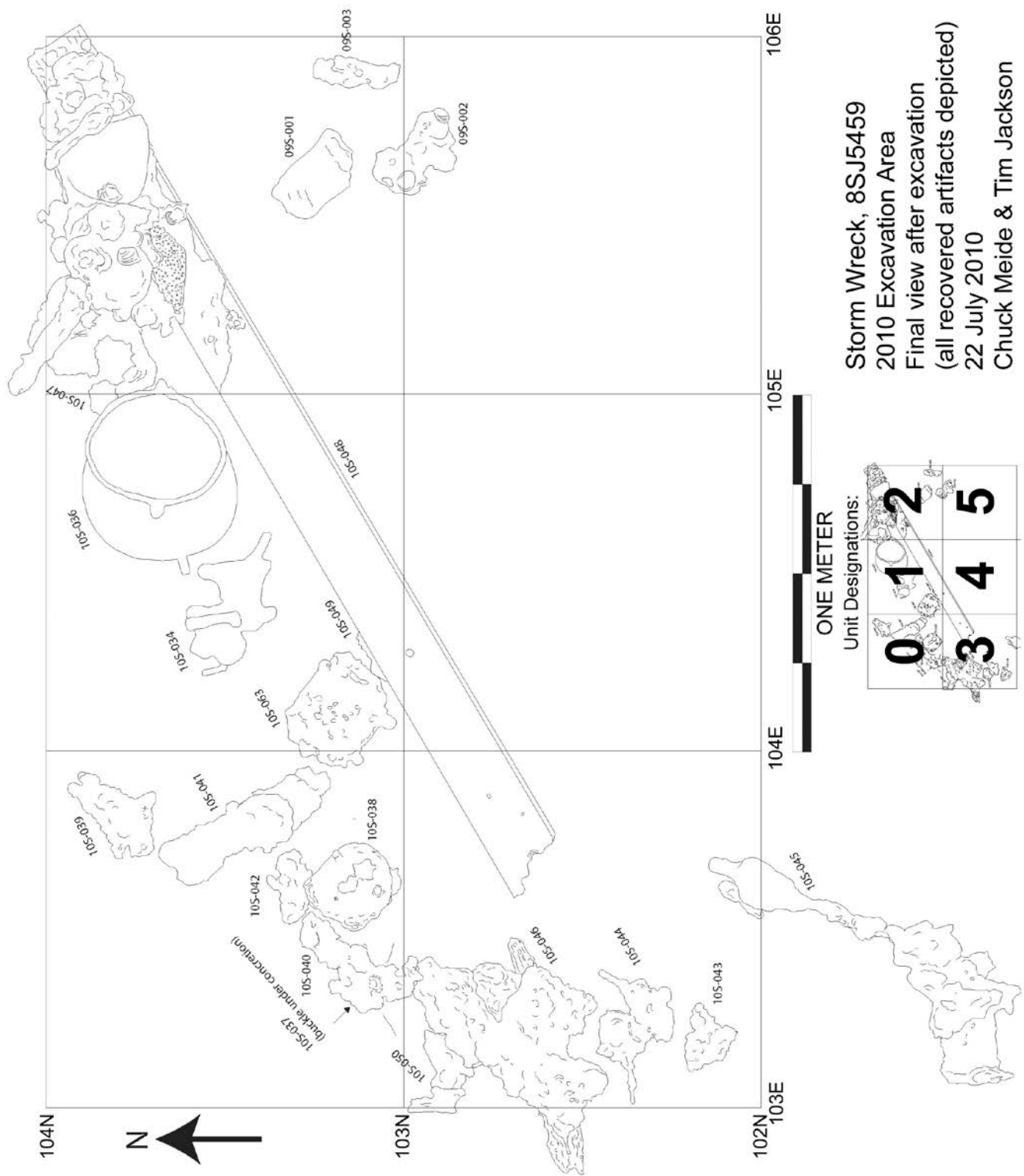


Figure 64. Plan view of the six units excavated in 2010 on the site of the Storm Wreck.

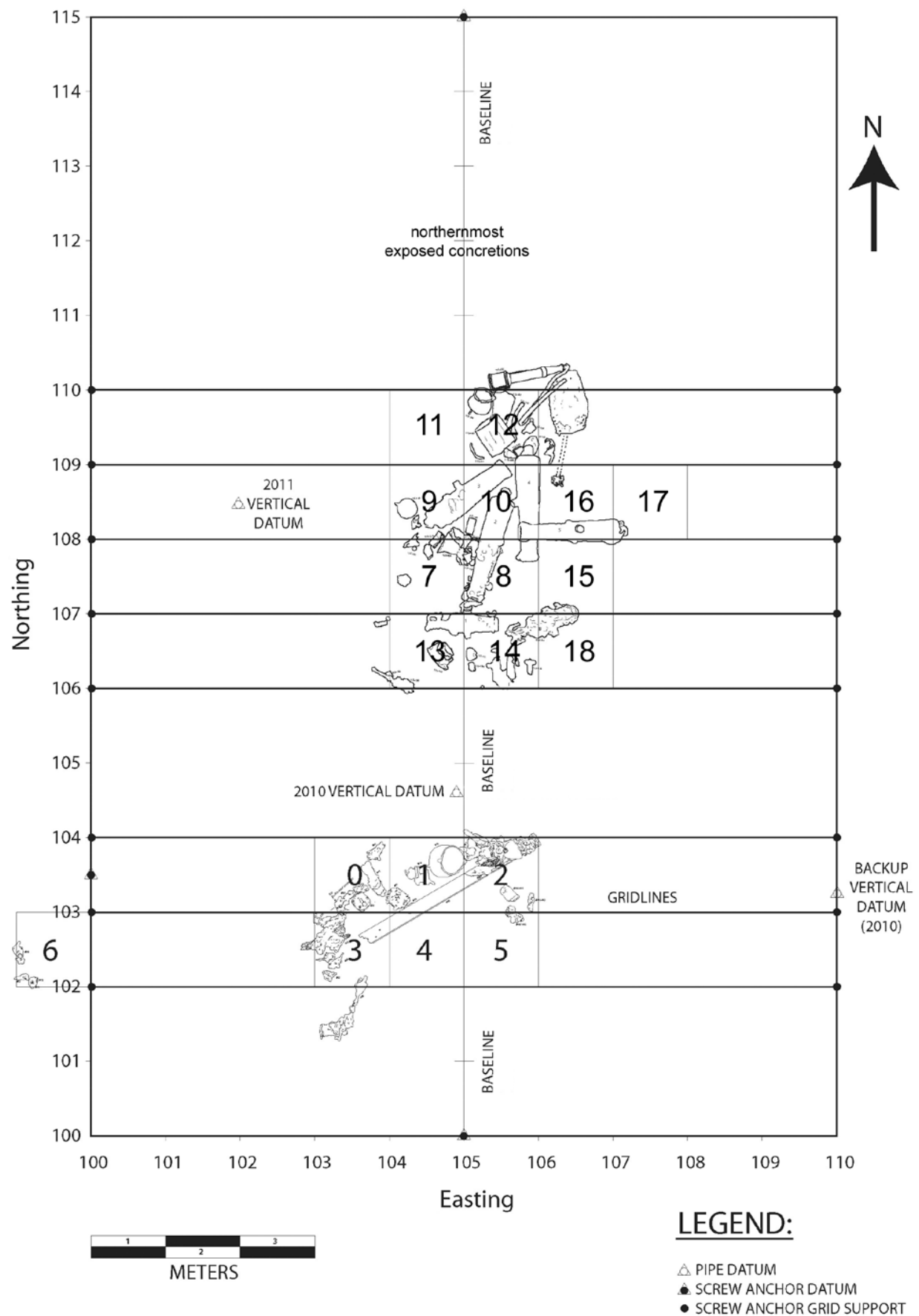
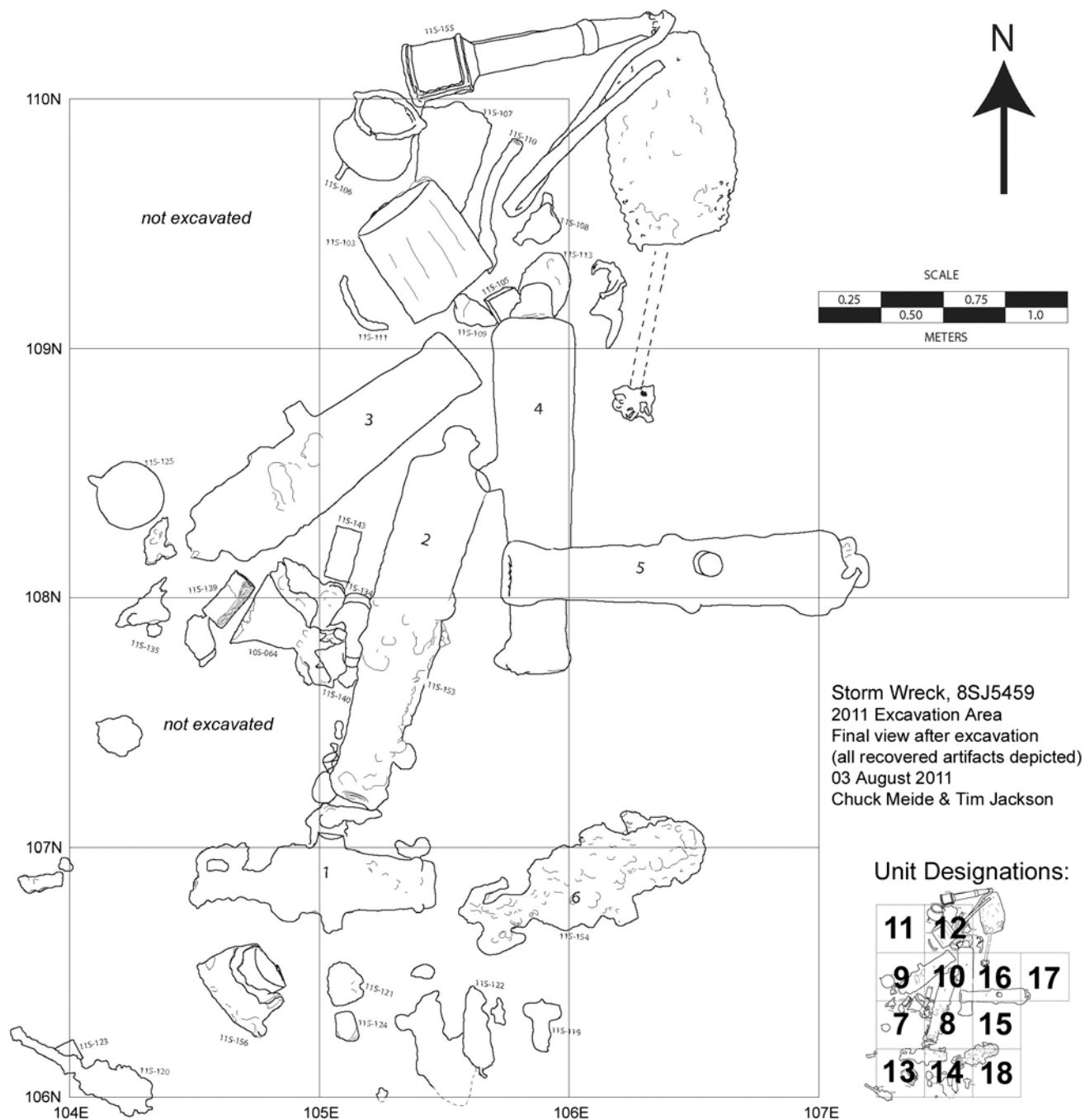


Figure 65. Storm Wreck, 2011 master site plan. Units 8-10 and 12-18 were excavated in 2011



**Figure 66. Plan view of the 2011 excavation area. This depicts the results of the 2011 excavation season, with all exposed artifacts shown in situ (including the ship's bell which was actually collected in December 2010). The primary goal of the 2011 season was to fully expose the six cannon, in order to raise two (Cannon No. 2 and Cannon No. 6), so in many cases units were only excavated to a depth roughly equal to the elevation of the guns. Units 7 and 11 were not excavated in 2011 but were the following season, and Units 8 and 15 were partially excavated in 2011 and were completed in 2012. Most of the other units depicted here (all but Unit 12) were only partially excavated in 2011. Compare this view with that of the same area as portrayed in Figure 68, which also includes the artifacts exposed after the 2012 excavation.**



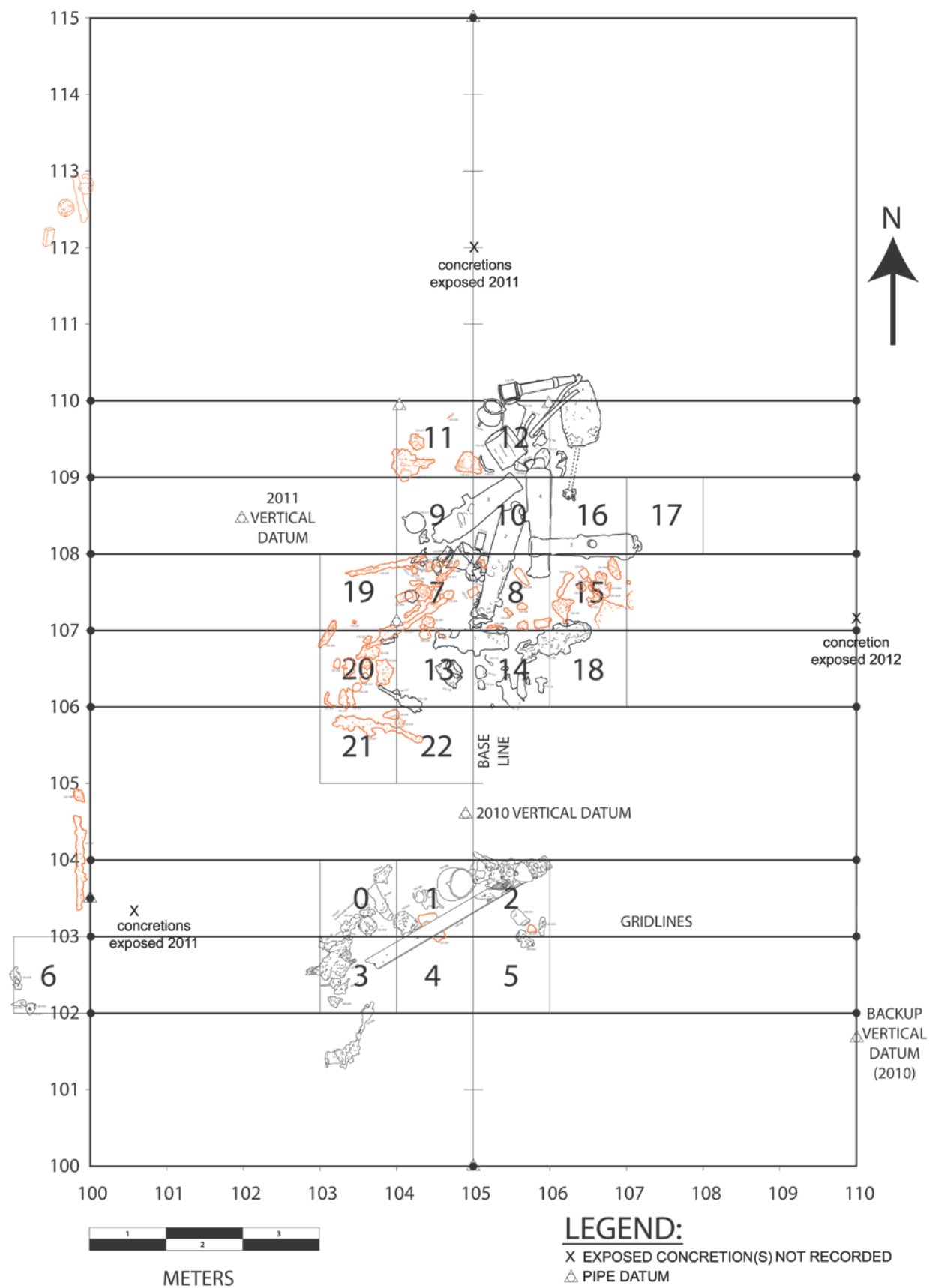
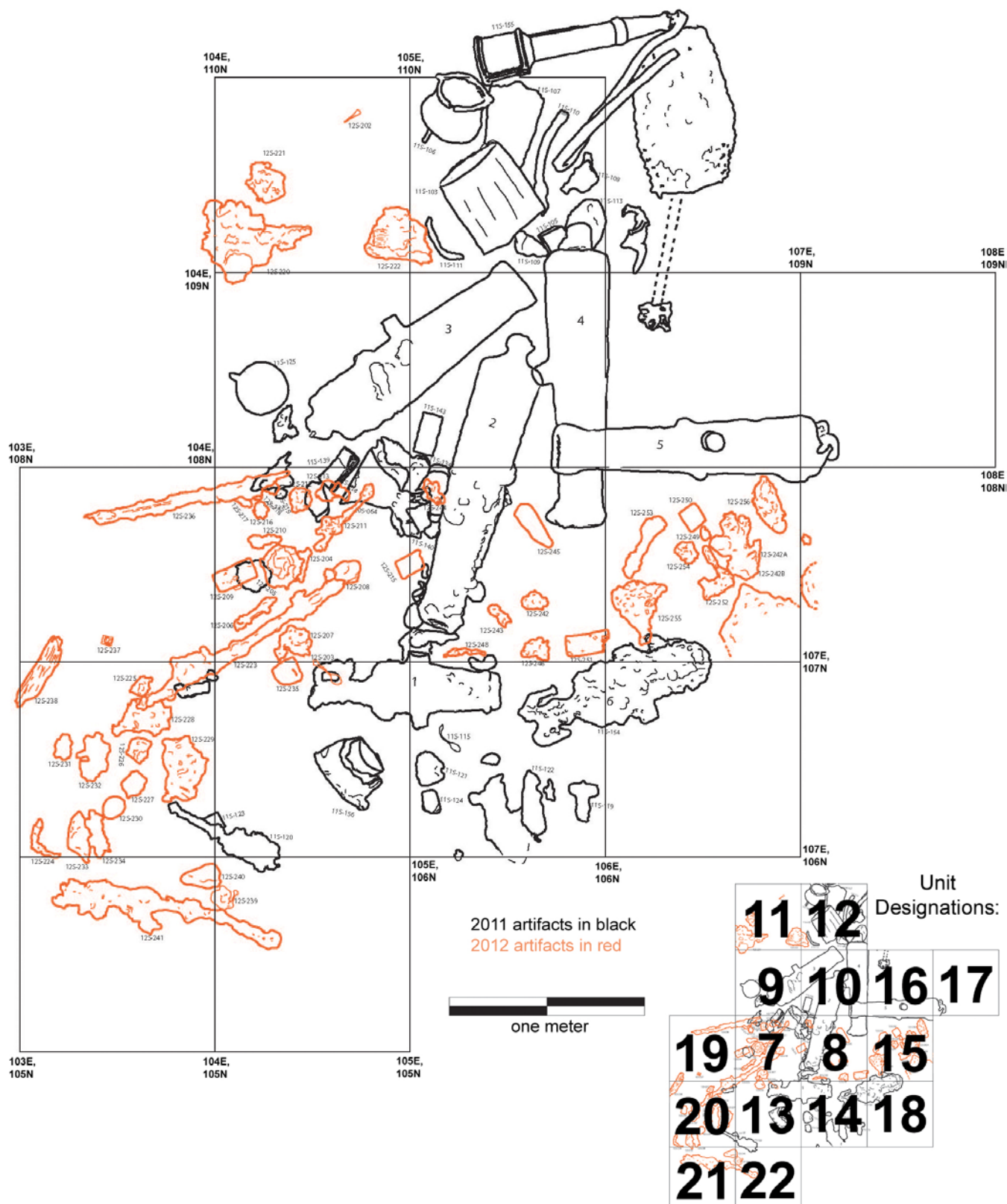


Figure 67. Storm Wreck, 2012 master site plan.



**Figure 68. Storm Wreck site plan, detail of 2011 and 2012 excavation areas. Artifacts in red were exposed in 2012, while artifacts in black were exposed in 2011 (along with the bell exposed in 2010). Compare with Figure 66, which details this area as exposed after the 2011 excavation season.**

The 2012 season yielded more artifacts similar to those found previously, including spoons, cauldrons, pins, shot, buttons, shoe buckles, clothing irons, tools, and coins (including a gold guinea dated 1776) (Brendel 2016; McCarron 2016). This was also the first year that British military artifacts were discovered (McNamara 2016). These included regimental buttons and three Brown Bess muskets. Subsequent x-ray imaging showed two of them were loaded and half-cocked, ready for use (Meide et al. 2014:182-192; Cox 2016). A button with the initials RP surmounted with a crown represented a Royal Provincial unit, indicating the presence of Loyalist soldiers. Another uniform button, from the 71st Regiment of Foot and recovered from U19 dredge spoil, provided the first conclusive evidence that the Storm ship was a member of the Charleston evacuation fleet.

### **2013 Field Investigations of the Storm Wreck**

The 2013 diving season on Storm Wreck consisted of 29 days between 23 May and 28 August. During that time a total of 253 dives were safely completed, aggregating a total diving time of 221 hours, 31 minutes, for an average of 7.64 hours dive time per day. In 2013 excavation continued to expand southward, connecting the 2011-2012 excavation area with the 2010 area. Eleven new units (U23-U33) were excavated and three previously excavated units (U18, U21-U22<sup>1</sup>) were completed (Table 5, Figure 69). Some 92 field specimens were recovered during diving operations, though conservation activity since that time has increased the 2013 artifact catalog to 189 numbered specimens or groups of specimens.

As had been observed at the start of the 2012 field season, all cultural material was buried at the start of the 2013 season (as opposed to the start of the 2011 season, when wreckage was exposed). The grids which had been left in place from previous seasons were also buried in 2013. The first excavation task in 2013 was therefore to excavate some of this overburden, so as to expose buried grids in order to have a reference point from which to lay in grids for new excavation units. The level of the sand in the 2011 excavation area (east and north of the 2013 excavation area) was measured between 36.5 and 42 cmbd before overburden removal commenced in 2013. The first portion of a grid to be re-exposed, the southwest corner of the U7 grid, was buried by around 32 cm of sand, or at a level of 68.5 cmbd. This overburden removal focused on the area around U7 and U9, west of the baseline, and all the material dredged was treated as a single, general overburden provenience. Once the entire western end of U7 was exposed, grids were deployed west of it to define new units. Subsequent excavation focused on new units to the west and south of the 2011-2012 excavation areas, using methods described in detail below.

Visibility in 2013 was unusually good, allowing for the first extensive underwater video footage and the first *in situ* artifact photographs for the project. In addition to familiar items such as spoons, cannonballs, clothing irons, and buttons, a multitude of unique objects were recovered, including a brass sector rule, brass keg tap, furniture drawer pull, a door lock and its key wrapped in cloth for transport, a false watch face, an assortment of lead weights, a livestock tether, and a well-preserved British sea service pistol.

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<sup>1</sup> Unit 22 was designated in 2012, and excavations in that unit were limited to a small area immediately adjacent to a long concretion (12S-241), initially believed to be a musket, which was recovered that year. As this concretion protruded only slightly into U22, a single dredge was used to excavate it in its primary unit, U21, and the small area in the NW quadrant of U22, and the spoil gathered was all treated as a single provenience associated with U21. There were therefore no artifacts, dredge spoil, or elevation measurements associated with U22 in the 2012 season, so it was effectively a new unit in 2013 despite the limited excavation that took place there the prior season. Additionally, Unit 33 was a new unit designated in 2013, but it was not excavated, though artifacts exposed in it by dredging an adjacent unit were collected.

### ***Establishing Vertical Control***

A vertical datum was set in place at the start of the 2010 field season by driving a 15 ft. (4.57 m) long steel pipe into the seafloor using the hydraulic probing system. With 2/3 of the pipe buried it has provided a secure anchor for the datum in an otherwise mercurial underwater landscape. A wire tie loop was fixed to the upper portion of the pipe, and that point designated the zero mark on the datum, so that a level line could be extended from there and vertical measurements taken below that point could be expressed as cmbd (cm below datum).

This pipe was designated the 2010 primary vertical datum, or primary pipe datum. It was established within a meter of the 2010 excavation area, and just off the baseline. A second pipe was similarly sunk into the seafloor four meters from the 2010 excavation area, to serve as a secondary vertical datum. During the 2011 season a third vertical datum was established just west of the 2011 excavation area. A discrepancy between the zero marks these datums was corrected, so that all of the pipe datums through the end of the 2013 season featured the zero mark at the same elevation, and the reporting of all elevation data in previous LAMP research reports or publications is consistent with this one (Meide et al. 2011:110). The locations of the three vertical datums are depicted in Figures 65 and 67.

Upon returning to the site in 2012, it was observed that the 2011 pipe datum had become displaced, having been severely bent down at an angle. A length of rebar was hammered in at an angle and lashed to the shifted pipe, to secure it. Because of the new triangular shape of these two lengths of steel, this datum became nicknamed the “teepee” datum and was sometimes designated Datum TP in field notes. At the start of the 2013 season it was determined that the TP datum or rather its vertical datum loop was no longer accurately positioned in relation to the other two vertical datums, which were both confirmed as remaining at the same level (0 cmbd). The TP or 2011 vertical datum was therefore no longer used as a vertical datum in this or future seasons. Instead, the 2013 down line buoy was secured 4 m to its west and connected to it with a travel line, and it served as a recognizable landmark for divers moving about the wreck or staging gear temporarily on the bottom.

Another important vertical datum change was made in the 2013 season. An alternate datum loop was established on each pipe datum, 30 cm higher than the primary datum, which allowed for accurate vertical measurements when the visibility was zero on the seafloor but somewhat better higher in the water column. Divers were careful to note if they were measuring from the “high datum” loop by including the letter “H” with the elevation value. This greatly reduced the number of times that it was impossible to record elevations due to the inability to see the bubble level.

### ***Establishing the Excavation Grid System***

A grid system established at the start of the 2010 season to provide horizontal control for excavation has been used each subsequent season (Figures 65, 67, and 69). The grids were fashioned of PVC piping, marked at 10 cm intervals with black electrical tape discernable by touch for divers in low visibility. Upon the initial setup of the grid system, a ten meter long polypropylene baseline, marked at one meter intervals, was stretched across the length of the 10 x 10 m site area, running from south to north along the 105E line. The baseline was placed so that its center point lined up with the original STM001 anomaly, though the screw anchor marking this spot was subsequently removed. The baseline was secured to steel screw anchors at either end (at approximately 105E, 115N and 105E, 100N); these also serve as site datums. As is typical, at the start of the 2013 season, a new baseline needed to be re-set, using the two existing screw anchors.

Originally it was planned to use the baseline to accurately position the excavation unit grids, in the same manner that the 2010 excavation area had been gridded. But it was observed that the steel screw anchors

at either end (one of which had been re-set the previous year) did not appear to be in their original positions. It was believed the grids deployed in previous years were probably more accurate in their position than the baseline, which is subject to sagging, stretching, or movement from surge, current, and divers. In 2010 and 2011 grids had been suspended from ten meter long polypropylene gridlines, which were aligned east-west and anchored at their ends by screw anchors. In 2011 it was decided to secure a 2 m by 3 m series of grids more firmly than their attachments to grid lines. To do so, three 10 ft. (3.05 m) long pipes were sunk deep into the seafloor at the inner corners of the 2 m by 1 m grids defining U7-U12 (at the southwest corner of U7, the northwest corner of U11, and the northeast corner of U12; they are shown in Figure 67). These rigid grids, all zip-tied to each other, were also lashed to the mostly buried pipes, and to one of the carronades, all of which served as secure anchor points for these grids. These grids, once permanently fixed in place, then served as the reference point for deploying other grids across the site. As more grids were added, they were attached to existing grids with zip ties or line, and were also pinned to the seafloor with long fiberglass rods at each corner. While some grids were removed at the end of excavation seasons, those secured by the pipes in the 2011 excavation area, along with those from the 2010 excavation area, were left in place permanently.

In this manner a total of 22 PVC unit grids were established on the site from 2010 to 2012, with an additional eleven in 2013, each denoting a 1 m<sup>2</sup> unit designated Units 0 through 33 (Table 5, Figure 69). The units may also be referred to by the Cartesian coordinates of their southwest corner (i.e., Unit 13 is also 104E, 106N) but the simple consecutive numbering system was deemed easier for divers working underwater. After each excavation season, most of the site and all grids are usually buried by natural causes, and the pipes are among the few grid features protruding up from the sand, allowing the relocation of these six units relatively easy.

### ***Excavation***

Two 4 in. (10.2 cm) diameter handheld induction dredges were usually used simultaneously for excavation of two units at a time during the 2013 season. They were powered by 212 cc water pumps mounted on the research vessel, which was stationary on a three-point mooring above the site. The exhaust end of the dredge hose was left on the seafloor downcurrent from the site (the prevalent current runs either north or south so the dredge hoses were extended some 10 to 15 m to the west or northwest of the site). All dredge spoil was filtered through a mesh bag attached to the end of the dredge hose. After the 2010 discovery of tiny lead pellets (Rupert shot, see Meide et al. 2011:127-131) in the dredge spoil, doubled mesh bags were always deployed to ensure the complete recovery of even the smallest of artifacts. This resulted in a sizable amount of dredge spoil, mainly in the form of shell hash, which was sorted by laboratory volunteers during and after the close of fieldwork.

Divers excavated in arbitrary levels. Before the start of excavations, an elevation measurement (in cmbd) was recorded in at least the center of each unit, and in most cases in all four corners and the center. After an excavation dive, divers recorded closing elevations in these five locations, and the volume excavated was treated as a single provenience. The site is characterized by deep deposits of sand that constantly shift, typically with no discernable sediment stratigraphy. That being said, there were occasionally clay deposits around some clusters of artifacts, if no contiguous strata. Excavated areas left untouched for more than a day or two would fill in as sand in surrounding areas slumped into the unit, which in many cases resulted in divers re-excavating through overburden, defined here as sand deposited into a previously excavated area. For the first few seasons, when excavating through such deposits, divers did not record starting or ending elevations unless they penetrated into a previously

**Table 5. Excavation Units designated through the 2013 field season, showing unit number, the Cartesian coordinates of each unit's southwest corner, and the year excavated.**

<b>Unit Number</b>	<b>Easting</b>	<b>Northing</b>	<b>Year Excavated</b>
0	103E	103N	2010
1	104E	103N	2010
2	105E	103N	2010
3	103E	102N	2010
4	104E	102N	2010
5	105E	102N	2010
6	99E	102N	Not excavated; exposed material collected in 2010
7	104E	107N	2012
8	105E	107N	2011, 2012
9	104E	108N	2011
10	105E	108N	2011
11	104E	109N	2012
12	105E	109N	2011
13	104E	106N	2011
14	105E	106N	2011
15	106E	107N	2011, 2012
16	106E	108N	2011
17	107E	108N	2011
18	106E	106N	2011, 2013
19	103E	107N	2012
20	103E	106N	2012
21	103E	105N	2012, 2013
22	104E	105N	2012, 2013
23	102E	107N	2013
24	102E	106N	2013
25	103E	108N	2013
26	102E	105N	2013
27	102E	104N	2013
28	103E	104N	2013
29	104E	104N	2013
30	105E	104N	2013
31	105E	105N	2013
32	106E	104N	2013
33	106E	105N	Not excavated but exposed material collected in 2013

unexcavated layer, though by 2013 effort was made to record vertical measurements even when digging through redeposited sand, to better understand the ongoing movement of sand on the site. The only times elevations in 2013 or subsequent years were not recorded were when excavators were unexpectedly recalled for safety purposes (i.e., sudden onset of dangerous weather).

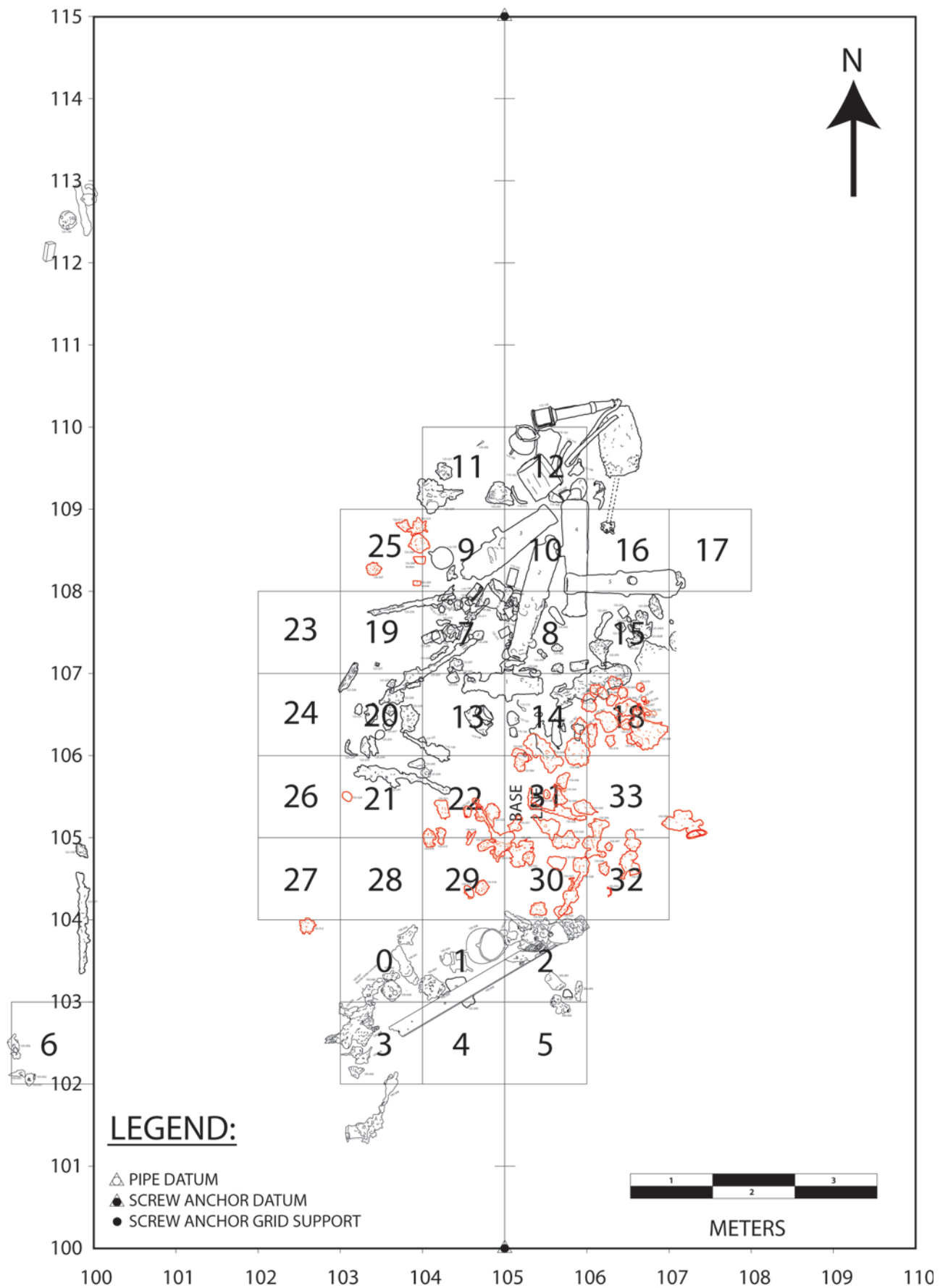


Figure 69. Storm Wreck master site plan, 2013 field season. Drawn by Chuck Meide and Olivia McDaniel, vectorized by Tim Jackson. Artifacts recovered in 2013 are in red.

Figure 69 shows the master site plan after 2013 excavations, and Figure 70 a detailed view of the main excavation area. Figures 71-74 show more detailed views of various areas within the excavation area, and are essentially enlargements of Figure 70. Table 5 lists all units excavated through the 2012 season, denoting the years each was excavated. Table 6 presents a summary of all excavation activities for the 2013 field season. It depicts which units were excavated by date, and which units artifacts were recovered from by date, showing all unit elevation measurements and indicating if the excavation was in undisturbed sediments or overburden.

### ***Site Recording***

Pre-disturbance drawings are not usually necessary at the start of each season, since the site is usually buried before excavation begins (the notable exception was in 2011). When excavators expose scattered concretions and other artifacts, detailed 1:5 scaled drawings are made of each unit whenever visibility allows. Sometimes there were delays of days between the time when artifacts were exposed, and that when visibility allowed for recording, though this was less often the case in 2013, when visibility tended to be good enough for drawing. Usually all excavated units were recorded to scale on individual mylar sheets, and subsequently re-drafted onto one large sheet of mylar at the same 1:5 scale. Each year this is scanned and then vectorized using Adobe Illustrator to create the final site plan, versions of which are presented as Figures 63-70.

### ***Artifact Recovery and Reburial***

Once recorded, artifacts were recovered by divers, and brought to the surface usually in sturdy plastic baskets lined with window screen, to prevent the loss of even tiny objects. A lightweight winch capable of lifting 300 pounds (136.3 kg), along with a robust davit rated for 1,500 pounds (680.4 kg), are installed on *Roper* but, unlike in previous years, there were few particularly heavy or large objects recovered in 2013. Therefore finds that season were raised by hand, using a lift bag as necessary.

Every collected artifact was cataloged in the field and then more thoroughly in the conservation laboratory. A trinomial Field Specimen number is assigned to each individual object or group of like objects. The prefix or project code, 13S, refers to the year and site, and the following catalog number represents the consecutive number of specimens recovered from the site. The third number, or lot number, is a decimal number extension, denoting separate objects or groups of like objects that might have been encountered attached to each other. Thus, one of the larger concretions recovered in 2013 was 13S-353.1, the 353rd specimen recovered from the site since its discovery. The flintlock pistol in this concretion, once separated in the laboratory, was numbered 13S-353.2, while the clothing iron in that concretion was 13S-353.3, the attached cannonball was 13S-353.4, the attached pewter spoon 13S-353.5, etc.

In previous years, to reduce overall conservation expense and time, selected artifacts were returned to the site and reburied in their original provenience (Meide et al. 2014:160). No such artifacts were returned to the site in 2013, though this artifact repatriation will continue to take place in future field seasons. The proximity of LAMP's headquarters to the site, and the reoccurrence of a field season each year, makes this option relatively simple and inexpensive, and thus an effective strategy to reduce the risk of too great a conservation backlog to manage in a sustainable manner.



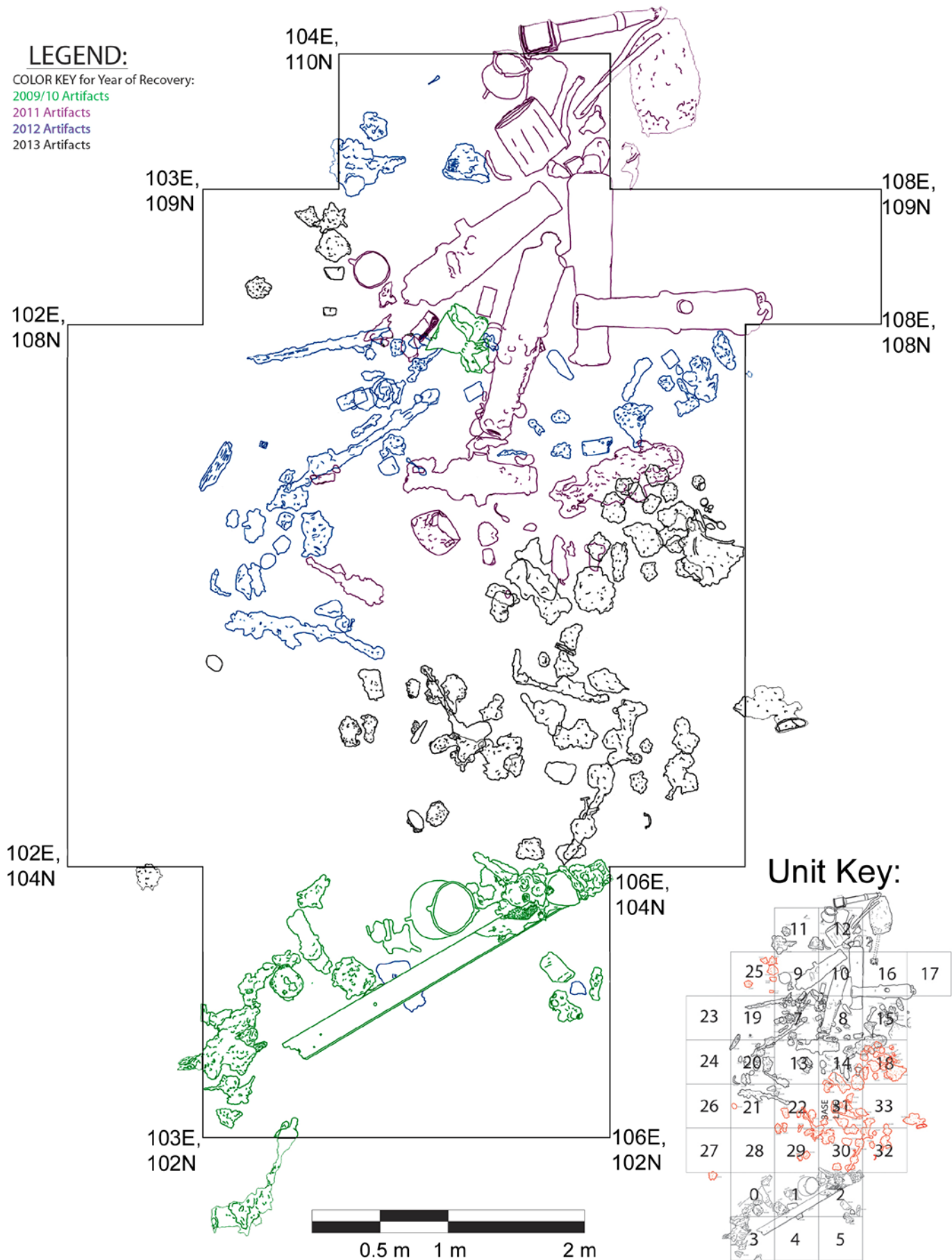


Figure 70. Detail of Storm Wreck 2013 master site plan, showing primary excavation area.

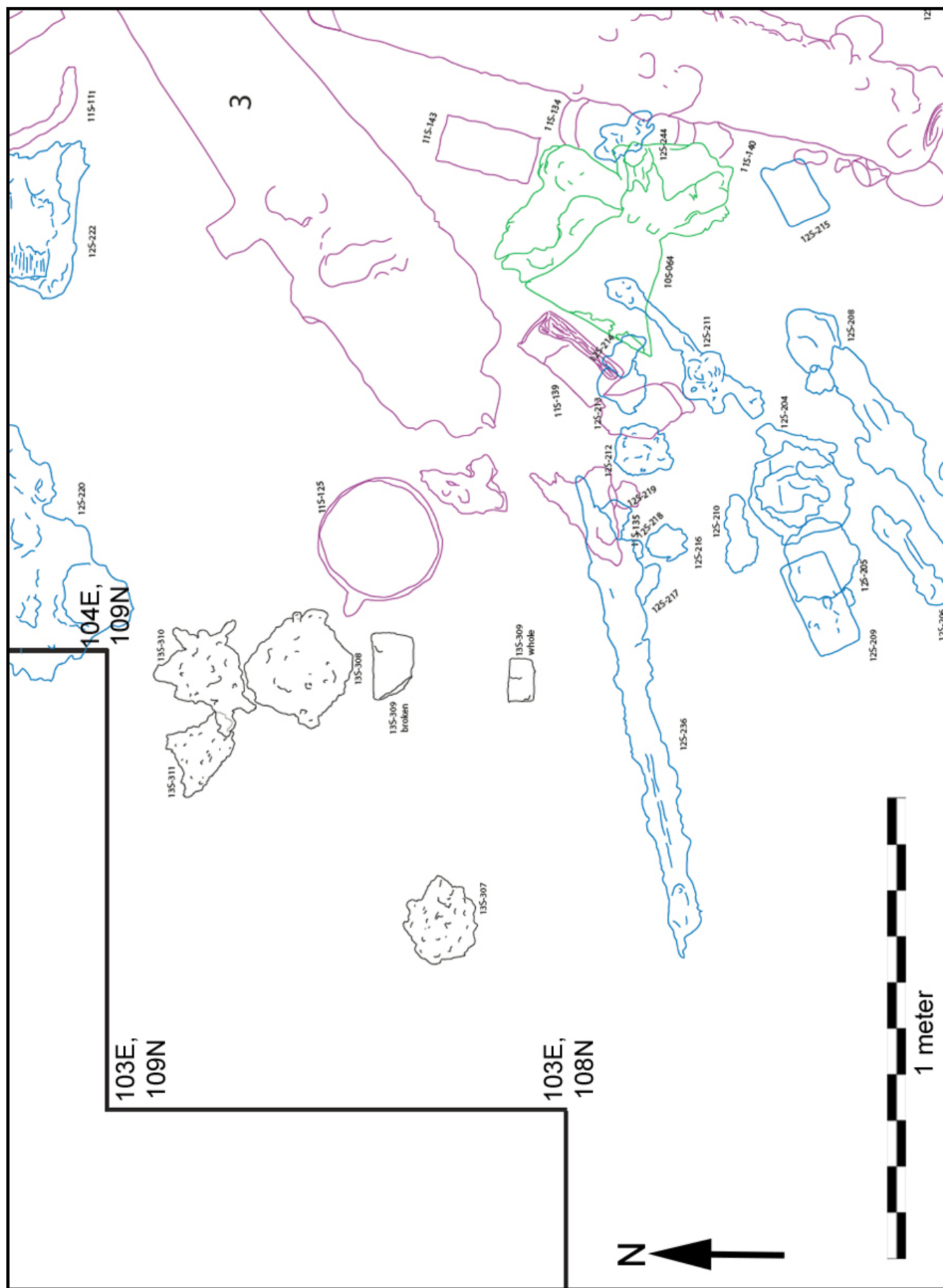


Figure 71. Detail of 2013 site plan, Units 25, 9, 10, 19, 7, and 8. Artifacts in black were excavated in 2013 (Unit 25 only).

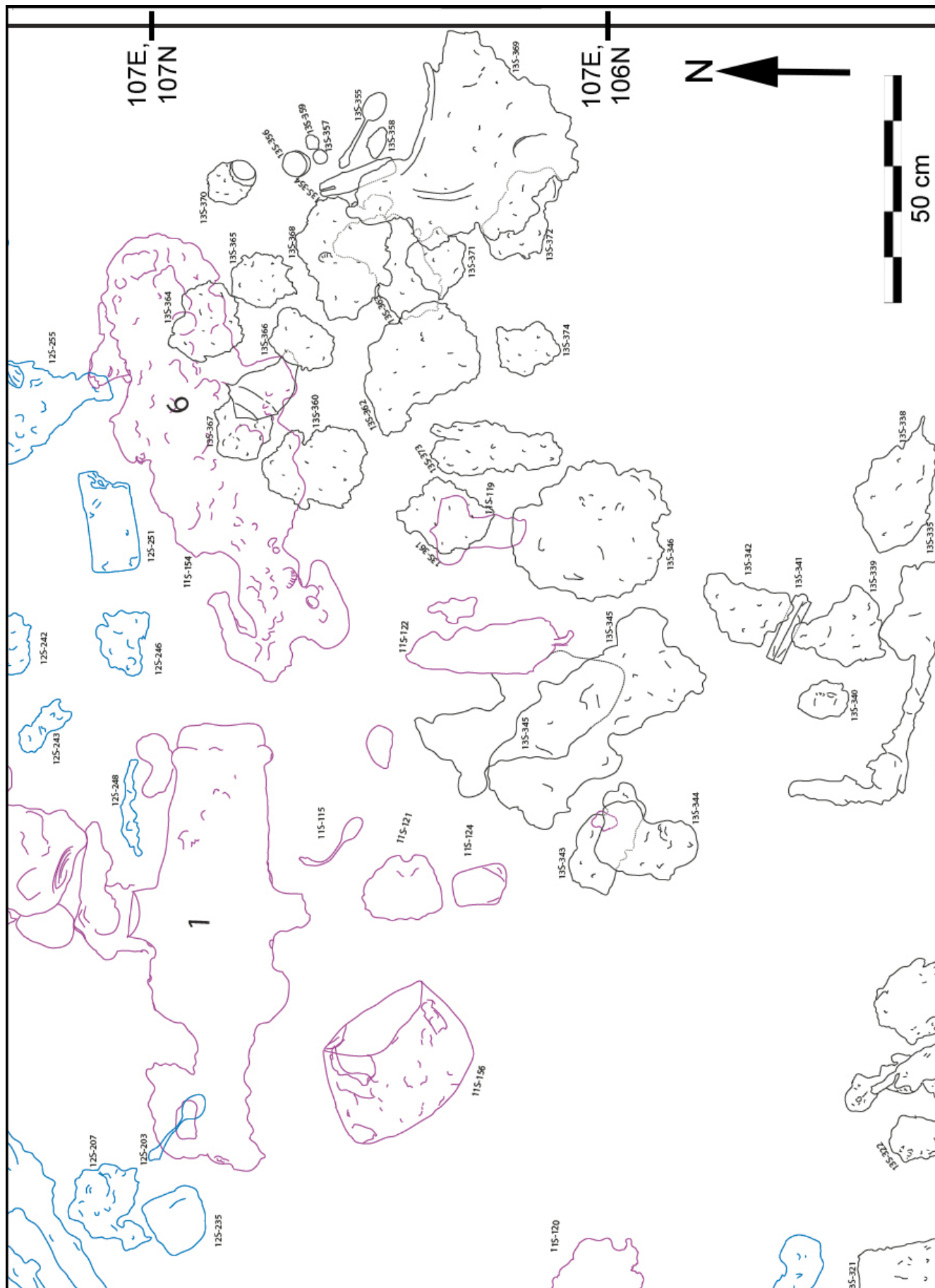


Figure 72. Detail of 2013 site plan, Units 13, 14, 18, 22, 31, and 33. Artifacts in black were excavated in 2013.

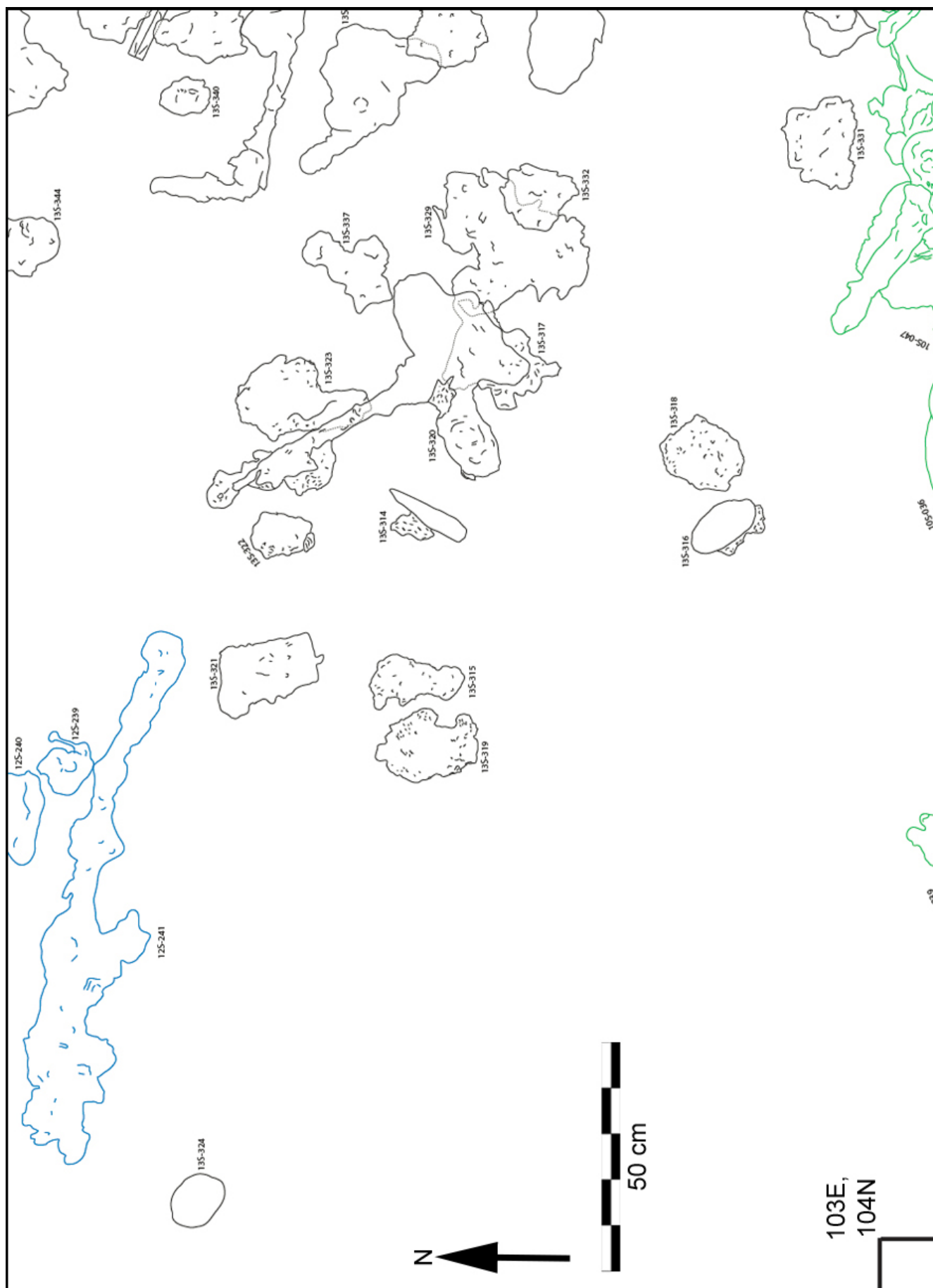


Figure 73. Detail of 2013 site plan, Units 21, 22, 31, 28, 29, and 30. Artifacts in black were excavated in 2013.

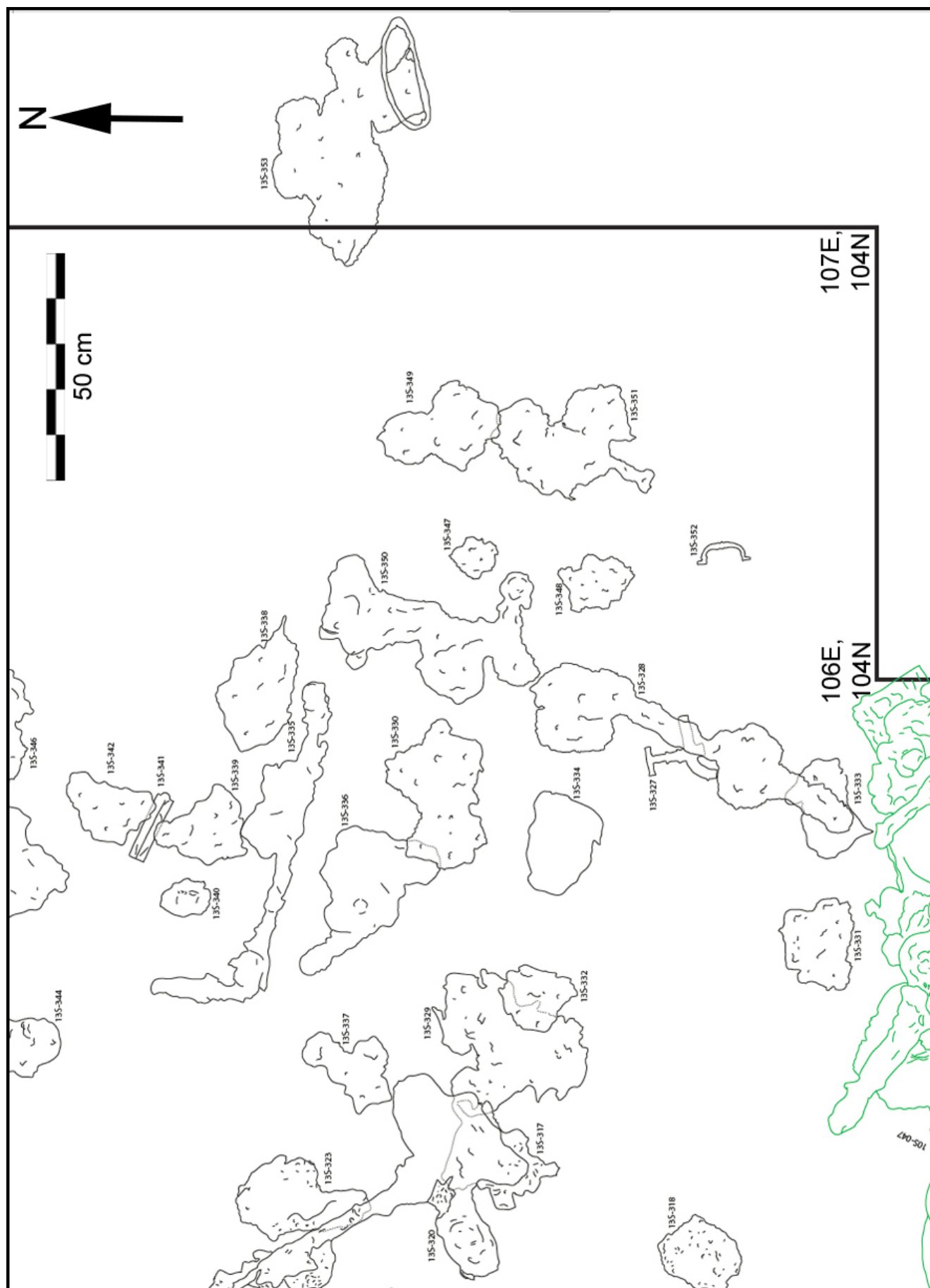


Figure 74. Detail of 2013 site plan, Units 22, 31, 33, 29, 30, and 32. Artifacts in black were excavated in 2013.



Table 6. Summary of 2013 excavation activity and artifact recovery, with elevations

Table 6. Summary of 2013 excavation activity and artifact recovery, with elevations (continued)

## Artifacts

### *Ordnance*

In December 2010, five cannons—one 9-pdr carronade and four 4-pdr long guns—were discovered on the wreck site. A second 9-pdr carronade was discovered the following year, when one cannon and one carronade were raised for conservation and analysis.<sup>2</sup> Detailed discussions of these guns and their historical context has been provided in previous reports and publications (Turner and Meide 2013; Meide et al. 2014:160-178; Meide 2016), and will not be repeated here.

At the time of this writing, the two recovered cannons have been fully conserved, and therefore a brief update on their conservation is presented here. In mid-October 2011 the guns were physically cleaned of concretion and the electrolysis treatment was initiated shortly thereafter. This treatment, in a periodically re-mixed solution of around 5-10% sodium carbonate, lasted almost four years. The tedious process of cleaning the gun bores of concretion was carried out at various times during the electrolysis process using a custom-built tool which could hammer a cutting bit slightly smaller than the bore diameter. Electrolysis continued until 3 September 2015, when it finally became apparent that no more chlorides were leeching from the guns. The guns were then removed from their electrolysis vat and subjected to a hot water bath at near-boiling temperatures. This process lasted four to six weeks for each gun. Then the guns were thoroughly dried in a climate-controlled environment. Once dried, they were each treated with several coats of Owatrol Marine Oil. This final treatment began in late January 2016 for the long gun and late April of that year for the carronade. Since May of 2016, the guns have been on display in the new “Wrecked!” exhibit at the St. Augustine Lighthouse & Maritime Museum, where they have been viewed by millions of visitors.

### *Ammunition*

While no artillery projectiles were encountered during the initial season of excavation, 9 were recovered during the 2011 and 2012 seasons, and an additional 37 were collected in 2013. All of the recovered specimens are cast-iron solid shot, also known as round shot and commonly referred to as cannonballs, though several are small enough to represent either grapeshot or possibly swivel gun shot. Solid shot were primarily used at sea to pulverize enemy ship hulls, though they could of course wreak havoc when fired on tightly massed personnel or cause devastating wounds from splinters when crashing through timbers.

Cannonballs were manufactured to nearly the bore diameter of the cannon for which they were intended. A standard was set in 1716 for determining bore diameters by Colonel Albert Borgard, Britain’s Chief Firemaster and later Assistant Surveyor of Ordnance (Collins 2014). Borgard was also the one to develop the system of standardized ordnance sizes based on shot weight (4-pounders, 6-pounders, etc.), which would become ubiquitous throughout the 18th century. He specified that the bore diameter should be  $\frac{21}{20}$  of the gun’s round shot diameter. Later designers, attempting to reduce windage in order to make guns more accurate and effective, modified this formula, so that Blomefield pattern guns in 1787 were manufactured with bores  $\frac{25}{24}$  of their shot diameter (Collins 2014). Carronades featured even smaller windages, a benefit of the improved accuracy of the Carron Company’s new boring machinery (Watters 1998:176,179)<sup>3</sup>. Table 7 displays the standardized calibers or bore diameters for these various gun patterns by shot weight.

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<sup>2</sup> An additional 4-pdr long gun was discovered with part of its attached during the 2015 excavation season (Meide 2016). It was recorded and reburied in situ.

<sup>3</sup> The decreased windage of the carronade resulted in improved accuracy and a reduced powder charge, but the tighter fit caused a problem: shot stored at sea would rust and the corrosion layer could prevent the shot from fitting into the bore. It



**Table 7. Standard 18th-century British cannonball and bore diameters in inches.**  
(Adapted from Collins 2014: Tables 1, 3-4; Carter 1995:Table 6)

<b>Shot Weight</b>	<b>Shot Diameter</b>	<b>1716 Borgard Pattern caliber <sup>21</sup>/<sub>20</sub></b>	<b>1787 Blomefield Pattern caliber <sup>25</sup>/<sub>24</sub></b>	<b>Carronade caliber <sup>35</sup>/<sub>34</sub></b>
½ pounds	1.53	1.61	1.59	n/a
1 pound	1.92	2.02	2.00	n/a
1 ½ pounds	2.20	2.31	2.29	n/a
2 pounds	2.42	2.54	2.52	n/a
3 pounds	2.77	2.91	2.89	n/a
4 pounds	3.05	3.20	3.18	3.14
5 ¼ pounds	3.34	3.51	3.48	n/a
6 pounds	3.49	3.67	3.65	3.60
9 pounds	4.00	4.20	4.17	4.12
12 pounds	4.40	4.62	4.58	4.52
18 pounds	5.04	5.29	5.25	5.16
24 pounds	5.55	5.82	5.78	5.68
32 pounds	6.10	6.41	6.36	6.25
42 pounds	6.68	7.02	6.96	6.84

Table 8 presents a complete inventory of all the Storm Wreck cannonballs recovered through the 2013 season, and lists weight and diameter for each. The assemblage tends to fall into three size ranges, with two exceptions. Twenty-four cannonballs were intended for a 4-pounder cannon, presumably one of the five long guns encountered on the site. Fourteen were intended for a 9-pounder gun, the same caliber as the two carronades. Six of the solid shot were small and either represented a grapeshot or a 1-pdr swivel gun (compare with Tables 7 and 9). There were only two specimens that fell outside these three size ranges. The first was a slightly smaller shot that appears to have been intended for a 3-pdr cannon, and the second was one sized for a 6-pdr gun (Figure 75). It is not known why these two odd sized cannonballs were on board the vessel, since the ship's armament seems to have consisted only of 4-pdrs and 9-pdrs. It is possible they were being used as ballast, or could even represent enemy ships that had fired into the hull of the Storm vessel. It is also possible that one of the cannons on the Storm Wreck, Cannon 3, is actually a 3-pdr, which could explain the presence of the apparent 3-pdr caliber ball, though thus far there is only one cannonball that may be in the 3-pdr size range.

Many of the cannonballs display characteristic features such as a casting seam and vent sprue. The casting seam appears as a thin raised line across the widest circumference of the shot, marking the join where the two part mold used to cast the ball was clamped together. Opposite this seam on one side, visible on many specimens, is the vent sprue, where molten metal would overflow during the casting process. When cooled the protruding sprue would be cut or hacked off. The resultant imperfection appears as a large, round indentation, typically measuring as much as 4.0 cm or more in diameter (Figure 75).

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was said that the Royal Navy had seamen paint cannonballs to prevent corrosion after the adoption of the carronade (Watters 1998:177).

**Table 8. Cast iron artillery shot from Storm Wreck, 2011-2013 seasons.**

FS No.	Estimated Caliber	Measured Diameter		Weight (Wet)	
		<i>cm</i>	<i>inches</i>	<i>kg</i>	<i>pounds</i>
11S-119.1	9-pdr	10*	3.94*	n/a	n/a
11S-140.1	4-pdr	8.1	3.19	1.80	3.95
11S-144.3	9-pdr	10.3	4.06	3.745	8.26
11S-144.4	Grape or 1-pdr	4.8	1.89	0.328	0.723
11S-153.5	4-pdr	8	3.15	1.59	3.50
11S-153.9	4-pdr?	8.4	3.31	1.77	3.91
12S-239.2	4-pdr	7.6	2.99	1.45	3.197
12S-254.1a	4-pdr	8	3.15	1.51	3.33
12S-254.1b	4-pdr	8	3.15	1.56	3.43
13S-328.3a	4-pdr	7.4	2.91	1.519	3.35
13S-328.3b	4-pdr	7.6	2.99	1.625	3.58
13S-332.2	9-pdr	10.2	4.02	3.761	8.29
13S-333.2	4-pdr	7.8	3.07	1.759	3.88
13S-333.3	Grape or 1-pdr	4.8	1.89	0.355	0.78
13S-335.2	4-pdr	7.7	3.03	1.593	3.51
13S-338.2	Grape or 1-pdr	5.05	1.99	0.390	0.86
13S-338.5	9-pdr	10.2	4.02	3.755	8.28
13S-339.2	4-pdr	7.561	2.98	1.466	3.23
13S-340.1	Grape or 1-pdr	4.8	1.89	0.340	0.75
13S-343.3	4-pdr	8.0	3.15	1.733	3.82
13S-344.2a	9-pdr	10.15	4.00	3.784	8.34
13S-344.2b	4-pdr	7.4	2.91	1.506	3.32
13S-345.3	9-pdr	10.2	4.02	3.770	8.31
13S-345.4	4-pdr	7.6	2.99	1.697	3.74
13S-345.5	4-pdr	8.1	3.19	2.071	4.57
13S-345.6	4-pdr?	8.3	3.27	1.628	3.59
13S-347.1	Grape or 1-pdr	5.0	1.97	0.349	0.77
13S-348.1	4-pdr	7.69	3.03	1.594	3.51
13S-349.2a	9-pdr	10.2	4.02	3.729	8.22
13S-349.2b	6-pdr	8.8	3.46	2.553	5.63
13S-350.2	9-pdr	10.2	4.02	3.888	8.57
13S-351.1a	9-pdr	10.05	3.96	3.729	8.22
13S-351.1b	9-pdr	10.15	4.00	3.777	8.33
13S-351.2	4-pdr	7.8	3.07	1.668	3.68
13S-353.4	4-pdr	7.5	2.95	1.497	3.30
13S-360.3	9-pdr	10.2	4.02	3.868	8.53
13S-360.4	Grape or 1-pdr	5.0	1.97	0.361	0.79
13S-364.1	4-pdr	7.8	3.07	1.614	3.56
13S-364.2	4-pdr	7.6	2.99	1.531	3.38
13S-365.2	4-pdr	7.6	2.99	1.567	3.45
13S-366.2	3-pdr?	6.8	2.68	1.071	2.36
13S-367.1	9-pdr	10.2	4.02	3.799	8.38
13S-368.1	9-pdr	10.1*	3.98*	n/a	n/a

**Table 8. Cast iron artillery shot from Storm Wreck, 2011-2013 seasons (continued).**

FS No.	Estimated Caliber	Measured Diameter		Weight (Wet)	
		<i>cm</i>	<i>inches</i>	<i>kg</i>	<i>pounds</i>
13S-372.3	4-pdr	7.55	2.97	1.374	3.03
13S-373.2	9-pdr	10.2	4.02	3.832	8.45
13S-374.1	4-pdr	7.6	2.99	1.547	3.41

*\* designates a measurement taken using a digital x-ray tool as the specimen is still inside a concretion and cannot be measured by hand.*

*Note: In Meide et al. 2014:Table 16, a cannonball and grapeshot (11S-144.3 and 11S-144.4) were incorrectly labeled as 11S-144.2a and 11S-144.2b. This error has been corrected in this table.*



**Figure 75. The vent sprue marking is clearly seen on this specimen, 13S-349.2b, a 6-pdr cannonball. Shot measures 8.8 cm in diameter. The circular sprue mark is similar to that seen on many other 4-pdr and 9-pdr cannonballs.**

**Table 9. Standard British grape shot sizes, ca. 1772**  
(Adapted from Caruana 1997:228)

<b>Gun Caliber</b>	<b>Grape Diameter</b>	<b>Grape Weight</b>	
<i>pounder</i>	<i>inches</i>	<i>Pounds</i>	<i>Ounces</i>
½	0.69	0	¾
1	0.87	0	1 ½
1 ½	0.96	0	2
3	1.21	0	4
4	1.38	0	6
5 ¼	1.44	0	6 ¾
6	1.52	0	8
9	1.80	0	13 1/8
12	1.92	1	0
18	2.20	1	8
24	2.42	2	0
32	2.77	3	0
42	3.05	4	0

It may not be possible to determine if the six smallest shot encountered represent 1-pdr swivel gun shot or grape shot. Compared to Table 7, these examples are very close to but either slightly smaller or larger than the standard 1-pdr shot (as with all of the shot, slightly larger sizes than prescribed could be resultant of corrosion product on the balls when measured in the laboratory). Swivel guns of ½-pdr, ¾-pdr, and 1-pdr calibers were common on both naval and merchant ships, usually mounted on the rails and, in larger ships, in the tops (Tucker 1989:98). It is also possible that this is a grape shot. Grape shot, sometimes called quilted shot, was the term for a cluster of cast iron shot bundled together for firing from cannon. These were arranged around a central pin or spindle attached to an iron or wood base (variously called the bottom, tampeon or sabot) which had been placed into a cylindrical cloth sack (McConnell 1988:315; Caruana 1997:111). The neck of the bag was then tied to the top of the spindle and the bag was held in place over the shot by a line wrapped around it in a diamond pattern, producing a quilted appearance reminiscent of a bunch of grapes. The size and arrangement of the grape shot and the spindle was standardized throughout the 18th century, so that the ten or twelve ball load specified in 1723 changed to a nine ball load sometime before 1740. At this time the thickness of the spindle and bottom piece were 1/3 the diameter of the appropriately sized round shot for that particular cannon, and the grape ball diameter was half that of the required round shot, minus that of the spindle (Caruana 1997:107). Table 9 shows the standard sizes of British Royal Navy grape shot for each caliber of cannon, from a manuscript dated May 1772. The possible grape shot from Storm Wreck all measure between 1.89 and 1.99 in. While close in size to the 1.92 in. grapeshot designed for a 12-pounder gun, they may represent grape intended for the 9-pounder carronades on board, as they measure only between 0.9 and 1.9 in. more that the prescribed diameter grape for that caliber (1.80 in.). It has also been speculated that this shot may have been intended for use as case or canister shot, in which a tin case full of small balls was fired for a scatter effect, much like grapeshot but with smaller balls. After analysis of standard case shot sizes used by the British Royal Navy in 1780, however, it became clear that this size exceeds that prescribed for even 42-pdr guns, precluding the possibility that these were used as case shot on board the Storm vessel (Caruana 1997:222). Both swivel guns and grape shot (particularly when fired from carronades) were common anti-personnel munitions and would have been particularly suited for defense from privateer attacks, the primary threat to the Storm ship on its last voyage.

All of the 2011-2013 cannonballs except for two specimens (11S-119.1 and 13S-368.1) have been cleaned of concretion. These two examples could not be measured by hand with calipers, and the measurements listed in Table 8 were generated through a digital x-ray software function. Measurement from x-ray images have been shown to introduce some error, in some cases exaggerating diameter by between 1.5 and 17.3%.

### *Small Arms*

A number of small arms were recovered from Storm Wreck during the 2011-2012 field seasons (Meide et al. 2014: 182-201; McNamara 2013b, 2016). No edged weaponry has been encountered on the site to date, though the remains of a dirk scabbard were recovered in 2010 (Meide et al. 2011:158-160; Cox 2013a:48) and those of several knives have also been encountered (Cox 2013a:47-48; McNamara 2013a:41-42; Meide et al. 2014:256-257), though these are believed to more likely to represent eating or utilitarian tools. The small arms that have been recovered are all firearms, including both musket and pistol remains, and are believed to represent both military and civilian pieces. Recovered specimens include three Brown Bess muskets, a Queen Anne's style box lock pistol, a British sea service pistol, and the remains of a wooden handle from an additional small pistol (Cox 2016). Only one of these, the sea service pistol, was recovered in 2013, but the others are in various stages of conservation either at the St Augustine Lighthouse & Maritime Museum or at the Florida Division of Historical Resources, and new information revealed by conservators is presented here.

### *Muskets*

The remains of three almost intact muskets and an additional short fragment of a musket were encountered and recovered during the 2012 season (McNamara 2013b; Meide et al. 2014:182-192; Cox 2016:154-157). All of these have been identified as "Brown Bess" muskets, the ubiquitous British military arm of the 18th century (Goldstein and Mowbray 2010). Figures 76-77 show a typical 18th-century flintlock musket and a detailed view of the gunlock with their parts labeled. The musket specimens were subjected to catscan radiography by LAMP conservators (Figure 78) but, because they were too long to fit in the oven in the Lighthouse's laboratory, they were transported to the state laboratory at the Florida Division of Historical Resources in Tallahassee for conservation.

The most prolific firearm of the American colonial period, the muzzle-loading, smoothbore, .75 caliber Brown Bess or Land Pattern musket, was ubiquitous to soldiers of the Revolutionary War. Land Pattern muskets and their derivative versions were used by both sides during the Revolution, and when found within an archaeological context can often tell us much about the people who used them. The Brown Bess was used by the British Army for well over a century, from 1722 to 1838, with many incremental design changes, including the Long Land Pattern, Short Land Pattern, India Pattern, New Land Pattern, and Sea Service Pattern. The Brown Bess in all its variants was produced in such large quantities by the English Board of Ordnance, and so widely distributed amongst British forces worldwide, that it could be considered the Automat Kalashnikov or AK-47 of its time. It was used during the American Revolution by both sides.

During the Revolutionary War, all infantrymen were armed with a flintlock musket, which fired a lead ball, and was furnished with a detachable socket bayonet, which turned the musket into a formidable pole arm (Frey 1981:100). A manual of exercise for infantry was designed to train soldiers in the loading and firing of muskets to condition them to act in conformity with the rest of the line so as to produce a massive, though not necessarily accurate, volley. In combat, once the advancing lines fired the initial volley, the muskets had to be reloaded and primed as the lines continued to move forward in the face of enemy fire. The complex loading drill consisted of 24 separate motions, beginning with opening the pan, removing the cartridge from a pouch worn at the waist, biting the top off the cartridge, shutting the pan,

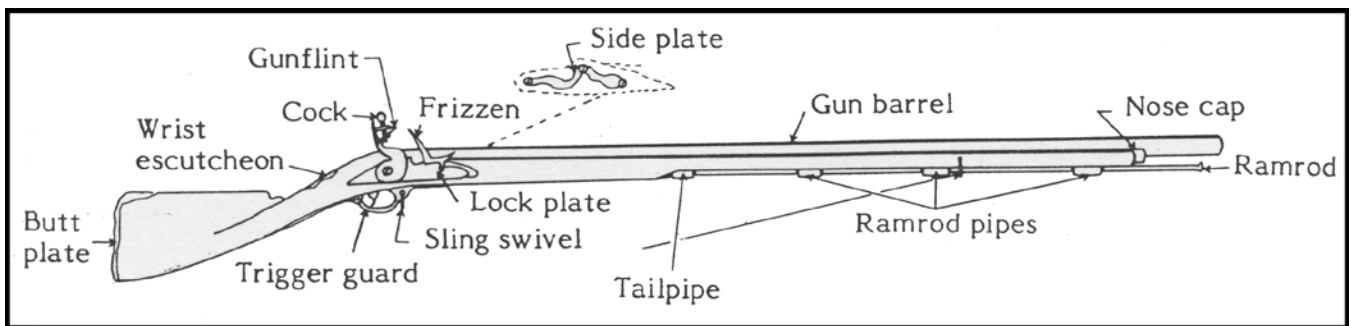


Figure 76. Eighteenth-century flintlock musket nomenclature. From Bryce 1984:11.

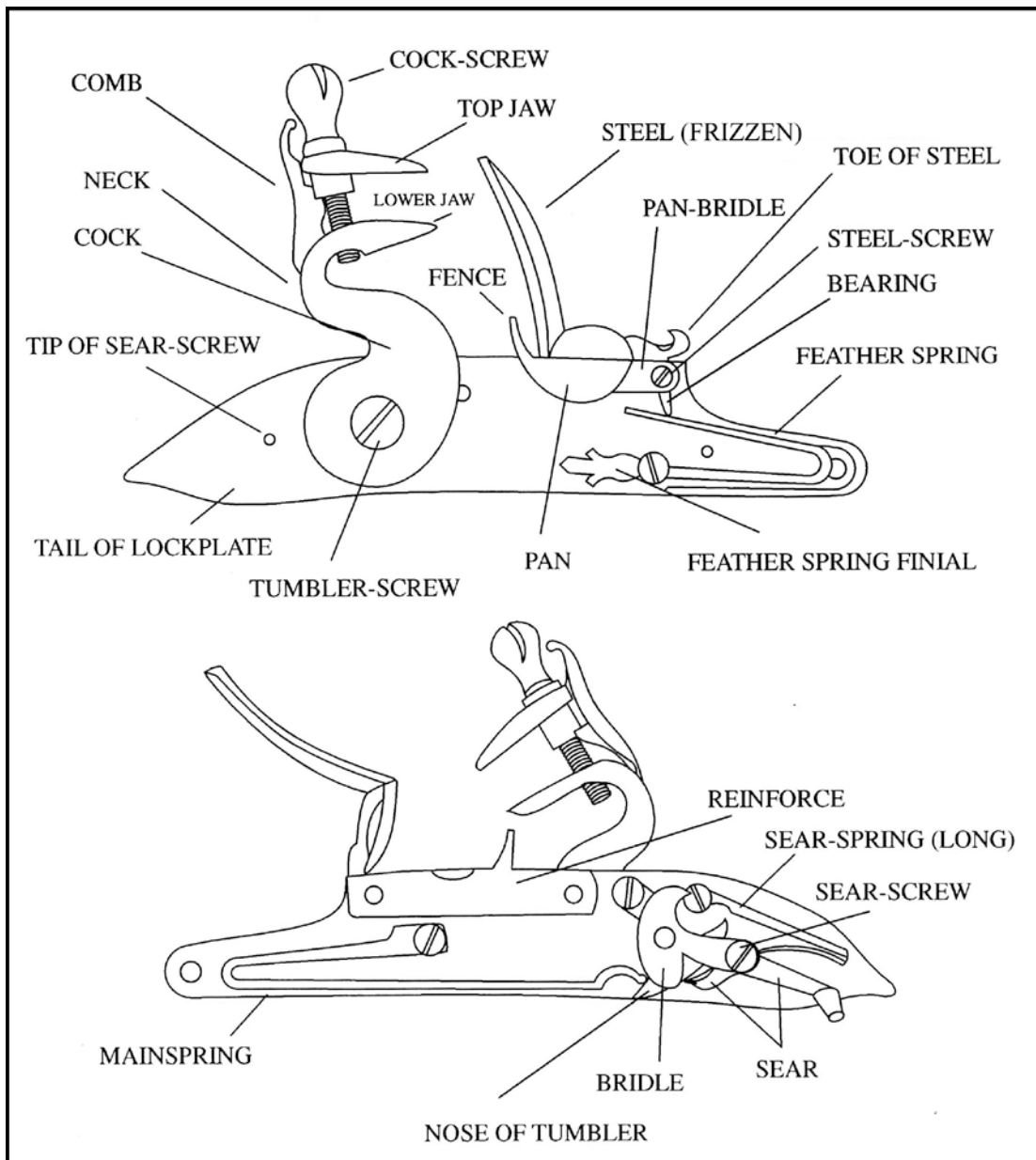
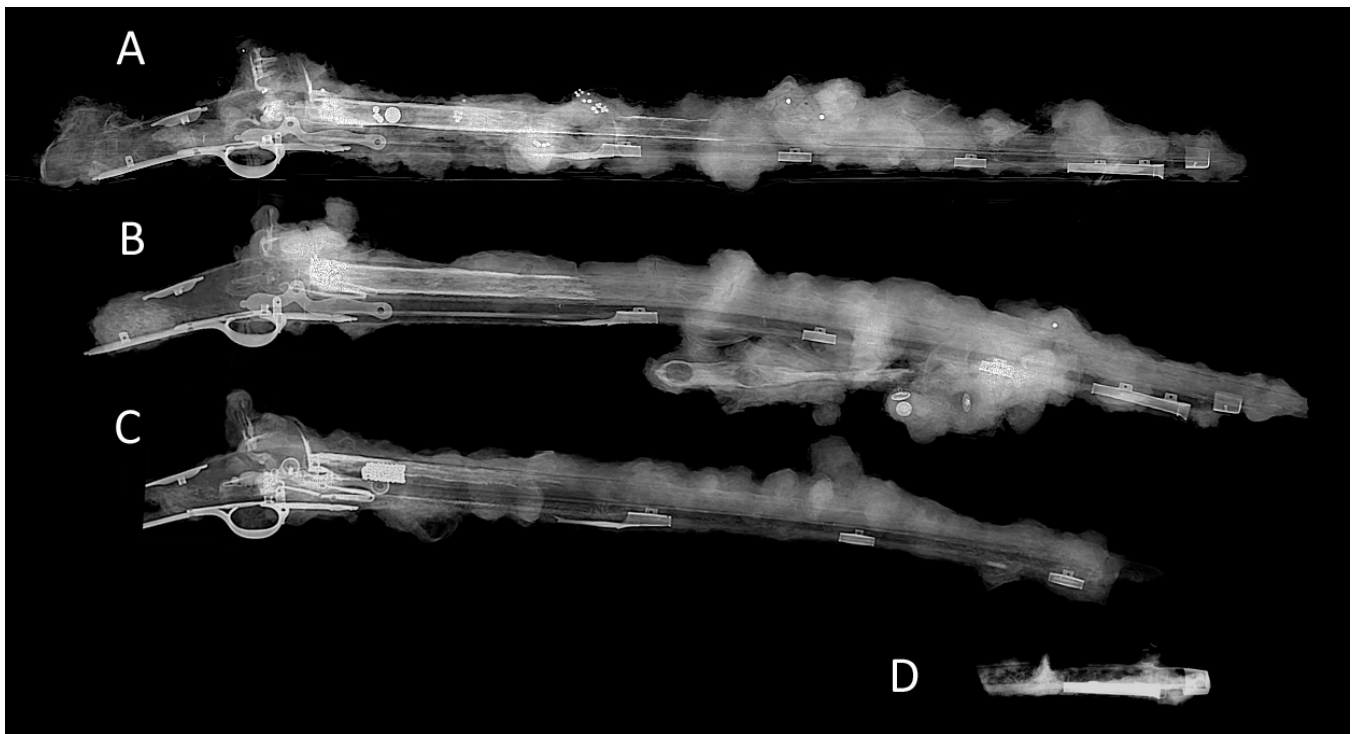


Figure 77. Eighteenth-century British gunlock nomenclature. From Bailey 2009:11.





**Figure 78. X-ray images of the Storm Wreck musket assemblage. A: FS No. 12S-197.1. B: FS No. 12S-223.1. C: FS No. 12S-236.1. D: FS No. 12S-206.1.**

and pulling the cock down on it. The next series of motions was related to loading the barrel with powder from the cartridge, and ramming home the lead bullet and paper from the cartridge with the ramrod (Frey 1981:100). The complicated process of loading and priming meant that even highly trained and disciplined soldiers could not usually achieve a higher rate of fire than two rounds a minute (Gibbs 1965: 67)

An accurate date of manufacture can be obtained by carefully observing several design features on each gun. It is generally acknowledged that the original Land Pattern musket evolved over a period of about 20 years, incorporating elements from contemporary Dutch muskets, Board of Ordnance procured British muskets, and privately purchased Colonel's muskets (Goldstein 2000:41). British Ordnance adopted the land pattern family of muskets in 1720, and with modifications and improvements the basic design was produced into the middle 1800s (Goldstein and Mowbray 2010:18,152).

As improvements and modifications were made to the manufacture of these muskets a change in the pattern was adopted, resulting in a new model or pattern of musket. These patterns were the approved design of the time, and were to be replicated exactly as specified. The original Long Land Pattern was the longest version, with a 46-in. barrel, but later versions were shorter once it was realized that shortened barrels were easier to handle without reducing accuracy. Land Pattern muskets can be dated fairly accurately by matching the nuances in their design and construction with these example 'patterns.'

Components for the Land Pattern family of muskets were manufactured by contractors in various factories and shops across Great Britain. Parts such as locks, barrels, and brass furniture were all outsourced by the British Board of Ordnance to be manufactured individually, according to a sealed pattern kept as example within the Tower of London. All of the completed parts were imported to the Small Gun Office Stores in the Tower for final inspection, and once approved these pieces were fine-tuned to fit together by 'Gun Barrel Filers' and 'Rough Stockers', then passed on to workmen called

‘Setters Up’ for final assembly. The finished muskets were then placed within the arsenal stores of the Tower before moving on to finally being issued into the hands of a soldier (Bailey 2009:14).

Field Specimens 12S-197.1, 12S-206.1, 12S-223.1, and 12S-236.1 were recovered during the 2012 field season, and brought to the Flagler Memorial Hospital for CT scanning on 3 October of that year (Figure 78). The resultant imagery revealed within these concretions the metal components of Brown Bess muskets contemporary to the period of the American Revolution. Examination of these components revealed a fairly accurate and telling identification of musket patterns with date ranges supporting the working hypothesis that the Storm Wreck was a Loyalist ship that lost in December 1782.

Musket 12S-197.1 (Figure 78, A) was discovered outside the main excavation area, to the southwest, from an undesignated unit at 99E, 103N (depicted on the site plan in Figure 69). It was partially exposed on the seafloor due to recent sand movement, and while it was fully exposed by hand-fanning and subsequently recovered, no further excavation was conducted in that area. It measures 131.2 cm in length. A brass trigger guard and the general shape of a musket lock were observed with the naked eye prior to CT scanning. This musket is the most intact specimen, though it is missing a large portion of its butt.

This musket has been identified as a British 1769 Short-Land Pattern musket. At the onset of the American Revolution, this model was the newest and most modern musket available to the British infantry (Goldstein and Mowbray 2010:92). These muskets were a shortened variant of the Land Pattern, with a 42 in. barrel rather than the 46 in. length of the older models. This particular model of the Land Pattern musket was produced between 1768 and 1777, numbering less than 68,000 (Goldstein and Mowbray 2010:93). During the American Revolution some 2,400 of these muskets were issued to the 71st Regiment of Foot, one of the regiments known to have been evacuated from Charleston with the fleet that included the Storm ship (Bailey 2009:170). Out of this issue, seven muskets survive today in collections with regimental markings of the 71st (Goldstein and Mowbray 2010:94). Regimental markings are typically observed on the musket’s barrel or on the brass wrist plate. The barrel on this musket is too far-gone to reveal any such markings, but the corrosion product around the barrel revealed a proof mark consisting of a crown and cross scepters (Figure 79). The brass wrist escutcheon survives in excellent condition, but upon deconcretion it was found to bear no inscription or identifying marks.

The visible profile of the extant brass furniture within this concretion matches that of English manufactured Land Pattern muskets from the Tower of London, and not of the Irish arms produced by Dublin Castle (Goldstein and Mowbray 2010:78). The flat style of side-plate and the absence of a “Pratt pipe” ramrod pipe (Figure 80) seen in later models helped in dating this piece, along with the corroded remnants of a steel ram rod. All of these characteristics are typical of muskets manufactured between 1768 and 1777 (Meide et al. 2014:185).

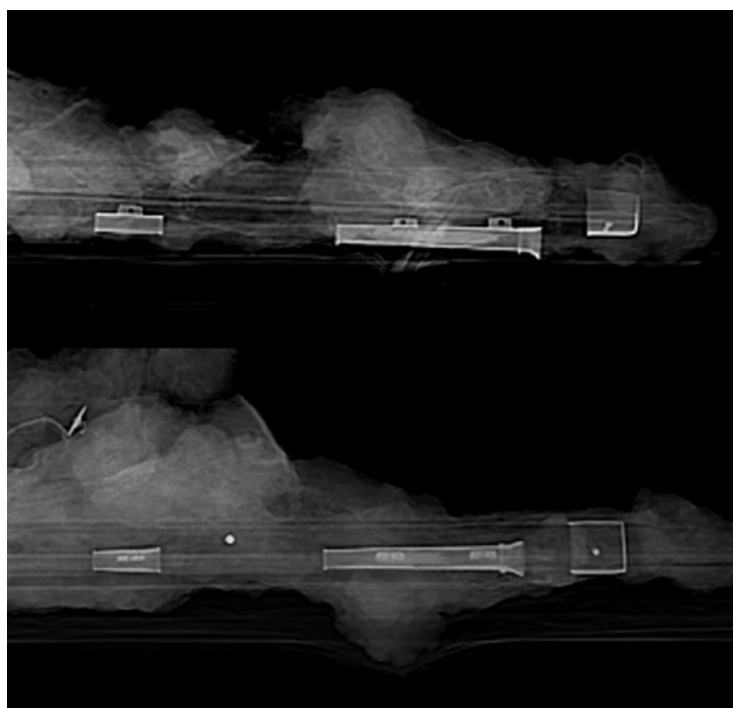
The musket lock is possibly a Pattern 1755 lock. CT scanning imagery revealed remains of the cock assembly: a slotted cock-screw, flat comb, and goose neck (Figure 81). This pattern of lock was stockpiled and used by the Tower of London armorers as the main component for Short Land pattern muskets until phased out by the later 1777 pattern lock. This further supports the identification of a 1769 Land Pattern musket (Meide et al. 2014:185).

The most startling discovery revealed by the CT scan was the fact that this musket is still loaded, and in the “half cock” position (Figure 81, top). There were three types of standard musket service cartridge:

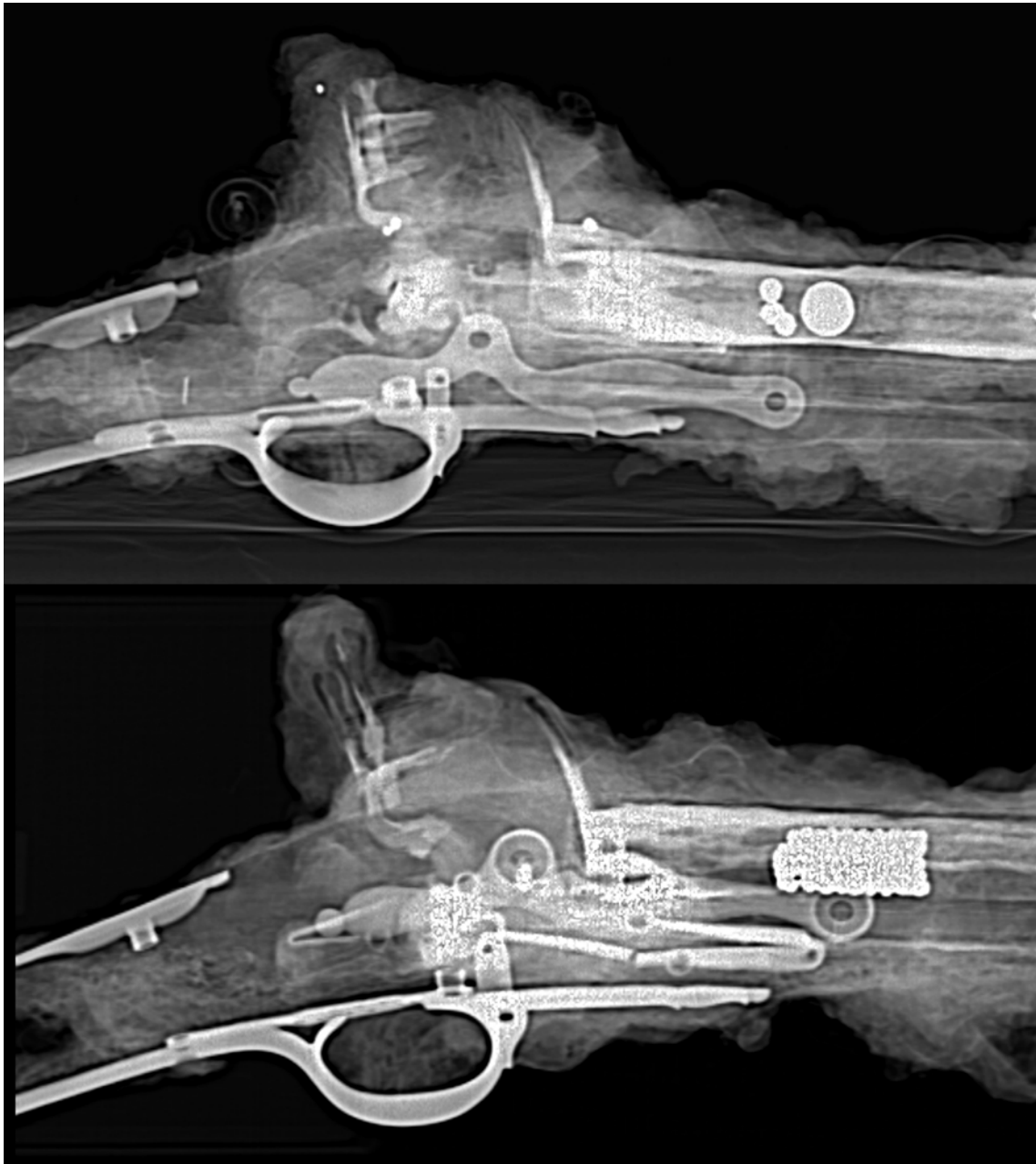




**Figure 79.** Cast of the proof mark found within the corrosion layer around the barrel of musket 12S-197.1 (photo courtesy of the Florida Division of Historical Resources).



**Figure 80.** X-ray images showing the muzzle detail of two muskets from Storm Wreck. Top: shows the regular style of pipe before the tail pipe and nose cap found on musket 12S-197.1. Bottom: shows the “Pratt” style of pipe before the tail pipe and nose cap found on 12S-223.1.



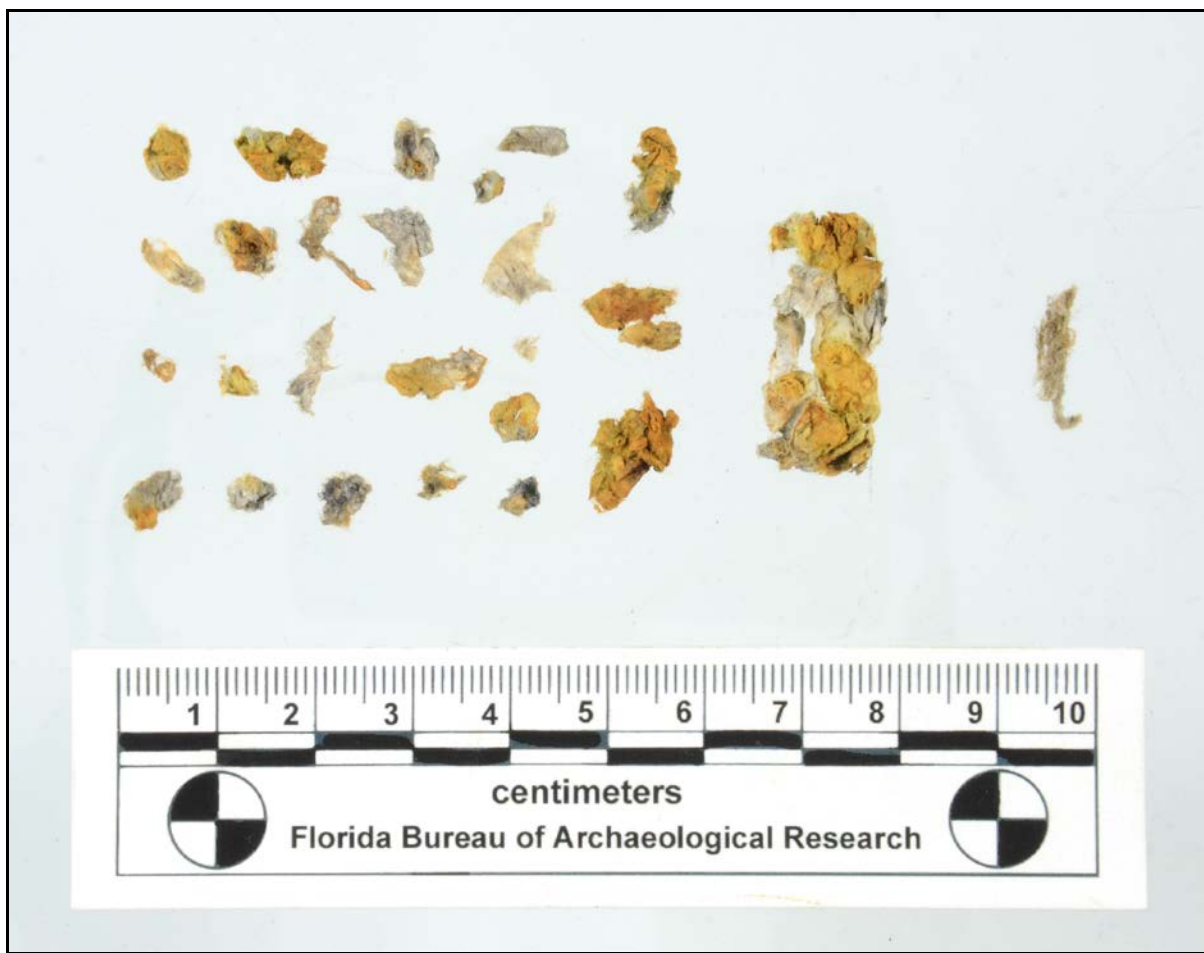
**Figure 81. X-ray showing detail views of the two loaded muskets. Top: 12S-197.1 with the half cock position of the hammer and the load of buck and ball. Bottom: 12S-236.1 in the half cock position and its load of bird shot, as well as the inletted areas on the side plate that allow for a recessed screw.**

ball, buck and ball, and buck shot (Bailey 2009:247). This musket has been loaded with a cartridge of buck and ball, which was developed to inflict greater damage by a unit's volley of fire. Buck and ball consisted of the standard load of a .69 caliber musket ball accompanied by three or four .32 caliber buckshot acquired from the Royal Artillery (Meide et al. 2014:185).

As state conservators make progress with the conservation of this musket at the Florida Division of Historic Resources, they continue to make discoveries that can only be found during the conservation process. Figures 82 and 83 show the buck and ball shot inside the poorly preserved remains of the iron barrel, along with the paper and wadding from the cartridge that contained the buck and ball.



**Figure 82.** The buck and ball within the barrel remains of musket 12S-197.1 (courtesy of the Florida Department of Historic Resources).



**Figure 83.** The paper and wadding from the cartridge of buck and ball found inside musket 12S-197.1 (courtesy of the Florida Department of Historic Resources).

The next intact musket encountered, 12S-223.1 (Figure 78, B), was over four meters away in Unit 7 (visible in the site plan in Figure 70, and partially visible in the site plan detail at the bottom of Figure 71). Additional excavation revealed that this musket extended into Unit 20. The musket concretion measures 125 cm in length, and displays a distinct curvature, likely due to the warping of the wooden musket stock. Musket 12S-223.1 is intact for the entire length of its barrel, but is missing most of its butt (Meide et al. 2014:185–186). X-ray imagery revealed that this musket, unlike the others, was not loaded at the time the ship was lost. Further analysis identified this specimen as a 1777 Short Land Pattern British musket, produced between 1777 and 1782. By the end of the Revolution, it is estimated that half of the 350,000 muskets procured by the British were of this pattern (Goldstein and Mowbray 2010:113).

Very little of the iron components remain on this musket. These missing parts would have made identifying its exact pattern difficult, were it not for the two key diagnostic pieces on the gun that did survive. The most noticeable of these is the brass “Pratt pipe” (Figure 80, bottom) that was designed by John Pratt and adopted by the Board of Ordnance in 1777. This pipe features a wide mouth and taper that facilitated a speedier return of the ramrod to quicken the loading process between shots (Goldstein and Mowbray 2010:62). This replaced the second ramrod pipe, immediately behind the forward “trumpet mouthed pipe” in Pattern 1777 muskets and all subsequent patterns. This musket also has the remains of a steel ramrod housed within its four brass ramrod pipes. Later variants of the Land Pattern family reduced the number of ramrod pipes from four to three as the overall musket lengths shortened over time (Meide et al. 2014:187).

The second diagnostic feature apparent in the CT scan is the remnant of the new variant of shortened sear spring which was introduced with the 1777 Short Land Muskets. This spring is normally easy to spot because the two screws were located behind the cock on the tail of the lock plate, but the lock has not survived within the concretion. The spring itself, however, is visible in the x-ray detail shown in Figure 84, with its two mounting holes located exactly where they should be behind the shadow of the now nonexistent cock.

The last of the three mostly intact muskets, 12S-236.1 (Figure 78, C), was also found in Unit 7 roughly parallel with and within a meter of musket 12S-223.1. It extended into Unit 19 for most of its length. It can be seen in the site plan in Figure 70, and at a larger scale in the site plan detail in Figure 71. Towards its distal end the musket is curved, again likely due to warping of the wooden stock. It is slightly less complete than the other two specimens, as it is missing most of the butt and also its forwardmost end or nose.

Diagnostic furniture revealed by x-ray identified this gun as a 1756 Long Land Pattern. Produced from 1756-1790, this was the pattern musket carried by British forces at the onset of the American Revolution. This pattern musket was originally fitted with a 46 inch barrel, though the length of this example cannot be confirmed since it is missing the fore-end, which includes the brass nose cap and “trumpet pipe” or first ramrod pipe. The measured distance between rammer pipes suggests a long land pattern with the 46 in barrel as opposed to a Short Land musket with a 42 inch barrel. This was the first musket in the Land Pattern series to be fitted with the trumpet pipe (Meide et al. 2014:198 – 191).

One of the features revealed in the x-ray imagery identifying the pattern of this musket are the contoured edges of the Long Land pattern side plate. When scanned from above the side plate exhibits a rounded profile, which is inletted to accommodate the heads of the side screws used for mounting the lock (Figure 81, bottom). This piece was replaced in all later patterns with a flatter side plate that was simpler to produce. Another visible feature is the shadow of remains of a pattern 1755 lock. This was the first musket in the Land Pattern lineage to be fitted with this lock, which was also used in the later Short



**Figure 84. X-ray detail of musket 12S-223.1 showing gunlock and trigger area. This gun is believed to be a British 1777 Short Land Pattern musket. Unlike the other Storm Wreck muskets, this specimen was not loaded at the time the ship was lost. Much of the gunlock has completely rusted away, though the newly shortened sear spring developed for the 1777 Short Land Muskets is visible.**

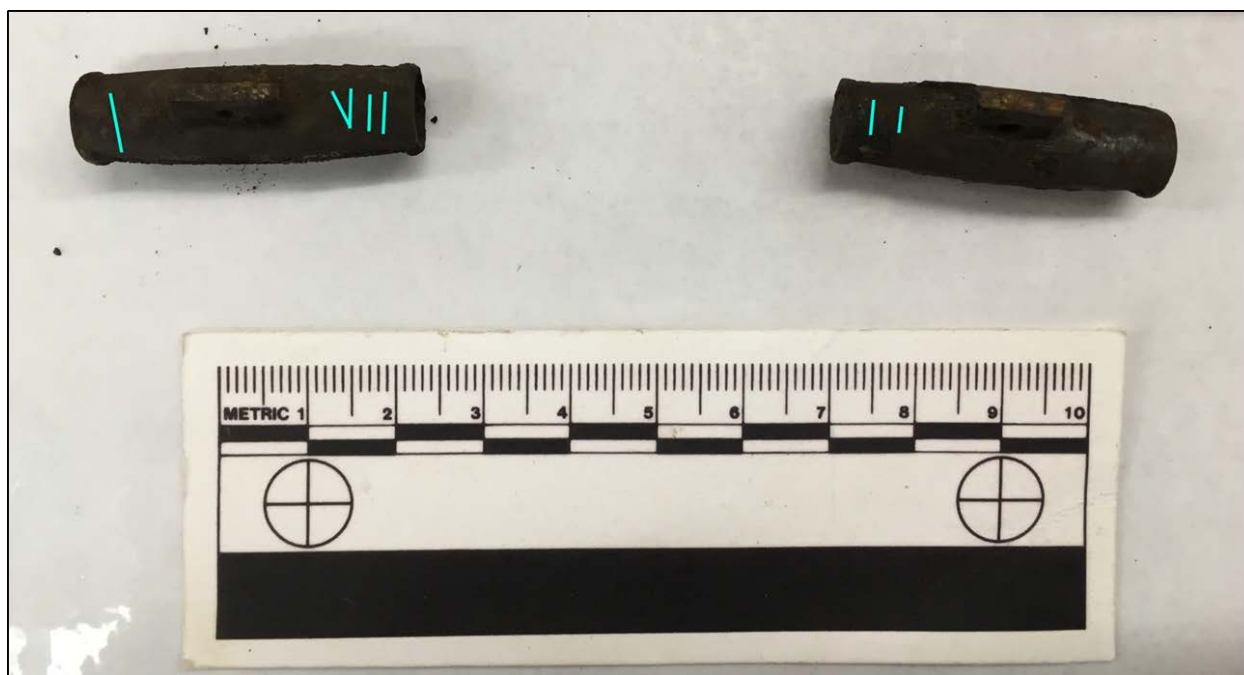
Land patterns (Meide et al. 2014:191). The brass hardware has been removed from the wooden stock during the conservation proves undertaken at the Florida Division of Historical Resources laboratory. Conservators noted several diagnostic marks on some of the brass furniture. The underneath side of the side plate displays a broad arrow (Figure 85), and two of the ramrod pipes have roman numerals scratched into them. The aft pipe contains two scratches or the Roman numeral II, and the forward pipe contains one scratch and the Roman numeral VII (Figure 86). The difference in numbers could indicate a possible repair, since most brass furniture was made and marked with matching numbers or marks so they could be kept together as matching sets for final assembly, and also marked with the order of assembly (Amy Borgens 2016, elec. comm.).

X-ray imagery revealed that this musket was loaded with its lock in the half-cock position, ready for firing at a moment's notice (Figure 81, bottom). The load is not military issued ammunition of .32 caliber buck-shot, but rather a load of Rupert shot or birdshot, tiny lead pellets which are omnipresent across the Storm Wreck. Disassembly in the conservation lab allowed for this load to be observed with the naked eye (Figure 87). The Loyalists evacuated Charleston under the perpetual threat of predation by American privateers. This danger is reflected in the weaponry being "locked and loaded," ready for rapid use if the need for self-defense did arise. Muskets loaded with these pellets, like a modern shotgun, would probably have been quite effective against a boarding party (Meide et al. 2014:191). There is some further discussion about these loads below in the ammunition section.

The final musket find, 12S-206.1, consists of only a short surviving segment (Figures 78, D and 88). This concretion, found within Unit 7, was only centimeters away from musket 12S-223.1. It is 26 cm long, 4.5 cm wide, and has a visible channel or groove along its length. When x-rayed by Monahan's Chiropractic, it was revealed to be the fore-end of a Musket stock with brass furniture still intact, matching that of an English Pattern 1756 Long Land musket, or possibly a later model of the Land Pattern musket family (Meide et al. 2014:191).



**Figure 85. The broad arrow found scratched on the reverse side of musket 12S-236.1's side plate (photo courtesy of the Florida Department of Historic Resources).**



**Figure 86. The marks found on the ramrod pipes of musket 12S-236.1, highlighted in white (photo courtesy of the Florida Department of Historic Resources).**





**Figure 87. The loaded Rupert shot or birdshot found in the barrel of musket 12S-236.1 (photo courtesy of the Florida Division of Historic Resources).**

Like the other musket finds, this specimen has been deconcreted by state conservators in Tallahassee. The two brass components preserved by concretion are a sheet brass nose cap and a trumpet-mouthed ramrod pipe. The trumpet mouthed ramrod pipe did not feature on British muskets until the pattern 1756 Long Land Musket was approved for issue, and is present in every subsequent model of Land Pattern muskets manufactured from that date on. The wooden portion of stock is grooved to accommodate a ramrod; partial remains of a steel ramrod are visible from the mouth of the ramrod pipe to the face of the nose cap (Meide et al. 2014:191). The British began issuing steel ramrods with the 1756 pattern muskets and by 1779 almost all muskets issued of both the Long and Short land patterns in North America were using steel rammers rather than wood (Bailey 2009:34).

While this fragment could represent a fourth musket, it is also very possible that it is the missing front-portion of musket 12S-236.1. The fragment does include the correct furniture for this pattern musket. The trumpet pipe from the field specimen, however, does not have any marks similar to those found on the ramrod pipes removed from 12S-236.1, and the break pattern in both pieces of wood do not align.

#### *Queen Anne Box Lock Pistols*

In 2010 a concretion was recovered from Unit 3 containing a small flintlock pistol, which was designated FS No. 10S-44.1 (Meide et al. 2011:171-172; Hanks 2013:34-35; Cox 2013a:48-49, 2016:153-154). X-rays revealed this pistol to be a Queen Anne style box lock pistol measuring 8.4 inches (21.3 cm) in length (Figures 89-90). All of the operational elements of the pistol can be

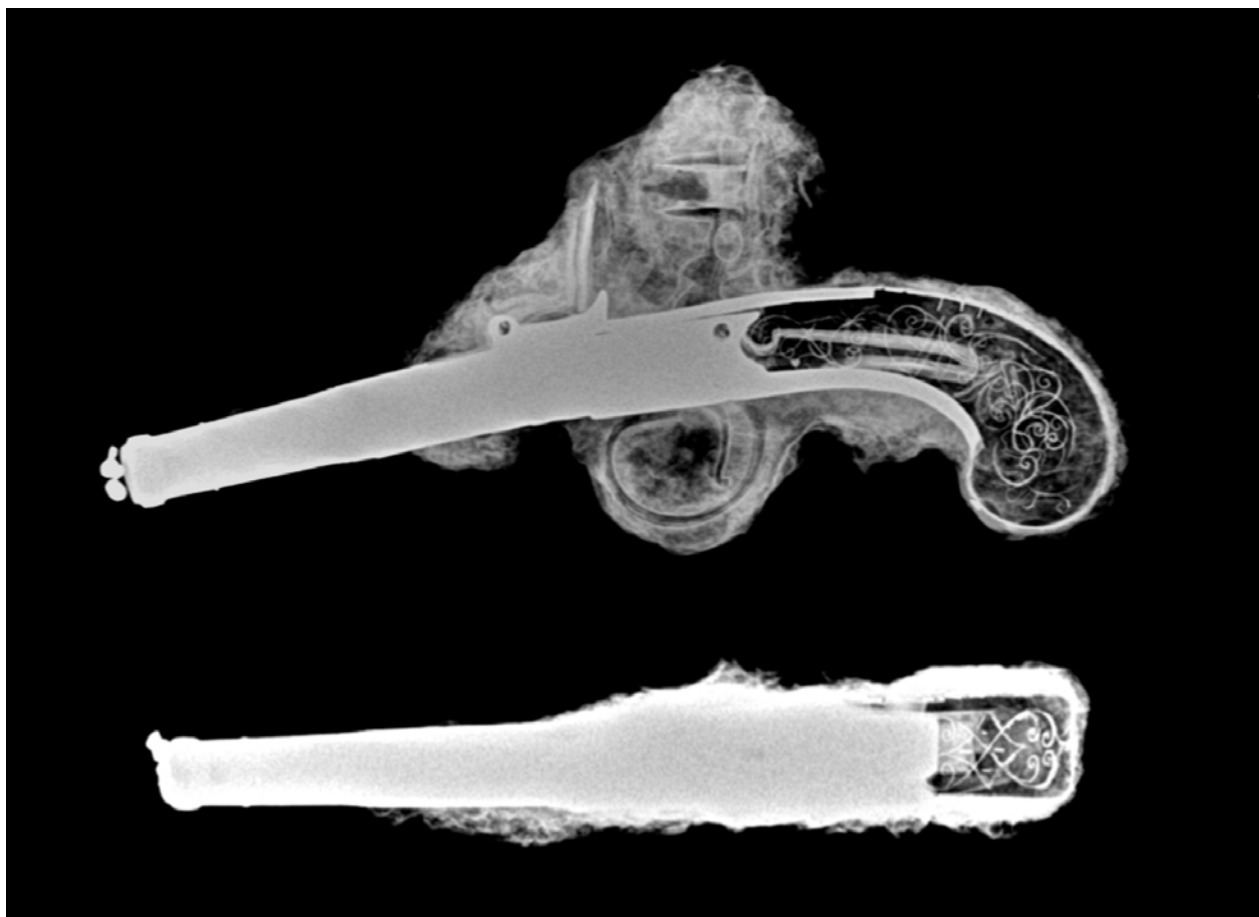


**Figure 88. X-ray image of musket fragment 12S-206.1 (top), photograph of 12S-206.1 before cleaning (middle), and detail from a modern Brown Bess replica, showing the forward portion equivalent to that preserved within the concretion (bottom). The measurements on the x-ray were generated by analytic software and likely bear some degree of inaccuracy. The brass fittings are the nose cap at right, and the trumpet-mouthed ramrod pipe at bottom.**

seen in the x-ray in their proper places, including the frizzen, wooden grip, barrel, and trigger guard, although not all of the elements are in good condition (Figure 89). The cock or hammer is hung in the middle of the frame and the pistol, which is sightless, is intended for close range firing (James Levy 2010, elec. comm.). A box lock is distinguished by having its trigger plate, lock plate, and breach of the barrel all as one piece, but the hammer can be either inline or side-cock (Burgoyne 2002:9).

Unlike most flintlock small arms of the time, this weapon was not loaded from the muzzle. Instead the barrel was unscrewed with a barrel key or wrench, the threaded stub was filled with powder, and the ball was put in place before reattaching the barrel. When fired, the ball, which was slightly oversized for the bore, was compressed down to bore size, which eliminated windage and resulted in a more powerful and





**Figure 89.** X-ray of pistol 10S-44.1. Visible are the hollows of the hammer, frizzen, trigger, and trigger guard, as well as the extant flint, handle decorative inlay, main spring, barrel, and box that would house the lock.



**Figure 90.** Queen Anne pistol, 10S-44.1, separated from its original concretion. The brass barrel and lock are mostly exposed, while the handle, frizzen, lock, trigger and trigger guard are still concreted.

truer shot (James Levy 2010, elec. comm.). A tiny lug was observed on the barrel after deconcretion, designed to accommodate the turning wrench for loading. This pistol was intended for close action as personal defense and was not military issue (Burgoyne 2002:13).

The Queen Anne style of pistol, also known as the pocket or coat pistol because its diminutive size allowed it to be concealed in a coat pocket, originated in the middle of the 17th century. The style was originally typified by a side lock action with a grip adorned by a ball-shaped pommel (Burgoyne 2002:13). Throughout the eighteenth century, the style evolved from a firearm reserved for the wealthy to a common sidearm used more broadly as more manufacturers produced them. Pistol 10S-44.1 has a slab-sided grip and no butt cap. These two attributes, as argued by Burgoyne (2002:54), indicate a move away from the artistic zenith of the Georgian-era towards a firearm favoring functionality over elegance, a transition he notes occurred by around 1775. However, it is clear that some amount of decoration exists on the pistol grip as the x-ray image (Figure 89) displays intricately flourished inlay work.

The concretion containing the pistol (along with several other artifacts) was placed in wet storage for several years before conservation treatment began in earnest in late 2014. The pistol has since been separated from the main concretion and much of it has been deconcreted, a process that continues to reveal more information about the gun (Figure 90). Its barrel and lock are made of brass, while the trigger guard, trigger, hammer, and frizzen were all made of iron. The handle is slab-sided and made of wood with metal inlay. The pistol has not been fully deconcreted due to the need to cast the iron components, which are mostly hollows left inside the concretion. These sections of concretion, however, have been removed from the brass portion and handle of the gun, which remain articulated. While uncovering the brass components, three marks were found upon the barrel (Figure 91). The top and bottom marks are Birmingham private proofs and the middle mark is the gun manufacture's mark (Puleo 2011:15). Along the sides of the box portion of the gun are the words "Ketland" on one side and "London" on the other (Figure 92).

"Ketland" refers to the manufacturer, and it was originally assumed that "London" referred to its location of manufacture. However, the proof marks, as well as the known history of the Ketland gunmaking dynasty, indicate this gun was manufactured in Birmingham (Puleo 2011:15-16). The Birmingham proofs used prior to 1813 contained a crown over a capitol P for the powder mark, and a crown over a capitol V for the viewed mark. These marks were very similar to the London proofs, and indeed London gunmakers as early as 1717 complained that they were too easily confused with the "more prestigious" London marks (Puleo 2011:15). While there was eventually a Ketland wholesale shop in London, it was essentially for export because it was illegal to sell guns in London that did not have the London proofs. London proofs could only be obtained through membership in the London Gunmakers Company, to which Thomas Ketland, Sr. never belonged (Puleo 2011:15-17). Thomas Ketland, Sr. was most likely the maker of this gun because the middle makers mark includes a TK. The upper portion of that mark appears to be a crown similar to the example found on the Historical Arms Gallery (2017) website (Figure 91).

Thomas Ketland, Sr. was born in early 1737 or late 1736 in Aldridge, South Staffordshire, and was the first known patriarch of a well-known gunmaking family (Puleo 2011:14-15). His sons William, Thomas Jr., John, and James would also carry on the family trade, eventually moving to America. By 1760 Thomas Sr. was listed as "Thomas Ketland gunsmith of 7 Lichfield Street" in Birmingham. In 1777 he moved his expanding business into the Birmingham neighborhood eventually known as "the Gun Quarter." According to Puleo (2011:15), sometime around 1785 Ketland opened a London location, recorded as "Ketland & Co., Wholesale Gun and Birmingham Warehouse" at 2 Scots Yard, Bush Lane, Cannon Street. Since the Storm Wreck box lock pistol already bears the name London, it seems likely



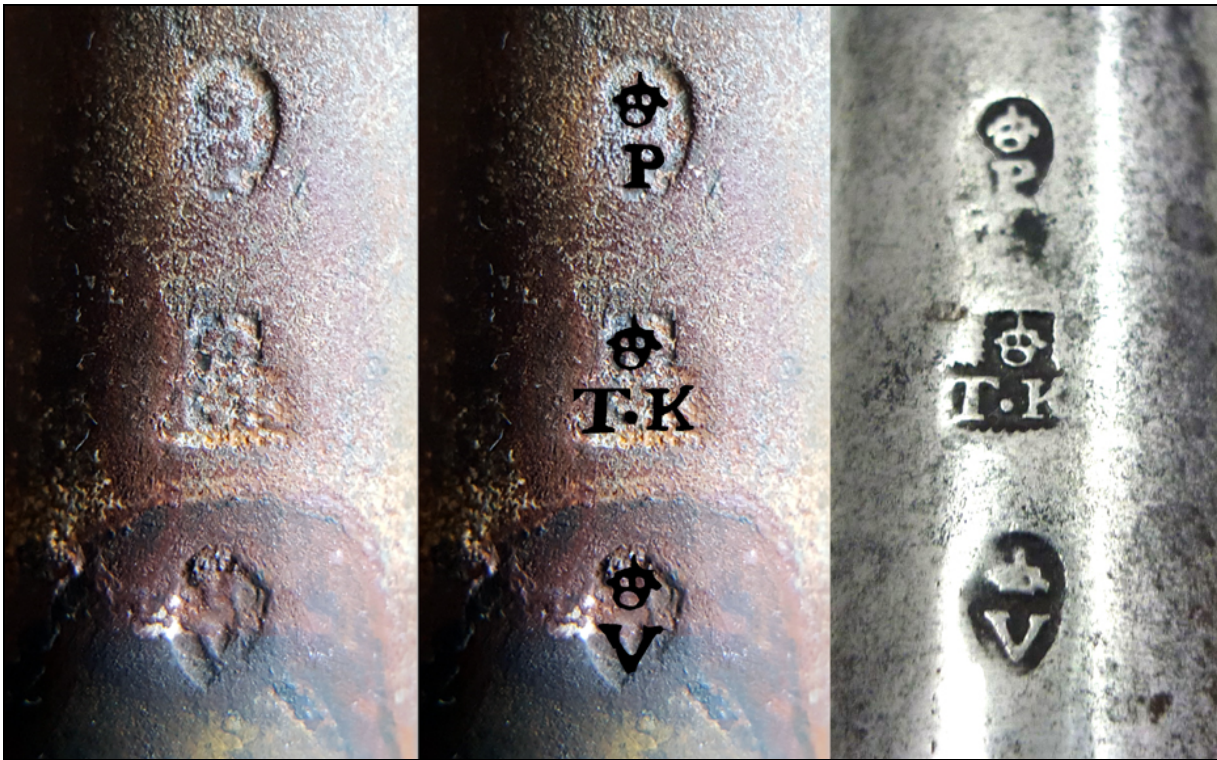


Figure 91. The left side is a close up of the marks found on the underneath side of the pistol barrel. The middle section shows the first section with an overlay to help define what is there. The right side shows a Ketland pistol with similar marks in better condition (The Historical Arms Gallery 2017).



Figure 92. Inscription on the opposing sides of the pistol's box lock. Top shows the word "KETLAND," and the bottom shows the word "LONDON."



**Figure 93.** The partial remains of a wooden handle from a small pistol, probably similar in size to the boxlock pistol recovered in 2010. Designated Field Specimen No. 11S-153.3, this object was found within the concretion covering the recovered long gun.

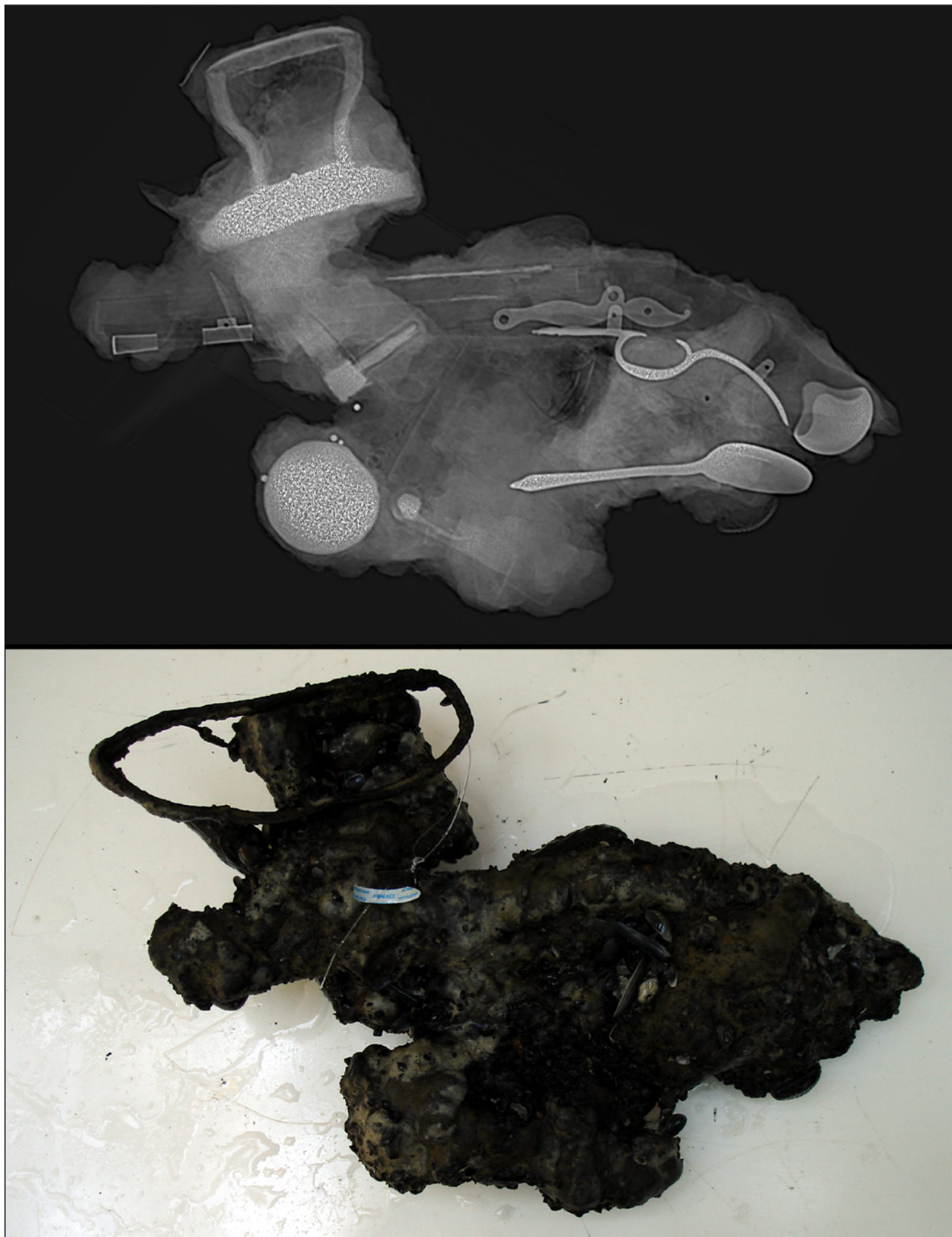
that Ketland opened this business somewhat earlier, by 1782. Puleo (2011:16) argues somewhat vehemently that the Ketland business was not exporting guns to America before 1789, as there is no documentary evidence to indicate otherwise. This suggests that this pistol, likely one of a pair, was originally bought in Birmingham and brought over to the colonies as a personal possession. Alternatively, the existence of a “London” engraved Ketland pistol in South Carolina in 1782 or earlier could indicate there was at least some early Ketland trade to the American colonies prior to 1789, the documentation of which has been lost to history.

The partial remains of a second Queen Anne or pocket pistol were found within the concretion of the cannon recovered in 2011 (Meide et al. 2014:191-192). Designated FS No. 11S-153.3, this artifact consists only of the lower portion, just 5 cm long, of the wooden handle of the pistol (Figure 93). It is similar in shape to the handle of the intact box lock pistol. No metallic portions of this pistol remain, although the handle is carved and drilled to accommodate a metal butt cap. The ventral surface has a carved channel 0.9 cm wide to accommodate the tang of a trigger guard. There is no evidence of any further decoration or embellishments. The fore end of this piece is roughly fractured, indicating that the handle might have been broken off and separated from its lock and barrel before or during the wrecking event. Box lock pistols were commonly sold in matched pairs, but this piece is not a mate to pistol 10S-44.1. Its profile is rounded, terminating in a bulbous butt-end 3.4 cm wide, as opposed to the slab-sided handle on 10S-44.1. Pistol 11S-153.3 with its rounded handle and (now missing) butt cap likely pre-dates the later slab-handled style of Pistol 10S-44.1.

#### *Sea Service Pistol*

The only military pistol encountered on the shipwreck to date was recovered in a sizable concretion in 2013. Found at the eastern border of Unit 33 and protruding out to the east, concretion 13S-353.1 was CT scanned at Flagler Memorial Hospital, and found to contain an well-preserved example of a British Sea Service flintlock pistol (Figure 94). Once separated from the main concretion, the pistol was





**Figure 94.** Concretion 13S-353.1 and its x-ray. Visible is a spoon, cannonball, birdshot, clothing iron, and a sea service pistol. The cuprous loop attached at top left was removed before x-ray imaging.

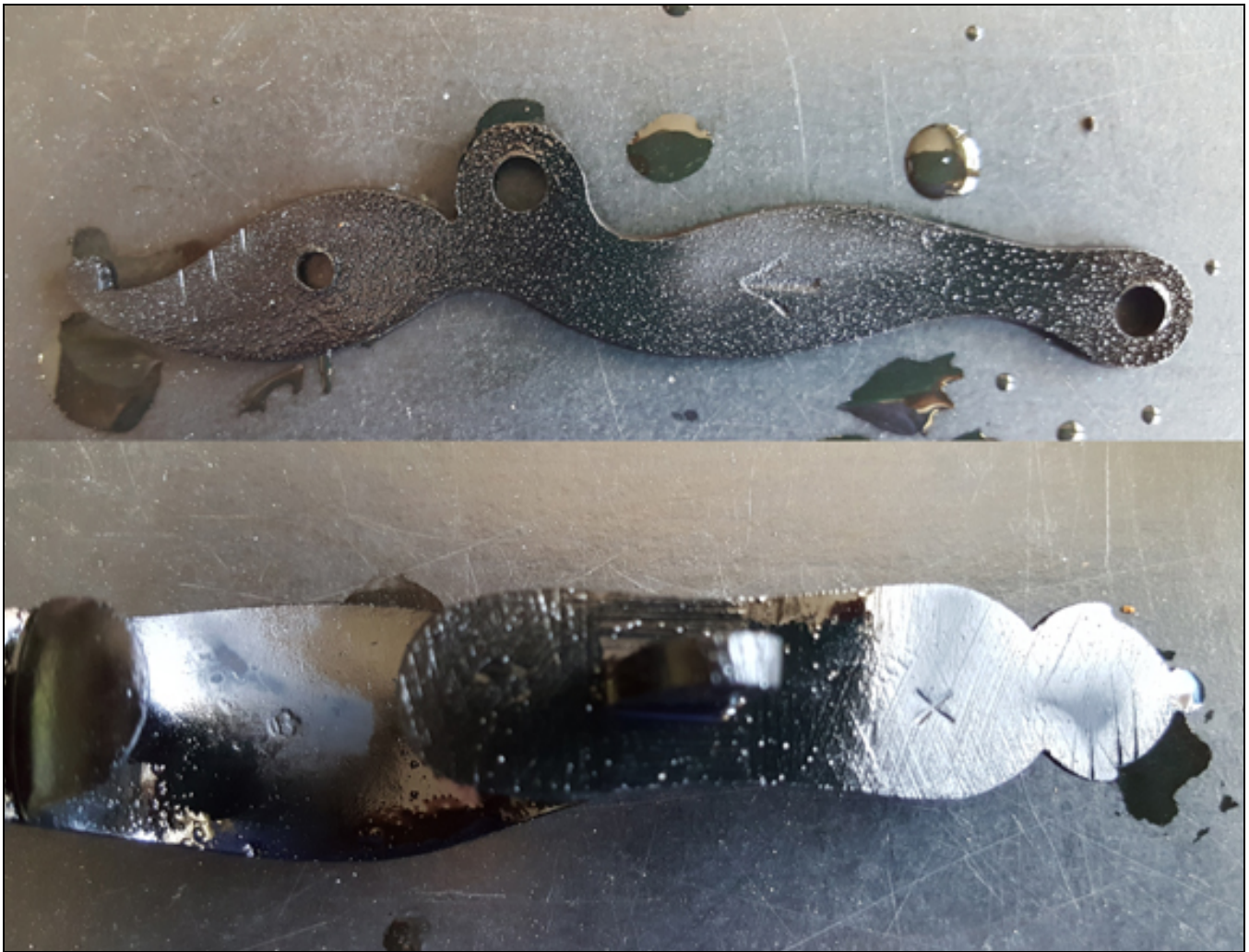


**Figure 95. The Sea Service pistol, 13S-353.2, once separated from its surrounding concretion. Top: the pistol shortly after initial cleaning, with epoxy resin present (white in middle of gun) to cast the hollow where the lock would have originally been set. At this time, the brass trigger guard and iron barrel remains were still in place and filled with concretion. Bottom: the pistol after the removal of the barrel, trigger guard, and side plate, its wooden stock cleaned completely of concretion. At this time of this photograph, and also at the time of this writing, the only brass fittings remaining are the butt cap, ramrod pipe, and ramrod tip.**

designated Field Specimen 13S-13S-353.2 (Figure 95).

Unlike the more ornate Land Service pattern of handguns, the Sea Service variants were of a minimalist design that simplified production and maintenance of weapons that were destined to serve a shorter service life in the saltwater environs of a ship at sea. This particular example was readily identifiable in CT imaging by the overly simplified yet heavily reinforced “skull crusher” style brass butt cap, flat side plate, and the use of a single brass trumpet pipe to hold a wooden ramrod. This pistol was found to be missing its lock, and its barrel was corroded away, but otherwise it remained in near perfect condition. The wooden stock when cleaned of concretion was found to be in remarkable condition, and at the time of this writing is awaiting only the removal of the butt cap and two pieces of ramrod furniture (tip and trumpet pipe) before wood conservation can begin (Figure 95). As conservation progressed, markings have been found on the interior surfaces of the brass furniture components that have been removed. The trigger guard has a crown visibly located in the inner curvature, and three distinct scratches and an X on the inner side of the tang (Figure 96, bottom). The side plate has a broad arrow and four deliberate





**Figure 96. Markings on the brass furniture removed from sea service pistol 13S-353.2. Top: the British broad arrow and three scratches found on the inner surface of the side plate. Bottom: the crown, “X”, and three scratches found in the inside surface of the trigger guard.**

scratches located on its interior surface (Figure 96, top). It is possible more markings will be revealed on the butt cap and ramrod pipe once they are removed.

It is clear from studying the x-ray image of this pistol that its lock is not missing because it has corroded away, but because it was not present on the gun when the ship wrecked. There was no trace of the lock or a void where it once was, as opposed to the iron barrel which had completely corroded, or the corroded components on the box lock pistol which was gone except for their voids preserved in concretion. This suggests that the lock had been removed for repair or replacement, and that this pistol was not in service at the time the ship was lost.

There were two variants of the Sea Service Pattern pistols in circulation during the American Revolution, differentiated by their respective barrel lengths. This example is of the “long” variant with a 12 inch, .56 caliber tapered round barrel with no sights and secured by two wire pins. The rammer with its tapered brass cap is made of wood rather than iron, so as not to rust in place while being stowed aboard ship. A shorter variant with a nine inch barrel was coming into circulation during the 1780s, but was not as common (Bailey 2009:89-92). Sea Service Pistols were stocked to the muzzle, and the brass

furniture consisted of one nearly cylindrical collared rammer pipe, with no tailpipe or trigger plate. The side plate sat flush with the wood stock and had an upward curving tail (Bailey 2009:89-92).

At sea it often became necessary to arm the crew with short notice in order to capture an enemy vessel or repel boarders. Sea Service pistols were typically stowed in the powder room or shot locker of a ship and kept under lock and key, under the guard of a Marine sentry. Only when the officers of the ship deemed it necessary for the conduct of the vessel, did they issue the order for pistols, muskets, cutlasses, boarding pikes and axes to be distributed among the crew. These weapons only went to specific men within the cannon crews who were to act as boarders, and then quickly re-collected when no longer needed to lessen the danger of mutiny (Gilkerson 1991:5). These were not items that a common sailor would have been allowed to keep on his person.

The existence of the sea service pistol, along with the three Brown Bess muskets, indicates a military presence aboard this ship. The fact that two of the muskets were loaded and ready to fire indicates the ship was under some sort of duress or that enemy ships were considered a clear and present danger. The two pocket pistols were not military issue, but personal belongings. These could have belonged to civilians or perhaps military officers who sometimes purchased quality side arms as personal possessions. The mix of military and civilian weaponry supports the working hypothesis that this ship was a private transport chartered to participate in the December 1782 evacuation of troops and civilians from Charleston, South Carolina at the end of the Revolutionary War.

#### *Small Arms Ammunition*

Other than the three buck shot described earlier (pp. 145-146), only two types of small arms ammunition have been found on the Storm Wreck site to date, lead musket or pistol balls and tiny lead pellets intended as scatter shot, sometimes known as “Rupert shot.” Musket or pistol balls were first found on the site during the 2011 season, in small numbers, and more were recovered in 2012 and 2013 (Table 10). In contrast, large quantities of Rupert shot were found in 2010, and fewer were recovered from the 2011-2013 excavation areas.

Musket balls intended for the Brown Bess muskets were likely meant to be used in conjunction with paper cartridges, used by British forces at least as early as 1685. From the early 1740s, the paper cartridge was the standard form in which military ammunition was prepared and carried in the British services (Bailey 2009:246). The cartridge acted as a means to have all the necessary ingredients for firing the smoothbore musket readily at hand: within the paper tube of the cartridge was the lead shot, and black powder necessary for priming the lock and loading the weapon. The paper of the cartridge was rammed down the barrel along with the lead shot to serve as wadding to secure the powder and ball within the barrel, keeping the contents from spilling out.

There were two basic categories of musket cartridge, service and practice. The types of standard musket service cartridge were: ball, buck and ball, and buckshot. The buck and ball cartridge contained one ball and four buckshot of .32-inch caliber, and the buckshot cartridge contained fifteen buckshot. The buck and ball load in musket 12S-197.1 seen in Figure 82 should have had, by strict Army standards, four buckshot instead of just three, and the load of birdshot observed in musket 12S-236.1 and seen in Figure 87 was not a standard load at all. There were a number of changes to the size of the powder charges during the Revolutionary War due to logistics and the allowances of powder ordered to regiments in the field, but the rough average was 6 drams or 165 grains of powder per cartridge (Bailey 2009:247). Cartridges were manufactured by groups of men from each regiment, often gathered together periodically with the Artillery and supervised by an artilleryman, using wooden cartridge formers, ball, paper, tin measures and twine supplied by the Artillery (Bailey 2009:250).



**Table 10. Musket or pistol balls recovered from Storm Wreck, 2011-2013**

<b>Field Specimen</b>	<b>Diameter (cm)</b>	<b>Diameter (in.)</b>	<b>Weight (g)</b>	<b>Unit</b>	<b>Notes</b>
11S-113.2	1.51	0.594	20.88	12	Conserved since first reported
12S-261.1	1.651	0.650	20.9	19	Hole for use as fishing weight
12S-279.1	1.554	0.612	17.8	15	Flat spot, probably cut sprue
12S-285.1a	1.754	0.690	29.6	11	No hole, sprue, or casting seam
12S-285.1b	1.654	0.651	24.4	11	Hole; flat spot (prob. cut sprue)
12S-285.1c	1.724	0.780	25.1	11	Hole; sprue
12S-285.1d	1.677	0.660	24.7	11	Hole, sprue
12S-285.1e	1.704	0.671	24.5	11	Hole; sprue
12S-285.1f	1.679	0.661	24.1	11	Hole; flat spot (prob. cut sprue)
12S-285.1g	1.685	0.663	23.5	11	Hole; flat spot (prob. cut sprue)
12S-285.1h	1.678	0.660	18.1	11	Hole, partially formed in mold
12S-285.1i	1.678	0.660	24.7	11	Hole; flat spot (prob. cut sprue)
12S-285.1j	1.688	0.664	14.6	11	Very large hole
12S-285.1k	1.659	0.653	18.9	11	Hole; partially formed in mold
12S-285.1l	1.940	0.765	30.7	11	Flattened with dimples
13S-310.5a	1.70	0.669	29.7	25	Possible bite marks
13S-310.5b	1.75	0.689	31.0	25	No sprue or casting seams
13S-310.5c	1.71	0.673	30.4	25	Possible bite marks
13S-310.5d	1.72	0.677	30.4	25	Prominent seam
13S-310.5e	1.46	0.575	15.3	25	Poss. bite marks and sprue
13S-310.5f	1.76	0.693	26.9	25	Elongated and flattened side
13S-310.5g	1.73	0.681	30.2	25	Poss. bite mark & prom. seam
13S-310.5h	1.73	0.681	30.8	25	Prominent seam
13S-310.5i	1.72	0.677	30.9	25	Possible bite marks
13S-310.5j	1.72	0.677	30.8	25	Possible bite marks
13S-310.5k	1.84	0.724	30.4	25	Pinched and prominent sprue
13S-310.5l	1.75	0.689	30.9	25	Flattened, no visible sprue
13S-375.1	1.700	0.669	25.96	18	Prominent sprue and seam
13S-378.1a	1.496	0.589	17.9	18	Little if any sprue
13S-378.1b	1.424	0.561	14.5	18	Prominent sprue and seam
13S-378.1c	1.443	0.568	14.1	18	Prominent sprue and seam

*Note: This table does not include specimens that are still encased in concretion (11S-107 and 11S-152) or associated with the loaded musket (12S-197.1) and conserved by the Florida Bureau of Archaeological Research.*

Another variant often employed on service was the blank cartridge was a “rolling ball.” These were frequently called for when soldiers mounted guard duties, so that the tedious and often impossible task of drawing the charges when coming off duty could be avoided and the ball cartridges as well as powder and ball saved. It simply meant that the naked ball, not wrapped in paper, would be rolled down the barrel and lie against a blank cartridge and at the end of the watch, rolled back out of the barrel so the blank could be either drawn or harmlessly fired off (Bailey 2009:249). The remains of paper and wadding found in musket 12S-197.1 and seen in Figure 83 indicate that these muskets did not employ a rolling ball but were properly loaded and ready for action.

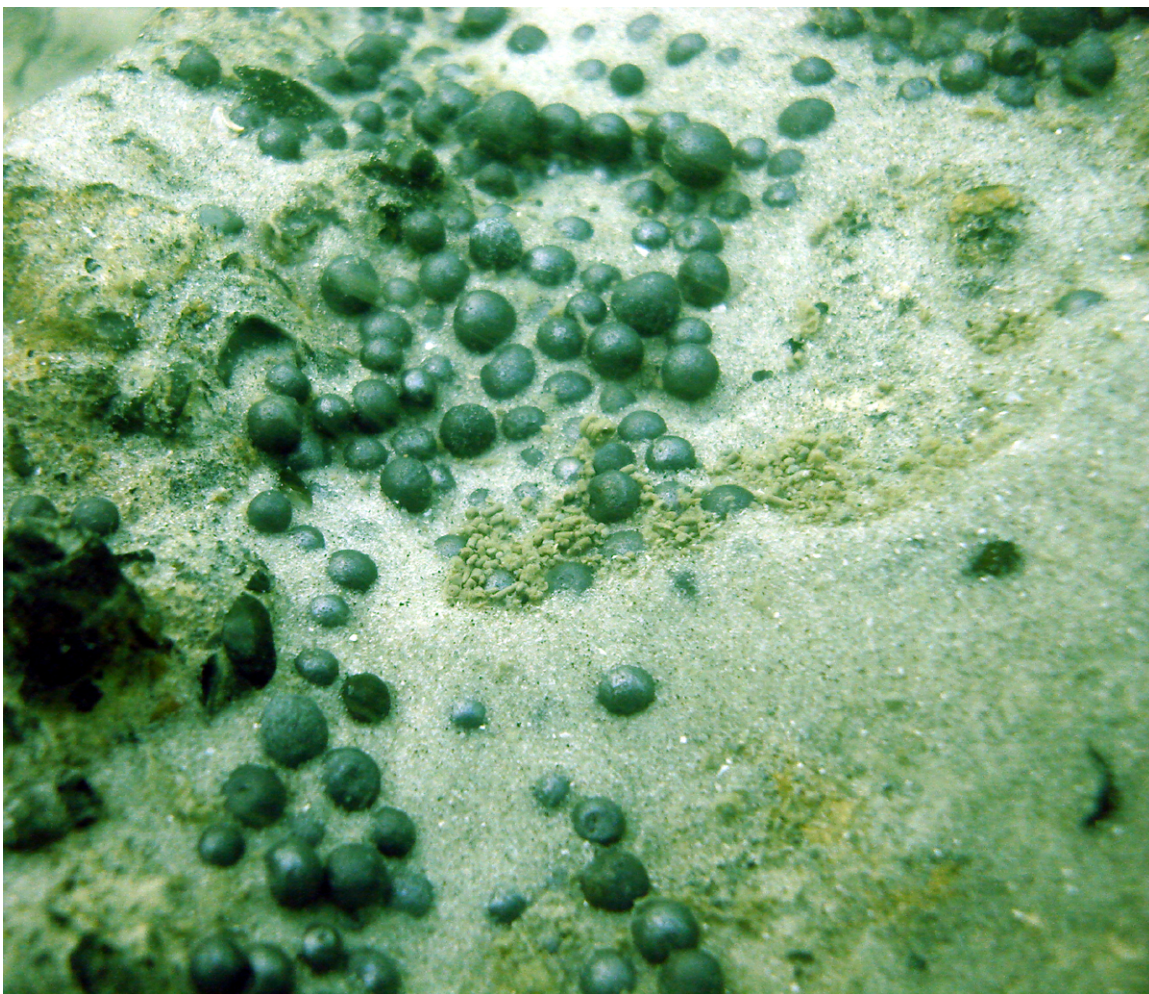
The official size of musket ball dictated for use by British services was a .693 inch ball, which equated to fourteen and a half musket balls manufactured per pound of lead (Bailey 2009:249). This was smaller than the actual bore size of the British Land pattern Musket, which was .750 in. to allow for the powder-fouling that accumulated inside the barrel after firing. After firing several shots without cleaning, the fouling would gradually reduce the diameter within the musket barrel, making the loading process more difficult with each successive shot.

Only three musket balls were recovered in the 2011 season, all in concretions. One of these, 11S-113.2, has been conserved, while the others, 11S-107 and 11S-152, remain encrusted and have not yet been observed with the naked eye. In 2012 fourteen additional examples of round musket shot were recovered from the Storm site, not including the single specimen found in musket 12S-197.1 loaded with buck and ball (Figure 82). These were designated 12S-261.1 and 12S-279.1, recovered individually, and 12S-285.1, which represents a lot of 12 musket balls recovered from within Unit 11. In 2013, four additional lead shot were recovered, all from Unit 18, designated 13S-375.1 (one ball) and 13S-378.1 (three balls). In general, the manufacture of the Storm Wreck musket and pistol shot is crude; most balls appear to have been made with a hand operated bullet mold of two halves, often leaving a casting sprue on the ball where the lead was poured into the mold. Some show that when formed the two sides of the mold were not exactly aligned, making the ball misshapen and not perfectly round. The casting sprues on the balls are in most cases not trimmed, or poorly trimmed to leave a flat spot, and no attempt appears to have been made to refine or clean the roughness of these shot. The size range for most examples falls between .631 and .678 inches, acceptable calibers for firing from a Land Pattern musket. Five specimens are smaller, ranging from .561 to .612 in., and might have been intended for pistols (though the sea service pistol is believed to be slightly smaller at .560 caliber). Three balls were larger, between .690 and .780 in. Table 10 displays the characteristics of recovered small arms shot which have been cleaned of concretion.

Interestingly, many of these lead shot were not intended for use as ammunition. Of particular note are the balls making up Field Specimens 12S-285.1 and 12S-261.1. Eleven of these were fashioned with a hole through the middle, presumably for use as fishing or net weights. They are described in more detail in Meide et al. 2014:194-196 and Thomson 2016:198-200.

The other type of small arms ammunition encountered on the site were tiny lead pellets or birdshot, sometimes known to archaeologists as Rupert shot (Figure 97). In addition to the Musket 12S-236.1 that was loaded with Rupert shot (p.148, Figures 81, bottom, and 87), thousands of these pellets in the 2.5 mm to 5 mm size range were recovered during the 2010 season (excavating Units 0-5), for a total of 26.27 kg or 57.90 pounds (Meide et al. 2011:127-131). The birdshot are mostly concentrated in the 2010 area, as only 16.71 g (0.59 oz. or 0.037 pounds) were recovered in 2011 and 7.55 kg (16.64 pounds) in 2012. Of the 2012 Rupert shot, 6.22 kg (13.72 pounds) or 82.5% of that year's total came from excavation in the 2010 area (Units 0-6). This means that some 96.2% of the total weight of Rupert shot recovered from 2010 to 2012 came from the 2010 excavation area (Units 0-6). Just over half of this shot came from Unit 4. It seems clear that a keg of this shot must have been broken open in this vicinity sometime during or after the wrecking process.

In 2013, when excavations opened up mostly south of the 2011-2012 area abutted the 2010 excavation area, more birdshot were encountered than in the previous two years. A total of 16.498 kg or 36.37 pounds of birdshot were recovered in 2013, more than twice than was recovered in 2011-2012 but around 62.8% of that recovered in 2010. The Rupert shot encountered in 2013 was most heavily concentrated in Units 28, 29, 21, and especially 22 and 30.



**Figure 97. Tiny lead shot or pellets photographed *in situ* in Unit 1, SW quadrant, on 13 July 2010. Known as “Rupert shot” because they were first publicized by the German-born Prince Rupert in 1665, they bear the distinct characteristics derived from their manufacturing process: varied sizes, slightly ovoid in shape, and a slight dimple on the more flattened side. Shot size ranges from 2.5 mm to 5 mm.**

Table 11 lists all of the Rupert shot recovered through the 2013 season by field specimen number, and Table 12 shows the distribution by unit number.

These lead pellets were utilized as hailshot, meant to be scattered when fired like modern shotgun pellets. Thus they were likely to have been used when hunting birds or game, though they could have served as anti-personnel ammunition, either from small arms or possibly from artillery. This scenario is evidenced by musket 12S-236.1 which was found to be loaded with Rupert shot (Figures 81, bottom and 87). The majority of the Storm Wreck hailshot are equivalent in size to modern shot ranging from No. 7 ½ to No. 1. The smaller sizes are considered appropriate for hunting small fowl such as pigeons or partridges, and the larger for hunting large birds such as turkey or game as large as deer. The hailshot would not have been separated by size, as is typical with modern shotgun cartridges, but would have been stored and used collectively, to fire a blast of mixed sized shot.

Similar tiny lead projectiles have been recovered from other colonial shipwreck sites including *La Belle* (1686), *Queen Anne’s Revenge* (1718), and *Machault* (1760) (Bruseh and Turner 2005:96; North Carolina Underwater Archaeology Branch 2010; Bryce 1984:52,55). The manufacturing process for this

**Table 11. Weight of all Rupert shot recovered from the Storm Wreck 2010-2013, by FS Number.**

Field Specimen No.	Provenience (Unit No.)	Weight		Percentage of total
		grams	pounds	
10S-07.1	1	423.8	0.930	0.8457%
10S-18.1	2	323.0	0.710	0.6457%
10S-19.1	2	0.6	0.001	0.0009%
10S-29.1	1	3.7	0.010	0.0090%
10S-32.1	3	697.8	1.540	1.4005%
10S-55.1	4	0.2	0.0004	0.0004%
10S-61.1	4	11507.7	25.370	23.0728%
10S-62.1	4	1.3	0.003	0.0027%
10S-63.1	1	0.3	0.0007	0.0006%
10S-67.1	5	13.6	0.03	0.0273%
10S-69.1	2	0.7	0.002	0.0018%
10S-72.1	1	1.5	0.003	0.0027%
10S-74.1	4	1.3	0.003	0.0027%
10S-76.1	0	5.6	0.012	0.0132%
10S-77.1	3	3439.8	7.580	6.8936%
10S-83.1	0	3288.5	7.250	6.5935%
10S-86.1	3 (overburden)	0.8	0.002	0.0018%
10S-90.1	4	1925.6	4.250	3.8651%
10S-93.1	0 & 4 (overburden)	946.8	2.090	1.9007%
10S-94.1	1 (overburden)	604.1	1.330	1.2095%
10S-96.1	3	2142.0	4.720	4.2926%
10S-98.1	0	928.8	2.050	1.8643%
10S-99.1	No provenience	7.5	0.017	0.0155%
<b>Total Weight 2010 Field Season:</b>		<b>26,265.0</b>	<b>57.904</b>	<b>52.6610%</b>
11S-156.3	13	5.62	0.012	0.0109%
11S-168.1	8,14,15,18 (overburden)	10.0	0.022	0.0200%
11S-175.1	9	1.1	0.002	0.0018%
<b>Total Weight 2011 Field Season:</b>		<b>16.72</b>	<b>0.036</b>	<b>0.0327%</b>
12S-199.1	0,1,2,3,4,5 (overburden)	3,486.5	7.686	6.9900%
12S-239.3	21	33.0	0.073	0.0664%
12S-242.5	15	39.24	0.090	0.0819%
12S-260.1	19	204.2	0.450	0.0409%
12S-265.1	19	323.5	0.713	0.6484%
12S-268.1	19	3.4	0.007	0.0064%
12S-272.1	21	641.0	1.410	1.2823%
12S-278.1	7	1.0	0.002	0.0018%
12S-284.1	1,2,3,4 (overburden)	476.8	1.051	0.9558%
12S-287.1	6	98.7	0.218	0.1982%
12S-288.1	15	0.5	0.001	0.0009%
12S-290.1	3	533.3	0.176	0.1600%
12S-295.1	0,1,2,3,4,5,6 (overburden)	1627.8	3.589	3.2640%
12S-298.1	8	78.8	0.174	0.1582%
<b>Total Weight 2012 Field Season:</b>		<b>7,547.74</b>	<b>15.640</b>	<b>14.2238%</b>

**Table 11 (continued). Weight of all Rupert shot recovered from the Storm Wreck 2010-2013, by FS Number.**

Field Specimen No.	Provenience (Unit No.)	Weight		Percentage of total
		grams	pounds	
13S-313.1	28	2301.0	5.070	4.6111%
13S-326.1	28,29,21,22 gen. prov.	80.6	0.180	0.1637%
13S-332.3	30	66.98	0.150	0.1364%
13S-333.4	30	38.74	0.090	0.0819%
13S-336.6	31	24.01	0.050	0.0455%
13S-338.3	31	114.92	0.250	0.2273%
13S-339.4	31	2.17	0.005	0.0045%
13S-340.2	31	15.55	0.030	0.0273%
13S-343.4	31	1.01	0.002	0.0018%
13S-344.3	31	52.23	0.120	0.1091%
13S-345.9	31	0.52	0.001	0.0009%
13S-347.2	32	12.65	0.030	0.0273%
13S-349.3	32	9.12	0.020	0.0182%
13S-350.5	32	23.78	0.050	0.0455%
13S-373.4	18	16.01	0.040	0.0364%
13S-374.2	18	2.18	0.005	0.0045%
13S-379.1	18	86.1	0.190	0.1727%
13S-380.1	31	2.6	0.006	0.0055%
13S-381.1	27	7.0	0.020	0.0182%
13S-382.1	26	1.6	0.004	0.0036%
13S-383.1	27	177.0	0.390	0.3546%
13S-384.1	29	806.2	1.780	1.6189%
13S-385.1	27	0.8	0.002	0.0018%
13S-387.1	21	1356.4	2.990	2.7192%
13S-389.1	28	227.2	0.500	0.4547%
13S-392.1	30	5312.82	11.710	10.6497%
13S-393.1	28	6.1	0.010	0.0091%
13S-394.1	25	0.6	0.001	0.0009%
13S-395.1	31	142.0	0.310	0.2819%
13S-396.1	32	125.9	0.280	0.2546%
13S-397.1	22	1875.5	4.130	3.7562%
13S-398.1	22	3608.8	7.960	7.2392%
<b>Total Weight 2013 Field Season:</b>		<b>16,498.09</b>	<b>36.376</b>	<b>33.0823%</b>
<b>Total Weight 2010-2013 Field Seasons:</b>		<b>50,327.55</b>	<b>109.956</b>	<b>100%</b>

*Note: "Overburden" signifies sand that slumped into a unit after initial excavation, so shot may have originated in neighboring areas. Shot still embedded in concretions are not included in this table. Note that some weight totals for the 2010 season have been reduced from previously reported numbers, due to re-weighing after deconcretion and thorough drying.*

**Table 12. Weight of all provenienced Rupert shot 2010-2013, by excavation unit.**

Unit No.	Weight		Percentage
	grams	pounds	
0	4,222.9	9.309	9.800%
1	429.3	0.946	0.996%
2	324.3	0.715	0.753%
3	6,812.9	15.020	15.812%
4	13,436.1	29.622	31.185%
5	13.6	0.030	0.0316%
6	98.7	0.218	0.230%
7	1.0	0.002	0.002%
8	78.8	0.174	0.183%
9	1.1	0.002	0.002%
10	0	0	0.000%
11	0	0	0.000%
12	0	0	0.000%
13	5.62	0.012	0.0126%
14	0	0	0.000%
15	39.74	0.088	0.093%
16	0	0	0.000%
17	0	0	0.000%
18	104.29	0.230	0.242%
19	531.1	1.171	1.233%
20	0	0	0.000%
21	2,030.4	4.476	4.712%
22	5,484.3	12.091	12.729%
23	0	0	0.000%
24	0	0	0.000%
25	0.6	0.001	0.001%
26	1.6	0.004	0.004%
27	184.8	0.407	0.428%
28	2,534.3	5.587	5.882%
29	806.2	1.777	1.871%
30	5,418.54	11.946	12.576%
31	355.01	0.783	0.824%
32	171.45	0.378	0.398%
<b>Total</b>	<b>43,086.65</b>	<b>94.989</b>	<b>100%</b>

*Note: This table does not include 7.24 kg of shot recovered 2010-2013 from general proveniences (overburden recovered from more than one unit) or with no provenience, or any shot still embedded within recovered concretions.*

type of shot was invented by and first described in 1665 by Prince Rupert of the Rhine, a German-born nobleman, soldier, general, admiral, and scientist who was the grandson of England's James I (Dircks 1867:221; Bryce 1984:55).

The Rupert shot was made by pouring the melted lead through a brass colander-like affair mounted a foot or so above a pan of water. The lead, fluxed with arsenic, was poured through live coals in the colander and dripped through to the water below. Since not enough time elapsed in the drop to permit surface tension to form a perfect sphere, the resulting shot is slightly ovoid in cross-section and has a slight dimple on the more flattened side (Hamilton 1976:35).

This process was eventually refined in the late 18th century, when multi-storied shot towers were used to greatly increase the distance the drops of lead would fall, resulting in more perfect spherical shot. This more advanced method of lead shot manufacture was patented by William Watts of Bristol in 1782, but the simplicity of the Rupert process, which did not require a specialized building, ensured that this method would continue well into the 19th century.

### ***Ship's Hardware, Fittings, and Equipment***

#### ***Chainplate***

In 2012 a long, curved concretion, designated 12S-241.1, was raised from Unit 21. Initially believed to be another musket, or perhaps even a cavalry saber, x-rays illustrated a long curved iron bar or rod, which researchers believe may represent a chainplate (Figure 98). First presented in the concretions section of the 2011-2012 report (Meide et al. 2014:301-303), the concretion has been mostly airscribed and its individual components separated and catalogued, including the potential chainplate (designated 12S-241.2), a copper alloy tack (12S-241.3), a copper alloy shoe buckle (12S 241.4), and a truncated pewter spoon (12S-241.5), all of which are discussed elsewhere in this report. Only the very end of the chainplate, which features an eye or bifurcation surrounded by several pieces of lead shot, remains concreted at this time. The exposed chainplate is square in cross-section. Although it is deteriorated in places, when measuring surfaces that appear to be original, the bar is approximately 3 x 3 cm (1.18 in. x 1.18 in.).

Chainplates evolved significantly over the 18th century and into the 19th century. Used to secure the standing rigging to the outer hull, they began as short-link chains, followed by long-lined chains, and then loops of rod iron towards the late 18th century (Meide et al 2014: 302). This specimen most closely resembles the iron rod chainplates that were common towards the mid-19th century, depicted in Figure 99. This would post-date the 1782 date of the Storm Wreck, which suggests 12S-241.1 is either not a chainplate at all, or that it may represent an early example of this design (Meide et al. 2014:302). Given the similarity in shape between this object as seen in the lower view of Figure 98 and the drawing in Figure 99, the latter explanation may be the more likely. Field Specimen 12S-241.2 is currently in wet storage awaiting the removal of the last bits of concretion, after which it will undergo further conservation treatment.

#### ***Navigational Dividers***

In 2010, LAMP recovered a concretion (10S-041.1) from Unit 0 which contained hooks, hanks, nails, and a set of navigational dividers (Burkett 2016:165). The dividers have since been deconcreted and designated 10S-041.2 (Figure 100). An important yet simple navigational instrument used to take measurements and plot points on nautical charts, dividers are composed of two legs that open from a hinge at the top of the tool, and have sharp points, often removable and made from iron or steel, at the end of each leg used for plotting points (Meide et al. 2011:162-163; West 2005:69). The Storm Wreck dividers did not survive conservation fully intact and no longer have these sharp iron tips, which is often the case with dividers recovered from wreck sites.



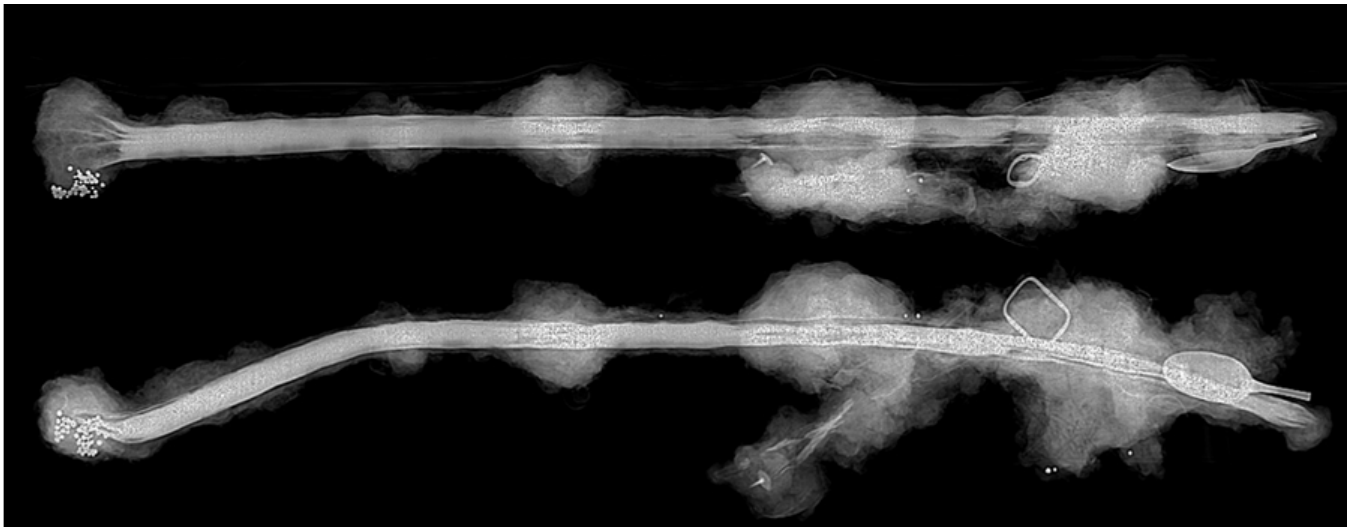


Figure 98. Two x-ray images of concretion 12S -241.1, containing a long, curved iron bar that may represent a chainplate. Most shoe buckle, pewter spoon, tack, and most of the possible chainplate have been de-concreted. The left end of the chainplate, which features either an eye or bifurcation, and the lead shot visible around it, remain in concretion at this time.

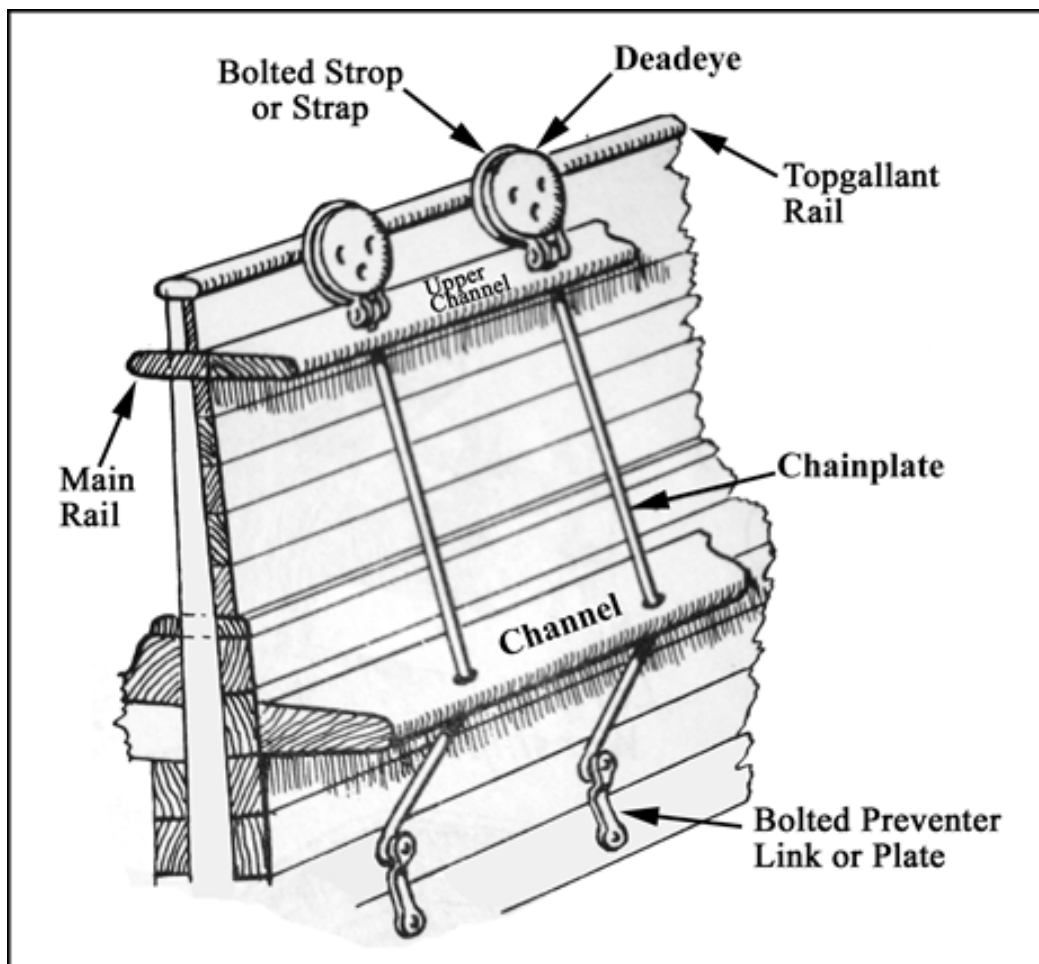


Figure 99. Schematic of a double-channel chainplate assembly. The design depicted here was standard by the mid-19th century and it may therefore post-date the Storm Wreck, though the iron fitting seen in Figure 98 does seem similar in form to the chainplate shown here. From Campbell 1995:Figure 19.





**Figure 100. Field Specimen 10S-041.1, a set of brass navigational dividers.**

Most dividers were made of brass or iron. Generally, iron dividers were used in carpentry for taking and transferring measurements, and brass dividers were used at sea for navigation (West 2005:68). Made of brass, the dividers from the Storm Wreck are currently stored in a sodium carbonate solution awaiting electrolysis. They measure 7.2 cm (2.83 in.) in length and 1.3 cm (0.51 in.) in width at the end farthest from the hinge. The diameter of the hinge is 1.4 cm (0.55 in.), and the width of the hinge is 1.0 cm (0.39 in.). Navigational dividers are commonly found on shipwreck sites. Just a few examples include: the 1798 wreck *Colossus* (1 pair), the 1653 *Lastdrager* (80 pairs), the 1686 *La Belle* (12 pairs), and the 1707 *Association* (3 pairs) (West 2005:70; Cook and Swanick 2017:339).

Dividers were not only essential for navigation and piloting, but also for sector rule calculation. Navigators used dividers to take distance measurements from the sector rule, and then transferred those measurements to the scales on the instrument (Smithsonian 2016). These dividers could have been used in conjunction with the sector rule (13S-341.1) found on the Storm Wreck and discussed below. Suitable for a variety of purposes by artisans, carpenters, engineers, and navigators, this simple but efficient tool remains in use today.

### *Sector Rule*

In 2013, archaeologists recovered a brass sector rule, 13S-341.1, from the northeast quadrant of Unit 31 (Figure 101) (Burkett 2016:166-167). The sector rule was a common navigational instrument and calculation device developed in the late 1500s by British mathematician Thomas Hood and Italian mathematician Galileo Galilei. Galileo designed the sector rule to help in solving military problems related to cannons and fortifications, but eventually the sector rule became a simple calculation device (Smithsonian 2016). In the early 1600s, Edmund Gunter used the basic principles of Hood's design to create an instrument solely used for calculation. He noticed that a device capable of quick and simple calculations was much needed, especially among seamen. His book, *De Sectore & Radio* (1623),



**Figure 101. Field Specimen 13S-341.1, a brass sector rule. This sector rule was closed when discovered but after conservation could be opened to expose the inner stabilizing arm, as seen here.**

allowed widespread understanding and application of the principles of an instrument that would be in common use for over 250 years (Waters 1958: 416-417; Hopp 2009: 7).

The sector rule follows the principle that corresponding sides of similar triangles are proportional. The two sides, or legs, of the instrument move about a central joint, and measurements are taken using dividers from scales inscribed on the legs (Hopp 2009: 7). The earliest sector rules had wooden joints with brass plates attached to the outside to strengthen the otherwise weak junctures, but eventually rule makers began making stronger metal joints that were attached to the wooden sides of the instrument (Doubleday 2013: 203). The scales included on sectors vary, but most include scales for measuring inches, decimals, chords, sine, tangent and longitude. Sector rules differ in length and material, although six inch rules of boxwood, ivory, or brass are most common (Hopp 2009: 7). The Storm Wreck sector rule is 15.2 cm (5.98 in.) long and 3.7 cm (1.22 in.) wide. The thickness of each leg is 0.3 cm (0.12 in.)

In researching the sector rule, several features on this specimen stood out. First, at the end opposite the hinge, there are small notches in the sides of the legs. On the inside of one leg there is a thin, brass stabilizing arm (Figure 101). This arm can be pulled outward and then inserted into the notches on the opposing leg, which allows more accuracy as it holds the angle in place while measurements are taken. The stabilizing arm is 13.0 cm (5.12 in.) long, 1.0 cm (0.39 in.) wide, and 0.1 cm (0.04 in.) thick. Second, the sector rule has single letters labeling its scales. Many sector rules from the same time period say “LON” for longitude or “SIN” for sine, rather than “L” for longitude or “S” for sine (Smithsonian 2016). Third, on the hinge side of the sector rule there is one word inscribed on each leg (Figure 102).



**Figure 102.** The lower leg of the sector rule appears to be marked with the word “London,” but researchers were unable to decipher the word visible on the upper leg.

The word inscribed on the lower leg appears to say “London”. Unfortunately, even after researching and comparing the names of rule makers from 18th century London, researchers were unable to decipher the word on the upper leg. At the end of the 17th century there were only three or four rule makers, each employing a few apprentices, but by 1866 the numbers had risen to 400 or 500 rule makers. (Doubleday 2013: 203) This rapid increase of manufacturers makes it extremely difficult to find the maker’s name.

It is possible that the dividers, 10S-041.2, found on the site in 2010 and described above could have been used to take measurements from this sector rule. Examples of similar sector rules can be found in the Smithsonian's National Museum of American History collections. The sector rule in this collection manufactured by Williams Harris has several similarities to artifact 13S-341.1, including a stabilizing arm (Smithsonian 2016). Sector rules have been found on other 18th-century shipwrecks, including *Whydah* (1717) and *Queen Anne’s Revenge* (1718).

### *Bricks*

A number of bricks have been found on the Storm Wreck and, due to their limited numbers, are believed likely to represent a fireproofing structure associated with the galley hearth or stove rather than a cargo. Overall, six whole bricks and six partial bricks have been collected, with one additional partial brick concreted to a cannon and measured but not collected (Table 13). During the 2013 season one complete red clay brick and one fragment, both designated 13S-309.1, were recovered from the southeast quadrant of Unit 25 (Figure 103). Their dimensions do not differ greatly from bricks recovered in previous years. None of the Storm Wreck bricks are exactly the same size, though they tend to fall in a range roughly comparable to that of a number of other bricks recovered from colonial British contexts (Tables 13-14).

**Table 13. Storm Wreck Brick Dimensions**

Field Specimen No.	Length		Width		Thickness	
	inches	cm.	inches	cm.	inches	cm.
<i>2011</i>						
11S-105.1	8.66	22	4.1	10.49	2.16	5.48
11S-106.3 (partial)	n/a	n/a	n/a	n/a	2.44	5.7
11S-106.4 (partial)	n/a	n/a	3.6	9.5	2.45	6.2
11S-123.1 (partial)	n/a	n/a	3.9	10	2	5
11S-139.1	8.26	21	3.93	10	2.16	5.48
11S-143.1	8.46	21.48	4.33	10.99	2.44	5.7
<i>2012</i>						
12S-209.1	8.50	22	4	10.50	2.06	5.25
12S-215.1 (partial)	n/a	n/a	3.74	9.5	2.06	5.25
12S-250.1 (partial)	n/a	n/a	4	10	2.5	5.75
12S-251.1	8.66	22	4.13	10.5	2.15	5.5
Attached to Cannon 4 (partial, not collected)	n/a	n/a	4.25	10.79	2	5.08
<i>2013</i>						
13S-309.1 (whole)	8.11	20.6	3.70	9.4	2.17	5.5
13S-309.1 (partial)	n/a	n/a	3.54	9.0	2.28	5.8

*Note: Only dimensions from intact sides of bricks are presented here, in order to compare with other bricks of known sizes.*

**Table 14. Comparison of English brick royal standards and colonial brick sizes (from Meide 1994:Table 1)**

Brick	Length		Width		Thickness	
	fraction	decimal	fraction	decimal	fraction	decimal
<i>English Royal Standards</i> (Lloyd 1925)						
1571, Elizabeth I	9	9.0	4 ¼	4.25	2 ¼	2.25
1625, Charles I	9	9.0	4 3/8	4.38	2 ¼	2.25
1725, George I (Place Bricks)	9	9.0	4 ¼	4.25	2 ½	2.5
(Stock Bricks)	9	9.0	4 ¼	4.25	2 5/8	2.63
1729, George II (within 15 miles of London)	8 ¾	8.75	4 1/8	4.13	2 ½	2.5
1769, George III	8 ½	8.5	4	4.0	2 ½	2.5
1776, George III	8 ½	8.5	4	4.0	2 ½	2.5
<i>English and American Colonial Bricks</i>						
Typical 18th century colonial brick (Nöel Hume 1969)	8 ¾	8.75	4	4.0	2 5/8	2.63
Nöel Hume “English” brick (small, cherry red), mid-18thC	7 ½	7.5	3 ½	3.5	2	2.0
Brunswick brick (small), 1725-1775 (South 1964)	7 ½	7.5	3 ½	3.5	1 ½	1.5
Brunswick brick (large), 1725-1775 (South 1964)	9	9.0	4 1/8	4.13	2 5/8	2.63
Williamsburg brick, 1719 (South 1964)	9	9.0	4 ¼	4.25	2 ¼	2.25
Jamestown brick (small), 1650 (South 1964)	8 ½	8.5	4 1/8	4.13	1 7/8	1.88
Jamestown brick (large), 1650 (South 1964)	9	9.0	4 3/8	4.38	2 ½	2.5
Fort George brick, Pensacola, 1765-1775, (Lazarus 1965)	9 ¼	9.25	4 ¼	4.25	2 ½	2.5





**Figure 103. Field Specimen 13S-309.1 showing possible charring.**

Little can be surmised from these bricks based on their size alone. While it is true that formal standards for brick sizes have existed through time (as seen in Table 14), adherence to those standards seems to have been inconsistent at best (Meide 1994:13-14). Likewise, South (1964) asserts that evidence “from Jamestown and Williamsburg has indicated that the size of bricks is generally of little value as a sensitive indicator for dating.” Variations in manufacturing processes and in firing temperature, or simply plain disregard for standards, meant that literally countless variations of brick size existed.

Researchers discovered no discernible marks or brands on the 2013 bricks, other than possible burn marks or charring on some of their sides (Figure 103). This is reminiscent of the burn patterns observed on specimens recovered in the 2012 excavation season and strengthens the hypothesis of researchers that the origin of the bricks is the lining of the ship’s galley, and not as ballast or cargo.

There are many examples of bricks being used for fireproofing ships' cooking areas. Galley structures varied in size and complexity depending on the vessel size and function and number of mouths to feed. The great warship *Vasa* featured a large but "simple cookhouse with fore and aft walls of brick and a 45 gallon cauldron suspended between them on an iron rod. The cauldron was heated over an open fire . . ." (Johnson 1982). In the case of a small, 18th-century merchant ship with few mouths to feed, food preparation needs might have been met by a modest brick hearth or a "caboose," a portable wooden structure equipped with a small stove or brick hearth designed to fit over a hatch (Broadwater 1996[2]:L14-L15). Examples of bricks associated with shipboard cooking facilities have been observed on British, French, American, Dutch, and Spanish wreck sites (Johnson 1982; Skowronek 1984b:29; Pearson and Hoffman 1995:149-151; Switzer 1998:191; Waters 1998; Bratten 2002:190; Martin 2005; Carnes-McNaughton 2007).

### *Fasteners*

A wide variety of fasteners have been recovered from the Storm Wreck, during the 2013 and previous field seasons. While it is not known if all of these fasteners were associated with the construction and maintenance of the ship, they are discussed here along with ship's fittings and equipment. Concretion 13S-345.1 contained several nails and what are probably two large staples. Researchers recovered the two staples from the concretion in the conservation laboratory. The staples 13S-345.7 measured 8.76 cm by 5.46 cm (3.45 in. by 2.15 in.) and 6.68 cm by 4.9 cm (2.63 in. by 1.93 in.) (Figure 104). Four large staples were also recovered during the 2010 field season. All were embedded within three concretions (Field Specimen numbers 10S-045.1, 10S-047.1, and 10S-049). One of these has since been deconcreted, 10S-045.3, while three others (two from 10S-047.1 and 10S-049) have been redeposited on the site in their original locations.

The Storm Wreck staples, if used in ship construction, may have functioned to hold the keel and false keel together, while still allowing separation in case of serious grounding (McCarthy 1996: 197). Usually made of copper alloy, keel staples had ragged or hooked ends and were similar in shape (if not in size) to the modern paper staple.

One iron fastener and one fragment of a potential iron fastener were cleaned from concretion (Figure 29EA) and designated 13S-339.3. The first was square-shanked and mostly intact, measuring 12.58 cm in length and 1 cm by 1.8 cm in cross section, with a head that while degraded may have originally measured 1.4 cm across. This could be a planking spike that was originally part of the Storm ship's hull fabric. The second object, which may not be a fastener at all, is narrow, measuring 0.9 cm by 0.2 cm, and mostly degraded with only 2.47 cm of its length intact (Figure 105).

Concretion 13S-320.1 is T-shaped and measures 77.0 cm in length and 51.0 cm across at one end (Figure 13EA). When x-rayed it appears to contain two small cylindrical fasteners with washers, perhaps not associated with the long fitting comprising the bulk of the concretion, which bears a ring at one end and is possibly a deck or ring stanchion. The nature of the two adjacent cylindrical fasteners is unclear as they cannot be fully examined until they are clear of concretion. The washers observed are either rings or roves used to clinch bolts into place (McCarthy 1996:191). Traditionally, these rings form the base for clinching the end of the bolts. The distal end of such a bolt is bent over and flattened against the ring, rove, or washer. This process is comparable to riveting, but is utilized at only the distal end of the bolt, as the proximal end would feature a manufactured head.



**Figure 104: Field Specimen 13S-345.7, partially deconcreted iron staples**



**Figure 105: Field Specimen 13S-339.3, iron fasteners**

In addition to the large fasteners found in 2013, an additional fifteen concretions were recovered from site consisting largely of nails or nail hollows. This brings the total number of concretions comprised mostly of nails to 35 (Table 15). Other perhaps than lead Rupert shot, nails are the most ubiquitous artifact encountered on the Storm Wreck (Jasper 2013:56-57). While stores of nails would typically be part of any ship's supplies, to allow the ship's carpenter to make repairs as needed during a voyage at sea, the vast quantity of nails found on Storm Wreck, which was known to be a refugee vessel, suggest

**Table 15. Storm Wreck concretions consisting primarily of nails.**

<b>Year and FS Number</b>	<b>Notes</b>
<i>2010</i>	
10S-41.1	Also contains reverse-eye hooks
10S-43.1	
10S-46.1	
10S-48.1	
10S-48.4	Also contains Rupert shot
10S-54.1	Also contains unidentified iron artifact
<i>2011</i>	
11S-103.1	Intact cask of nails, reburied on site
11S-147.1	
11S-142.1	
11S-122.1	Also contains a pewter spoon.
11S-121.1	
11S-109.1	Also contains lead fragments.
11S-107.1	Also contains musket shot
11S-141.1	
11S-153.1	
No number	Second, larger cask, not recovered
<i>2012</i>	
12S-200.5	Nails in a leather pouch, appear to be clenched nails (Figure 106).
12S-220.1	
12S-222.1	
12S-256.1	
12S-232.1	Nails appear to be clenched.
<i>2013</i>	
13S-310.1	Also contains spoon, tap key, fishing weight, musket shot, military buttons, and a croze blade.
13S-311.1	Also contains a possible button. To be reburied on site.
13S-312.1	Also contains lead shot and unid. artifact. To be reburied on site.
13S-314.1	Also contains worked slate.
13S-315.1	To be reburied on site.
13S-317.1	Also contains brass pins and lead shot. To be reburied on site.
13S-319.1	Also contains lead shot.
13S-323.1	To be reburied on site.
13S-329.1	Also contains clothing iron, lead shot, and possible cannon ball. To be reburied on site.
13S-335.1	Also contains cannon balls and L-shaped bar.
13S-337.1	Also contains lead shot and cauldron fragments. To be reburied on site.
13S-345.1	Also contains cannon balls, lead shot, button, and staples.
13S-346.1	To be reburied on site.
13S-368.1	Also contains a cannon ball. To be reburied on site.
13S-369.1	Also contains a partial barrel hoop and unknown artifact. To be reburied on site.

that many of these may have been personally owned by passengers and were brought as hardware supplies to St. Augustine. Nails and other hardware would have been in short supply in the town at this time, as St. Augustine was flooded with thousands and thousands of homeless refugees seeking promised plots of land to rebuild their homes, farms, and businesses. Hardware supplies of any type



would not have been left behind. The nails encountered on Storm Wreck typically range in size from 4 cm (1.57 in.) to 12 cm (4.72 in.) in length and all appear to be iron hand-forged nails typical of the eighteenth century. Condition of the nails ranges from complete, well-preserved nails to nail-shaped voids within concretions, where the bodies of the nails have completely or partially corroded away. At this time, many nails have been cleaned of concretion through aircsribing, some replica nails have been cast from nail voids preserved within concretions, and other concretions not yet subjected to aircsribings have been or are designated to be reburied on site.

In 2012, a bundle of nails was located in concretion 12S-200.1 (Meide et al. 2014:285-287). After breaking open the concretion, it became apparent that this was not simply a mass of nails but was a leather pouch full of nails, which had hardened as part of the concretion. The leather container could not be discerned in the x-ray image. The pouch of nails was assigned Field Specimen 12S-200.5 upon removal from the concretion (Figure 106). The pouch measures 22 cm (8.66 in) by 17 cm (6.69 in.). The iron fasteners inside the pouch are not visible. The upper portion of the pouch features a flap which is folded over on the front side, discernable by a seam. The fasteners observed within the pouch on the x-ray seem similar to those present in other Storm Wreck concretions.

### *Iron Bar*

A large L-shaped iron bar was recovered from Unit 31, in concretion with a cannonball (13S-335.2), a rigging thimble (13S-335.3), two small pieces of glass (13S-335.4 and 13S-335.5), and several small pieces of lead birdshot that have not been assigned a field specimen number at this time. Radiograph images also revealed nail hollows (Figures 23EA-26EA). A small portion of the iron bar remains concreted at this time. The field specimen number assigned to the concretion, 13S-335.1, now refers to the iron bar (Figure 107). What is exposed shows that the bar is flat on one side, and appears to be slightly curved on the opposite side, so the cross section of the bar would appear as a thin half oval. The shorter leg broke away while being cleaned of concretion, but the interior angle of the bend in the bar appears to be slightly more than 90°, when observed in x-rays of the artifact. It is unclear whether the bend in the bar was intentional or the result of damage from the wrecking event or some other factor.

The purpose of this artifact is unknown, but it may represent wrought iron bar stock, or, if the bend in the artifact was intentional, perhaps a bracket or other iron support. However, there are no other distinguishing marks on the artifact. Granted, it appears to be fairly deteriorated, and any identifying attributes may have eroded away previously. What does remain is currently in wet storage, awaiting further conservation practices.

### *Ballast*

Two specimens of stone believed to be part of the ship's ballast were recovered during the 2013 field season, from Units 29 and 21 (Table 16). They both appear to be stream-tumbled cobbles, similar to the majority of other stone specimens recovered thus far. The assemblage of ballast, summarized in Table 16, has not yet been subjected to more in-depth geological analysis.

### *Hooks and Thimbles*

Many iron hooks have been recovered from Storm Wreck between 2009 and 2013, often in clusters embedded in concretion. Many of these are eye hooks, or hooks attached to an iron ring and typically used in the ship's rigging. In 2013, two additional eye hooks were recovered from the site. Hook 13S-336.7 came from a concretion in the southern half of Unit 31 (Figure 26EA). It is an eye hook similar to others found previously, but with an associated ring or thimble (Figure 108). The iron hook and attached ring measure approximately 18 cm (7.09 in.) in total length. The hook itself measures 11.5 cm (4.53 in.) in length and is 6 cm (2.36 in.) wide at the hook. The ring attached to the hook through its eye is 7.5 cm



**Figure 106. Field Specimen 12S-220.5, leather pouch filled with iron nails. The visible seam in the center of the object marks the location of the folded over top of the pouch.**



**Figure 107: Field Specimen 13S-335.1, L-shaped iron bar**

**Table 16. Summary of ballast stones recovered from the Storm Wreck, 2009-2013**

<b>Year and FS No.</b>	<b>Size (cm)</b>	<b>Unit</b>	<b>Description</b>
<i>2009</i>			
09S-1.1	22	2	Sub-angular, dark grey gabbro. Surface rough, slightly tapered. Interior crystalline, fine grained, greenish.
<i>2010</i>			
10S-48.2		2	Large rounded cobble, material known but possibly sandstone.
<i>2011</i>			
11S-124.1		14	Angular cobble
11S-130.1		13	Small angular pebble.
11S-138.1	14	8	Rounded cobble, rust staining, mafic composition with inclusions
11S-184.1	4	12	Small, rounded pebble. Oyster shells on surface, unknown material.
<i>2012</i>			
12S-208.1	18	7	Angular cobble, material possibly mafic.
12S-230.1	13	20	Rounded cobble, gray material, possibly mafic.
12S-233.1	25	20	Angular cobble, material possibly basaltic.
12S-235.1	22	7	Rounded cobble, material possibly mafic.
12S-240.1	14	21	Angular cobble with heavily eroded edges, material unknown.
12S-282.1	16	1-4	Angular stone fragment, possible shattered cobble, material unknown.
<i>2013</i>			
13S-316.1	18.5	29	Rounded cobble
13S-324.1	13.5	21	Rounded cobble

(2.95 in.) in diameter. The hook is 1.5 cm (0.59 in.) thick. An additional iron piece is attached to the object, but was not originally associated with the ring and hook. These objects have been removed from the concretion and are awaiting electrolysis.



**Figure 108. Field Specimen 13S-336.7. The hook and ring are the noticeable round pieces in the image. The square-shanked iron object that sits across the hook is not associated with the ring and hook feature, and became attached during the erosion process. This piece will be detached through further conservation work.**

A second hook with an attached ring was recovered from the same concretion, and designated 13S-336.11. This hook and ring measures approximately 5 cm in length. It has also been removed from concretion and is awaiting further conservation.

These two hooks from 2013 both have an attached ring or thimble. This suggests that they are likely fish hooks. This does not refer to hooks used for catching fish but rather is a rigging term, referring to a piece of hardware meant to take a hempen line known as the fish pendant. Fish hooks typically had the thimble attached and were a part of the tackle structure of a vessel (Lees 1984:168). As a part of the block assemblage, the rope on the block was spliced and the hook and thimble inserted. These blocks with attached hooks and thimbles were a part of numerous types of tackles including, bowline tackles, garnet tackles, quarter tackles, rudder tackles, runner tackles, stay tackles, staysail tackles, shifting backstay tackles, topmast stay tackles, preventer stay tackles, tack tackles, truss tackles, and yard tackles (Gill 1932:131-133). It is unknown at this time what type of tackle assemblage these hooks may have belonged to. Similar hooks have been recovered from other 18th century shipwrecks including *Le Machault* (1760) and HMS *Pandora* (1791) (Sullivan 1986:17; Campbell and Gesner 2000:65).

Also during the 2013 field season, archaeologists recovered a concretion from Unit 31, in the southeast quadrant towards the unit center. This was the same concretion that contained the L-shaped bar described earlier, but once airtscribed it was found to also contain an iron ring, designated 13S-335.5. This artifact, like the rings described above, is believed to represent another thimble (Figure 109). The thimble was a rigging component that, as described above, played a crucial role in standing rigging, particularly as a key piece in block-and-tackle rigging (Figure 110). Thimbles are described as rings of different sizes, with grooves along the outer edge. They are “fixed to the rigging for blocks to be hooked to and for ropes to reeve through, etc.”(Gill 1932:133). Thimbles effectively prevent rope chafing and





Figure 109. A close-up of thimble 13S-335.3, recovered during the 2013 field season. A groove on the outside of the ring would fit a rope to prevent chafing.

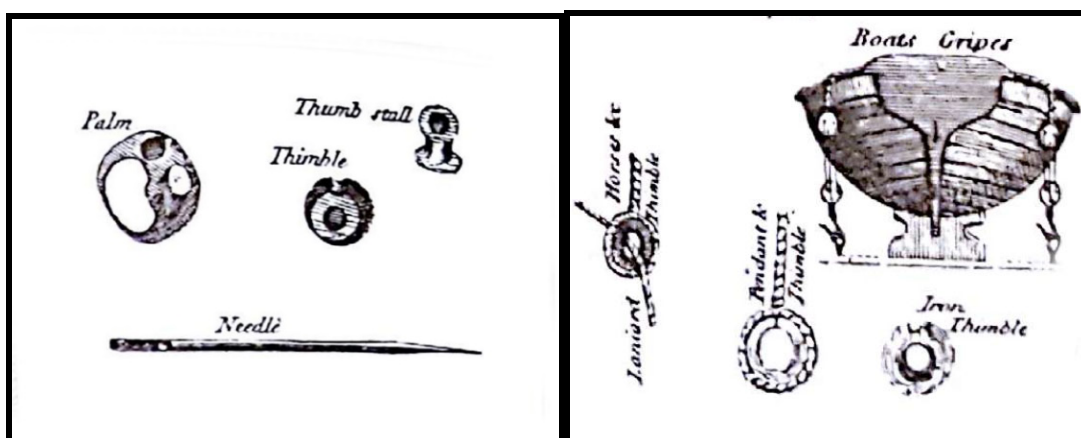


Figure 110. Examples of ships' thimbles from *Steele's Elements of Mastmaking, Sailmaking, and Rigging*. 1794 edition (Gill 1932).

fraying, and allow blocks to attach to other elements of the rigging with ease and interchangeability. Thimble 13S-335.5 was broken into three pieces, and measured 8.5 cm (3.35 in.) in length and 6.5 cm (2.56 in.) in width. It is still undergoing conservation treatment at the time of this writing.

### **Weights**

A wide variety of weights have been recovered from the Storm Wreck in 2013 and in previous years (Thomson 2016). They have been classified as commercial or measurement weights, agricultural weights, fishing weights, and miscellaneous weights, and they are discussed in detail below.

#### *Commercial or Measurement Weights*

Weights meant for measuring, most likely for commerce, include three conical pan weights and what appears to be a steelyard weight. Field Specimen 13S-357.1, a small pan weight, was found in Unit 18 (Figure 111, at right). It was immediately recognizable upon excavation, as no concretion had built up



**Figure 111. Three solid lead pan scale weights recovered from Storm Wreck in 2013 (13S-370.1, 13S-356.1, and 13S-357.1).**

on the surface of the lead. Weight 13S-357.1 is the smallest of the pan weights, with a diameter of 3.17 cm (1.25 in.) at the base tapering to 2.59 cm (1.02 in.) at the top and 1.63 cm (0.64 in.) high. It is made of lead poured into a mold and cooled, and weighs 113.04 grams. The shape of the weight is conical, with a flat bottom and a flat top displaying one small circle and a central dot. There are no markings on the exterior to indicate the mass of the weight, unit of measurement, or if it belonged to a larger set. It was intended for use with a simple balance or pan scale.

Artifact 13S-356.1 was another, somewhat larger conical pan weight, and was also found in Unit 18, immediately adjacent to the first specimen (13S-357.1). It also was recognizable upon excavation, as the lead surface bore no concretion. It is of similar shape and design as the smaller one described above, measuring 5.95 cm (2.34 in.) at the base narrowing to 4.97 cm (1.96 in.) on top and 2.9 cm (1.14 in.) high (Figure 111, center). It is also made of cast lead and weighs 744.62 grams. On its upper surface, there are three sets of identical inset markings arranged around a dot in the weight's center. Each of these three marks consists of a capital "P" above a numeral "2." The markings appear to be part of the casting mold, and not stamped in later, as the edges remain sharp and show no signs of external force or wear. The "P2" likely refers to the size of the individual weight. Either it may designate the second in the series of a set, or it may signify the weight measures two pounds.

The largest pan-scale weight, 13S-370.1, was also found in Unit 18, near the previous two weights (Figure 111, left). A slight covering of concretion had built up on the surface of the lead, but it was identifiable upon excavation. An x-ray indicated no other material was found in the concretion coating

this weight. Once cleaned, its diameter was measured as 7.46 cm (2.94 in.) at the base and 5.96 cm (2.35 in.) at the top, and it stands 3.8 cm (1.50 in.) tall. It too is made of cast lead and weighs 1,487.05 grams. The shape of the weight is conical, with a flat bottom and a slightly concave top. Like the artifact 13S-356.1, the top of the weight has three sets of identical markings around the center. Each of the three marks feature a capital “P” above a numeral “4.” As with the other numbered weight, these markings also appear to be part of the casting mold, and not stamped in later. Either the “P4” refers to it being the fourth in a set of weights or else is meant to indicate the weight is four pounds.

All three of these weights have been fully conserved. While the first two were free of encrustation when collected, the concretion on the third was removed by mechanically cleaning its surface using an air scribe. Once all weights were clean, they were placed into a short duration bath of hydrochloric acid, rinsed with reverse osmosis water, and sealed with molten microcrystalline wax (Hamilton 1996:84-87).

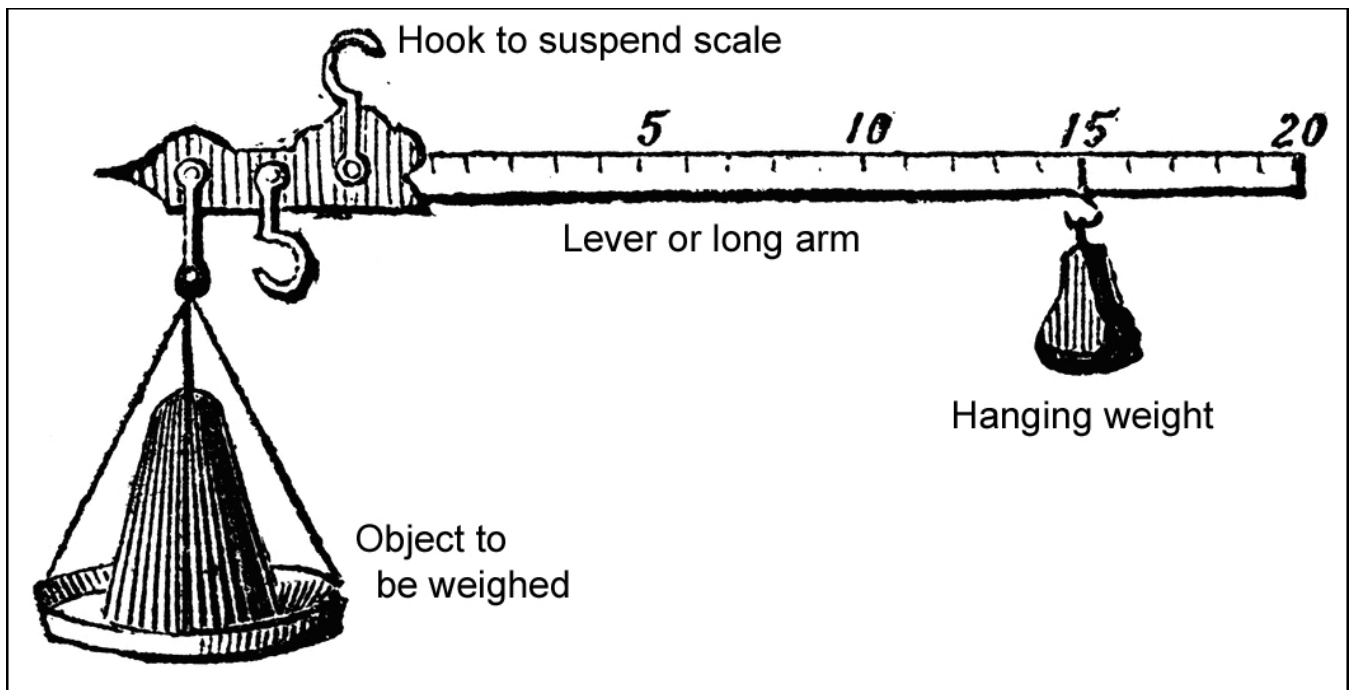
While the “P2” and “P4” marked on the surface of the two larger weights certainly seem to indicate pounds, it was uncertain what exact unit these weights were designed to measure. Prior to the 18th century a confusing array of unrelated systems of weights and measures were in use, as can be seen in the immense variety detailed in *A Dictionary of Weights and Measures for the British Isles: The Middle Ages to the Twentieth Century* (Zupko 1985). During the 18th century an effort to standardize units was undertaken to help simplify, regulate and control trade (Sheldon et al. 1996:25-26). Two likely candidates for a matching measurement system are the Troy ounce and the Avoirdupois ounce. Both were in use by the British during the late 18th century, but have a difference in standardization. The Troy ounce system only equates 31.10 grams per ounce and 12 ounces to a pound. The Avoirdupois ounce totals 28.35 grams per ounce and 16 ounces to a pound (Zupko 1985:24, 30).

**Table 17. Comparison of the Storm Wreck commercial weights and their measures**

Artifact	Description	Measured Weight	Troy Ounces	Troy Pounds	Avoirdupois Ounces	Avoirdupois Pounds
13S-356.1	Pan weight “P2”	744.62 g	23.94 oz.	1.99 lb.	26.27 oz.	1.64 lb.
13S-357.1	Pan weight (smallest)	113.04 g	3.63 oz.	0.30 lb.	2.95 oz.	0.18 lb.
13S-370.1	Pan weight “P4” (largest)	1,487.05 g	47.81 oz.	3.98 lb.	52.45 oz.	3.29 lb.
13S-372.2	Steelyard weight	3,217.25 g	103.44 oz.	8.62 lb.	113.48 oz.	7.09 lb.

As seen in Table 17, both weights 13S-356.1 and 13S-370.1 come very close to matching the Troy pound. What is interesting to note is the Troy ounce was adopted in Britain by the late 15th and early 16th century for commercial uses, but later relegated to only precious metals and pharmaceuticals (Hallock and Wade 1906: 33-35). If the two marked pan weights are of the Troy ounce unit, it is possible they were used for valuable materials. However, the size of the weights is rather large and there are no official verification markings, such as governmental stamps, in the lead. If they were used for expensive commodities, these weights may not have been entirely legitimate.

A fourth, and much heavier, weight of a different type was also unearthed in Unit 18, near the western border of the southeast quadrant, and once removed from concretion was designated Field Specimen 13S-372.2. The object was found substantially concreted and quite heavy for its size. X-rays revealed two artifacts within the image; one was an unidentified cylindrical object and the other a cast iron



**Figure 112. Illustration of a mid-19th century steelyard. To use this scale, it is suspended by hand or from a secure position, the object to be weighed is hung from the short end, and a hanging weight like the one discovered on Storm Wreck is slid along the lever or long arm until the arm remains horizontal. From Quackenbos 1859:97.**

cannonball (Figure 55EA). The individual artifacts were separated by mechanically removing the concretion with an air scribe. Upon cleaning, it was decided that the cylindrical item was most likely a distinct type of commercial weight, made for a different type of scale than the pan weights. Weight 13S-372.2 was probably meant to hang from a steelyard scale. To use the weight, the product being weighed would hang from a short end of the steelyard and the weight would slide down the long arm as a counterbalance until equilibrium was achieved. Predetermined marks on the arm would indicate the measured weight (Figure 112). This type of scale was suitable for weighing heavy or large objects, required only one weight, and was convenient to transport and set up.

The Storm Wreck steelyard weight consists of three separate pieces (Figure 113) that together weigh 3,217.25 grams (8.62 Troy pounds or 7.09 Avoirdupois pounds). The main piece is the lead weight at the center. There are also two pieces made of cupreous alloys, most likely brass, which covered the exterior sides and top of the lead weight. The lead weight portion was first poured into a mold. It is cylindrical in shape with a flat bottom, a flat top and rounded edges. The base has a diameter of 7.42 cm (2.92 in.), narrowing to 5.59 cm (2.20 in.), and is 8.86 cm (3.49 in.) tall. The top portion appears to have once held an iron ring that has since corroded away. The ring allowed the weight to be suspended. There also appears to be lead added later to patch over the top of the hollowed area. On the side of the lead there are two markings opposite each other, stamped into the surface at a later time. The first is a small royal crown. The second is a series of numbers, “3426,” stamped into the lead at a later time. The last number, “6,” is especially hard to read due to a tack hole through the number.

Of the two small, thin pieces of brass covering the lead, the larger was held in place by small nails or tacks hammered into the side of the lead. The larger piece also overlapped the edge of the top, which held the smaller cap in place. A small hole would have allowed the iron ring to pass through. The larger





**Figure 113. Field Specimen 13S-372.2, brass and lead steelyard weight separated after conservation, showing the exterior brass collar on the right, the lead weight in the center, and the exterior brass cap on the left.**

piece covered the outside of the lead and had the same stamped markings as the weight. The small royal crown and the numerals 342 were on opposing sides of the brass covering as well, though they did not overlap with the markings on the lead underneath. The stamped figures on the brass were instead rotated 105° clockwise from the lead markings. Furthermore, the last numeral in the series “3426” in the lead was not in line with the numerals on the outside of the brass. Instead, it was stamped in the metal on the edge where the collar was nailed into the lead for unclear reasons. If the markings were stamped through the brass and into the lead, then the brass covering had to have been moved at some point during the process. Although there are numbers stamped into the brass and lead, they are unclear. It should be safe to assume that they refer to the corresponding actual measurement of the weight. The total of the lead and brass pieces equals 3217.25 grams (8.62 Troy pounds or 7.09 Avoirdupois pounds), which is reasonably close to the figure “3426,” though this shipwreck pre-dates the metric system by more than 15 years. It may be that a bottom brass section is missing, and it or the corroded iron ring at the top could have added to the overall weight.

#### *Agricultural Weight*

Field Specimen 13S-362.1 was found in the eastern half of Unit 18 towards the center of the unit. It is one of the more interesting and initially confusing objects conserved thus far from the Storm Wreck. It was very heavy and dense in the initial x-rays (Figure 45EA). The image showed a large solid mass and a loop or ring at the top of the artifact that had slightly corroded. Having to move the artifact for storage and x-rays, it was plainly a very heavy object and meant to be a weight of some kind. After removing the concretion from the artifact, it was realized that the large radio-dense section was made of cast iron and conical in shape, with a flat bottom and rounded top (Figure 114). The base of the weight measures 16.11 cm (6.34 in.) in diameter, tapers to 14.61 cm (5.75 in.) and is 18.91 cm (7.44 in.) tall. With as much concretion cleaned off as possible before electrolytic reduction treatment, the overall weight is



**Figure 114. Side and top view of Field Specimen 13S-362.1, a cast iron and lead livestock tether**

approximately 55 pounds or 25 kg. The underside of the weight was also cast iron, but had a central hole leading to a cavity inside the cast iron. This hollow was filled with molten lead. The rounded top also held a large, separate iron ring. Once the object was cleaned of concretion, LAMP archaeologist Brendan Burke noticed that it resembled a livestock tether similar to one that had been used on the farm he grew up on. It seems likely that this weight served to tie up horse or cattle, and would have been relatively mobile, allowing farm hands to move animals to pastures for grazing. Another possibility was a “buggy anchor.” This would have served the same purpose as a naval anchor, but by tethering a carthorse in place instead of a ship.

#### *Fishing Weights*

The first fishing weights found on the Storm Wreck were a group of what appeared to be 12 perforated musket balls recovered in 2012 from Unit 11. Grouped together as Field Specimen 12S-285.1, it was realized upon closer inspection that they were not musket balls repurposed for fishing by drilling, but instead they had been intentionally cast with holes using musket ball molds. These weights are described in more detail in Meide et al. 2014:195-196 and Thomson 2016:198-200.

Another lead object believed to have served as a fishing weight was recovered in 2013. Artifact 13S-310.4 was found in the northeast quadrant of Unit 25, encased in concretion. An x-ray revealed many different artifacts in this concretion, including musket shot, a brass tap key, pewter buttons, and a cooper’s croze (Figure 4EA). The individual artifacts were separated and cleaned using an air scribe. The lead weight removed from this concretion was conserved by being placed in a quick bath in muriatic acid, rinsed with reverse osmosis water, and sealed with molten microcrystalline wax. It is roughly cast and conical in shape, measuring 2.93 cm (1.15 in.) at the base, tapering to 1.5 cm (0.59 in.)



**Figure 115. Field Specimen 13S-310.4, a thimble-shaped lead fishing weight with evidence of line.**

at the top and 3.01 (1.19 in.) tall (Figure 115). There is a 0.66 cm (0.26 in.) hole running vertically through the center. While cleaning the hole, the impression of cordage was observed in the surrounding concretion, though no remains of this line survived. The presence of cordage suggests the artifact could have been used on a fishing line or as a larger casting or seine net weight.

#### *Miscellaneous Weights*

Artifact 13S-354.1, like the pan and steelyard weights, was also excavated in Unit 18, in the northeastern quadrant. The artifact is somewhat of a mystery (Figure 116). It is a rectangular lead object, 11.47 cm (4.52 in.) long with its body measuring 4.76 cm (1.87 in.) by 2.71 cm (1.07 in.) and weighing XXX kg. The upper end displays a 0.94 x 5.49 cm (0.37 x 2.16 in.) notch or gap resulting in that end bearing two separate arms or end pieces. Additionally, a 0.62 cm (0.24 in.) hole has been cast or drilled through each of the two resulting arms or end pieces. It is unclear whether the lead was affixed to anything at the time of the wreck. The small, rectangular shape suggests it may be window sash weight, though the holes in the upper end are too small for cordage robust enough to hold the weight. Another perplexing element of the artifact is the sign of later alteration. There are numerous cut marks and part of the bottom is missing. Finally, there are what appear to be hammer marks on the upper end, which apparently was intended to beat one of the arms or end pieces towards the other so that they now are firmly pressed together.

The rough condition and signs of abuse suggest that 13S-354.1 was dismantled and used for scrap, possibly to be melted down and molded into other weights or objects. Another possibility, and one not mutually exclusive with the previous one, is that this object, which clearly had some specific function at some point, was being repurposed for some other reason. Hammering one of the arms or end pieces into the other created a larger tie-off point than the tiny, pre-existing hole in the upper arms, which would have made it easier to attach to a length of line. One possibility was that the object was turned into a makeshift sounding weight, perhaps to track the rising of water in the hold or determine depths of the surrounding sandbar after grounding. This was a critical task in an emergency grounding, and this weight would have served well if the regular sounding lead was inaccessible.



**Figure 116.** A lead hanging weight of unknown function, 123S-354.1. It is believed that it may have been a window sash weight that was salvaged from an abandoned home in Charleston, and brought by refugees or soldiers as a source of lead for casting ammunition or fishing weights. A portion of the lower end has apparently been cut off for this purpose. It has also been modified with a hammer, to bend the upper arms together, which would create a better tie-off point than the small hole that originally perforated the two arms (visible in the upper image). It is speculated that it may have been made into a makeshift sounding lead after the ship ran aground, to track rising water in the hold or water depths on the sandbar around the ship.

While the original purpose of this object is unknown, the most plausible explanation is that it was a window sash weight, hanging inside the window frame or adjacent wall to work as a counterweight to assist in lifting the window. It seems about the right size and shape for this purpose, and it could have hung from a metal pin that would have fit through the small holes in its upper arms. Somewhat similar lead block counterweights, associated with windows or dumbwaiters, were identified on the 1791 wrecked *Pandora* (Campbell and Gesner 2000:73-74). Hanging lead sash weights like these would have been salvaged from homes being abandoned by refugees, as the lead would come in handy for casting fishing weights or ammunition. Likewise soldiers would loot such items from houses also for casting shot. The lower end of this weight looks like it was cut off at an angle, so a portion of this weight may have been removed for this same purpose. It therefore could have been taken as an ingot for someone's personal source of casting lead, which then was hastily modified into a sounding weight after the ship ran aground.

There is one other weight on the Storm Wreck whose function also remains unknown. Field Specimen 12S-253.1 was recovered in a concretion from Unit 15 in 2012. It was reported previously as a hanging iron weight of unknown function, possibly a window sash weight, plumb bob, or clockworks weight (Meide et al. 2014: 306,308-309). Since the time of that report, the object has been cleaned of concretion and is currently awaiting electrolysis treatment. Once deconcreted, a very short fragment of cordage was





**Figure 117.** A cast iron, tapering, cylindrical hanging weight of unknown function, 12S-253.1. A short length of cordage has survived in the eye at the top of the weight. It seems most likely that it is a window sash weight, though it has been speculated that this object could have functioned as a plumb bob, as a clockworks weight, or for some other purpose.

found preserved in the eye at the top of the weight (Figure 117). Unfortunately, deconcretion has not elucidated the identity of this object. It is reminiscent of a sounding lead, except that it is iron instead of lead, and also it tapers to a point rather than growing wider at the bottom and featuring a hollow. It measures 33.57 cm (13.22 in.) long and 3.7 cm (1.46 in.) at its widest point. The ring at the top measures 4.73 cm (1.86 in.) in diameter and is 1.36 cm (0.54 in.) thick. It appears much too bulky to have served as a plumb bob, especially given the robust nature of the cord that was once tied to the eye. The most likely explanation is that this object was a window sash weight. While it differs in form and material from the other possible window sash weight (13S-354.1), sash weights of this type were known in the 18th century, and their cylindrical shapes allowed users to encircle the weight with a strip of lead to increase weight as needed while still fitting in the confined space required for a sash counterweight (Brendan Burke 2017, pers. comm.).

*Discussion: Distribution of Weights on the Storm Wreck*

One thing that has interested researchers was the distribution of the weights found on the wreck site, namely the concentration of weights in Unit 18. All three pan weights, the steelyard weight, the livestock tether, and the possible lead window sash weight were all found in the confines of this unit, while the other, iron, possible window sash weight was found just one unit to the north in Unit 15. Other than a handful of fishing weights, almost all objects intended for use as weights appear to be confined to this unit (and its neighbor Unit 15), a pattern that seems statistically significant. Unit 18 featured a dense array of concretions and other non-concreted objects, and is one of the most densely populated units in the entire excavation area (Figure 72). In addition to the array of weights, there were cannonballs and lead shot here (which tend to be distributed across the site), and a number of personal items such as a false watch and a spoon. One obvious explanation for the concentration of weights is that they were all packaged together. This makes sense for the pan weights, which were clearly a set meant to be used together. The owner of the pan weights (and perhaps the balance pan scale associated with them) might have also owned a steelyard scale and weight, and could have packaged them together. This individual might have been a merchant, but many professions, including that of a farmer, would make regular use of such items. Would this same individual have owned a livestock tether? Perhaps so, but would it make sense to package it and the other items in the same chest or box? The livestock tether with its convenient handle might have not even been stowed in a container, unless the owner wanted to ensure it was more secure from theft in a marked or labeled box. It might have made sense for someone to pack heavy objects together in a single container (one that would have had to be relatively small), especially if those

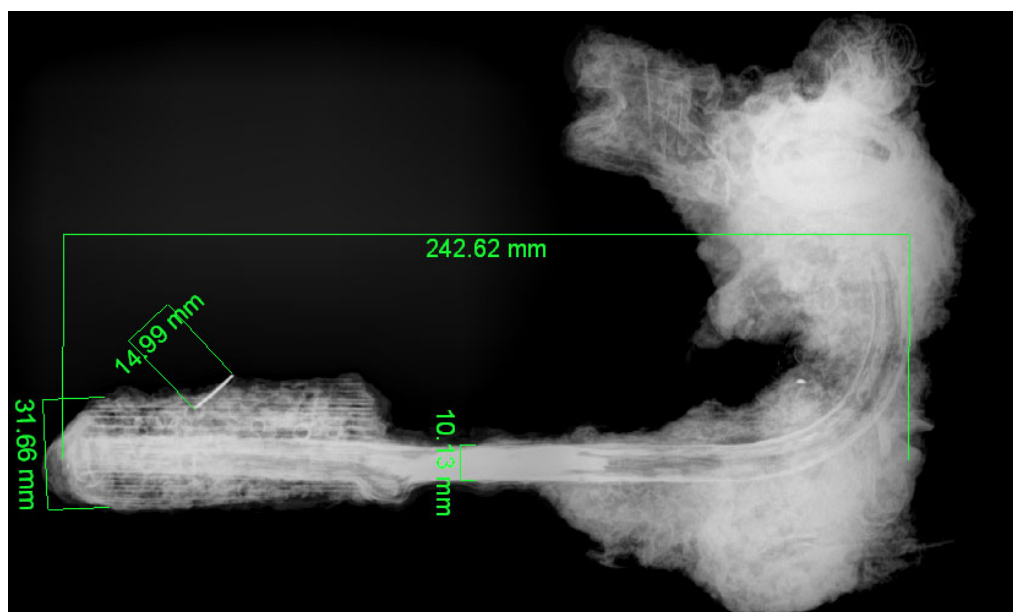
heavy objects were not prone to damage if packed together (i.e., one could pack a steelyard weight with a livestock tether, but would not pack their ceramic plates or their pocket watch in the same container). Another question is, if these weights were originally packaged together, were they thrown overboard after grounding, or were they inaccessible in a hold filling quickly with water? A box known to contain heavy cargo might be among the first to be jettisoned overboard when the ship ran aground, and this area of the wreck seems to reflect the jettisoning of cargo. Unit 18 is adjacent to and includes part of the cannon pile, which was likely formed by an attempt to lighten the ship of its artillery. On the other hand, the bulk of the excavation area, which is relatively small, reflects this activity, which at its most limited extent might be defined as the area including the cannon pile through the location of the disabled and discarded lead deck pump about three meters to the north (Meide et al. 2014:208-215). If the weights were all in one box, whether it was deliberately jettisoned here or if it instead stayed in the hold until the ship broke up, the archaeological signature might be the same, with the individual weights in close proximity to each other. Alternatively, it may be that the weights (other than the set of pan weights) were stowed separately, and after the wreck broke apart perhaps their increased weight contributed to their movement on the seafloor towards a low spot, possibly a scour formed by the nearby cannon pile. That being said, there is clearly a difference in a weight weighing 55 pounds and one weighing two or four pounds, and so just because all contain or are comprised of lead does not mean they would react to site formation processes in the same way. At present the researchers are not certain what to make of this seeming pattern of artifact distribution. It does seem likely that at least some of the weights were packaged together, and if so a heavy box might have been discarded and ended up in the vicinity of the jettison dump area, but alternative scenarios also seem plausible and these questions may remain unresolved.

## **Tools**

A variety of tools have been recovered from the Storm Wreck between 2009 and 2013 (Turner 2016). While some are still concreted, many of these have been cleaned of concretion and are undergoing electrolysis or other conservation treatment. The Storm Wreck tools include a reef hook used to pull old caulking from ship's planks, a croze blade used by coopers in barrel making, three types of hammers, and three types of axes. These varied tools represent implements used for every day work on the farm or frontier, and also specialized tools used by artisans and craftsmen including carpenters, shipbuilders, shoemakers, coopers, and furniture makers. This variety reflects the nature of the passengers on board the Storm ship. This was a refugee vessel and represented a cross-section of Charleston and Carolina society, with members of every class and many professions on board. The tool assemblage is presented below.

### *Rake Hook or Reef Hook*

The only tool from the Storm Wreck that is believed to be directly related to shipbuilding or ship maintenance was recovered from Unit 15 in 2012. Although it remains in concretion 12S-252.1, it has been identified via x-ray analysis as a rake hook, also called a reef hook or seam rake (Figure 118). A second rake hook was recovered in 2014 and is discussed in Turner 2016:184. Rake hooks were used to extract old and failing oakum caulking from the seams between a ship's planks (Turner 2016:184). The seams between planks in a ship's hull and deck were always flexing as the ship moved through various sea states, and through the drying and wetting effects of sun and sea. Periodically, the caulking had to be completely replaced. This was especially true of decks in southern climates, where the effects of the sun were harsher than more moderate climes. This tool is likely part of the ship's carpenter's toolkit, though it is quite possible that it represents the working tool of a caulker who practiced his trade in the Carolinas.



**Figure 118. X-ray image of the hook in concretion 12S-252.1. It is believed to represent a rake or reef hook, a ship maintenance tool used to extract old oakum caulking from between plank seams. It was originally thought this tool could be an agricultural implement or docker's hook. Measurements were generated by the digital x-ray analytic software.**

It is also possible that our understanding of this tool will change when it is cleaned of concretion and conserved. It was originally believed that this hook could have been an agricultural tool, such as a bale hook, or a dockworkers tool, such as a cargo hook or docker's hook.

### *Croze Blade*

The cooper's, or barrel maker's, trade is represented by a single tool (13S-310.9), or rather part of a tool, called a croze blade (Figure 119). Field Specimen 13S-310.9 was recovered during the 2013 season from the northeast quadrant of Unit 25. The specimen has a total length of 13.5 cm (5.31 in.) and is 2.4 cm (0.94 in.) wide. The blade has been removed from concretion 13S-310.1 and is awaiting electrolysis treatment. The specimen consists of the iron serrated blade and tang, which has broken, along with a brass or copper-alloy ring, and a slip cover or guard which slides on and off the serrated blade. This cover or guard was probably made of low grade iron and it has completely deteriorated, but an epoxy replica was cast from the concretion void. This replicated piece can slide on and off as the original would have done, and appears as a dull whitish color in Figure 119.

The croze blade or croze iron is the cutting part of the croze, a tool used to carve the interior grooves at either end of a barrel where the edges of the lids or head pieces fit. While ships were dependent on casks for supplies ranging from water to salt pork, these were typically procured from coopers or chandlers who purchased them with or without contents. Casks were the predominant container for packing and shipping most comestibles along with many manufactured goods. They were widely purchased and then packed with contents which were sold together with the casks that contained them. Casks and barrels therefore came from many sources and may have been sold and resold any number of times before arriving on board ship. While it is possible that a croze tool might be on board a vessel for repairing or maintaining a ship's casks, it seems likely that this tool belonged to a professional cooper who was relocating from the Carolinas as a result of his political support for the British Crown.



**Figure 119. Front and back views of the croze blade, 13S-310.9. It consists of an iron serrated blade and tang (which has broken), a brass collar or ring at the neck of the blade, and a slip cover or guard meant to protect the blade. This latter has completely deteriorated but has been replicated with cast epoxy, which appears whitish in the image above.**

### *Axes*

The most frequently found tool on the Storm Wreck is the axe, a variety of which have been identified. There is perhaps no tool more associated with the founding of America and the ever moving frontier than the axe. These come in a wide variety of forms, ranging from general to very specialized use. With three types of axes discovered by 2013, the Storm Wreck has yielded examples of both. The axe has a number of features that bear distinct names. The blade, known as the bit, is the cutting edge of the axe regardless of size or type. The back of the axe head opposite the bit is called the poll. The top of the cutting edge, is known as the toe of the axe and its opposite at the bottom is called the heel. The two sides of the axe are known as its cheeks.



**Table 18. Axes recovered from Storm Wreck between 2009 and 2013.**

FS Number	Total Length of Head	Hafted	Type	Unit	Conservation Status
2009					
09S-002.1	18.2 cm (7.17 in.)*	Yes	Felling	5 and 2	Concreted
2011					
11S-122.1	22 cm (8.66 in.)	Yes	Broad	14	Cleaned, awaiting electrolysis
2012					
12S-232.1	n/a	Yes	Hatchet	20	Concreted
2013					
13S-319.1	17.2 cm (6.77 in.)	No	Felling	29	Cleaned, awaiting electrolysis
13S-330.1	26.26 cm (10.34 in.)	Yes	Broad	30	Cleaned, awaiting electrolysis

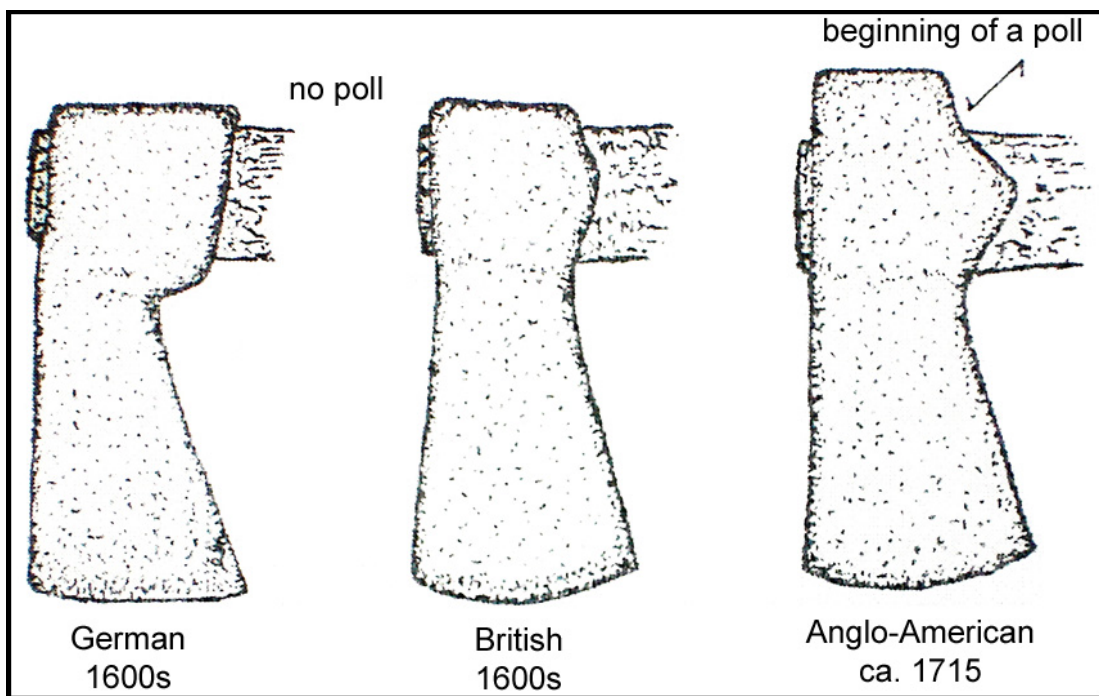
\* designates a measurement determined by analytic software from a digital x-ray image, which has some margin of error

Five axes have been recovered from the Storm Wreck by the end of the 2013 field season<sup>4</sup>. They are summarized above in Table 18. These include two broad axes (11S-122.1, 13S-330.1); one hand axe or hatchet (12S-232.1); and two felling axes (09S-002.1, 13S-319.1). Three of the five were hafted, with partial wooden handles still attached to the heads. This indicates that they were usable tools at the time of the sinking of the vessel, as opposed to a cargo item being shipped in bulk. This latter scenario is illustrated by an archaeological example dating to the start of the British Period. Three wooden cases packed with twenty axe heads each were found on the wreck of the *Industry*, a coastal sloop lost on the St. Augustine bar in 1763 (Meide 2015b:365). As wood was plentiful in the colony, the cargo of axes did not include handles, which could be manufactured from timber available on the Florida frontier. In contrast, the axes on the Storm vessel were most likely being brought by Loyalist refugees for the purpose of starting life anew in East Florida.

These axes include examples that appear to have been made both in colonial America as well as in England. These two types can be distinguished by the size of their “ears,” or pointed lugs on the bottom of the axe head (Franklin 2005:116). The Anglo-American colonial variety had much larger “ears,” an improvement which increased the wood-to-iron contact area and thus helped keep the axe head securely attached to its handle (Figure 120). This style includes specimens 09S-002.1, 11S-122.1, 12S-232.1, and 13S-330.1. That with considerably smaller “ears” (13S-319.1.) is likely an English import.

The first axe head was recovered in 2009 during the initial target testing of the site, and was designated Field Specimen 09S-002.1 (Figure 121). It was only the second artifact recovered from the site, and like all other finds was buried by at least 30 cm of sediment, from what would later be designated the northeast quadrant of Unit 5 (straddling the border with Unit 2) (Meide et al. 2010:157-159). This specimen is still concreted, so the following measurements were calculated using the digital x-ray analytic software, which has proven to have some margin of error. The axe head is 18.2 cm (7.17 in.) long. It is 6.78 cm (2.67 in.) wide at the beard of the axe head and 3.5 cm (1.38 in.) thick. Where hafted, the head is 4.7 cm (1.85 in.) thick. The remaining handle is 4.4 cm (1.73 in.) wide at its widest point. This axe has been identified in x-ray imagery as a felling axe. This is perhaps the most familiar type of

<sup>4</sup> By the end of the 2015 season, a total of seven axes have been recovered, including two broad axes, one hand axe or hatchet, three felling axes, and one believed to be a mortising axe (Turner 2016:184-186).



**Figure 120. Image of European and American colonial axe head styles (Franklin 2005:117)**



**Figure 121. Felling axe, 09S-002.1, embedded within concretion. This axe was hafted and the truncated remains of its wooden handle can be seen on the lower right side of the concretion. The section of wooden handle can be observed in x-ray imagery.**



**Figure 122. Field Specimen 11S-122.1, a knife edged broad axe. Photograph taken after deconcretion but before further conservation treatment.**

axe to modern Americans, who no longer use these tools on a regular basis. As its name implies, the primary purpose of this axe is to chop down, or fell, trees. After the tree has fallen to the ground, the felling axe is used to trim the tree branches and prepare the log for further work. The felling axe was also used to make spaced cuts into the trunk across its grain to a constant depth, to prepare the log for squaring with a broad axe. The depth of the cross-grain cuts determined what would then be the face of the flat surface. A broad axe would then be used between the spaced cuts going with the grain of the wood at 90° to the spaced cuts. Felling axes were also commonly used to cut branches and split logs into firewood, and had many other general cutting applications as well.

Field Specimen 11S-122.1 was the second axe to be recovered and the first to be deconcreted (Meide et al. 2014:263-264). Recovered from Unit 14, it has been identified as a broad axe (Figure 122). The overall length of the head is 23.1 cm (9.09 in.), and it measures 18.0 cm (7.09 in.) across at its widest point near the cutting edge, and 8.9 cm (3.5 in.) at the widest part of the poll, or the blunt end opposite the bitt. The cheek is 6 cm (2.36 in.) across where it narrows at the haft. The head measures 1.2 cm (0.47 in.) thick near the hafted end, and gradually narrows as it approaches the bit, where it measures 0.1 cm (0.04 in.) thick.

The broad axe was a typical frontier tool, used to square up logs once felled. The broad axe was instrumental in processing timber used in many applications, but it was critical to house and barn building where a certain standard of finished and squared timber was desired. One side or cheek of the axe was flat, while the other had a regular sloped shape beginning at the poll and running to the bit. The flat side of the axe was used to hew the rounded side of the log and give a flat finish to the cut. In

addition to this, the handle of the broad axe was offset so that the craftsman wielding the axe could get his hand and blade right up against the log without scraping the back of his hand and knuckles against the log as he cut.

The flat side, or cheek, of the broad axe was often left unsharpened, leaving only one edge sharpened like a chisel. This practice is described as chisel-edged sharpening and was intended for hewing and shaping (Franklin 2005:118). Some broad axes however, including the two examples from the Storm Wreck, were knife-edged sharpened, or sharpened on both sides of the blade like a knife. This is also how felling axes were sharpened, and knife-edged broad axes were typically used for general carpentry (Franklin 1992:42). The broad axe also had applications in the shipbuilding industry, where it was known as the shipwright's axe (Horsley 1978:105). This was for much the same purpose as in house and barn building, in taking round and rough logs delivered to the shipyard and shaping them before going to the adzemen.

Axe head 12S-232.1 was recovered in 2012 from Unit 20. This was previously reported by Meide et al. (2014:299-300), and mistakenly identified as a broad axe from a preliminary x-ray examination. Further scrutiny of the x-ray imagery makes it clear that the dimensions of this axe are far too small to be a broad axe. In fact, this axe is too small to serve as a felling axe, and is best described as a hatchet. This tool, like the felling axes, was used in making firewood for cooking, and for trimming and other general uses. This hatchet is hafted and still remains in concretion.

Axe head 13S-319.1, a felling axe, was the first of two axes recovered during the 2013 season (Figure 123). This one came from the northwest quadrant of Unit 29, embedded in concretion (Figure 12EA). The head is 17.2 cm (6.77 in.) long and 4.3 cm (1.69 in.) wide at the beard of the head. It is similar in size and shape to 09S-002.1, but it has been removed from its concretion and is awaiting electrolysis.

Axe head 13S-330.1, a broad axe, was recovered during the 2013 season from the northeast quadrant of Unit 30 (Figures 124, 19EA). The head is 26.0 cm (10.24 in.) long and 7.0 cm (2.76 in.) wide at the beard of the head (where the head narrows towards the handle). The blade is 18.5 cm (7.28 in.) across at the bit. The poll at the opposite end is 6.5 cm high (2.56 in.). The head is 2.2 cm (0.87 in.) thick at the beard and tapers towards the cutting edge or bit which is 0.1 cm (0.04 in.) thick. X-ray imagery of the concretion indicated a portion of the wooden handle was present, and upon deconcretion it was observed the wood remained in good condition. The remnant handle is 15 cm (5.91 in.) in length and 7 cm (2.76 in.) across at the haft and 5.0 cm (1.97 in.) across at its top end (Figure 124). This axe head has been identified as a broad axe. It has been removed from its concretion and is awaiting electrolysis.

### *Hammers*

The remains of three hammers have been found on the Storm Wreck to date, all before 2013 (Turner 2016:183-184). The two recovered in 2012 are associated with specialized trades, while the first, unearthed in 2010, could be representative of any number of trades, or simply classified with general carpentry or woodworking. This first specimen is a claw hammer that was recovered in 2010 from the northeast quadrant of Unit 0, in concretion 10S-39.1. It has been reported previously in Meide et al. (2010:160-162), and though it has been inspected through x-ray imagery it has yet to be deconcreted. Similar in form to a modern carpenter's or claw hammer, it features a cleft or claw opposite the striking surface, designed to pull nails out of wood. It appears to have an octagonal striking head, though this has not yet been confirmed. It is hafted but the handle has broken near the head, though the remainder of the handle is preserved in the same concretion as the head. The hammer has been measured using the x-ray analytical software, which is not perfectly accurate. The hammer head is about 10.8 cm long (4.25 in.) and 2.8 cm (1.10 in.) wide, and the broken portion of the handle measures 15.3 cm (6.02 in.) in length.





**Figure 123. Felling axe head, 13S-319.1. A portion of the handle is still visible hafted on the right hand side of the artifact.**



**Figure 124. Broad axe head, 13S-330.1. This is another hafted axe, with the well-preserved handle still visible on both sides of the head. The difference in shape between a felling axe and broad axe is readily apparent when comparing this example with the felling axe above (though they are not the same scale).**

The next hammer found was designed for a specialist profession: an intact cobbler or cordwainer's hammer. It was unearthed near the southern boundary of Unit 1 in 2012, and x-ray analysis revealed the hammer and a number of other objects (Meide et al., 2014:285-286). Once the concretion was airtscribed, the separated hammer was designated 12S-200.2. This hammer and its handle are remarkably well preserved, with only some slight loss of iron at the head. Based on the broad shape of the hammerhead face (bell face) and the curved peen without a cleft or claw, this hammer has been identified as a cobblers' or cordwainer's hammer (Figure 125). The hammer measures 20.0 cm ( in.) in total length, including the handle. The head measures 12.0 cm (4.72 in.) long and 4.6 cm (1.81 in.) wide the at the head face. The artifact has been removed from concretion and epoxied, and is currently awaiting further conservation.

The historical distinction between the cobbler and cordwainer is not widely recognized today, but one that was upheld by British law in England and the colonies. The cordwainer was a shoe manufacturer, as opposed to the cobbler who was restricted to the repair and maintenance of shoes. The term cordwainer is Anglicized from the French term *cordoanier* originally referring to a craftsman working with imported cordovan leather from Córdoba, Spain. The distinction between cordwainer and cobbler was upheld through separate guilds and by point of law enforced in British territories, where cobblers were prevented from working with new leather. Cobblers could legally make shoes but only from used or discarded shoe leather. The two trades were separated by a degree of skill that amounted to an extra five years of training on the part of the cordwainer.

Another of the hammers associated with a specialized trade is one that was particular to the upholsterer. These tradesmen specialized in covering furniture such as chairs and couches with textile or leather and finishing them to a presentably high standard. One of the upholsterer's principal tools was a specialized hammer with which he drove the brass tacks that held both textile and leather coverings in place. Among the tools found on the Storm Wreck is a single example of such a tack hammer (Figure 126). This was previously reported on after a preliminary X-ray examination as a regular carpenter's hammer but following cleaning during the conservation process it was found to be a tack hammer (Meide et al. 2014:304-305).

This piece, 12S-242.4, was first identified as a hammer through x-ray imagery. Its wooden handle seemed intact, but upon exposure during the airtscribing process, it was found to be extremely friable and it mostly fell to pieces during the remaining mechanical cleaning. The head measures 9.34 cm (3.8 in.) in length and 1.94 cm (0.76 in.) in width at the head face (Figure 127). The handle is 1.90 cm (0.75 in.) wide. The entire hammer measures 28 cm (11.02 in.) in length.

## ***Personal Items***

### ***Buttons***

At the finish of the 2013 field season, nineteen buttons had been recovered from the Storm Wreck. The first nine to be found in dredge spoil or removed from concretions were reported in detail in the 2011-2012 FCMAP report on archaeological investigations (Meide et. al 2014: 227-233). An update on the conservation status of the previously reported buttons is provided here, along with a detailed discussion of the 10 buttons recovered since the completion of the 2012 report. These include the three buttons observed in the x-ray of Field Specimen 12S-223.1, a concreted musket recovered in 2012. The buttons have been removed from the concretion and designated 12S-223.2, 12S-223.3, and 12S-223.4. The remaining seven were removed from concretions recovered in 2013, and are designated 13S-310.6a, 13S-310.6b, 13S-310.7, 13S-336.2, 13S-336.3, 13S-336.4, and 13S-345.2. Seven of the ten new buttons are made of pewter, two are brass or other copper alloy, and the last is a wooden button blank. Figure 128 illustrates the various parts of a button and the different types of button shanks, to be used as a



**Figure 125. Field Specimen 12S-200.2, a cobbler's or cordwainer's hammer with intact handle. The white material on the head of the hammer is epoxy resin for casting voids in the concretion.**



**Figure 126. Field Specimen 12S-242.4, a tack hammer, after partial removal from concretion. The handle has since fallen apart and only the head remains intact.**

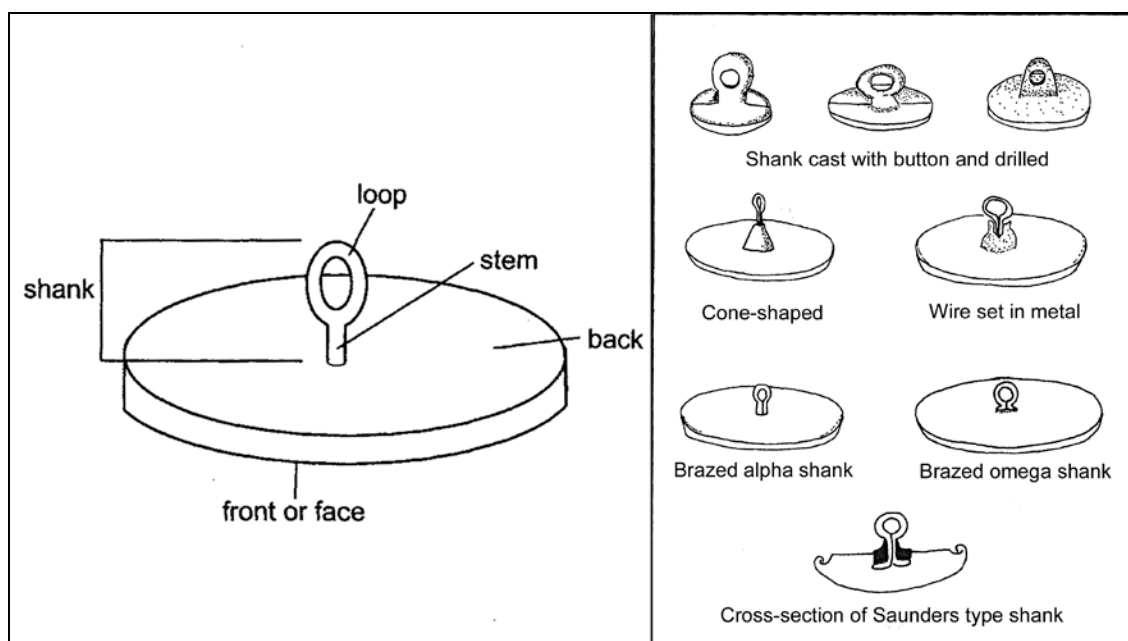




**Figure 127. Detail views of the tack hammer head, 12S-242.4. Very little of the handle survived conservation and much of the head was cast with epoxy, as indicated by the white substance on the right side of the head.**

reference throughout the following discussion. Table 19 presents all of the buttons recovered from the Storm Wreck thus far, and includes a brief description of decorations along with measurements, shank type, and material. Figures 129 and 130 show the faces and backs of each button.

The first evidence of button use comes in the form of 12th century sculptures, but it was not until the 16th century that buttons became a common clothing fastener, usually in the form of small, round buttons cast in a mold (Nöel Hume 1969:88). Throughout the 16th and 17th centuries buttons continued to evolve in shape, design, and size. By the 18th century, buttons came in a multitude of sizes and designs, and were no longer just a functional clothing fastener, but also one of the chief ways to embellish men's clothing. Most women's clothing did not employ buttons until the 19th century, except



**Figure 128. The parts of a button and various types of button shanks. (White 2005: 59, 64).**

in the form of riding habits, which were similar to those for men and likewise employed buttons (White 2005:50,57).

The standard men's suit in the 18th century included a coat, waistcoat, and breeches, all of which employed buttons in various numbers, depending on the style. Coat buttons tended to be large, measuring 1.8 to 3.5 cm or more. Waistcoat buttons ranged from 1.45 to 1.95 cm, and sleeve buttons, worn on coats and shirts at the cuff, were usually between 1.3 to 1.7 cm. Breeches buttons varied in size, as they were worn at both the knee and at the waist (White 2005:57-62).

Button manufacturers used a multitude of materials to make buttons, including metals, organics, glass, and ceramics, each of which involved its own manufacturing process. The manufacturing process of metal buttons on the Storm Wreck depended on the type of metal used. Pewter buttons were most often cast in a mold. Designs were either set in the mold itself, or they were stamped into the button face with dies after casting. Alternatively, pewter buttons could be stamped out of flat sheets of metal and decorated with dies. Copper alloy buttons were manufactured and decorated a number of ways, including casting, stamping, engraving, plating, and gilding, and such variability increased their popularity during the 18th century. Buttons made of tombac, a variety of brass with a high copper content, were usually cast and engine turned or hand engraved. Hard-white buttons, a type of pewter with a high tin percentage used in the latter half of the 18th century, were usually cast (White 2005:63-65).

Buttons are often the most commonly found item of personal adornment on historic period sites, and the various designs, materials, and functions have great potential for interpreting what people wore in the past, as well as what was communicated through appearance (White 2005:50). The different materials used to make buttons indicated a level of affluence. As with buckles, pewter buttons were reserved for the lower classes, while brass and other copper alloy buttons, and ornately decorated buttons, were worn by the middle to upper class. Material type had such an influence over what was communicated about wealth and status that manufacturers and sellers started marketing later pewter buttons as hard-white buttons in order to avoid the stigma associating pewter with the lower classes (White 2005:50,65).

**Table 19. Storm Wreck buttons found in dredge spoil and removed from concretions.**

<b>FS No.</b>	<b>Decoration</b>	<b>Unit</b>	<b>Diam. in cm</b>	<b>Thickness (at edge)</b>	<b>Thickness (at center- includes shank)</b>	<b>Material</b>	<b>Shank Type</b>
10S-064.2	“RP” under crown	7	1.60	0.15 cm	0.50 cm	Pewter	Wire set in metal, partially intact
11S-121.2	Double sunburst, wavy line around edge	14	1.65	0.05 cm	0.20 cm	Brass	Undetermined
11S-122.4	Concentric circles, buzzsaw pattern around edge	14	1.75	0.1 cm	0.9 cm	Silvered brass	Wire set in metal
11S-161.1	Plain	13	2.30	0.10 cm	0.80 cm	Pewter	Wire set in metal
12S-205.4	Plain	7	2.00	0.25 cm	0.25 cm	Wood blank	No shank
12S-223.2	Plain	20	1.6	0.1 cm	0.65 cm	Pewter	Wire set in metal
12S-223.3	Circular feathered pattern, wavy motif around edge	20	1.4	0.1 cm	0.8 cm	Brass/ Copper Alloy	Wire set in metal
12S-223.4	“63” in circle in 8-pointed star	20	1.7	0.1 cm	0.5 cm	Pewter	Wire set in metal
12S-258.1	“71” with wavy & straight lines around edge	19	2.20	0.20 cm	0.60 cm	Pewter	Partially intact cone
12S-259.1	Plain	19	1.85	0.20 cm	0.60 cm	Pewter	Cast with button, partially intact
12S-291.1	Plain	3	2.65 cm	0.10 cm	1.10 cm	Pewter	Wire set in metal
12S-306.1	Flower-like spirograph design; no longer visible	7	2.40	0.20 cm	1.20 cm	Pewter	Cast with button
13S-310.6 a	“RP” under crown	25	2.2	0.107 cm	0.686 cm	Pewter	Wire set in metal
13S-310.6 b	“RP” under crown	25	2.19	0.101 cm	0.538 cm	Pewter	Wire set in metal
13S-310.7	Crown over “3” over “American”	25	1.62	.108 cm	0.537 cm	Pewter	Wire set in metal
13S-336.2	“30”	31	2.1 cm	0.174 cm	0.615 cm	Pewter	Wire set in metal
13S-336.3	Plain	31	1.76 cm	0.1 cm	0.55 cm	Brass/ Copper Alloy	Wire eye? (only partial)
13S-336.4	Plain	31	1.39	0.25 cm	0.25 cm	Wood blank	No Shank
13S-345.2	“RP” under crown	31	2.18	0.107 cm	0.655cm	Pewter	Wire eye set in metal



**Figure 129.** The faces of the Storm Wreck buttons recovered through 2013. The color of each button in this image may not reflect the actual color of each specimen, as their color properties have been adjusted in Photoshop in order to illustrate each button's design as best as possible.





**Figure 130. The backs or sides of the metal Storm Wreck buttons, illustrating what is left of their shanks. These images are not to exact scale.**

While the variability of buttons makes them useful for inferring what was communicated through dress, it also makes them difficult to date specifically, although some typologies have been established, such as Stanley South's typology from the Brunswick Town site (Noël Hume 1969:90-92). Carolyn White (2005) discusses another method of dating buttons in the 18th century using shank types. The button shank, which serves to attach a button to a garment, is "directly related to the button's efficacy as a fastener (White 2005:63)." Shank designs change rapidly over time as button makers continuously tried

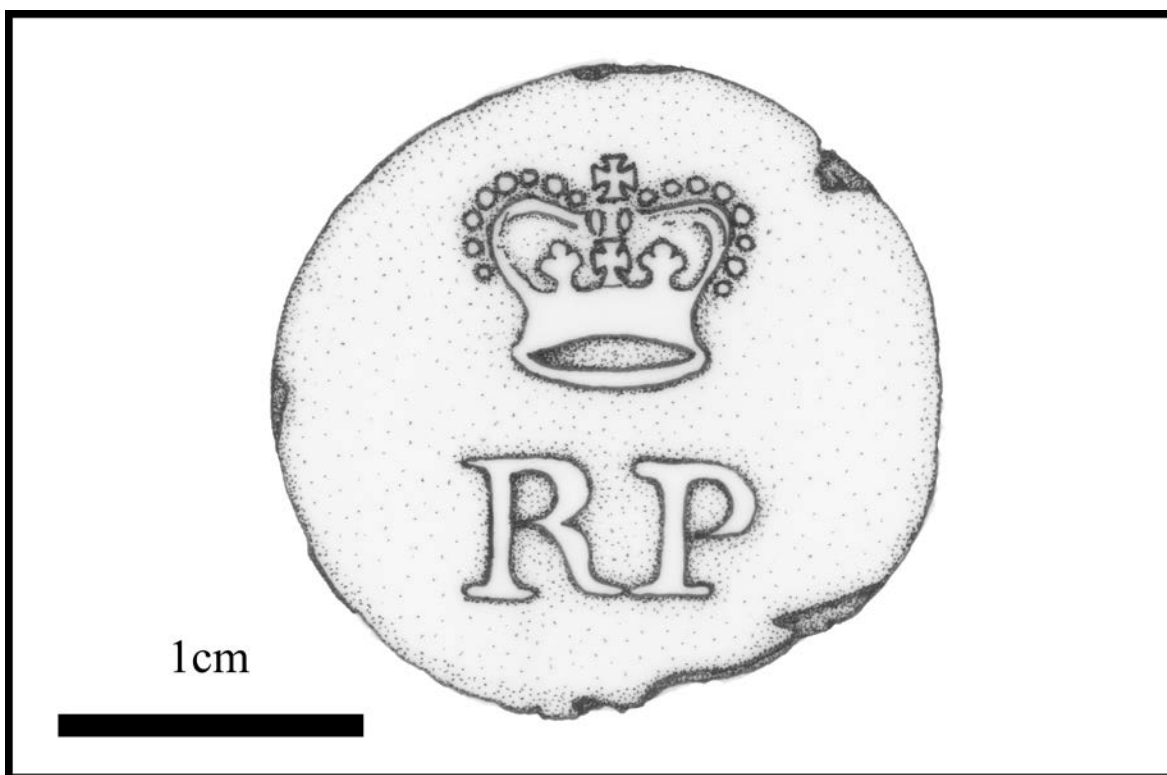
to improve upon the strength and durability of the shank. Consequently, there is a traceable chronology associated with button shank types. The earliest shank type was cast with the button, and a hole was drilled afterwards to allow thread to pass through. This type was most common between 1700 and 1765. The cone-shaped shank saw a wire loop inserted into a cone or mound of metal molded as part of the button. A similar shank saw a wire loop set into a daub of metal placed separately on the back of the button. Both of these shanks were common between 1760 and 1785. In the alpha shank, the two ends of a brazed wire loop meet at the base of the shank and attach to the button back there. This shank was seen throughout the 18th century. The omega shank had a wire loop in which the end flattened out against the button back, and resembles the Greek letter omega, hence the name. This type was common in the late 18th century through approximately 1850. The Saunders-type shank features a wire loop inserted into the button back and secured with resin. Benjamin Saunders patented this design in 1813, for use with textile-covered buttons (White 2005:63-64). This chronology cannot strictly place buttons in a certain time period, because the manufacture of certain shank types did not stop entirely once a new shank was developed. However, it remains useful in determining the general periods in which certain shank types were most common.

The buttons found on this wreck were most likely imported from England, as the American button-making industry did not fully develop until the 19th century. Before then, America imported most of its buttons from England, although some small-scale button manufacturing did occur domestically (White 2005:50; Noël Hume 1969:92-93). Birmingham was the English center for metal button making in the 18th century, with over eighty button makers established in the city. Metal buttons were the focus of most manufacturers, but they also used other materials including organics, glass, and ceramics (White 2005:50). The buttons recovered from dredge spoil or removed from Storm Wreck concretions during 2013 are discussed below, with military buttons listed first, followed by civilian buttons.

Six more military buttons have been removed from concretion at the time of writing this report. Three of these are examples of Royal Provincial uniform buttons, designated 13S-310.6a, 13S-310.6b, and 13S-345.2. All are approximately the same size, but are much larger than 10S-064.2, the first Royal Provincial button recovered from the site. They feature diameters at or just under 2.2 cm (0.87 in.), and measure just over 0.1 cm (0.04 in.) thick at their edges. The larger diameter suggests they were used on coats or waistcoats (White 2005:59). The “RP” and crown design associated with Royal Provincial buttons is clearly visible on both 13S-310.6a and 13S-310.6b (Figure 131). The face of 13S-345.2, on the other hand, is very worn, and only the crown and the lower left leg of the “R” of the design remain to identify it as a Royal Provincial button. All three feature the wire eye set in metal attachment type. The loops are missing from each button; however, the holes where the wire loop would be inserted into the stem are clearly visible.

A third button was removed from concretion 13S-310.1, also made of pewter and designated 13S-310.7. The button features a “3” in the middle of the face, with a small crown above it and “AMERICAN” below it, curving around the outer edge of the bottom half of the face. This design belonged to the uniform of a specific Royal Provincial unit known as the 3rd American Regiment, or the New York Volunteers (Allen and Braisted 2011:75). Measuring 1.62 cm (0.64 in.) in diameter and 0.108 cm (0.043 in.) thick at its edge, it is one of the smaller buttons in the assemblage. Its shank is partially intact, but what is remaining appears to be in the wire eye in metal style. The metal loop is missing, but the holes where it would insert into the stem are clearly visible. The conservation of 13S-310.7 is complete.

13S-336.2 is a pewter button removed from a concretion found in Unit 31. Removed from concretion 13S-223.1 in 2015, the only distinguishing mark on it is a large “30” in the center of the face, matching



**Figure 131. Illustration of one of the larger Royal Provincial regimental buttons, 13S-310.6b. Drawing by Loren Clark.**

those found on the uniform of a soldier in the 30th Regiment of Foot (Franklin 2012:275). It measures 1.76 cm (0.69 in.) in diameter and 0.1 cm (0.04 in.) thick at its outer edge. Its shank is partially intact, and appears to be in the cone style. The holes where the wire loop would insert into the cone are clearly visible. The conservation of 13S-336.2 is complete.

12S-223.4 is one of three buttons (see 12S-223.2 and 12S-223.3 below) removed from concretion 12S-223.1, along with a Brown Bess musket, now designated 12S-223.1 (see p. 147 and Figure 78). The button is made of pewter and is stamped with the “63” surrounded by an eight pointed star pattern consistent with that of the 63rd Regiment of Foot (Franklin 2012:309). Measuring 1.7 cm (0.67 in.) in diameter and 0.1 cm (0.04 in.) thick at its edge, it was most likely employed as a waistcoat button, or perhaps a large sleeve button. The wire loop of the shank is missing, but what does remain of the shank appears to be in the wire eye in metal style. Button 12S-223.4 underwent conservation at the Florida Bureau of Archaeological Research Conservation Laboratory, and its treatment is now complete.

Military buttons continue to be of particular interest to the interpretation of the Storm ship, which was involved in the mass evacuation of both Loyalist civilians British soldiers (Trivelpiece and Meide 2016; McNamara 2016). The first Royal Provincial button (10S-064.2) and the 71st Regiment button (12S-258.1), both of which were discussed in the 2011-2012 report (Meide et al. 2014:231), were the first clues connecting the Storm Wreck vessel to the final Loyalist evacuation of Charleston, SC. The very same document that places several Royal Provincial units and the 71st Regiment in Charleston in late 1782 also names the 63rd Regiment, the 30th Regiment, and the 3rd American Regiment (there described as the New York Volunteers) among the garrison to be evacuated from the city (British National Archives [BNA] 1782:CO5, f 38-f39, f41; Trivelpiece and Meide 2016:133-134), further supporting archaeologists’ belief that this vessel participated in the final evacuation of Charleston.



12S-223.2 is a plain pewter button also removed from concretion 12S-223.1. While there are several plain pewter buttons in the assemblage, most are flat and appear to be cast buttons. 12S-223.2, on the other hand, appears to be made from two half-shells soldered together. A seam is clearly visible where the two shells meet. The shank appears to be the wire eye set in metal style. It measures 1.6 cm (0.63 in.) in diameter and is 0.1 cm (0.04 in.) thick at its outer edge. Franklin (2012:124) notes that earlier British military uniforms (pre-1760) employed plain buttons manufactured in this fashion, so it is possible that this button could have belonged to either a soldier or a civilian. 12S-223.2 underwent conservation at the Florida Bureau of Archaeological Research Conservation Laboratory, and is now complete.

12S-223.3 is the last button removed from concretion 12S-223.1. Made of a copper alloy, it features a circular feathered or saw-like design etched around its center. There are small half-circle depressions spaced evenly around the outer edge of the face, creating a wavy pattern. It is one of the smaller buttons in the assemblage, measuring 1.4 cm (0.55 in.) in diameter and 0.1 cm (0.04 in.) in thickness at its outer edge. Its shank appears to be in the wire eye set in metal type, and is fully intact. This button underwent conservation at the Florida Bureau of Archaeological Research Conservation Laboratory, and is now complete.

13S-336.3 is a plain, copper alloy button removed from concretion 13S-336.1, recovered from Unit 31 in 2013. It measures 1.76 cm (0.69 in.) in diameter and is 0.1 cm (0.04 in.) thick at its outer edge. The shank is only partially intact, but what does remain appears to be of the wire eye set in metal style. It is currently in wet storage awaiting further conservation.

13S-336.4 is a wooden button blank. Measuring 1.39 cm (0.55 in.) in diameter and 0.25 cm (0.1 in.) thick at its edge, it is currently in wet storage awaiting further conservation. The blank unfortunately broke into two pieces during its removal from concretion, but conservators still may be able to reattach the two pieces after conservation is complete. The blank remains slightly concreted, making some of its details difficult to discern, but it does appear to have a hole at its center. This indicated the button was cut by a rotating tool with three projecting points, and was most likely meant for a textile or leather covered button (White 2005:65-71). This makes it similar in style and function to 12S-205.1, the only other wooden blank recovered from the Storm Wreck to date (Meide et al. 2014:230). It is currently in wet storage awaiting further conservation.

At the completion of the 2011-2012 report, five buttons were still undergoing conservation or had not yet begun conservation at the time. Of those, 11S-121.2, 11S-122.4, and 12S-205.1 are still being stored in solution, awaiting further conservation. The conservation processes for 11S-161.1, a plain pewter button, and 12S-306.1, the pewter button featuring a geometric flower or Spirograph design, are now complete. The design that was visible on 12S-306.1 at the time of its recovery from dredge spoil unfortunately did not survive the electrolysis process.

### *Shoe Buckle*

Shoe buckles were an important clothing accessory throughout the 18th century until their decline beginning in the 1790s (Figure 132). Since the completion of the 2011-2012 report, a single shoe buckle has been removed from a concretion raised in 2012 (Figure 133). Designated 12S-241.4, the copper alloy buckle joins the two shoe buckles previously reported, 11S-112.1 and 12S-237.1 (Meide et al. 2014:234-238). Measuring 6.0 cm (2.36 in.) in length and 4.5 cm (1.77 in.) in width, 12S-241.4 is missing its pin, roll, and tongue which, collectively referred to as the chape, serve to attach the buckle to the shoe and fasten it in place. Buckle chapes were often made of iron or steel, and therefore would not

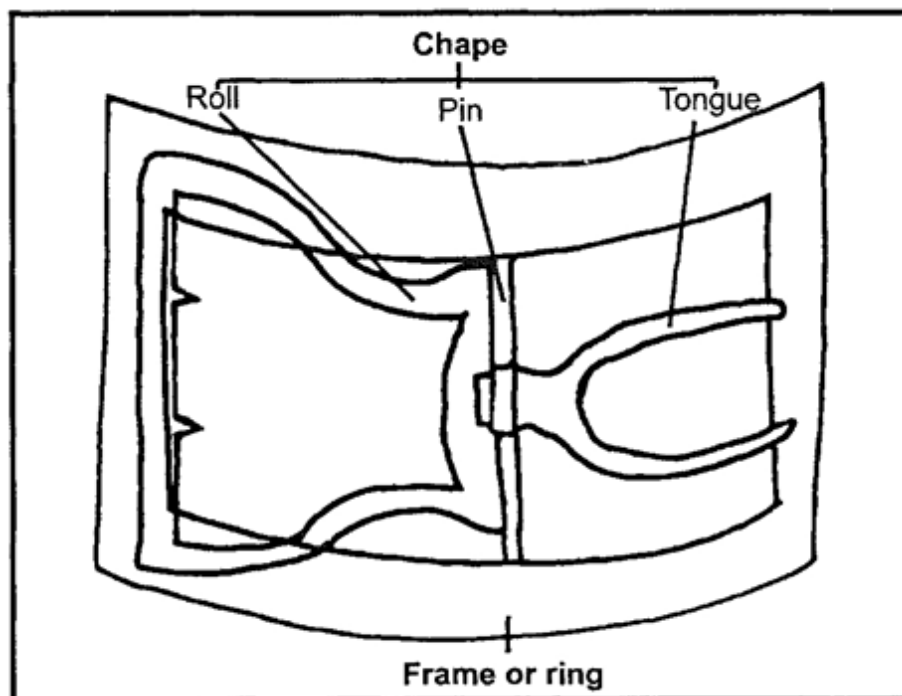


Figure 132. Components of an 18th-century shoe buckle (White 2005:33).

survive as well in salt water environments (Wróblewska 2008:200). This may explain why more buckle frames rather than whole buckles are discovered on marine sites, as is the case with the Storm Wreck and other contemporary wreck sites, including *General Carlton* lost in 1785 (Wróblewska 2008:200) and the *Defense* lost in 1779 (Smith 2008:124).

While 12S-241.4 is missing its chape, and it is made of a copper alloy like 12S-237.1, those are the only characteristics 12S-241.4 shares with the previously recovered Storm Wreck shoe buckles. Where the previously recovered buckles feature wide, flat, ornately decorated frames, 12S-241.1 is void of ornamentation, featuring a simple, rectangular frame with rounded edges, made of a thick copper alloy rod. The rod thickness flares slightly in the middle of each side of the frame. It is very similar to a series of buckles found on the 1785 *General Carlton* wreck (Figure 134). According to Elżbieta Wróblewska (2008:206), this style of buckle was more likely solely utilitarian in nature, as opposed to the more intricately designed buckles that were meant to be fashionable as well as utilitarian, and they were commonly used throughout most of the 18th century. This buckle also seems similar to those recovered from the Anniversary Wreck off St. Augustine, which is believed to date to between 1760 and 1800. At the time of writing this report, 12S-241.4 remains in wet storage at the Museum, awaiting further conservation.

#### *Straight Pins*

Several brass straight pins were raised in concretions during the 2013 field season (Figure 10EA). This brings the total number of pins found on the Storm Wreck to date to twenty-six, ten of which have been removed from concretion at the time of writing this report. Table 20 lists the Storm Wreck pins and their provenience, and if they have been removed from concretion, their length, diameter, and head diameter.

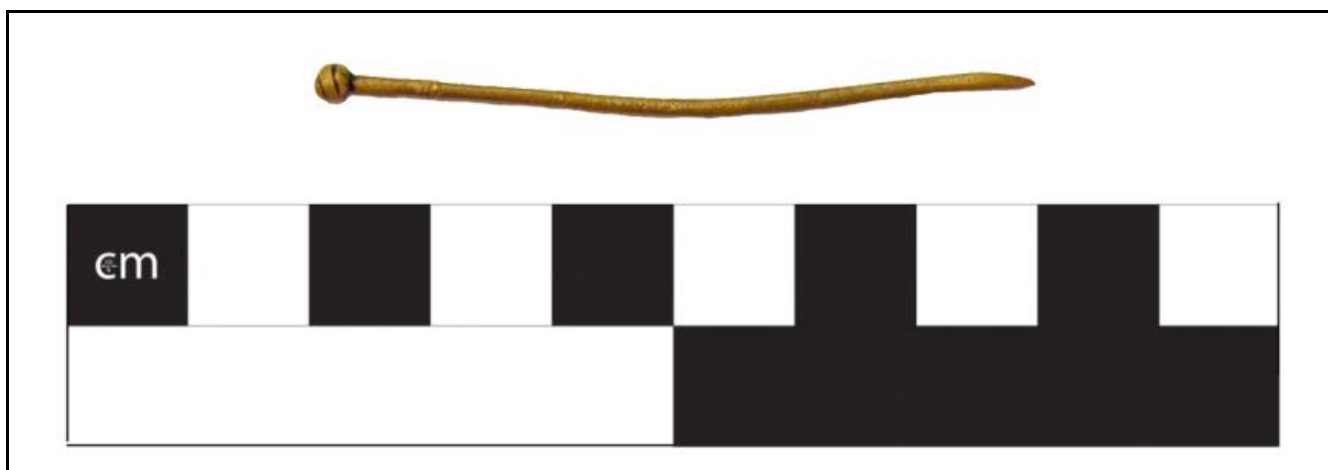
Many of the deconcreted pins are bent, in which case the length given is an approximation of their length should they be straightened. Measurements for pins that remain in concretion are not provided, as these are estimates at best, even with digital x-ray measuring tools.



Figure 133. Field Specimen 12S-241.4, a brass shoe buckle recovered in 2012. Photo taken before conservation.



Figure 134. 18th century shoe buckles from the 1785 wreck of the *General Carlton* (Wróblewska 2008:209).



**Figure 135.** Field Specimen 13S-308.2, the largest brass pin discovered on the Storm Wreck. A large pin such as this might have been intended to bind together papers or documents (Beaudry 2006:21; Jones 2017:555)

**Table 20. Brass Pins from the Storm Wreck, 2010-2013 seasons**

Field Specimen	Unit No.	Quantity	Deconcreted?	Length (cm)	Pin Diameter (cm)	Head Diameter (cm)
<i>2010</i>						
10S-036.3	1	1	Yes	2.5	0.1	0.15
<i>2011</i>						
11S-119.1	14	1	No	-	-	-
11S-148.1	10	1	No	-	-	-
11S-153.7	8 and 10	1	Yes	2.37	0.05	0.16
<i>2012</i>						
12S-204.1	7	1	No	-	-	-
12S-210.1	7	1	No	-	-	-
12S-218.2	7	2	Yes	~1.8 ~2.7	0.03 0.06	0.04 n/a
12S-220.1	11	1	No	-	-	-
12S-226.1	20	1	No	-	-	-
12S-228.1	20	9	No	-	-	-
<i>2013</i>						
13S-308.2	25	1	Yes	6.0	0.15	0.35
13S-317.1	29	1	No	-	-	-
13S-336.5	31	1	Yes	~1.0	0.026	0.088
13S-353.8		1	Yes	2.9	0.078	0.2
13S-364.3	18	2	Yes	2.9 ~3.2	0.03 0.06	0.04 n/a
13S-366.3	18	1	Yes	2.6	.09	0.17

While iron pins rust and rarely survive in the archaeological record, brass pins were widespread and are a common occurrence on archaeological sites, both terrestrial and underwater, dating from the 16th century onward (Noël Hume 1969:254; Tylecote 1972; Deagan 2002:193-194; Beaudry 2006; Jones 2017). Shipwrecks featuring similar brass pins include the 1554 Spanish wrecks at Padre Island, the 1686 French shipwreck *La Belle*, the 1749 Dutch shipwreck *Amsterdam*, the 1760 French shipwreck *Machault*, the 1764 British shipwreck *Industry*, and the ca. 1772-1800 Roosevelt Inlet Shipwreck

(Arnold and Weddle 1978:287-289; Bruseth and Turner 2005:88-89; Marsden 1974:175; Sullivan 1986:92; Franklin 2005:149-151; Krivor et al. 2010:90-91; Jones 2017:551-552).

While brass pins varied in size, virtually all were manufactured the same way. A length of brass wire was cut to the desired length and sharpened at one end. Another, finer wire was wrapped two or more times about the unsharpened end and stamped either with a hammer or a specialized machine, anchoring it to the pin to serve as the head (Figure 135). This method of manufacture was established by the mid-16th century and remained virtually unchanged until after a machine to stamp out a solid-headed pin was patented by Lemeul W. Wright in 1824 (Noël Hume 1969:254-255; Bruseth and Turner 2005:88-89; Beaudry 2006:21; Cox 2012:46; Jones 2017:).

While pins are often associated solely with sewing, and although this is probably their most common use, they actually served many purposes other than simply holding pieces of fabric together to be sewn. Mary Beaudry (2006:10-43) illustrates various uses for brass pins besides sewing, including holding blanket folds and other furnishings together, manufacturing drapes and upholstery, making lace, pinning hair, securing wigs, and fastening various items of clothing. This last practice might include decorative cuffs, collars, stomachers, and neckerchiefs for fashion-conscious elites, or for simple clothing fastening in lieu of buttons for lower classes. According to Beaudry (2006:25), pins of just over one inch in length (2.54 cm), and 1/16 inch (0.063 in. or 1.5 mm) in diameter were most commonly used for sewing, but it was common for households to have various sizes of pins on hand not only for sewing but for fastening clothing along with other tasks. Pin 13S 308.2, the largest pin recovered from the Storm Wreck to date (Figure 135), likely represents a pin used for one of these other purposes, and could have been a “banker’s pin” for binding documents (Beaudry 2006:21; Jones 2017:555). Of the other pins removed from concretion since the completion of the last report, two are smaller than the average size of sewing pins, one is a likely candidate for a sewing pin, and the others are larger than sewing pins, according to Beaudry’s classification (Table 20).

Most of the pins removed from concretion thus far are fully conserved. Field Specimen 13S-336.5 and Field Specimen 13S-366.3 are currently in wet storage and are awaiting further conservation.

### *Coins*

Several different coins have been recovered from the Storm Wreck site. Four of these coins have been presented in previous report, including a George III gold guinea (12S-303.1), a King George II halfpenny (12S-257.1), and two silver pieces clumped together in one mass (12S-262.1) (Meide et al. 2014:239-243). The past year conservators have removed two more George III gold guineas, 10S-044.2 and 10S-048.7 from concretion, and completed conservation of the King George II halfpenny. These coins are discussed below.

Long periods of use and wear make coins susceptible to corrosion when found on archaeological sites. Coin 12S-257.1, believed to be a British halfpenny, is an example of such deterioration. Both sides of the coin, obverse and reverse, show signs of wear and corrosion that make the facing difficult to interpret. It was recovered from Unit 19 dredge spoil in 2012. Upon close inspection, the coin bears the faint shape of a left-facing bust on the obverse, suggesting its identification as an “old head” George II copper halfpenny. This “old-head” design was minted from 1740-1754 during the reign of King George II. The coins were used for a long period of time, since no halfpennies were issued from 1755-1770, contributing to the worn surfaces of this specimen (Krause and Mishler 1993:492; Noël Hume 1969:162; Meide et al 2014:240). The Storm Wreck halfpenny measures 2.6 cm (1.02 in.) in diameter and 0.1 cm (0.04 in.) thick. This makes 12S-257.1 slightly smaller than a newly minted King George II halfpenny. The discrepancy in size is likely due to the wear this coin underwent from years of use.



**Figure 136. Copper (Cu) King George II halfpenny 12S-257.1 post-conservation. The outline of King George II's is still slightly visible, although it is worn.**

12S-257.1 was initially stored in a sodium carbonate solution before undergoing electrolysis. After the completion of conservation, the coin's possible bust of King George II on the obverse is more prominent upon visual inspection (Figure 136). Conservation also removed most corrosion on the coin to expose its copper color.

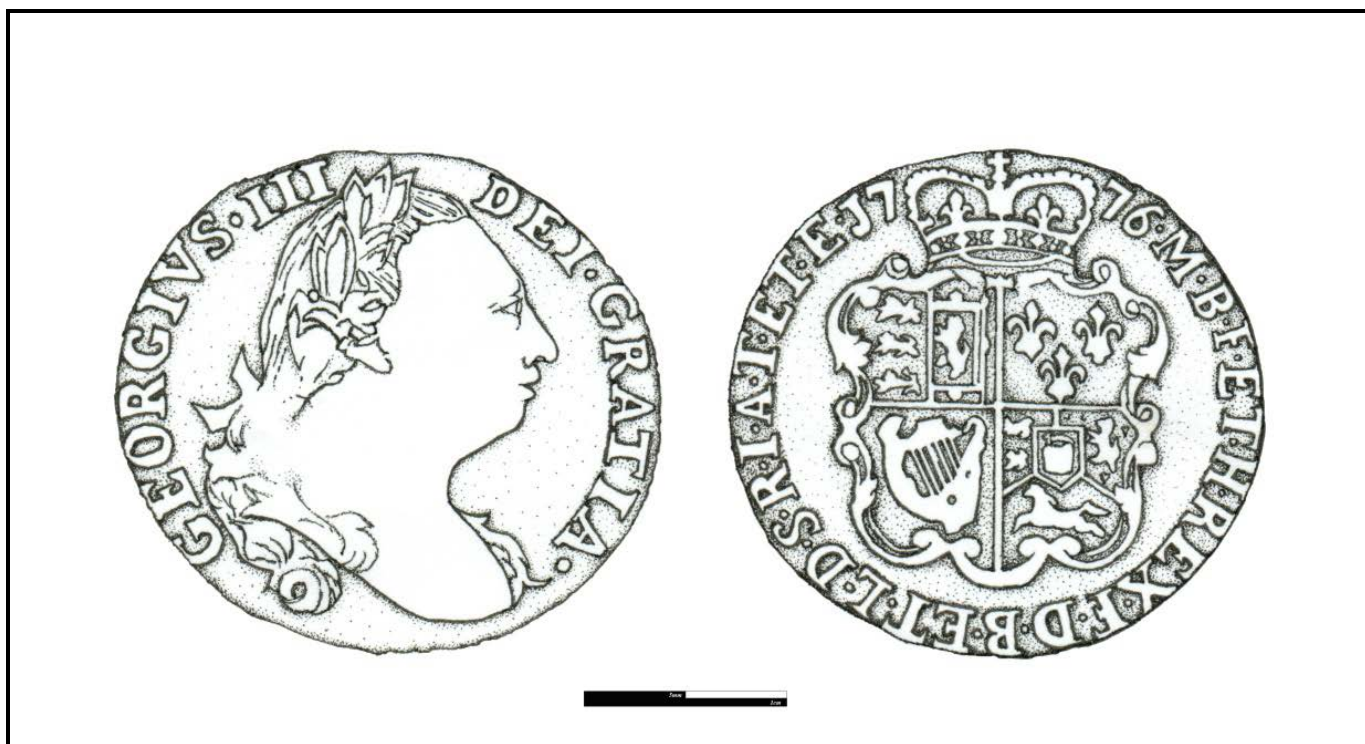
Coins 10S-044.2 and 10S-048.7 are King George III gold guineas almost identical to 12S-303.1 (Figures 137-138). They were both recovered from within concretions that were collected in 2010. The only significant difference between these three coins is their mint dates. 10S-044.2 was minted in 1774, and it was removed from concretion 10S-044.1, which was recovered from Unit 3 during field excavations in 2010. The coin measures 2.4 cm (0.94 in.) in diameter and 0.1 cm (0.04 in.) thick. Coin 10S-048.7 was minted in 1775, and was removed from concretion 10S-048.2, which was the concretion attached to one end of the wooden plank discovered on the site in 2010. The majority of the plank, designated 10S-048.1 was returned to the site in 2012. Coin 10S-048.7 measures 2.45cm (0.96 in.) in diameter and 0.12 cm (0.04 in.) thick. The dimensions of 10S-044.2 and 12S-303.1 are identical, and the dimensions of 10S-048.7 differ only slightly. All three coins were conserved similarly, with alternating water and diluted acid baths to remove residual encrustation, and then hand polished. The conservation of all three coins is complete.

Other than the mint dates, the guineas' markings are identical. On the obverse face, the bust of King George III is surrounded by the legend, reading "GEORGIVS·III DEI·GRATIA·" ("George III by the grace of God"). On the reverse, the lettering "·M·B·F·ET·H·REX·F·D·B·ET·L·D·S·R·I·A·T·ET·E·" surrounds a crowned shield. The letters comprising the reverse legend are an abbreviation for the phrase "King of Great Britain, France and Ireland, Defender of the Faith, Duke of Brunswick and Lüneberg, Arch-Treasurer and Elector of the Holy Roman Empire" in Latin. The crowned shield is quartered, showing the arms of Britain and Scotland, France, Ireland, and Hanover. The coins' mint dates are part of the legend and are visible at the top of each the reverse face. They are bisected by the crown on the coat of arms (Meide et al 2014:240). The 1774, 1775, and 1776 King George III gold guineas were all a





**Figure 137. King George III gold guinea dated 1774, Field Specimen 10S-044.2, after conservation.**



**Figure 138. This illustration of 12S-303.1 more clearly illustrates the various markings on the fourth issue King George III gold guineas. The only area in which the three Storm Wreck guineas differ in decoration is their mint dates of 1774, 1775, and 1776. Drawing by Loren Clark.**



**Figure 139.** The face of the *fausse montre* or false watch (13S-360.2) shortly after removal from concretion. It measures 3.994 cm (1.57 in.) in diameter, and displays hands in the 6 o'clock position encircled by a circular band of Roman numerals extending clockwise I through XII, surrounded by ornate scrollwork.

part of the fourth issue of the coin, which was minted between 1774 and 1786 (Krause and Mishler 1993:500).

#### *False Watch*

During the 2013 excavation season, the face of a false watch, or *fausse montre*, was recovered in the northwest quadrant of Unit 18. Lodged within concretion 13S-360.1, the false watch has since been removed, conserved, and catalogued as 13S-360.2, and is currently on display at the St. Augustine Lighthouse & Maritime Museum. The x-ray imagery of concretion 13S-360.1 showed some kind of lettering or inscription on a disk-like object inside (Figures 42EA-43EA), but it was not until it was removed from concretion that conservators realized the object bore the face of a watch (Figure 139). Initially it was believed this was the remains of a once-working pocket watch, until it was realized that the hands were cast into the face of the watch and could never have moved from the 6 o'clock position. The watch face is composed of cast pewter and measures 3.994 cm (1.57 in.) in diameter while its dial measures 2.123 cm (0.84 in.) in diameter. Roman numerals spanning clockwise outline the dial and are separated by lozenges indicating half hours. An ornately decorated twisted rope and scrollwork border encircles the dial in a rococo-like style (Figures 139-140).



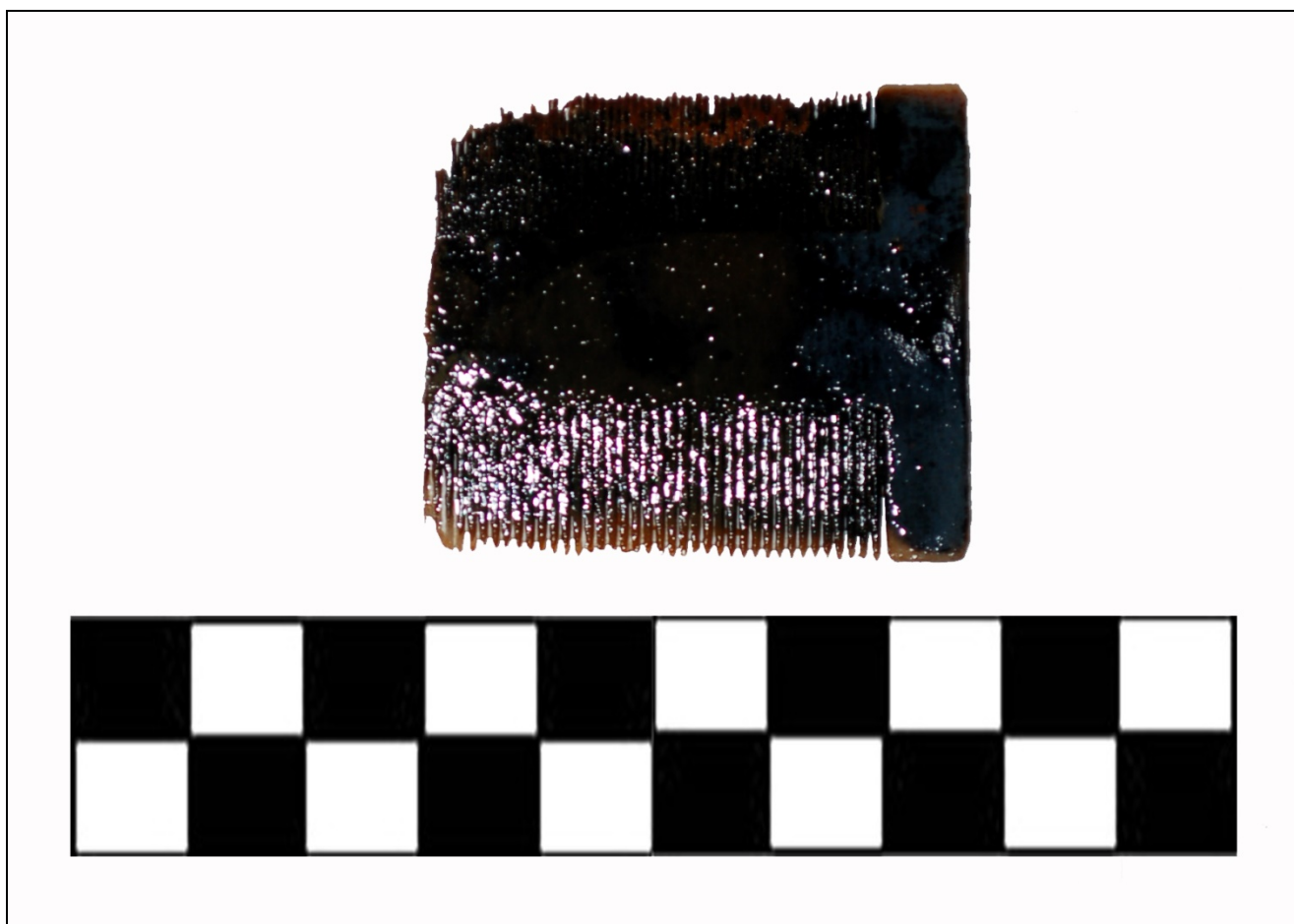


**Figure 140:** *Fausse montre* or false watch face, 13S-360.2. **Top:** Photographs of exterior and interior surfaces. **Bottom:** Drawing of exterior and interior surface. Illustration by Loren Clark.

There is no visible indication that a pendant once crowned the top of the facing. The false watch also bears what appears to be graffiti or personal markings. On the front of the watch face, the letters MAR are etched or scratched on the dial, presumably by the owner of the watch. On the back of the watch there are what appear to be similar etched lines which form what appears to be a large “14” accompanied by a pyramid-like icon (Figure 140). Upon closer inspection, the lines on the back of the watch face are not scratched in, but are raised, so must have been cast into the metal. The raised lines or ridges are not perfectly symmetrical, and may be the result of someone scratching the mold during the manufacturing process. Regardless, these markings seem to represent some kind of graffiti rather than a formal maker’s mark.

Any precise dating of the false watch is difficult because English false watch makers often reused molds. Nonetheless, by using Forsyth and Egan’s typology (2005:352-370), the Storm Wreck false watch is considered a Type 5 design, which dates from the late 17th through the 18th centuries.

William Hux and the Company produced a majority of English false watches in the 18th century. These were often accompanied by a maker’s mark of HUX/London (Forsyth and Egan 2005:342). No formal



**Figure 141. Field Specimen 12S-200.4, a bone or wooden lice comb.**

maker's mark is on the face of this false watch, unless the raised lines are meant to serve as such. No watches or watch type in Forsyth and Egan's 2005 typology bear such a mark either.

In the late 18th century, false watches were at the height of their popularity due to their association with French fashion *en vogue* across Europe (Forsyth and Egan 2005:341). Watches were a popular status symbol, and wearing two watches, the secondary of which was often a false watch or *fausse montre*, became fashionable in early 1770s London and would have spread to the colonies thereafter (White 2005:132). False watches were often suspended by leather straps, chains, or ribbons from small pockets known as fobs in the breeches or waistcoat (Evans 1970:161-162; White 2005:132; Krivor et al. 2010:189). While false watches have been historically documented as gifts to children for use as toys (Forsyth and Egan 2005:342), they were definitely a widespread fashion accessory and it is likely this watch belonged to an adult. False watch cases without facings have been recovered from at least one other 18th century shipwreck site, the Roosevelt Inlet Shipwreck (Krivor et al. 2010:189).

#### *Lice Comb*

During the 2012 season, concretion 12S-200.1 was recovered from Unit 1. Since being reported in the 2011-2012 season report (Meide et al. 2014:285), the concretion has been opened. An incomplete lice comb, not visible in the x-ray of the concretion, was discovered while airtyping (Figure 141). The comb was assigned Field Specimen number 12S-200.4. It is 4.0 cm (1.57 in.) wide and its surviving length is 4.75 cm (1.87 in.). It appears to be made of wood, but could possibly be crafted from bone. As

with many specimens found on other shipwreck sites, the comb is double sided. On one side the fine teeth are very closely spaced, for the removal of head lice, while on the other side the teeth are spaced slightly further apart, for the normal grooming of hair. This rectangular, double-sided form was typical of hair combs from at least the 16th-18th centuries and later known as specifically as lice combs in the 19th century. Typically, combs of this type were made of particularly dense woods, like black thorn or boxwood, and also of horn, ivory, bone, or tortoise shell, and sometimes even lead (Noël Hume 1969:174-175). Such combs have been found on many shipwreck sites, including the French shipwrecks *La Belle* (1686) and *Le Machault* (1760), the Dutch shipwrecks *Vergulde Draek* (1656), *Kennemerland* (1664), and *Amsterdam* (1749), the Spanish shipwrecks *Nuestra Señora de Guadalupe* (1724) and *El Rubi* (the 1733 *flota Capitana*), and the English shipwrecks *Mary Rose* (1545), the Aldernay Wreck (ca. 1590), *Stirling Castle* (1703), and *Pandora* (1791) (Marsden 1974:170; Green 1977:240; Price and Muckelroy 1979:319-320; Skowronek 1984a:132,137; Sullivan 1986:98; Davenport and Burns 1995:36-37; Apestequi 1996:120; Cates et al. 1998:139; Campbell and Gesner 2000:125; Richards 2013:156-160; Waselkov et al. 2017:705-707).

## Cookware

### Cauldrons

During the 2013 field season, a single intact cast iron cauldron was encountered along with four pieces of cast iron cauldrons. This find brings the total number of intact cauldrons on Storm Wreck to eight (Table 21). Four examples were recovered during the 2010 season, one was collected during the 2011 season, and two more were raised in 2012 (Meide et al. 2011:118-126; McNamara 2013a:39-41; Meide et al. 2014:243-246; Carter 2014,2016). Four nested copper pots were also recovered during the 2011 field season (Meide et al. 2014:246-248). These were different in form from the cast iron pots: they are flat bottomed, straight-walled, and between cylindrical and conical in shape.

**Table 21. Dimensions of the cauldrons found on Storm Wreck (before deconcretion).**

FS No.	Overall height		Inner rim diameter		Max. body diameter		Leg length		Wall thickness		Handle height		Handle width		Conservation Status
	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	
2010															
10S-036.5	39.88	15.7	36.25	14.27	40.89	16.1	11.38	4.48	1.91	0.75	7.75	3.05	4.45	1.75	Cleaned but not fully conserved
10S-038.5	16.99	6.69	14.5	5.71	17.27	6.8	2.49	0.98	0.79	0.31	2.01	0.79	2.49	0.98	Cleaned but not fully conserved
10S-063.4	24.51	9.65	24	9.45	27.51	10.83	5.99	2.36	1.5	0.59	3	1.18	3.99	1.57	Redeposited
10S-063.2	n/a	n/a	17.5	6.89	n/a	n/a	n/a	n/a	0.99	0.39	n/a	n/a	n/a	n/a	Redeposited
2011															
11S-106.1	26	10.24	27	10.63	34.4	13.54	7.2	2.83	1	0.39	8.8	3.46	1.7	0.67	Fully conserved
2012															
12S-196.1	17.5	6.89	19.5	7.68	23	9.06	5	1.97	0.6	0.24	2.5	0.98	1.2	0.47	In electrolysis
12S-205.1	17.9	7.05	18.2	7.17	21	8.27	2.3	0.91	0.7	0.28	4.5	1.77	2	0.79	In electrolysis
2013															
13S-308.1			18.5	7.28					0.5	0.20					Cleaned but not fully conserved

*Note: Cauldrons 10S-63.4 was previously reported as 10S-63.1 but its catalog number has been changed. It is the larger of two nested cauldrons, and instead of attempting to separate them, the two were repatriated to the site. Food remains were found in 10S-38.5 (green pea) and 13S-308.1 (fish vertebra).*

Cast iron cauldron 13S-308.1 was recovered from the southeast corner of Unit 25 during the 2013 season. The mouth of the cauldron measures 18.5 cm (7.28 in.) across and the lip is 0.5 cm (0.20 in.) thick. Once cleaned with a scribe, it was realized that the cauldron is not fully intact. One side has bent in and portions of it broken away. The ear opposite the collapsed side is still present although not completely so. Its three legs are still present, although two appear to be broken. To date, no further conservation has occurred beyond cleaning it of concretion (Figure 142). The sediment contents inside this cauldron were collected separately and cataloged as field specimen 13S-308.3. This sample was sent to Jacob Shidner of the University of Arkansas, who sieved it through a series of fine screens and analyzed the contents under a microscope. This yielded the remains of a past meal: a fish vertebra of yet unidentified species (Class *Actinopterygii*) which had been sliced with a knife and cooked (Figure 143) (Shidner 2016:206). One other cauldron has produced food remnants: the smallest, 10S-38.5, yielded a single green pea, which had been preserved in concretion filling the interior of the pot (Meide et al. 2014:244,246; Carter 2016:177-178)

When comparing these cauldrons to dated specimens presented by Neumann (1984:175-177), the characteristics and rounded rather than oval shape of the Storm Wreck cauldrons suggest a date range of between 1740 and 1780, which coincides closely with the year of the Storm Wreck's loss, 1782. Neumann's typology, however, is not based on precisely dated archaeological specimens but rather represents a more general temporal range for various styles (Meide et al. 2011:118). Using this typology to precisely date cauldrons can be problematic because classic pot-style cauldrons were still in use and produced, particularly in rural or remote areas, even after newer styles were introduced in the nineteenth century (Eveleigh 1997:17). Likewise, Noël Hume (1969:175) notes that neither cauldrons nor skillets "can be dated at all closely, as traditional shapes continued to be made in a great many places over a long period of time."

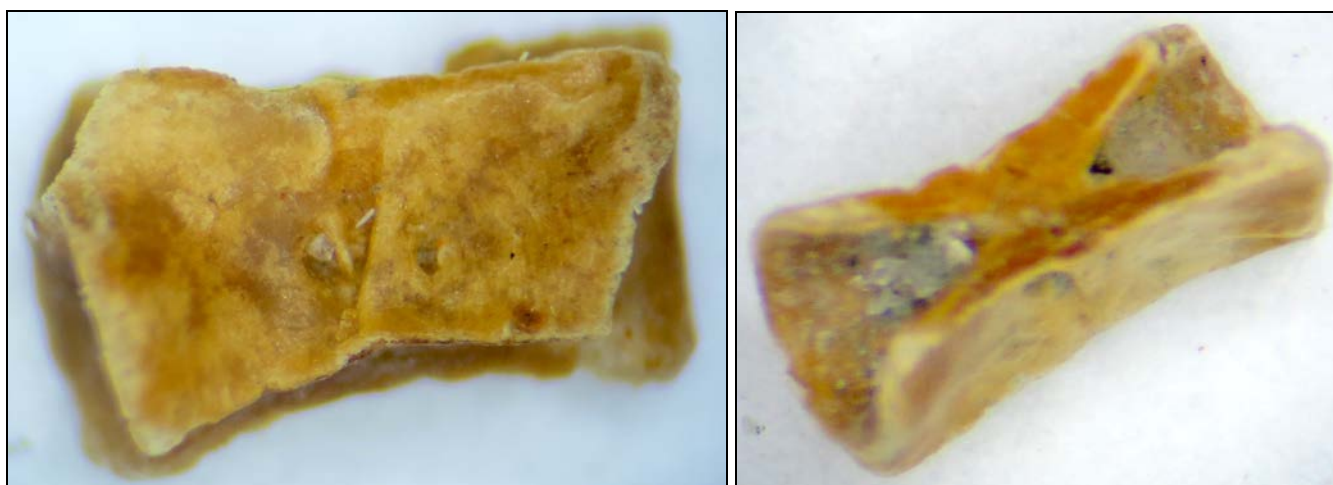
The form of the Storm Wreck cauldrons was also very similar to a specimen recovered on the nearby *Industry* wreck, a British supply sloop lost on the St. Augustine bar 18 years earlier in 1764 (Franklin 2005:139-143). The *Industry* cauldron at 13 in. or 33 cm in height was slightly smaller than the largest example from the Storm Wreck. Another similar cast iron pot of about the same size as *Industry*'s was discovered on the 1776 gunboat *Philadelphia*, still situated in the boat's galley fireplace (Bratten 1997:200,316-317). The Storm Wreck cauldrons also seem similar to a great number of cauldrons that have been observed on the Anniversary Wreck, another 18th-century shipwreck off St. Augustine excavated by LAMP and believed to date to between 1760 and 1800.

Due to the number and varied size range of cauldrons, and the current interpretation of the Storm Wreck as a wartime refugee vessel, it seems clear that they represent household cookware brought by numerous evacuating families, as opposed to ship's galley ware (though it is plausible that the largest cauldron found, 10S-36.5, could have served as the primary cooking pot in the ship's galley). Food remains found in the two of the pots indicate they were used for subsistence and were not new cauldrons on board as cargo. Cast iron pots, which were used on an everyday basis throughout the colonial period, were not manufactured locally and were therefore an essential import to St. Augustine. Recent analysis of British Period St. Augustine port records indicate that iron pots were commonly listed on incoming cargo manifests (Turner 2010). In the recently published Sitiki slave narrative (Sitiki and Griffin 2009), the autobiographer describes the unloading of iron cauldrons from ships in St. Augustine's harbor between 1815 and 1825, and notes that these items were so valuable that they were often stolen on the way to Josiah Smith's store where Sitiki clerked at the time (Patricia Griffin 4 May 2011, elec. comm.). If such ironware was in that great demand in the early 19th century then it is difficult to imagine how scarce it would have been during the Loyalist influx at the end of the American Revolution, when tens of thousands of refugees flooded the city, many having lost their possessions due to shipwreck.





**Figure 142:** Cast iron cauldron 13S-308.1 mostly cleaned of concretion. The left image shows the side view of the cauldron including the broken side on the left and the visible ear on the right. The right image shows the interior view seen from above, including the sediment still present in the cauldron. The bent in piece is visible on the left side of each view.



**Figure 143.** Close up views of a tiny fish vertebra that has been sliced and cooked, and was found inside the cast iron cauldron 13S-308.1 (above). This object has not yet been assigned a Field Specimen number. Photograph by Jacob Shidner.

### *Cast Iron Tea Kettle*

A traditional cast iron tea kettle was also recovered from the Storm Wreck (McNamara 2013a:41; Meide et al. 2014:247-249; Carter 2016:178-179). It has a round body with a spout and flat bottom. Recovered from the southwestern quadrant of Unit 9, it is cataloged as Field Specimen 11S-125.5, and measures 25 cm (9.8 in.) wide and 16.3 cm (6.3 in.) tall. Cast iron kettles were primarily used for boiling and pouring water mostly at the hearth, whereas copper or brass spouted kettles were more likely to be used for serving in the parlor (Neumann 1984:174). Kettle 11S-0125.5 has a body that is more rounded in shape compared to later, high-shouldered examples, and is similar to an example dated from between ca. 1720 and 1780 by Neumann (1984:174). This kettle 11S-125.5 has been cleaned and has completed conservation (Figure 144).

It is assumed that this kettle was a household possession brought on board by a refugee fleeing Charleston or the backcountry of the Carolinas for St. Augustine, as opposed to a piece of ship's cooking hardware. If so, it gives some insight, like many of the objects found on the Storm Wreck, into what items were considered essential for colonists fleeing their homes to make a new life in an unfamiliar colony (Meide 2015b:379). By 1782, English colonial families of virtually all statuses were participating in the social ceremony of taking tea. Archaeologists have found porcelain teawares on farmstead sites in the Carolina backcountry, suggesting that as early as the 1750s this quintessentially British tradition with its genteel materiality was practiced well outside the stylish urban center of Charleston (Deetz 1996:60; Crass et al. 1999). Another artifact related to the taking of tea was recovered from the shipwreck, a porcelain sherd believed to be from a tea bowl (pp. 235-236). It is interesting to



**Figure 144: Cast iron tea kettle 11S-125.5, mostly intact and fully conserved.**

speculate what meaning this family ritual may have had in the circumstances of a forced evacuation; perhaps continuing the regular practice of teatime would lend at least a temporary sense of normalcy in an otherwise uncertain and frightening time.

### *Gridiron*

The final piece of cookware from the Storm Wreck assemblage is a round cooking iron (McNamara 2013a:42; Meide et al. 2014:249-250; Carter 2016:178,180). It was recovered in 2011 from under Cannon 4 in the southeast quadrant of Unit 12 and was designated 11S-113.1. Since being previously reported, the gridiron has completed conservation and is currently on display in the “Wrecked!” exhibit at the St. Augustine Lighthouse & Maritime Museum (Figure 145). Its overall diameter is 28.5 cm (11.22 in.), and it consists of an outer circular band, approximately 2 cm (0.79 in.) wide and 0.6 cm (.24 in.) thick, supporting twelve irregularly spaced cross-bars which span its interior area. These wrought iron bars are square in cross section and are positioned so that a corner, rather than a flat edge, faces up. The gridiron has one surviving leg, which measures 5.3 cm (2.09 in.) long. There are no other obvious attachment places for other legs, which certainly would have been present (either three or four total).



**Figure 145:** Cast iron gridiron 11S-113.1, after deconcretion, electrolysis, and protective sealing treatment.



**Table 22. Spoons recovered from Storm Wreck between 2009 and 2013.**

FS Number	Total Length		Bowl Length		Type	Unit	Conservation Status
	cm	in	cm	in			
2010							
10S-064.1	15	5.9	8.4	3.3	Drop attached bowl; truncated handle	9	Complete
2011							
11S-104.1	19	7.5	7.6	3.0	Fiddle-back design with a shell-back bowl attachment	12	Complete
11S-115.1	17.6	6.9	6.3	2.5	Dog-nose style with rat-tail bowl attachment	14	Complete
11S-122.1	11.5	4.53	6.8	2.68	Rat-tail bowl attachment	14	Complete
2012							
12S-202.1	9.5	3.74	n/a	n/a	Ridgeback pattern	11	Complete
12S-203.1	18.5	7.28	6.3	2.48	Dog-nose style with rat-tail bowl attachment	7	Complete
12S-239.4	17	6.69	6.5	2.56	Dog-nose style with rat-tail bowl attachment	21	Complete
12S-241.5	14.2	5.59	8.3	3.27	n/a	21	Complete
2013							
13S-310.2	18.93	7.45	6.75	2.66	Dog-nose style with rat-tail bowl attachment	25	Complete
13S-338.4	18.0	7.09	6.5	2.56	Dog-nose style with rat-tail bowl attachment	31	Complete
13S-353.5	19.1	7.52	n/a	n/a	Dog-nose style, attachment obscured	33	Cleaned, awaiting electrolysis
13S-355.1	18.5	7.28	6.75	2.66	Dog-nose style	18	Cleaned, awaiting electrolysis
13S-386.1	13.5	5.31	7.5	2.95	Rat-tail bowl attachment	21	Cleaned, awaiting electrolysis

Gridirons were used in the hearth for light cooking and as warming plates (Neumann 1984:192-193). It was alternatively speculated that this circular grating might be from a brazier, a portable device used for warmth or cooking that was “popular on shipboard” in the late 18th century (Neumann 1984:198). But the presence of a leg, which was not noted until the piece was deconcreted, suggests this item was a stand-alone cooking device and not part of a brazier.

### ***Tableware***

#### ***Spoons***

Five spoons were recovered during the 2013 season, in addition to the eight spoons recovered between 2010 and 2012 (Table 22). All the Storm Wreck spoons are pewter (McNamara 2013a:38-39; Brendel 2016:187-188; McCarron 2016:170-171). Standard pewter was a mix of approximately 95% tin, 3 to 4% lead, 1% copper, with slight traces of bismuth, arsenic, and zinc, and for centuries it was a common alloy for use in tableware (McNamara 2013a:38).

The first spoon recovered in 2013 was 13S-310.2 from concretion 310.1. It was recovered from the northeast corner of Unit 25. The spoon was found in one piece and upon removal from the concretion it



**Figure 146. Field Specimen 13S-310.2, a pewter spoon with dog-nose handle and rat-tail attachment. Notice the circular decorations on the end of the handle of the spoon.**

broke into two pieces, towards the end of the handle (Figure 146). Its total overall length is 18.93 cm (7.45 in.) with the stem and bowl measuring 14.35 cm (5.65 in.) and the handle 4.58 cm (1.80 in.). The bowl measures 6.75 cm by 4.3 cm. (2.66 in. by 1.69 in.). It has a rat-tail attachment along the bottom of the bowl and dog-nose pattern on the end of the handle. The dog-nose style was popular from 1690 into the 1800s (McNamara 2013a:39). The spoon has undergone electrolysis and its conservation is complete.

The second spoon recovered in 2013 was 13S-338.4, recovered from the southeast quadrant of Unit 31 (Figure 147). It was embedded within concretion 13S-338.1, which x-rays suggested also contained a cannon ball and lead bird shot (Figure 28EA). It has since been cleaned and undergone electrolysis and final treatment. Its overall length is 18.0 cm (7.09 in.), and its bowl measures 6.5 cm by 4.5 cm (2.56 in. by 1.77 in.). It has a rat-tail attachment along the bottom of the bowl and dog-nose pattern at the end of the handle. On the reverse of the dog nose end of the handle is a scratched “S” (Figure 148). The S is believed to represent an initial or personal mark inscribed by the spoon’s owner, likely either a sailor or passenger. Historically, sailors or other travelers often marked their spoons to designate ownership, usually with their initials, a practice that has been documented on a number of 18th-century shipwrecks, including the Dutch East Indiaman *Amsterdam* and the American privateer *Defence* (Marsden 1974:179; Smith 2008:88-89). Two other Storm Wreck spoons have similar markings believed to be owner’s personal marks: 11S-104.1 bears an “X,” and 11S-115.1 has an asterisk-like mark. These have been interpreted as marks made by owners who were illiterate and could not write their own initials.



**Figure 147.** Field Specimen 13S-338.4, a pewter spoon with a dog-nose style handle and a rat-tail attachment. While similar to many of the other spoons recovered from Strom Wreck, this one has a unique identifying mark. Visible on the back of the end of the handle, indicated by the arrow, is an “S,” likely the initial of the owner of the spoon (see also Figure 148 below).



**Figure 148.** Inscribed “S” on back of spoon 13S-338.4. This “S” likely is the initial of the owner of the spoon. Additional markings are adjacent to the “S” but are as yet indecipherable.





**Figure 149. Field Specimen 13S-353.5, a pewter spoon with a dog-nose style handle. Concretion obscures the type of bowl attachment though it is likely a rat-tail like most of the other Storm Wreck spoons.**

The third spoon recovered in 2013 was 13S-353.5 from concretion 353.1. X-ray imagery indicated this concretion, recovered from the southeast quadrant of Unit 33, included a variety of objects, including the spoon, a cannonball, a clothing iron, and a flintlock pistol (Figures 94, 41EA). The spoon has since been removed from concretion, though it is still partially encrusted (Figure 149). Its overall length is 19.1 cm. (7.52 in.) and it displays a dog nose handle. The concretion still attached to the spoon obscures part of its bowl and handle, and prevents further measurements and an understanding of its bowl attachment. It is awaiting further cleaning and electrolysis treatment.

The fourth spoon recovered in 2013 was 13S-355.1 (Figure 150). It was recovered by itself and not inside a larger concretion, from the northeast quadrant of Unit 18. Its overall length is 18.5 cm (7.28 in.) and its bowl measures 6.75 cm by 4.75 cm (2.66 in. by 1.87 in.). Like most of the Storm Wreck spoons it has a dog-nose style handle and a rat-tail attachment at the bowl. Its handle is exceptionally straight compared to most of the other spoons from the Storm Wreck, which are frequently bent or sometimes broken. Its bowl, however, has been dented. There is a circumpunct decoration on the front of the end of the handle, similar in placement and design to that on 13S-310.2 seen in Figure 146. The spoon has not been fully cleaned of a light layer of concretion or undergone electrolysis, and further conservation may elucidate the nature of its decorations.

The final spoon recovered in 2103 was 13S-386.1 (Figure 151). It was recovered from Unit 21. It has a truncated handle and an elongated bowl compared to most of the other specimens. Its bowl measure 7.5 cm by 4 cm (2.95 in. by 1.57 in.) and its handle has been cut or broken and measures 13.5 cm. (5.31 in.). It is currently unknown whether the truncated handle was a deliberate cut by the owner or if it resulted from the shipwreck event or subsequent natural actions on the seafloor. Shortening spoon handles in order to make them easier to fit into pockets was a documented practice among sailors in the 18th-19th



**Figure 150. Field Specimen 13S-355.1, a pewter spoon with a dog-nose style handle and rat-tail bowl attachment. It bears a circumpunt decoration at the end of the handle similar to that on 13S-310.2 (Figure 146). It is an exceptionally straight spoon, unlike many others from the Storm Wreck which have been bent or broken, though its bowl is dented.**



**Figure 151. Field Specimen 13S-386.1, a truncated pewter spoon with a rat-tail bowl attachment.**

centuries (Broadwater 1996:133; Smith 2008:88-90). The spoon has a rat-tail attachment joining the handle stub with the bowl but its original handle style will remain a mystery. It has not yet undergone conservation other than cleaning.

All spoons found during the 2013 season resemble those found in previous Storm Wreck seasons, including 11S-115.1, 12S-203.1, 12S-239.4, and 13S-338.4. There are also a number of styles previously recovered which do not have parallels from the 2013 assemblage. As each spoon recovered from the Storm Wreck has their own unique characteristics, and with many bearing personal markings, they were most likely acquired and possessed by different means and owners (McNamara 2013a:39; McCarron 2016:171). Each spoon, for example, bears different markings, some of which were decorations cast into the original spoon and some of which were added later by an owner, and some spoons have bent or truncated handles. During the 18th century, soldiers, sailors, and other travelers often carried their own utensils for dining and personal use, so the presence of different types of tableware is not unexpected on a contemporary shipwreck, especially one believed to have been an evacuation vessel loaded with refugees.

### ***Other Domestic Items***

#### ***Keg Tap and Tap Key***

Two artifacts related to dispensing liquids from kegs or casks were found, a copper alloy keg tap and a keg key made of a similar material. It remains unclear whether these items were part of a refugee's possessions or intended for use on a beer or water cask from the ship's stores.

The keg tap 13S-327.1 was found in the southeast quadrant of Unit 30, at an elevation of about 72 cmbd underneath a large concretion, and can be seen in the site plan detail in Figure 74. It is brass or a similar copper alloy and is 15.0 cm (5.91 in.) in length and weighs 864.23 g (Figure 152). It measures 12.7 cm (5 in.) in height, including its T-bar handle, which is 6.5 cm (2.56 in.) across. The bore at the spout measures 1.5 cm (0.59 in) in diameter, while the tapered stem that was inserted into the keg has a bore diameter of 1.6 cm (0.63 in) even though its outer diameter is narrower than at the spout. The keg tap has completed conservation and is now on display.

It was found with its handle or stopcock in the open position, which led to speculation that it may have been operated in the aftermath of the ship's grounding. Several scenarios can be imagined. Desperate sailors, frustrated or despondent in the belief that the stranded ship was doomed, may have decided to cease attempts to save the vessel and instead drink themselves into insensibility. This is a well-documented coping behavior during historical shipwreck events (Gibbs 2006:12). A less mutinous scenario could be that the captain ordered the beer kegs tapped to reward and encourage a shift of thirsty men who had been toiling for hours at the pumps or jettisoning heavy materials in an attempt to refloat the stricken vessel. A third possibility is that the captain may have ordered water or other liquid stores to be drained directly into the hold, where the bilge pumps could flush the expelled liquid overboard, as the fastest way to relieve the stricken ship of the weight of its water or liquid stores. A fourth scenario is that the tap was not installed on a keg at the time of the wrecking, but instead was stowed for transport. In this case, the handle would likely be stored in the open position, so that the tap and handle could lie flat for more easy storage. On at least one other shipwreck site, the Spanish merchant *fragata Nuestra Señora de Begoña* lost in 1725, a similar tap was found in the open position (Maus and Beeker 2013:26).

Taps, cocks, or spigots used to tap wooden casks have been found on other shipwrecks, including the English merchantman *Ann Francis* (1583), the Dutch East Indiamen *Batavia* (1629), *Vergulde Draeck* (1656), *Meresteyn* (1702), *Aledaar* (1728), and *Hollandia* (1750), the French frigate *Le Machault* (1760), the aforementioned *Nuestra Señora de Begoña* (1725), and the British frigates *HMS Sirius*



**Figure 152. Brass tap or spigot, 13S-327.1, after conservation. Its handle was found in the open position.**

(1790) and HMS *Pandora* (1791) (Marsden 1976:209, 211; Green 1977:183-184; Sullivan 1984:60; Green 1989:163; Gawronski et al. 1992:359; Stanbury 1994:52-53; Redknap and Besly 1997:198; Campbell and Gesner 2000:81; Martin 2005:207; Maus and Beeker 2013:26). Similar finds have also been made on terrestrial sites, particularly at taverns and other drinking establishments. These include the 18th-century Wetherburn's Tavern and Charleton's Coffeehouse at Colonial Williamsburg, a 19th-century fur-trading post in Wisconsin, and various mining town saloons in Alaska and the western U.S. (Ewan 1986; Bowers and Gannon 1998; Dixon 2005:77; Levy et al. 2007; Smith 2008:23-24).



**Figure 153. Copper alloy tap key, 13S-310.3. This would have served as a removable handle for a tap or spigot, different than tap 13S-327.1.**

The tap key 13S-310.3 was discovered inside a concretion recovered from the northeast quadrant of Unit 25. Concretion 13S-310.1 is visible in the site plan detail in Figure 71, and is described in detail in the subsequent section on concretions. X-ray analysis revealed, among other artifacts, a metal key (Figure 4EA). When removed from concretion, the key was found to be made of brass and was identified as a tap key (Figure 153). It would have served as a removable stopcock, which could be used to restrict access to the liquid within a tapped keg. It therefore could not have come from tap 13S-327.1, whose handle was intact and non-removable. It measures 7.1 cm (2.80 in.) in length and its oval bow handle is 3.7 cm (1.46 in.) across. It is similar in form to specimens commonly found by metal detectorists in England and elsewhere (UK Detector Finds Database 2017). Additionally, the brass spigot from *Le Machault* had a tap key which looks very similar to this one (Sullivan 1984:60).

### *Clothing Irons*

In Europe, heated irons were used for smoothing clothes as early as the medieval period (Glissman 1970). By the 17th century, “flat iron” or “flatiron” was the general name for the hand-held iron, which consisted simply of a handle with a solid, flat, triangular metal base, and was named after the flat ironing face used to smooth clothes. “Sad iron” or “sadiron” was an alternative term, with “sad” meaning solid or heavy, so in some contexts this referred to a heavier version of the standard flat iron. Sometimes the term “smoothing iron” was also used. Usually two irons were used when ironing clothes, with one being left on the fire to heat while the other was in use, until it cooled and was switched out for the first. A cloth or rag was used to hold the heated iron since the handle was also hot, though sometimes handles were made of wood and by the late 19th century removable handles were produced which could be attached to a pre-heated iron.

Four clothing irons were recovered during the 2013 season (Table 23). In addition to the five recovered between 2010 and 2012, the total number of irons found on site by the end of the 2013 season is nine<sup>5</sup>. These irons, while varied in style, are all simple designs featuring an iron handle attached to a solid base. X-ray images have provided various views of the concreted irons and, in some cases, depending on the angle of the iron, preliminary measurements (Figures 17EA-18EA, 20EA, and 41EA). Table 23 presents the basic dimensions of the irons as measured by hand and from x-ray imagery. As mentioned elsewhere in this report, the x-ray analytic software measurements have some margin of error, in these cases between 0.3 and 5 mm.

Iron 13S-328.2 was recovered from the southeast quadrant of the Unit 30 at an elevation of between 72 and 78 cmbd. It was embedded within a concretion and first noted in an x-ray radiograph (Figure 17EA). It was found mostly complete and has a handle that originally measured around 12 cm (4.72 in.) long and a body measuring around 15.5 cm (6.10 in.) by 10 cm (3.94 in.) (Figure 154). This clothing iron is still only partially deconcreted, which has obscured measurements. No further conservation has taken place at this time.



**Figure 154. Clothing iron, 13S-328.2, after cleaning but not full conservation.**

Field Specimen 13S-329.1 was a concretion found in the northwest quadrant of the Unit 30. X-ray imagery of this concretion clearly shows the iron, along with a variety of other objects (Figure 18EA). The iron has been measured inside the concretion using the digital measuring tool, and is approximately 15 cm (5.9 in) long. It has not yet undergone conservation and remains within the concretion.

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<sup>5</sup> A tenth iron was recovered during the 2014 season.



**Table 23. Clothing irons recovered 2010-2013, with base measurements**

FS No.	Attribute	X-Ray Measurement		Actual Measurement		Unit
		<i>cm</i>	<i>inches</i>	<i>cm</i>	<i>inches</i>	
10S-34.1	length	14.2	5.59	n/a	n/a	1
(concreted)	width	10.5	4.13	n/a	n/a	
	thickness	n/a	n/a	n/a	n/a	
11S-145.2	length	n/a	n/a	12.9	5-1/16	8
(deconcreted)	width	9.039	3.56	8.7	3-7/16	
	thickness	n/a	n/a	2.5	1	
11S-146.1	length	16.287	6.41	n/a	n/a	8
(concreted)	width	n/a	n/a	n/a	n/a	
	thickness	n/a	n/a	n/a	n/a	
12S-242.2	length	n/a	n/a	15.0	5-7/8	15
(deconcreted)	width	n/a	n/a	10.4	4-1/16	
	thickness	n/a	n/a	2.8	1-1/8	
12S-242.3	length	14.077	5.54	14.5	5-11/16	15
(deconcreted)	width	9.834	3.87	9.8	3-13/16	
	thickness	n/a	n/a	2.8	1-1/8	
13S-328.2	length	14	5.51	~15.5	~6.10	30
(concreted)	width	n/a	n/a	~10	~3.94	
	thickness	n/a	n/a	n/a	n/a	
13S-329.1	length	15	5.91	n/a	n/a	30
(concreted)	width	n/a	n/a	n/a	n/a	
	thickness	n/a	n/a	n/a	n/a	
13S-331.2	length	15.49	6.10	14.07	5.54	30
(deconcreted)	width	n/a	n/a	9.13	3.59	
	thickness	2.98	1.17	2.54	1	
13S-353.3	length	13.7	5.39	13.0	5.12	33
(deconcreted)	width	n/a	n/a	9.0	3.54	
	thickness	n/a	n/a	2.75	1.08	

Iron 13S-331.2 was found in a concretion in the southern half of Unit 30 at an elevation of 68 cmbd. It was found to be intact and has since been cleaned of concretion (Figure 154). Its base measures 14.07 cm long and 9.13 cm wide (5.54 in by 3.59 in.) and is 2.5 cm (0.98 in.) thick. The handle of the iron thins from the body to the top. The vertical back of the handle starts 7.31 mm (0.29 in.) thick and narrows to 5.44 mm (0.214 in.) at the top. The vertical front of the handle starts at 7.83 mm (0.31 in.) and narrows to 5.89 mm (0.23 in.). The horizontal thickness of the handle is 15.64 mm (0.62 in.). Visible on the handle is a small number “3.” The meaning of this number remains unknown, though it could represent one of a series of sizes. This iron has undergone electrolysis and its conservation is complete.

Iron 13S-353.3 was in a concretion recovered from the southeast quadrant of Unit 33 at an elevation of 65 cmbd. X-ray imaging of this concretion indicated it contained a number of other interesting objects, including a pewter spoon, clothing iron, cannonball, and flintlock pistol (Figures 94, 41EA). This concretion has since been broken up by aircsribing and its contents have been separated and cleaned of concretion. The iron measures 13 cm long (5.11 in.) and has a 2.75cm (1.08 in.) thick base (Figure 155).



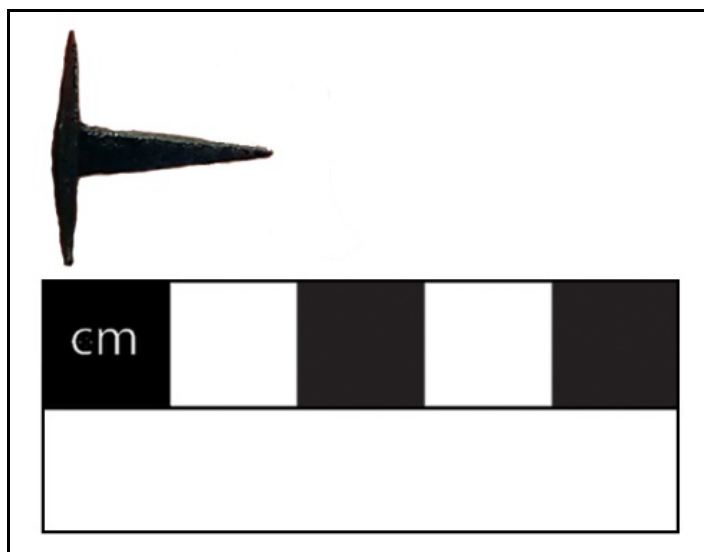
Figure 154. Clothing iron, 13S-331.2, after conservation.



Figure 155. Clothing iron, 13S-353.3, after cleaning but not yet full conservation.

The handle is 0.5cm (0.2 in.) thick at the base and 1.6 cm (0.63 in.) thick at its top. The height of the handle is 8.3 cm (3.27 in.) and it is 11 cm (4.33 in.) long. Very similar in size to 13S-331.2, this iron also has a number 3 visible on its handle, strengthening the hypothesis that the “3” refers to a particular size of iron. While it has been cleaned of concretion, this iron has not yet undergone additional required conservation treatments.

The spatial distribution of the irons recovered between 2010 and 2013 is of some interest. Their units of origin are included in Table 23. Eight out of the nine irons were seemingly recovered in pairs, with two from Unit 8, another two from Unit 15, another two from Unit 30, and an additional example from Unit 30 with a second in the adjacent Unit 33. This is noteworthy because, as mentioned above, irons were typically used in pairs. The distribution of these irons suggests that archaeologists may have recovered four sets of irons owned by as many as four individual families. They were probably packed along with other personal possessions in boxes or similar containers on board the ship and, due to their weight and shape, did not move very far from the location of their original deposition after the wrecking process.



**Figure 156. Field Specimen 12S-241.3, a copper alloy tack that may represent an upholstery tack**

### *Tack*

A copper alloy tack was removed from 12S-241.1, a long concretion raised from the northern half of Unit 21, and protruding into Unit 22, in 2012 (Meide et al. 2014:301-303). This concretion also contained the possible chainplate discussed earlier (Figure 98), a truncated spoon (Table 22), and a shoe buckle (Figure 133). This concretion had not yet been opened when previously reported in the 2011-2012 report (Meide et al. 2014: 301-303), but the aforementioned objects have all been removed from concretion and cleaned at this time. The brass tack, now cataloged as 12S-241.3, is the only tack recovered from the Storm Wreck thus far. Researchers believe it may represent an upholstery or furniture tack, a common find from 18th-century sites (Noël Hume 1969:227-228). It measures 1.8 cm (0.7 in.) in length, and has a square shank that tapers to a point. Its head is flat and eroded, measuring 1.8 cm (0.7 in.) across at its widest point. The shank is not perfectly centered on the head.

The tack was likely part of an 18th century furniture item. It should be remembered that there was evidence that there was at least one upholsterer on board this vessel as a refugee (pp. 197-199), and this may have been part of his stores, or else it could come from a piece of furniture brought aboard by

another refugee fleeing his or her home. When compared to other examples in the archaeological record, it shared similarities in both shape and size to an upholstery tack recovered at the Rocky Mountain House (FcPr-1), in Alberta, Canada, which was occupied between 1799 and 1834 (Noble 1976). A number of brass tacks have also been recovered from the Anniversary Wreck offshore St. Augustine, which dates to between 1760 and 1800, although these have not yet been cleaned or closely studied. The Storm Wreck tack, 12S-241.3, is currently in wet storage awaiting further conservation treatment.

### *Ceramics*

There have been surprisingly few ceramic specimens recovered from the Storm Wreck, with only five sherds encountered from 2010 to 2013. Additionally, three small pieces of an unknown material that may be ceramic were removed from concretion surrounding a small cauldron, 10S-038.5, recovered from Unit 0 in 2010. The pieces, designated 10S-038.3, are in wet storage awaiting further conservation. Once conservation practices commence, further attempts at a positive identification of the material will take place.

Of the positively identified ceramics, most are small and unmarked. Field Specimen 10S-051.1 consists of three small sherds of stoneware that were removed from the outside of concretion 10S-051.2 which X-rays indicate holds iron fasteners. The concretion itself was recommended for redeposition to its original provenience, Unit 6, and therefore only the sherds visible on the outside of the concretion were removed for further analysis. The rest of the concretion was left intact for redeposit. The sherds comprising 10S-051.1 are currently in wet storage and awaiting further conservation.

A rim sherd, 13S-331.3, was removed from concretion 13S-331.1, which was raised from the southern half of Unit 30 at a depth of 68 cmbd, and also contained a clothing iron, lead shot, and a fragment of glass (Figure 19EA). When it was initially removed from the concretion, the sherd appeared to be some sort of refined white earthenware, but it was badly discolored, and further attempts at analysis were postponed until after further conservation. The piece has now been thoroughly desalinized and cleaned and its body can be seen to have an ivory or cream color (Figure 157). This piece was analyzed by Kathy Deagan who confirmed its identification as creamware. The molded shape of its rim is also distinctive to a particular style of creamware known as the Royal pattern.

The introduction of creamware was probably the most significant development in Britain's ceramic industry in the entire 18th century. It witnessed such an immediate appeal, and spread so rapidly throughout the English colonies (displacing white salt-glazed stoneware), that the phenomenon has been called "the Creamware Revolution" (Martin 1994). Creamware dominated the Staffordshire pottery trade from around 1765 until at least 1780, when it began to share the utilitarian market with pearlware (Noël Hume 1970: 409). Its origins can be traced back to the experimentation conducted by Thomas Astbury and Thomas Whieldon, who around 1750 developed dip-glazed cream-bodied vessels, decorated with various clouded or stippled colors, generally known as "clouded wares." A temporary partnership between Whieldon and Josiah Wedgwood led to further developments in the ware, and once Wedgwood was in business on his own he perfected what is today known as creamware in 1762 (Noël Hume 1969: 124-125).

Wedgwood's marketing skills were as advanced as his technical skills, and within a few years he gained an official endorsement for his new ware by Queen Charlotte (Noël Hume 1972: 352-353). Creamware was thereafter known as "queen's ware," and its royal recognition certainly helped spread the rapidly expanding appeal for this new, plain cream-colored ware. In addition to the new ware itself, new mold patterns (especially for plate rims) were regularly developed and introduced, which in turn stimulated sales as fashion-conscious consumers on both sides of the Atlantic tried to acquire the latest styles. Thus



**Figure 157. Top and bottom views of 13S-331.3, a creamware rim sherd from a “Royal pattern” style plate.**

the familiar seed impressions from the distinctive white stoneware “barleycorn” plates was omitted, leaving the empty bands, ribs, and undulating edge, creating the new “Queen’s pattern” for creamware plates. The omission of these bands and marley divisions made for a new rim design, supposedly intended specifically for King George III, known as the “Royal pattern.” While Campbell and Gesner (2000:99) note that the design was first listed in the Leeds Pottery Pattern Book in 1783, this well-known pattern originated two decades earlier, sometime “shortly after” the Queen’s pattern was introduced in 1762, and before the popular feather-edged pattern was produced around 1765 (Noël Hume 1969:125).

An ongoing development in the British ceramics industry was the search for ever-whiter tablewares to compete with expensive imported Asian porcelains. After about 1775, creamware was made in a lighter color, which can often be distinguished from earlier, deeper-cream-colored sherds in the archaeological record. The advent of the much whiter pearlware in 1780 would soon displace creamware from its most favored tableware status, though creamware has been found on colonial sites dating to as late as 1820.

Wedgwood did not have a patent on creamware, and so it and other Staffordshire type ceramics were produced across Britain and in the American colonies. Creamware was produced in Wachovia in North Carolina, and also by potter John Bartlam in South Carolina, who by 1771 was making a variety of green-glazed and creamware forms including plates with the popular molded rim styles such as that found on Storm Wreck (South 2004). His business continued until his death in 1781, just a year before the Storm ship departed Charleston, and was successful enough that it was of concern to Josiah Wedgwood himself (South 2004:4).

Creamware sherds are ubiquitous at archaeological sites across the British Atlantic world dating between the 1760s and into the early years of the 19th century, when they were increasingly being displaced by pearlwares. The 1791 wreck of the British frigate *Pandora* produced a number of Royal pattern creamware dinner plates, soup plates, and bread and butter plates, all similar to the single specimen of Royal pattern creamware on the Storm Wreck.

The largest and perhaps most interesting ceramic sherd recovered thus far, 13S-319.2, is a body sherd from a porcelain vessel believed to be of English manufacture (Figure 158). It was found in concretion surrounding an axe head (13S-319.1) raised from Unit 29. It features a blue underglaze transfer print motif known as a “fisherman and cormorant” pattern, which is sometimes also referred to as a “fisherman and pleasure boat” pattern. This pattern was produced by both Caughley and Worcester potteries in the late 18th century. Figure 159 includes an example of a Worcester (left) and a Caughley (right) tea bowl bearing the fisherman and cormorant motif. In this particular instance, the Storm Wreck sherd more closely resembles the Worcester vessel, though with various other examples from the late 18th century the fisherman and cormorant vessels made by the two companies are nearly indistinguishable. Ivor Noël Hume (2001:290) addresses this problem, noting that often the only distinguishable difference between Caughley and Worcester fisherman and cormorant porcelains, outside of a maker’s mark, is the tension in the fisherman’s line (taught for Caughley, and slack for Worcester), or the size of the fish caught by the man on the pleasure boat (fat for Caughley, and long and skinny for Worcester). As neither fish nor fisherman are present on porcelain sherd 13S-319.2, archaeologists cannot positively determine which pottery is responsible for its manufacture.

For centuries, Europeans had coveted the high quality porcelains of China. Chinese hard-paste porcelains used kaolin clay, which was previously unknown in Europe. Because both the glaze and body of this Asian ware were made of the same substance in different stages of decay, the firing process created an extremely hard product that was very white, scratch-resistant, and impervious to fluids. Europeans were fascinated with this imported porcelain and long sought the secrets of its manufacture, resulting in the development of a variety of lower-quality, soft-paste porcelains from a range of different materials. In the early 18th century a European source of kaolin was discovered in Germany outside Colditz and Aue, allowing German factories such those at Meissen and Dresden to make their own hard-paste china (Collectors Weekly 2017).

British access to German kaolin was restricted, however, and British potteries continued to rely on their own trademark soft-paste porcelain formulas. Various additives including chalk, lime, ground glass, and bone ash (producing what was known as “bone china”) were used to improve the quality of soft-paste porcelains (Collectors Weekly 2017). Factories in Bristol, Worcester, and Caughley in Shropshire stood out as early producers of fine soft-paste porcelains. The pottery at Worcester was established in 1751 when 14 business partners started an enterprise to manufacture porcelain, which survives to this day as Royal Worcester (Collectors Weekly 2017). Between around 1775 and 1799, Ambrose Gallimore and Thomas Turner also became known for their high quality soft-paste porcelain at Caughley (Caughley Society 2017). These factories made a variety of shapes and patterns, in the primary wares prized by households of the then-emerging middle classes. It is likely that the Storm Wreck porcelain sherd was from a vessel, likely a tea bowl or other teaware, manufactured at one of these two factories. The implications of artifacts associated with the taking of tea being found on a refugee ship have already been discussed on pp. 219-220)

### *Fireplace Hardware*

The hearth was the heart of the colonial home, providing warmth, food, and hot water for taking tea. A couple of artifacts recovered from the Storm Wreck are related to the fireplace. The first of these is Field Specimen 12S-234.1, a pair of iron fire tongs recovered from a concretion located in the southwest quadrant of Unit 20. This artifact was originally interpreted as a pair of large dividers from observation of x-ray imagery (Meide et al. 2014:299-301). They have since been removed from concretion and have been identified as fireplace tongs (McCarron 2016:173). The tongs, which are incomplete, measure 36 cm (14.17 in.) from the base of the handle to their surviving distal end, 8 cm (3.15 in.) wide, and 1.3 cm



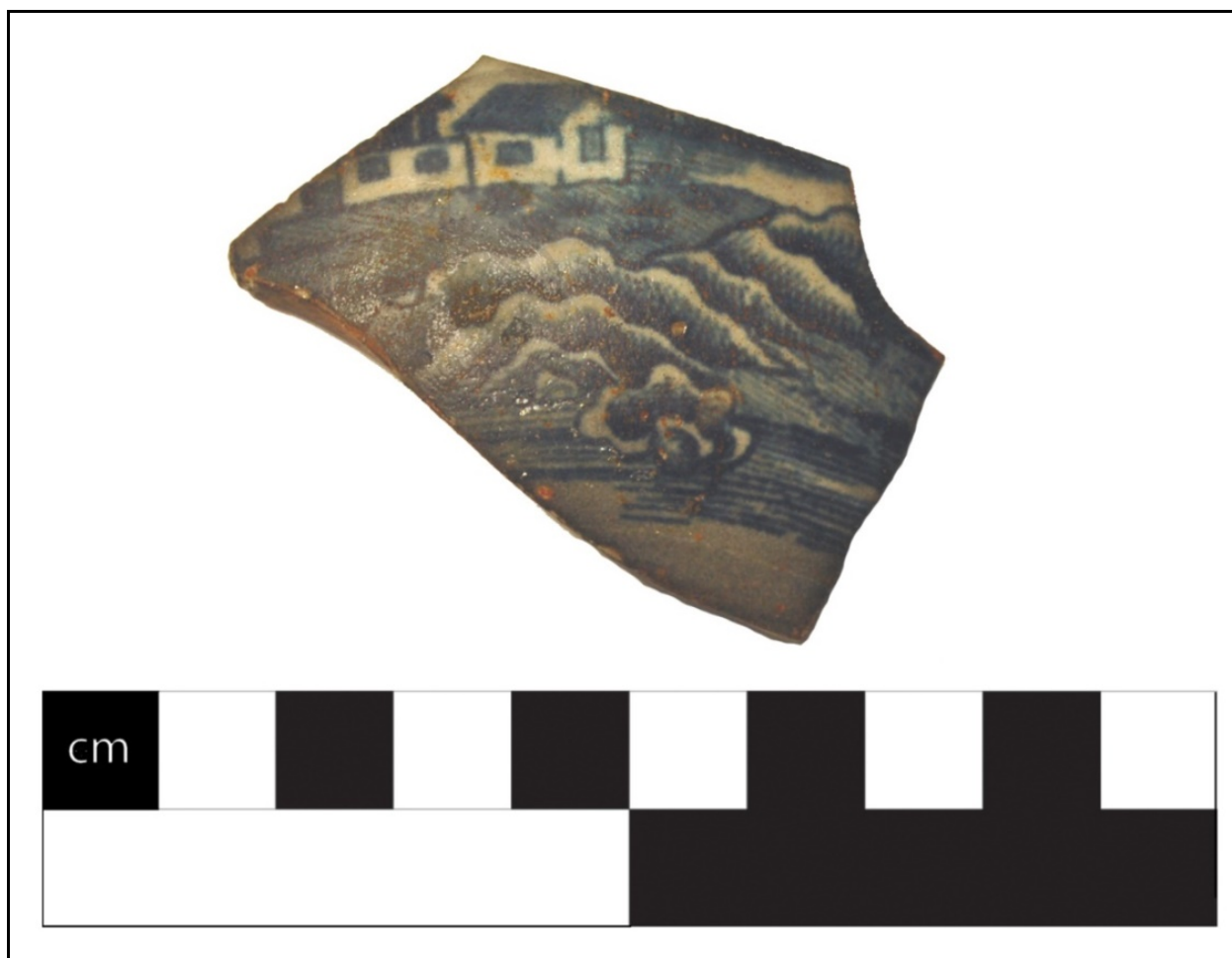


Figure 158. Field Specimen 13S-319.2, an English porcelain sherd featuring the “fisherman and cormorant” motif, manufactured by either the Caughley or Worcester ceramics company.



Figure 159. Examples of Worcester (left) and Caughley (right) tea bowls, both featuring the fisherman and cormorant motif (from National Trust 2017 and Antiques Atlas 2017). The red circles indicate the part of the pattern that is visible on 13S-319.2. In this case it is more similar to the Worcester vessel, but with other examples found by researchers, the Storm Wreck sherd highly resembles “fisherman and cormorant” vessels manufactured by both companies.



**Figure 160. Fire tongs, 12S-234.1.**

(0.52 in.) thick (Figure 160). They resemble the basic form used for hearth tongs that Neumann (1984:170) dates to between 1700 and 1820. The tongs have been removed from the concretion and are awaiting further cleaning and electrolysis.

The other fireplace-related artifact recovered from Storm Wreck is Field Specimen 13S-350.6, an andiron. It has been removed from concretion 13S-350.1, which was recovered from the northwest quadrant of Unit 32 at 67 cmbd. A wine bottle base was attached to this concretion and visible to the naked eye, but subsequent x-ray imaging revealed a fireplace andiron and a cannonball inside (Figure 39EA). The andiron is mostly intact but is missing its two front legs, or an arched base which acted as two front legs and might have been a separate piece (Figure 161). The full length of the andiron is 39 cm (15.35 in.) and its height is 25.2 cm (9.92 in.). The andiron is 2.4 cm (0.94 in.) thick and measures 18 cm (7.09 in.) from the “scrolled-top” to its lowermost forward extent (where the missing base or front feet would have been).

Andirons, also known as firedogs, held logs in the fireplace so as to allow air to circulate beneath them during a fire. While the earliest American andirons were simply formed of stones or bricks, cast and wrought-iron forms had been long used in Europe, and by the mid-17th century iron andirons were being imported or made in the English colonies (Neumann 1984:156). Typically a pair of andirons were used in a fireplace, positioned side by side and apart so that logs could be placed on top of them, with each end of the log supported by one of the andirons. Individual andirons typically consist of a vertical front piece or post, which grew taller and “goose-necked” over time, supported by a two legged front base, with a horizontal log support extending back and curving downwards to form a third foot in the rear. Some examples were comprised of three pieces, i.e., front post, two-footed front base, and rear log support/foot, while some were made of two pieces, with the front section including both post and front legs. Neumann (1984:156-164) presents many different andirons of varied shapes dating from ca. 1640 to 1820. Andiron 13S-350.6 seems most similar to a two-piece “scrolled-top” form, in which the rear log support was mortised into the front piece, which featured an arched two-footed base and a flat and rather short vertical piece terminating in a scrolled top (Neumann 1984:158). This example measures 9.5 in. tall and is dated to ca. 1710-1730. Another somewhat similar specimen, which a slightly taller front piece with a less pronounced top scroll, was dated to ca. 1720-1760 and measures 12 in. tall (Neumann 1984:158). At 9.92 in. tall the Storm Wreck andiron is relatively short, like these two early examples. All of Neumann’s later pieces, dating to the end of the 18th century, are taller, ranging from 15 to 24 in. high. The Storm Wreck andiron’s front vertical piece is flat in cross section and is curled or scrolled at the top, like the aforementioned Neumann examples. The “scrolled-top” formed a loop which, while decorative, could also have allowed a spit to be suspended between the andirons for cooking purposes.



Figure 161. Side view of the andiron recovered from Storm Wreck, 13S-350.6, as it would have been positioned in a fireplace. The dotted lines indicate the approximate position of the two missing front legs. Notice the “scrolled-top” on the upper end of the forward piece, which was decorative but also could have supported a cooking spit. The arched, two-footed base at the front end is missing, and it is not known if this piece was a separate piece or simply the lower part of the front piece.

Later examples of andirons feature taller and more curving front pieces which terminate in finials, crooks, faceted heads, or rings. If Neumann’s typology is accurate, then the Storm Wreck andiron likely dates to earlier in the 18th century and may have been two to six decades old at the time of the evacuation. As andirons are sturdy pieces not prone to breaking, they probably saw decades of use and may have been passed down to the next generation.

It has not yet been determined if 13S-350.6 was a two piece or three piece andiron, due to deterioration at the front end and remnant concretion, though further cleaning and electrolysis could answer this question. The Storm Wreck andiron has undergone preliminary cleaning and is currently awaiting electrolysis. While andiron legs or front pieces have been recovered from the British frigate wrecks *Sirius* (1790) and *Pandora* (1791) (Stanbury 1994:44; Campbell and Gesner 2000:76,78), these were intended for specialized shipboard fireplaces, while the Storm Wreck andiron is believed to have been intended for a household hearth, and thus is more representative of such hardware used by the general colonial population.

#### *Brass Drawer Handle*

A brass drawer pull or handle, 13S-352.1, was recovered unconcreted from the southwest quadrant of Unit 32 at 85 cmbd. It is 13.3 cm (5.25 in.) in length and 5 cm tall (1.97 in.). The central decoration or knop is 1 cm (0.39 in.) round and the handles or balusters are 2 cm (0.79 in.) in length. Its interior

surface is plain but its exterior shows a flower design at center and ornamental flutings along the arms (Figure 162). This handle resembles an everted-ended bail handle with balusters and central knob, a style commonly used with a “batwing” or “angel’s-wing” plate from about 1720 to 1750 (Noël Hume 1969: 278-79; Neumann 1984:341). It would have been mounted on a single decorative backplate, or possibly on two smaller rosettes. It could have come from a chest of drawers, a desk, or a similar piece of furniture, or even possibly a coffin (Whitechapel Ltd. 2017). Similar examples have been found on the 1761 French shipwreck *Le Auguste* (Parks Canada 1992:24)



**Figure 162. Brass Drawer Handle, 13S-352.1**

#### *Door lock*

A door lock 13S-321.1 was recovered from the southwest quadrant of Unit 22 at 83 cmbd. Upon recovery, it appeared to be a small, flat metal box, covered in concretion, and one researcher hypothesized that it was a door lock while still on the research vessel. This supposition was confirmed by x-ray imagery even before deconcretion (Figure 14EA). The outer face of the lock is made of brass, while the inner mechanisms—bolt, spring, tumbler, ward, etc.—which formed the concretion around the artifact, were made of iron. Many of these components are still present but severely eroded. The lock is 19.86 cm (7.82 in.) long, 12.13 cm (4.78 in.) wide, and 0.5 cm (0.20 in.) thick. There are three attachment holes present, all approximately 0.66 cm (0.26 in.) in diameter. The key hole is 3.25 cm (1.28 in.) long and the key pin hole or round section is 1.17 cm (0.67 in.) wide and the key bit hole is 1.14 cm (0.55 in.) wide. A fourth larger hole towards the center of the lock has an outer diameter of 1.3 cm (0.51 in.) (Figure 163). The lock has been deconcreted and is undergoing further conservation.

Upon opening the concretion, the hollow of the lock’s key was discovered. The key, made of iron, had completely eroded away. Conservators were able to make a cast of the key from this void (Figure 164). The key measured approximately 12.13 cm (4.78 in.) in length, allowing it to fit nicely within the interior of the lock for safe transport. Just to one side of the bit or distal end of the key, wedged tightly





**Figure 163: Exterior view of the door lock, 13S-321.1, displaying the key hole and attachment holes.**

into a narrow space between the outer wall of the lock and some of its inner mechanisms, is a thin sliver of mirrored glass (Figure 164 at top, left of center). It appears to have been cut to fit into its constricted space. While glass relocking devices are utilized in some modern safes or vaults, these researchers know of no traditional use of glass components in a historic lock. The most plausible explanation is that the sliver of mirror was an expedient solution to a problem with the lock, and that it was modified to fit into the space for use like a shim or filler piece to fill a gap or help hold another component in place.

Field Specimen 13S-321.1 is an 18th century rim lock with the iron key stored inside and secured in cloth for transportation. In the last quarter of the 17th century, rim locks began to be made in brass cases that were attached to a door by three or four screws; by the 18th century, they featured a slide on the underside of the box, like that seen in Figure 163. Early brass rim locks were expensive and were used on better American doors throughout the century (Noël Hume 1969: 246). It would have been coupled with either a brass knob or a shouldered loop handle. Finding an artifact like this on a refugee ship is unsurprising. This specimen was clearly removed from the door it was attached to, as the key was stored inside the working body, which would have been impossible if the lock was still installed on a door. There is no doubt that this door lock was removed by a refugee from an evacuated house. Stripping homes of hardware prior to abandonment was a common practice. Many of the evacuees disassembled their entire homes and transported them for eventual reassembly in their new locations. A documented example of this practice is the case of a man named William Curtis, who decided to “pull down” his recently built home in Charleston and take it with him to St. Augustine. Unfortunately his house and other effects were lost when his ship wrecked on the St. Augustine bar. (Lambert 2010:187; Meide 2015b:381). We can only assume that Curtis, who clearly had the labor needed to take apart and transport his entire house, was a slave owner. Others without the wealth to afford such a labor force would probably have focused not on disassembling and shipping their house piece by piece, but instead stripping the house of useful hardware which could be re-used when building a new house, and would



**Figure 164: Interior view of the door lock, 13S-321.1. Although eroded, many of the parts of the inner mechanisms are still visible. The key on the left-hand side of the picture was completely eroded within the concretion. The visible key (yellow) is an epoxy cast of the original in its storage location within the lock interior. Remains of the coarse fabric used to wrap up or package the lock and its key can be seen to the right of the key handle. To the right of the upper or bit end of the key is a small sliver of mirrored glass, the purpose of which remains unknown.**

likely have been scarce or unavailable given the number of refugees flooding into St. Augustine seeking to build new homes.

### *Padlocks*

Padlocks date back to the Middle Ages and grew in sophistication through the 18th century, evidenced by the entry in Chambers' *Cyclopaedia* published in 1728: "The lock is reckoned the master-piece in smithery; a great deal of art and delicacy being required in contriving and varying the wards, springs, bolts, &c." (Noël Hume 1969:243). Two small padlocks were recovered from the Storm Wreck during previous seasons. Padlock 10S-045.4 was recovered during the 2010 season from concretion 10S-045.1 protruding out of the southern border of Unit 3. While the concretion was x-rayed, the padlock was not discernable in the radiograph (Meide et al. 2011:Figure 133) and it was not until the concretion was aircsribed and its components separated that it was identified as a padlock. While it has been removed from concretion and partially cleaned, this lock is still heavily concreted (Figure 165). It is 8.6 cm (3.39 in.) wide and 10.6 cm (4.17 in.) tall, weighing 576.95 g in its current condition.

Padlock 12S-200.3 was recovered in 2012 from a concretion (12S-200.1) in Unit 1. The x-ray image clearly showed a purse-shaped padlock (Figure 166). The concretion has since been opened and the padlock exposed. Upon aircsribing the concretion, the padlock hollow was observed along with small pieces left behind. Much of the padlock is no longer present, having corroded away. The concretion was able to provide useful information about its size and shape even before a cast has been made.





**Figure 165. Field Specimen 10S-045.4. iron padlock after removal from concretion.**



**Figure 166. X-ray image of Field Specimen 12S-200.3, an iron padlock still encased in concretion. This x-ray image and subsequent airscribing indicated that much of the original padlock has rusted away.**

Padlock 12S-200.3 is 9.7 cm (3.82 in.) in length and 7.2 cm (2.83 in.) wide. The body is 5.9 cm (2.32 in.) in length and the shackle extends 3.8 cm (1.5 in.) from the top of the body. The shackle is 0.8 cm (0.31 in.) thick. The size of this padlock closely matches the size of an iron padlock discovered on the 1733 Spanish Plate Fleet wreck, *San Jose y Las Animas* (Skowronek 1984a:93). Padlocks have also been found on other shipwrecks, including the French vessels *La Belle* (1686) and *Le Auguste* (1761) and the English ships *Sea Venture* (1609) and *Pandora* (1791) (Wingood 1985; Parks Canada 1992:23; Campbell and Gesner 2000:81; Waselkov et al. 2017:691-692; West 2017:652-653).

### ***Other Artifacts***

#### ***Glass Fragments***

A variety of glass objects, mostly broken fragments from bottles or similar containers, has been collected during excavations 2010-2013 (Table 24). Many of these finds are modern glass and intrusive to the site, apparently having worked their way down to the archaeological deposits during periods of sand erosion or scouring. Some pieces, such as a wine glass base (10S-035.1), have been identified as historic material.

Three more examples of historic glass were recently cleaned in conjunction with the airscribing of concretions and subsequent artifact conservation. The first two are fragments from what are likely English 18th-century “black glass” bottles. The term “black glass” is regularly seen in the archaeological literature, and refers to liquor bottles of the mid-17th through early 19th centuries, which are often very dark in color but usually are a very dark green glass. The dark, almost opaque color resulted from the transition from wood to coal in English glass furnaces in the early 17th century. The cylindrical shape became the norm by the 1730s. Usually referred to as wine bottles, the form was also used for beer, cider, spirits, and other beverages, and was the dominant container for such liquids up until around 1820. As such their remains are commonly found in North American archaeological assemblages dating to the colonial period (Jones 1986; Jones and Sullivan 1989:14).

One of these two bottle pieces was recovered during the 2013 season. Field Specimen 13S-350.3 is a dark glass bottle base found in the northwest quadrant of Unit 32 at an elevation of between 67 and 78 cmbd (Figure 166). While it has not yet been subjected to extensive analysis, a preliminary inspection of its shape suggests that it is most similar to Noël Hume’s example of a glass bottle dating to 1770 (1969:67). In addition, a green bottle neck was recovered from a musket concretion 12S-197.1 that also seems to date to the late 18th century (Figure 167). This concretion was not within the formal excavation area and so was not in a numbered unit, but was found exposed on the surface to the southwest in an undesignated unit at 99E, 103N. The neck itself is longer and thins towards the mouth of the bottle much less dramatically than the more bulbous glass bottles used earlier, potentially positioning it between 1761 and 1772 when comparing to the Noël Hume (1969: 60-69) typology. While not a perfect match, it seems closest in shape (of lip, neck, and shoulder) to Noël Hume’s 1761 specimen (1969:67). Neither the bottle neck or base have yet been subjected to a more sophisticated dating analysis using the regression formulas developed by Jones (1986:115-130).

The third historic specimen of glass which has recently finished conservation treatment is a glass stopper found during the 2013 field season. It was partially embedded but visible in a concretion recovered from the northwest quadrant of Unit 31. It was designated 13S-343.2 upon removal from concretion (Figure 168). It is a beautiful example of a glass stopper likely intended for a decorated glass decanter. It shares the dark green, almost black glass color with the wine bottles popular at the time. Up until 1841, stoppers were manufactured individually to fit a specific bottle and would have been relatively expensive. This example resembles a “disc stopper” decorated with cut facets whose finial is a vertical, flat circle, also known as a “wheel” (Jones and Sullivan 1989: 155).

In addition to the base and stopper, three additional glass fragments were uncovered during the 2013 season. Two of these are likely modern amber beer bottle glass, while one (13S-331.4) is described as dark brown and could be another 18th century wine bottle shard. Table 24 illustrates all the glass specimens recovered from the Storm Wreck through the end of the 2013 field season.

**Table 24. Storm Wreck Glass Shards, 2009-2013**

<b>Field Specimen #</b>	<b>Description</b>	<b>Count</b>	<b>Unit</b>
09S-009.1	Uncertain	2	1
10S-017.1	Clear	1	2
10S-035.1	Clear, wine glass base	1	4
10S-038.2	Green	2	8
10S-056.1	Clear	2	4
11S-118.1	Amber	1	14
11S-125.2	Uncertain due to discoloration	7	9
11S-131.1	Amber	1	14
11S-136.1	Clear, broken container base	20	8
11S-137.1	Amber	7	8
11S-145.3	Amber	3	8
11S-153.6	Uncertain due to discoloration	2	8 & 10
11S-153.10	Clear, possibly painted, possible wine glass base	3	8 & 10
11S-153.12	Amber, broken, but was a container corner	7	8 & 10
11S-171.1	Clear	1	8
12S-197.1	Green wine bottle neck from musket concretion	1	99E 103 N
13S-331.4	Dark brown	1	30
13S-335.4	Amber, thick	1	31
13S-335.5	Amber, shiny coating, possibly mirrored	1	31
13S-343.2	Green glass stopper	2	31
13S-350.3	Dark colored wine bottle base	1	32

### *Cloth Fragments*

A number of small cloth fragments have been removed from nine concretions containing various types of iron artifacts, all recovered between 2010 and 2013 (Table 25). Florida's warm waters are not conducive to the preservation of organic material, and the fragments of cloth that did manage to survive inside concretion are invariably small and mostly are in poor condition. Most of the fragments removed from concretion thus far are still undergoing conservation, but the few pieces that have been fully conserved or closely inspected all exhibit the same weave style. The exception to this is the burlap-like fabric which was used to wrap or package the door lock 13S-321.1, seen in Figure 164. This is noticeably more course than the finer cloth making up the remainder of the fabric finds discussed here. Figure 169 provides a detailed close up view of the largest fragment from 10S-36.2, clearly illustrating the weft and warp of the fabric's weave. This fragment is less than five by five centimeters square, and is the only specimen to exhibit any remaining stitching. Three rows of stitching can be seen on this piece (Figure 169, top view). The fragment seems to be stitched in a way that folds the cloth over the stitched seam, which would help protect the seam and make it less prone to fraying than a simple line of stitching affixing two pieces of cloth. It is believed that this kind of seam would be more resistant to wind, which might make it suitable for either sailcloth or for tent canvas, two likely candidates for the original fabric.



**Figure 166: Field Specimen 13S-350.3, the base of a “black glass” English wine bottle. Interior view. The shape of this specimen seems most like one dated by Noël Hume (1969:67) to 1770.**



**Figure 167: Green glass bottle neck recovered from concretion 12S-197.1, one of the muskets currently being preserved by the Florida Bureau of Archaeological Research (Image courtesy of Florida Bureau of Archaeological Research). The shape of the rim treatment, neck, and shoulder seems most similar to Noël Hume's example dated to 1761 (1969:67)**



**Figure 168: Field Specimen 13S-343.2, a green glass bottle stopper**

While the fragments recovered are too small and too poorly preserved to determine their specific purpose, archaeologists believe, as mentioned above, that they may represent pieces from the ship's sails or perhaps canvas from military tents. The presence of sailcloth on a ship is obviously expected, and in the case of a refugee ship, military-issued tents would be present in great numbers as well. An alternative hypothesis is that this cloth was used to wrap or pack the personal possessions of refugees on board. Many fragments of cloth were found in conjunction with the large cauldron 10S-036.1, for example, which is an item that might have been wrapped in cloth to protect it during shipment.



**Table 25. Cloth fragments removed from concretions from the Storm Wreck.**

Field Specimen	Count	Unit
10S-036.2	16*	1
11S-106.5	0**	12
12S-205.5	6	7
13S-321.1	1***	22
13S-332.4	1	30
13S-336.8	8	31
13S-338.6	3	31
13S-344.4	4	31
13S-350.7	1	32
13S-367.2	1	18

\*10S-36.2 also includes one small piece of rope that brings the total specimen number to seventeen.

\*\*This specimen did not survive removal from concretion

\*\*\* This specimen is the coarse fabric used to wrap the door lock and key, discussed above, and has not yet been removed from concretion. It is a distinctly more rough or coarse material than the other examples.

### *Rope Remains*

Four small pieces of rope or cordage were also removed from concretion since the publication of the last FCMAP research report. The first was removed from the concretion surrounding the large cast iron cauldron 10S-036.1, and is included with Field Specimen number 10S-36.2, along with the 16 pieces of cloth discussed above. This cauldron was recovered from the northeast quadrant of Unit 1 in 2010. If the cloth remains also associated with this cauldron are sailcloth, the rope remains could represent line sewn along the border of the sail as a bolt rope or to form a grommet. The second example of cordage, 10S-048.5, is one of the many artifacts removed from the wooden deck plank and associated concretion 10S-048.1. The third specimen, 11S-125.1, was removed from the concretion surrounding the cast iron tea kettle (pp. 219-220). This is the longest surviving length of cordage, though it still only measures around 6 cm in length (Figure 170). It was recovered from the southwestern quadrant of Unit 9 in 2011. A fourth specimen of rope was preserved in concretion 12S-253.1. It was a tiny fragment of a longer piece once tied to the eye of a cast iron object believed to be a window sash counterweight, described earlier (pp.187-188). This piece can be seen in Figure 117. Like the cloth or other organic remains, rope does not preserve well in Florida's warm water environment, and the small pieces that have survived inside concretion tend to remain in poor condition.

At this time, the cordage fragments have only been subjected to cursory inspections and a more complete analysis may result in a better understanding of their material, construction, and function.

### *Worked Slate*

A small fragment of worked slate with a small concretion attached to its side was recovered in 2013 from the northeast quadrant of Unit 29, protruding slightly into the southwest quadrant of Unit 22 (Figure 171). X-ray imaging clearly showed the slate and revealed nail hollows in the attached concretion (Figure 7EA). This specimen appears to be of the same material as Field Specimen 12S-245.1, a slate fragment recovered in 2012 about three meters away, in Unit 8. Archaeologists believe that the piece of slate recovered in 2012 represents part of a broken, unfinished headstone (Meide et al 2014:267). It has been suggested that 12S-245.1 may have been brought aboard the vessel as ballast or to be reused as a sharpening stone after being broken and discarded by a stonecutter in a port of call. It is possible that 13S-314.1 may have been brought aboard in a similar fashion. However, where 12S-245.1



**Figure 169.** The largest of the seventeen cloth fragments comprising 10S-36.2, and the only example to bear stitching. In the top view a flap of fabric is moved to display lines of stitching, indicated by the arrows. The warp and weft of the cloth weave can be observed in this images, and seem similar to that visible on other examples.



**Figure 170. Field Specimen 11S-125.5, small rope fragments removed from the concretion coating the cast-iron tea kettle. This is the longest surviving fragment of cordage found on the Storm Wreck to date. Photograph taken before conservation.**



**Figure 171. Field Specimen 13S-314.1, a fragment of worked slate. A small concretion containing the voids from corroded fasteners is attached to the slate. This piece seems similar to another piece of worked slate (12S-245.1) believed to have been broken from a tombstone which was recovered in 2012. This piece, slender and worked on three sides, may have served as a sharpening stone.**

features a curved edge and evidence of carving that is typical of 18th century tablet-style headstones, 13S-314.1 lacks these distinguishing features. Rather, 13S-314.1 appears to be worked on at least three sides, featuring squared edges that indicates this piece was not part of a larger slab intended for use as a headstone (unless its sides were worked after it broke away). It is likely that this particular piece of slate was originally intended for some other use. It is about the right size to serve as a whetstone for sharpening knives or other tools.

At this time, no systematic geological analysis has taken place with either 12S-245.1 or 13S-314.1, and their identification as slate has been based on casual observation alone. 13S-314.1 is currently in wet storage due to the attached concretion, and is awaiting further conservation.

#### *Unknown Substance: Possible Pigment Cake, Graphite, or Gunpowder*

Between the 2010 and 2012 field seasons, a number of small specimens of an unidentifiable substance were recovered from dredge spoil across Units 1, 2, 3, and 4. In 2013 a large sample of this same substance was recovered from the northwest corner of Unit 30, the unit just north of Unit 2 (Figure 172). In addition to this large chunk, cataloged as 13S-334.1, and several more small specimens were recovered from Unit 30 dredge spoil and designated 13S-391.1 (Figure 173). The large specimen was found in a cake or mass that was cylindrical in shape and intact upon recovery from the seafloor, but it split through the middle shortly after coming to the surface (Figure 172). Otherwise, the substance holds its shape, is a dark, bluish grey in color, and is similar in feel to semi-solid pieces of paste or clay. It rubs off and smears easily as does graphite. Several possibilities for the identity of this unknown substance have been suggested, the most likely being some sort of pigment cake, ink that has solidified over the past few centuries, or graphite. When the substance is allowed to dry, it does resemble modern graphite, although it seems slightly heavier. Lastly, it has been suggested that it may be gunpowder that solidified into a paste-like substance as it mixed with salt water. At present, no chemical analysis has been performed to determine the true identity of this unknown substance.

#### **Concretions**

The majority of the objects recovered from the site—53 individual specimens in 2013—were in the form of concretions. These are composed of one or more iron artifacts that have corroded and fused together in a matrix of iron corrosion product, calcium and other mineral deposits, and naturally occurring shell fragments. Surrounding non-ferrous materials can sometimes get consumed by the corrosion matrix, including glass, pewter, lead, brass, and in some cases, cloth. It usually is impossible to identify the artifacts embedded within concretion with the naked eye. Therefore all of the concretions recovered in 2013 underwent CT scanning at Flagler Hospital's Imaging Center of St. Augustine or x-ray scanning at Monahan Chiropractic Medical Clinic. At the time of this writing, many of the concretions recovered in 2013 and previous years have been airtight to unearth the cultural material buried within. Any metal objects removed from concretions, other than gold and lead, require electrolytic reduction treatment, a process that may take years for some items.

The following summary is meant to provide an overview of the concretions found on the Storm Wreck during the 2013 season, presenting the basic characteristics of each concretion, its provenience on site, a description of its contents as determined from x-ray analysis, its current state of conservation, and an x-ray image of its contents. Objects already removed from concretion have been presented in the sections above, and in these cases only a brief summary is provided here. It should be noted that, unless otherwise noted, all of the measurements of artifacts in concretion provided in this section were generated through the use of digital x-ray analytic software, which sometimes has displayed a varying margin of error when compared to measurements taken by hand.





Figure 172. Field Specimen 13S-334.1, a large sample of an unknown substance. It was initially found in a cylindrical cake or mass but it broke apart upon recovery. Archaeologists believe it may represent graphite, some kind of coloring pigment, solidified ink, or solidified gunpowder

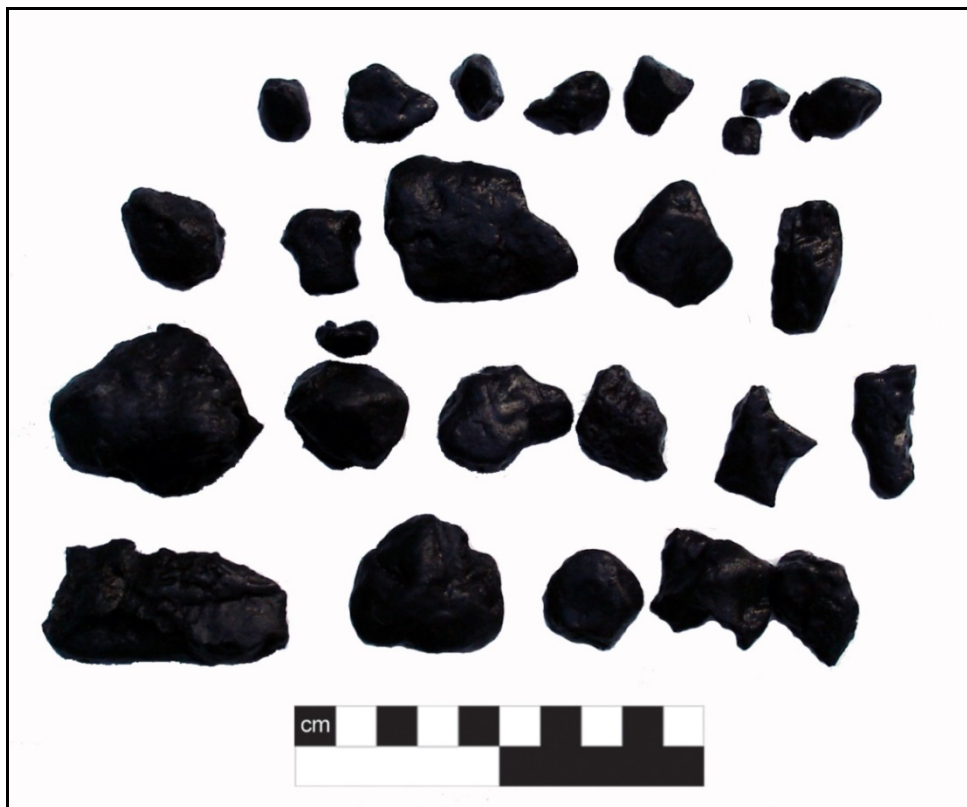
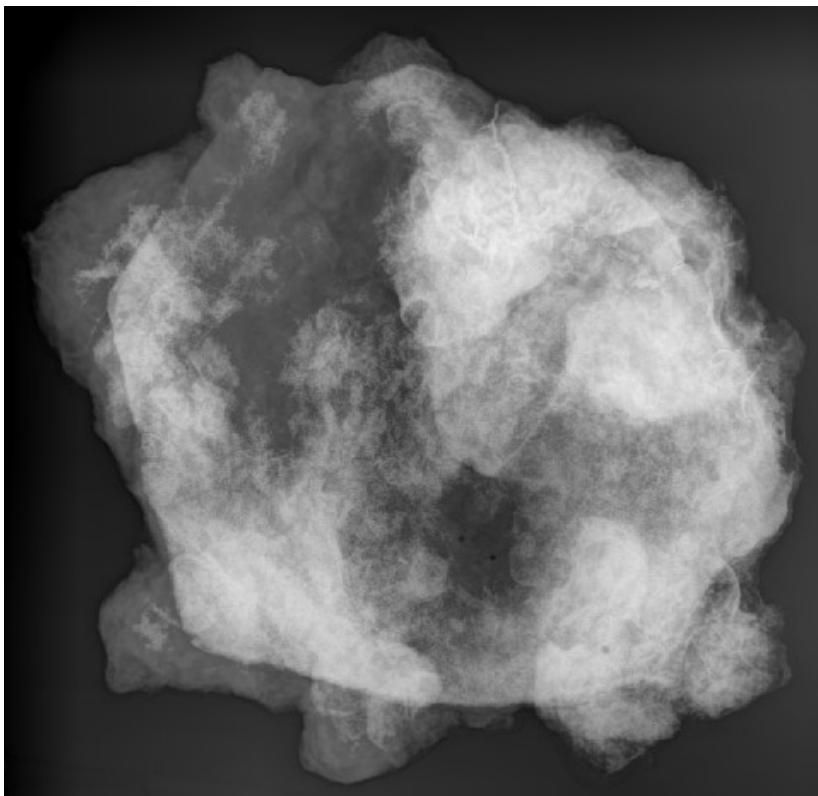


Figure 173. Field Specimen 13S-391.1, the small pieces of unknown substance recovered from dredge spoil.

*Concretion 13S-307.1: Possible Cauldron Fragment*

13S-307.1 is a concretion recovered from the southwestern quadrant of Unit 25, and measures 15.5 cm by 20.0 cm. X-ray imaging was inconclusive as to its contents, though it may indicate a body section from a cast iron cauldron (Figure 176). It has not been airtscribed. This object is a candidate for repatriation on the site for *in situ* preservation. Cauldrons recovered from the site are discussed in detail on pp. 216-218.

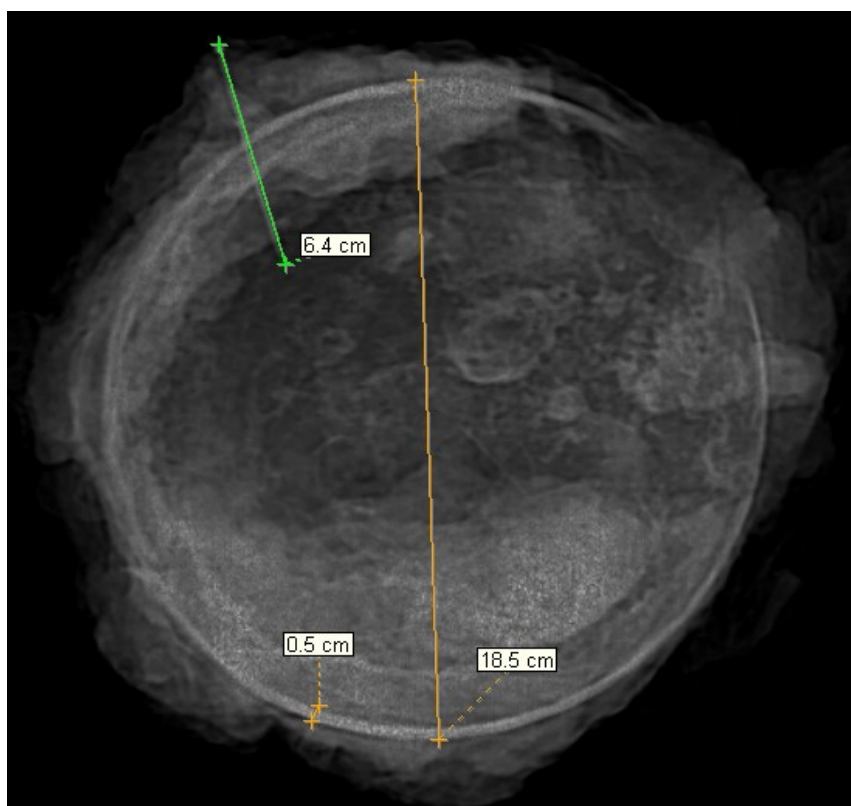


**Figure 176. X-ray image of concretion 13S-307.1, showing an unidentified metal object, possibly a cauldron fragment.**

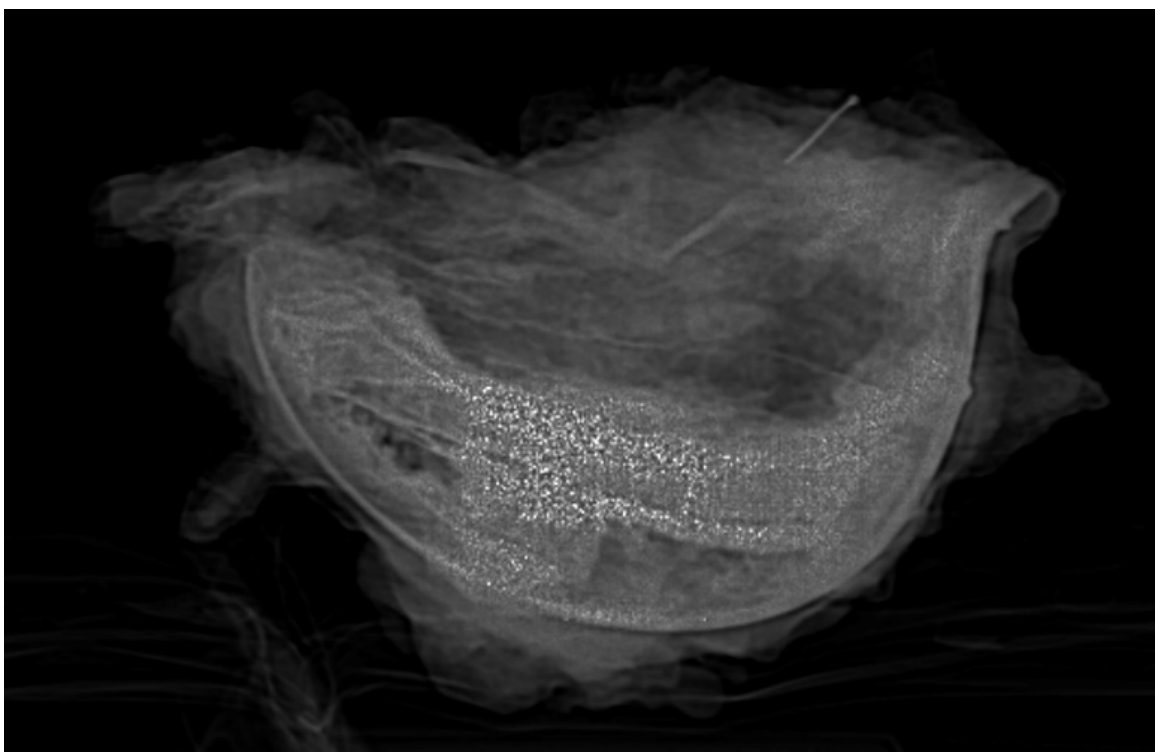
*Concretion 13S-308.1: Cauldron*

13S-308.1 was a large concretion recovered from the southeast quadrant of Unit 25. It was obvious even to the naked eye that this object was a concreted cauldron, and near the cauldron rim a large brass straight pin was also exposed and visible to researchers even before x-ray imaging. The concreted cauldron measured 26.0 cm long, 24.0 cm wide, and 15.5 cm tall. X-ray imaging showed the distinct outline of the cast iron cauldron, which the analytic software measured as 18.5 cm in diameter with a 0.5 cm thick rim, and a large brass pin measuring 6.4 cm in length (Figures 177-178). This concretion has been cleaned with a pneumatic airtscribe, fully exposing the cauldron and detaching the pin. Now that the concretion itself is no longer extant, the cauldron itself bears the Field Specimen number 13S-308.1, and it is described more fully on pp. 217-218 and pictured in Figure 142. It has been mostly deconcreted but has not yet undergone electrolysis. The brass pin has been assigned Field Specimen number 13S-308.2 and is described on pp. 209-210, in Table 20, and shown in Figure 135.





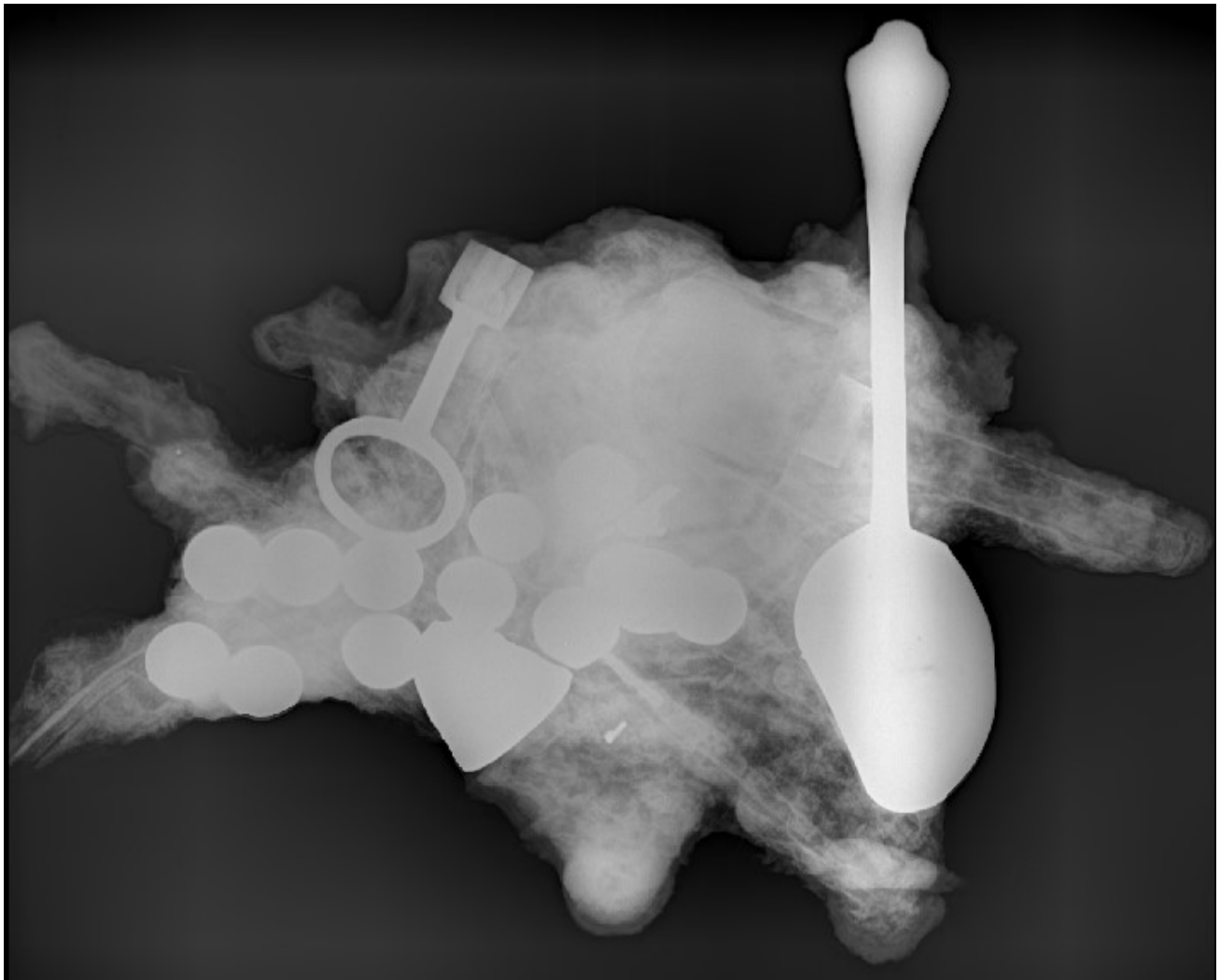
**Figure 177.** X-ray image of concreted cauldron 13S-308.1, seen from above, with digital measurements. It has since been deconcreted.



**Figure 178.** X-ray image of concreted cauldron 13S-308.1, seen from the side, showing the distinctive pot-bellied cauldron shape, and also the affixed brass pin near the rim or lip.

*Concretion 13S-310.1: Pewter Spoon, Keg Key, Royal Provincial Buttons, Lead Fishing Weight, Croze Blade, Iron Fasteners, Lead Musket Shot, and Knife*

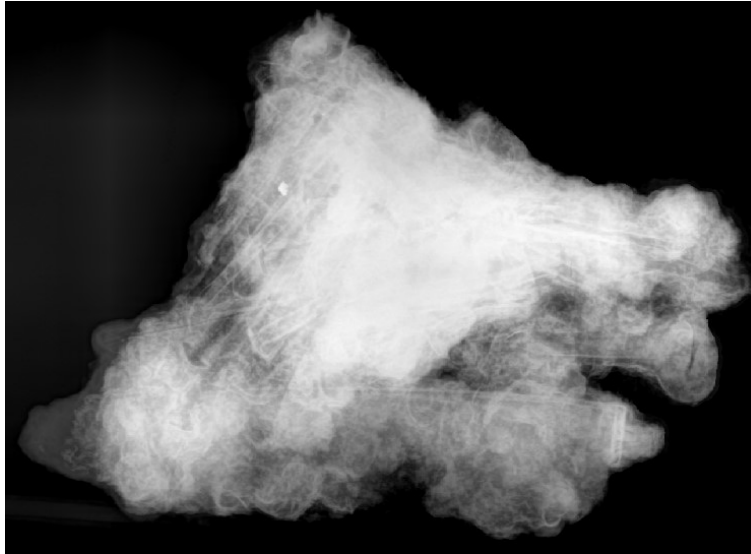
13S-310.1 is an interesting concretion recovered from the northeast quadrant of Unit 25, measuring 27.0 cm in length and 22.0 cm wide. The very end of a pewter spoon handle was visible protruding from the concretion when found, but was accidentally broken off sometime after x-raying. Subsequent x-ray imaging revealed the entire spoon which measured 18.3 cm long, a key measuring 7.3 cm long and 3.6 cm wide, around a dozen musket shot, a button, a possible thimble, and a possible wax seal stamp (Figure 179). Upon opening the concretion, researchers discovered not one but three buttons: two decorated with a crown and the letters “RP” for Royal Provincials (13S-310.6) ( pp.201-205) and one from the 3rd American provincial unit (13S-310.7) (pp. 201-204). Other artifacts removed from this concretion include a keg key (13S-310.3) (p. 228), a pewter spoon (13S-310.2) (221-222), 12 musket shot (13S-310.5) (pp. 160-161), and an iron fastener (13S-310.10). The apparent thimble was actually a lead fishing weight (13S-310.4) (pp. 185-186), and the possible signet stamp was actually a croze blade (13S-310.9) (pp. 190-191). The concretion also displayed within its matrix the impression of a knife, but with no physical remains.



**Figure 179. Field Specimen 13S-310.1 X-ray image showing a spoon, along with a tap key, a dozen musket shot, three buttons, fasteners, possible thimble which was actually a fishing weight, and possible wax signet stamp which was actually a cooper’s croze blade.**

*Concretion 13S-311.1: Iron Fasteners and Button*

Concretion 13S-311.1 was recovered from the northeast quadrant of Unit 25. It measures 20.0 cm long and 13.3 cm wide. X-ray images revealed multiple fastener hollows and a possible button (Figure 180). Fasteners from the shipwreck are discussed in more detail on pp. 173-176, and buttons are on pp. 197-206. This concretion, comprised mostly of nails, has been designated a candidate for reburial on site for *in situ* preservation.



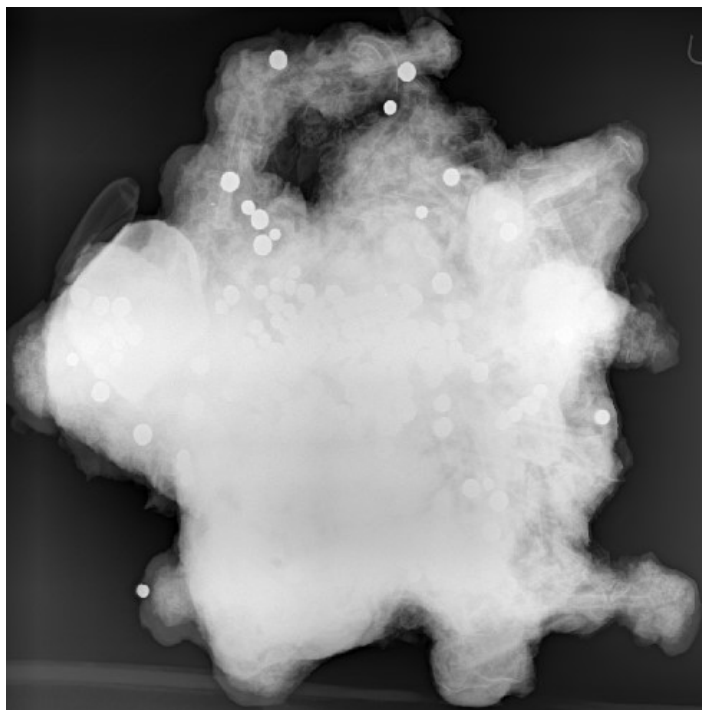
**Figure 180. X-ray image of concretion 13S-311.1, showing several fastener hollows and a possible button. It is planned to return this artifact to the site for reburial and *in situ* preservation.**

*Concretion 13S-312.1: Iron Fasteners and Lead Birdshot*

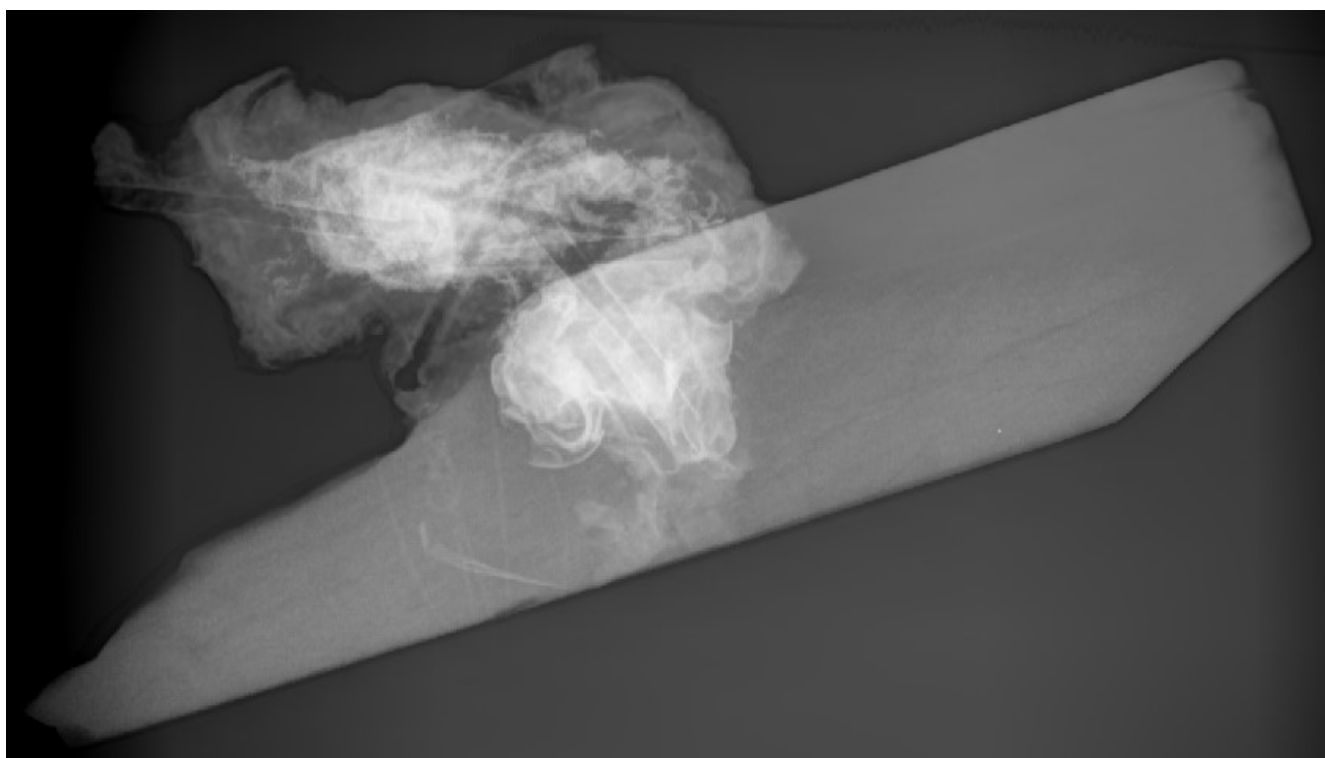
Field Specimen 13S-312.1 is a concretion measuring 19.0 cm long and 18.5 cm wide. It was removed from the northern border of Unit 27, protruding into Unit 26. X-ray analysis revealed several lead birdshot, nail hollows, and an unknown chunk of metal (Figure 181). Fasteners recovered from the shipwreck are discussed in more detail on pp. 173-176, and birdshot on pp. 161-166. This concretion has not been airscribed, and it is planned to return it to the shipwreck for reburial.

*Concretion 13S-314.1: Slate and Iron Fasteners*

13S-314.1 is a piece of slate with a small concretion attached to it (Figure 171). It was recovered from the northeast quadrant of Unit 29, protruding slightly into the southwest quadrant of Unit 22, and measures 19.8 cm long and 8.7cm wide. The x-ray image displays nail hollows in the attached concretion (Figure 182). The slate is presented on pp. 248-251, while fasteners recovered from the site are discussed on pp. 173-176.



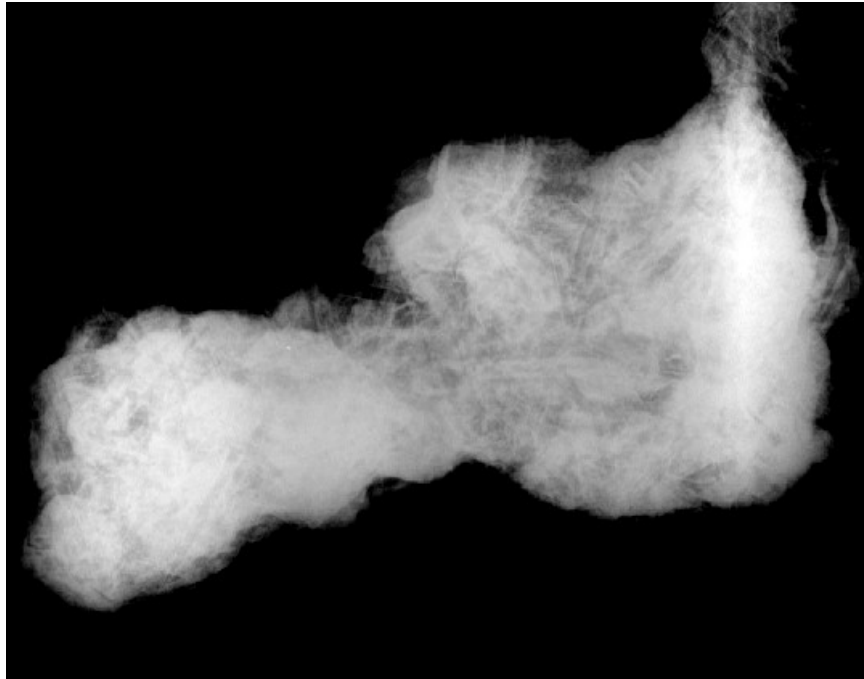
**Figure 181. X-ray image of 13S-312.1, showing lead birdshot, fastener hollows, and an unidentified metal object. It is planned to return this concretion to the shipwreck site for reburial.**



**Figure 182. Field Specimen 13S-314.1 X-ray image reveals a piece of worked slate with an attached concretion containing the hollows of completely eroded iron fasteners.**

*Concretion 13S-315.1: Iron Fasteners*

13S-315.1 is a concretion from the northwest quadrant of Unit 29 which protruded into Unit 22. It measures 22.0 cm long and 12.0 cm wide. X-ray images reveal a multitude of nail hollows (Figure 183). One of a number of concretions composed primarily of fasteners or fastener hollows (Table 15), this concretion will be reburied on the site in its original location. Fasteners from the shipwreck are discussed in detail on pp. 173-176.



**Figure 183. X-ray image of concretion 13S-315.1 showing fastener hollows. This concretion has not been aircscribed and it is planned to return it to the shipwreck for reburial and *in situ* preservation.**

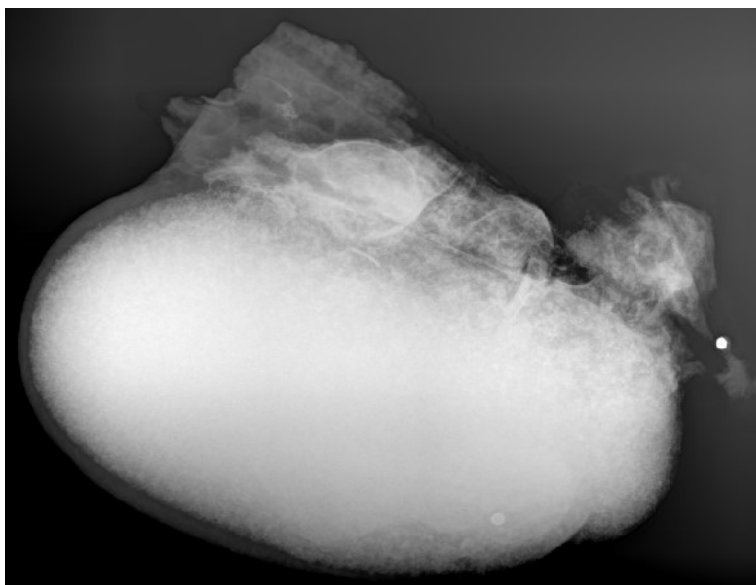
*Concretion 13S-316.1: Ballast Stone, Iron Fasteners, Lead Birdshot*

13S-316.1 was found in the southeast quadrant of Unit 29, and is a ballast stone with a small concretion attached. Overall, it measures 18.5 cm long and 13.0 cm wide. Radiograph images reveal fastener hollows and two lead birdshot (Figure 184). Ballast stones recovered from Storm Wreck are presented on p. 176 and Table 16, fasteners on pp. 173-176, and Rupert shot or birdshot on pp. 161-166.

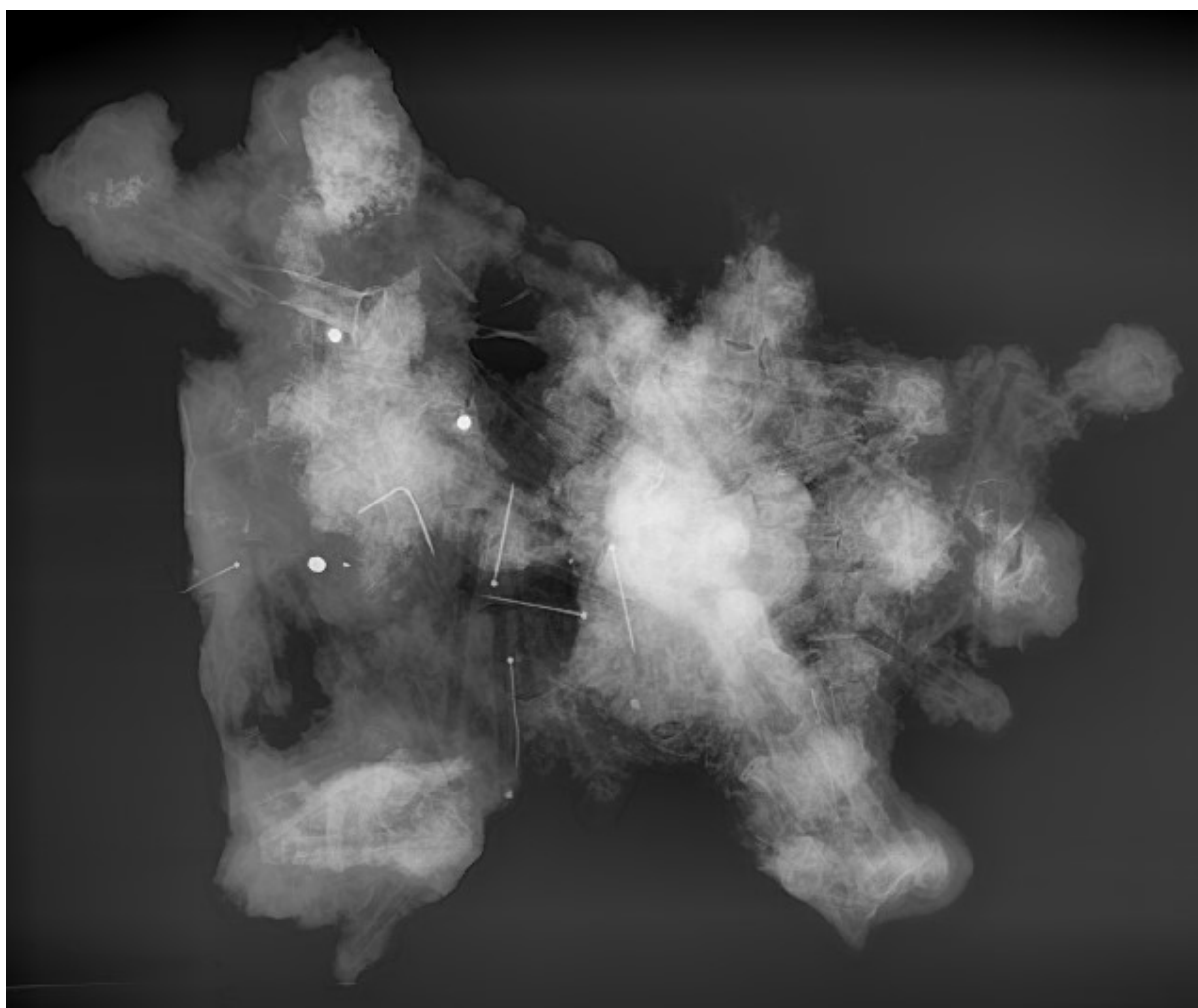
*Concretion 13S-317.1: Brass Clothing Pins, Iron Fasteners, Lead Birdshot*

13S-317.1 is a concretion measuring 28.0 cm long and approximately 22 cm wide, recovered from the northeast quadrant of Unit 29. X-rays reveal nail hollows, three lead birdshot, and at least six brass straight pins, measuring 2.6 – 2.8 cm in length (Figure 185). Straight pins recovered from the shipwreck are discussed in detail on pp. 207-210, fasteners on pp. 173-176, and birdshot on pp. 161-166.

This concretion has not been aircscribed, and it is currently planned to return it to the site for reburial, as numerous other examples of these artifact types have already been recovered and conserved.

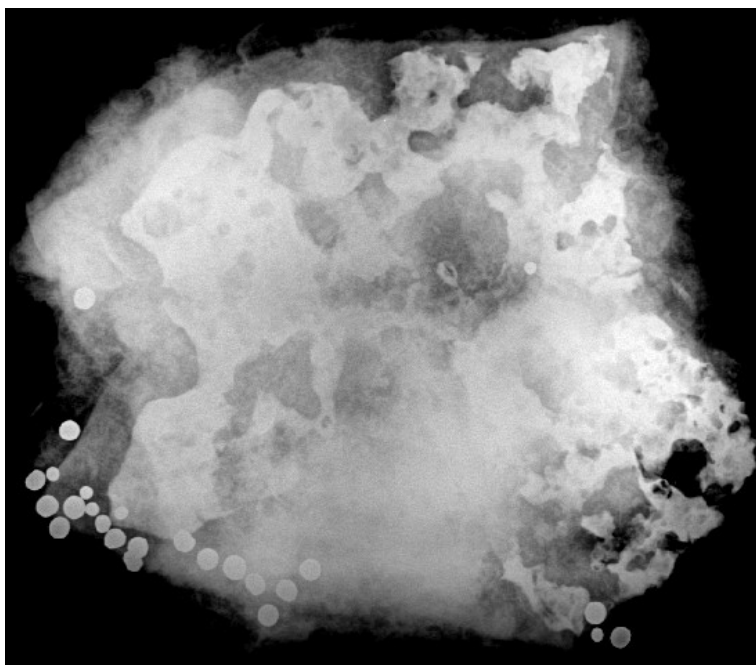


**Figure 184. X-ray image of Field Specimen 13S-316.1, showing the ballast stone with attached concretion consisting of fastener hollows and several lead birdshot.**



**Figure 185. X-ray image of concretion 13S-317.1, showing nail and fastener hollows, lead birdshot, and brass clothing pins. It is planned to return this concretion to the site for reburial.**





**Figure 186. Field Specimen 13S-318.1 X-ray image showing several lead birdshot and an unidentified metal object.**

*Concretion 13S-318.1: Lead Birdshot, Unidentified Object*

Field Specimen 13S-318.1 is a concretion measuring 19.0 cm long and 15.0 cm wide. It was recovered from the southeast quadrant of Unit 29 at a depth of 80 cmbd. X-ray images to determine what artifacts were in it were largely inconclusive (Figure 186). Present are around two dozen lead birdshot, and possible metal sheathing or a larger piece of metal that is heavily degraded. Rupert shot or birdshot are discussed on pp. 161-166. This concretion has not been airtreated and it is planned to return it to the site for reburial and *in situ* preservation.

*Concretion 13S-319.1: Iron Fasteners, Lead Birdshot, Axe Head, Porcelain Sherd*

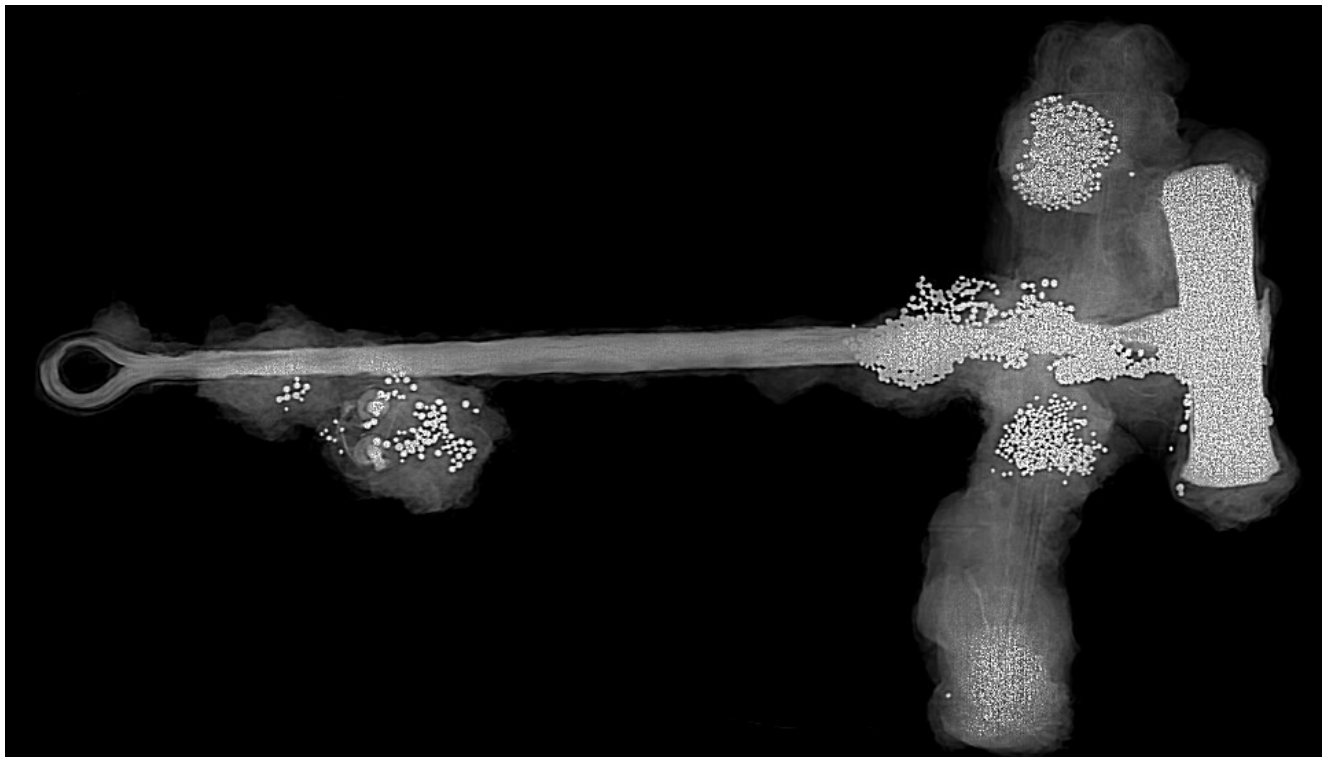
Field Specimen 13S-319.1 was recovered from the northwest quadrant of Unit 29 but was mostly protruding into Unit 22, and was situated at an elevation of 73 cmbd. It is a concretion measuring 23.0 cm long and 16.0 cm wide. Radiograph images reveal fastener hollows, two lead birdshot, and what appeared to be an unhafted axe head (Figure 187). It was subsequently airtreated to recover the axe head. A porcelain sherd, 13S-319.2, was discovered and removed from this concretion (Figure 158), in addition to the axe head which was indeed hafted and displayed the remnant of its wooden handle (Figure 123). As this concretion no longer exists, the axe head has now been designated 13S-319.1. The axe is described on pp. 195-196, the porcelain on pp. 235-236, iron fasteners on pp. 173-176, and birdshot on pp. 161-166.

*Concretion 13S-320.1: Stanchion, Bolts, Lead Birdshot*

13S-320.1 is a large, T-shaped concretion recovered from the northeast quadrant of Unit 29, with its elongated shank protruding into the southeast quadrant of Unit 22, positioned at a depth of 64 cmbd. It measures 77.0 cm long and 51.0 cm wide. X-rays reveal many lead birdshot, a long iron object with a loop or eye at one end, a shorter perpendicular piece which may or may not have been attached to the long shank-like piece, and two bolt-like fasteners with clench rings or roves (Figure 188). It is not certain if the two iron pieces were once a single T-shaped object, or if they are separate artifacts. It also



**Figure 187. X-ray of Field Specimen 13S-319.1, showing the axe head buried in concretion with several fastener hollows and lead birdshot. While not readily apparent, the porcelain sherd 13S-319.2 is located at the left side of the image adjacent to the heel of the axe bit. This concretion has been airtscribed and its component artifacts have been recovered.**



**Figure 188. X-ray of concretion 13S-320.1 showing a long linear object with an eye, a shorter T-shaped object which may have been attached to the long object, two roved bolts, and an abundance of lead birdshot. The linear object with the eye is a possible railing stanchion. It has not been airtscribed.**



**Figure 189. X-ray of Field Specimen 13S-321.1, showing the interior view of a door lock. The body of the lock is a brass box, and some of the inner working parts fashioned of iron are visible. The key was stored inside the lock but it is not apparent in this image. This artifact has been mostly deconcreted and a replica of the missing key has been cast, but conservation is not yet complete.**

is not known if the two fasteners were originally associated with the larger iron hardware pieces. One hypothesis is that the long linear object with the eye is a railing stanchion that would have been mounted on the deck of the Storm ship. These objects have not yet been cleaned of concretion. The two fasteners are discussed on p. 173, and Rupert shot or birdshot is on pp. 161-166.

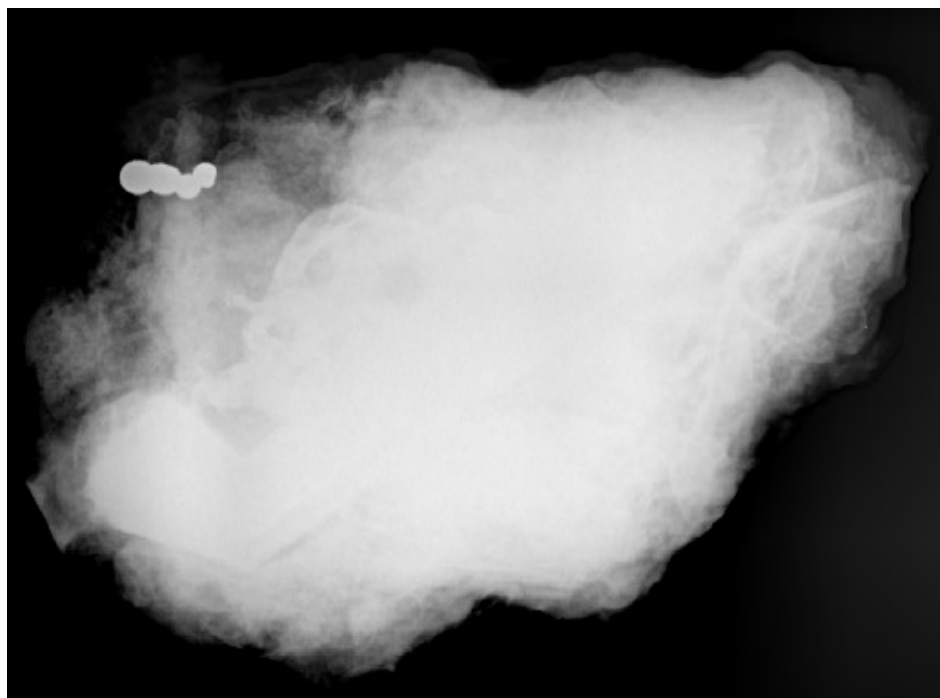
#### *Concretion 13S-321.1: Door Lock*

A concretion containing a door lock, 13S-321.1, was recovered from the southwest quadrant of Unit 22 at an elevation of 83 cmbd. Before cleaning the object, it appeared to be a small, flat metal box, covered in concretion, measuring 25.5 cm long and 17.5 cm wide. X-ray scans revealed a door lock, which when measured digitally, was estimated at 19.9 cm by 12.1 cm (quite close to post-deconcretion measurements taken by hand of 19.86 cm by 12.13 cm) (Figure 189). The body of the lock is essentially a shallow, brass, open-faced box (Figure 163), containing inner mechanisms (bolt, spring, tumbler, ward, etc.) made of iron. Some of these internal components can be seen in the x-ray images. Upon deconcreting 13S-321.1, the door lock's key was found stored within the lock itself, secured by wrapping with cloth (Figure 164), though neither key nor cloth remains could be made out in the radiographs.

This artifact has been mostly deconcreted and cleaned, and the corroded key has been cast. It is currently awaiting further conservation, which will involve separating the brass, iron, and fabric components of the artifact. It is described in detail on pp. 239-241.

#### *Concretion 13S-322.1: Unknown Object or Objects and Lead Birdshot*

13S-322.1 is a concretion from the southeastern quadrant of Unit 22 at a depth of 80 cmbd. It measures 14.7 cm long and 11.0 cm wide. X-ray imagery revealed a few lead birdshot but little else, leaving the primary contents of this concretion a mystery (Figure 190). It is currently in wet storage awaiting



**Figure 190. Field Specimen 13S-322.1 X-ray image showing birdshot, and some other object or objects that are barely discernable and not identifiable. This concretion has not yet been airtscribed.**

deconcretion. Birdshot recovered from the shipwreck have been addressed previously, on pp. 161-166

*Concretion 13S-323.1: Iron Fasteners*

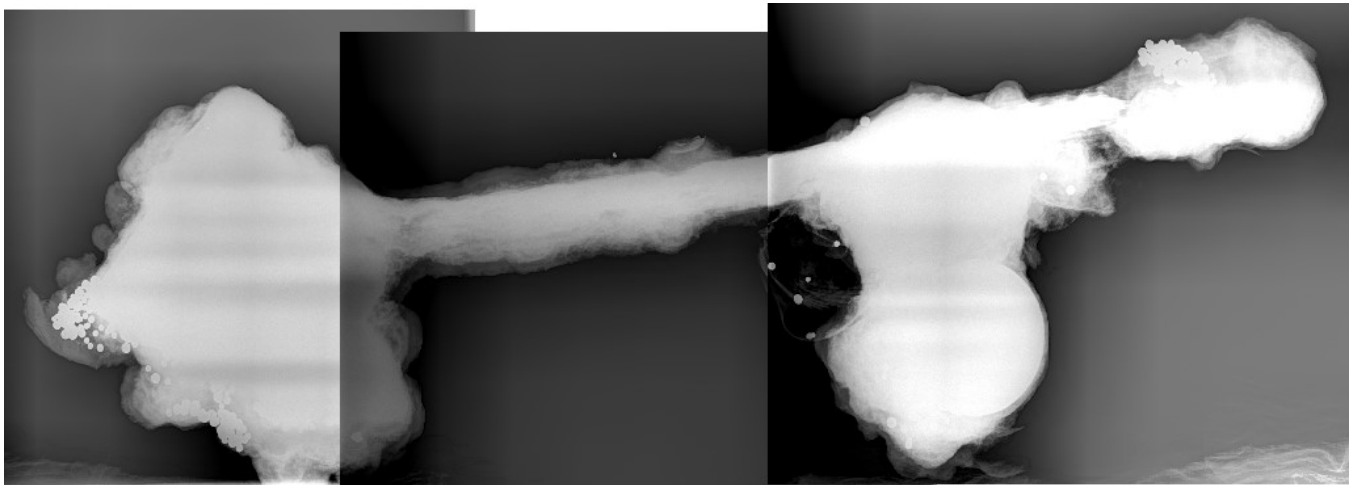
Concretion 13S-323.1 was recovered from the southeast quadrant of Unit 22, at a depth of 60 cmbd. It measures 31.0 cm in length and 19.0 cm in width. X-ray scanning revealed multiple nail hollows (Figure 191). This artifact is planned to be returned to the site and reburied in its original position (Table 15).



**Figure 191. X-ray image of 13S-323.1 showing a concretion consisting of fastener and nail hollows. It is planned to return this concretion to the site for reburial and *in situ* preservation.**

*Concretion 13S-328.1: Possible Bar Stock, Cannonball, Clothing Iron, and Birdshot*

13S-328.1 is a large concretion measuring 70.5 cm long and 27.0 cm wide, found in the southeastern quadrant of Unit 30. One end of this concretion was situated at 72 cmbd, the other was at 78cmbd. X-ray images reveal a length of iron which could be bar stock, a cannonball measuring 8.7 cm in diameter and possibly a second cannonball, numerous lead birdshot, and a clothing iron (Figure 192). Most items could not be measured with the digital measuring software because the particular machine used for imaging was not equipped to handle artifacts of this size, and three radiographs had to be mosaicked together to encompass the entire concretion. This concretion has been airtscribed and individual components within have been broken out, including the clothing iron 13S-328.2 (Figure 154), the two cannonballs designated 13S-328.3 (Table 8), the rod or bar 13S-328.4, and birdshot 13S-328.5. The iron is discussed on p. 229, cannonballs on pp. 135-140, and birdshot on pp. 161-167.

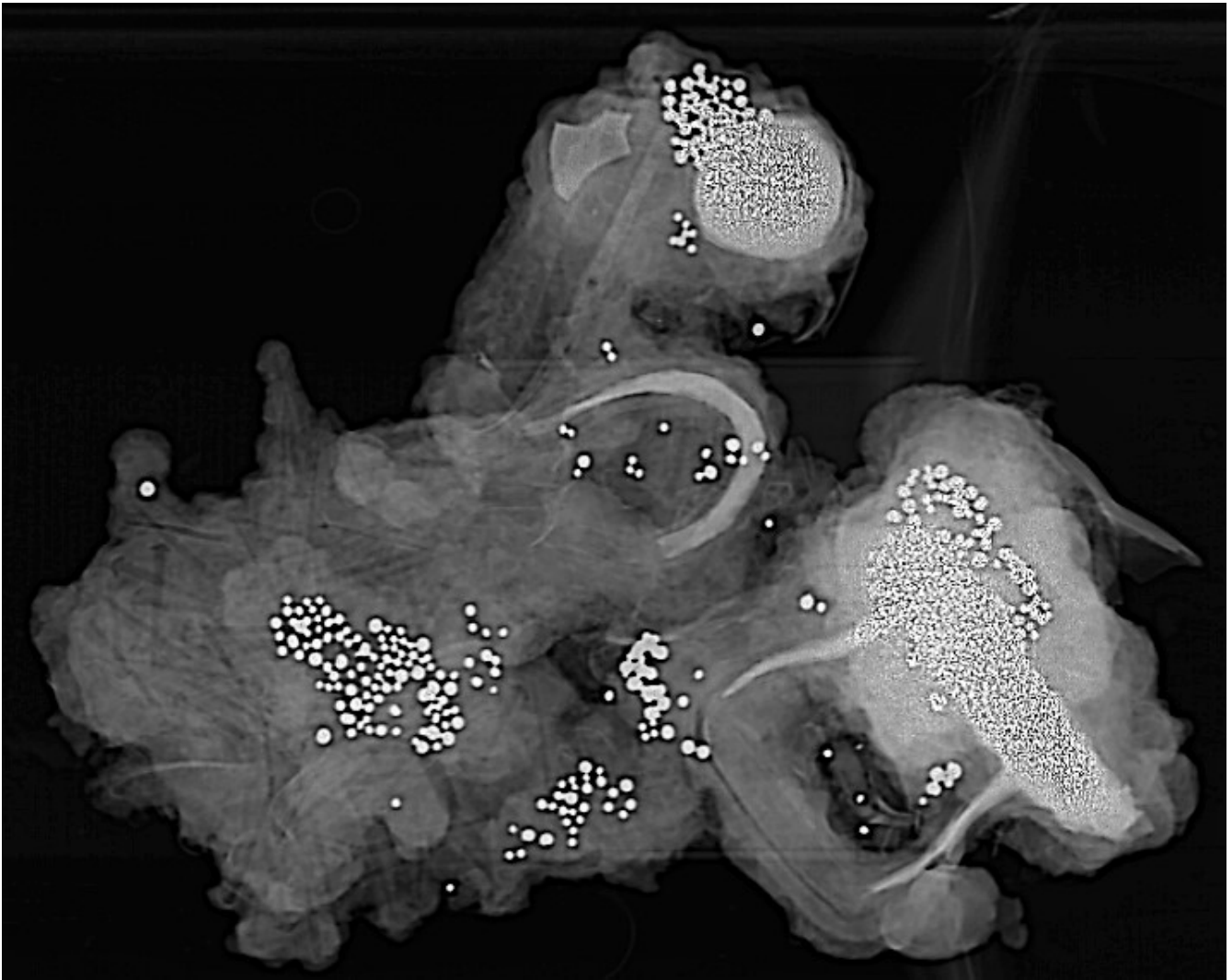


**Figure 192. X-ray image of 13S-328.1 showing a length of possible bar stock, one and possibly two cannonballs, a clothing iron, and birdshot. The concretion has been airtscribed and these objects have all been removed and cleaned.**

*Concretion 13S-329.1: Clothing Iron, Lead Birdshot, Iron Fasteners, Grapeshot, Possible Cannonball and Other Unidentified Objects*

13S-329.1 is a large concretion measuring 36.5 cm long and 31.0 cm wide. It was recovered from the northwest quadrant of Unit 30 at a depth of 78 cmbd. X-rays reveal a multitude of nail hollows and lead birdshot, a probable grape shot measuring 5.0 cm in diameter, and a clothing iron with an overall height of approximately 10.2 cm (Figure 193). There are also several unidentifiable objects, and a probable cannonball. This concretion has not been air scribed and because there are already multiple examples of the objects preserved within, it is a candidate for returning to the site for reburial.

Clothing irons are discussed on pp. 228-232, birdshot on pp. 161-166, cannonballs and grapeshot on pp. 135-140, and iron fasteners on pp. 173-176.



**Figure 193. X-ray image of concretion 13S-329.1, showing a clothing iron, birdshot, grape shot, nail hollows, and a possible cannonball. This concretion may be returned to the site for reburial.**

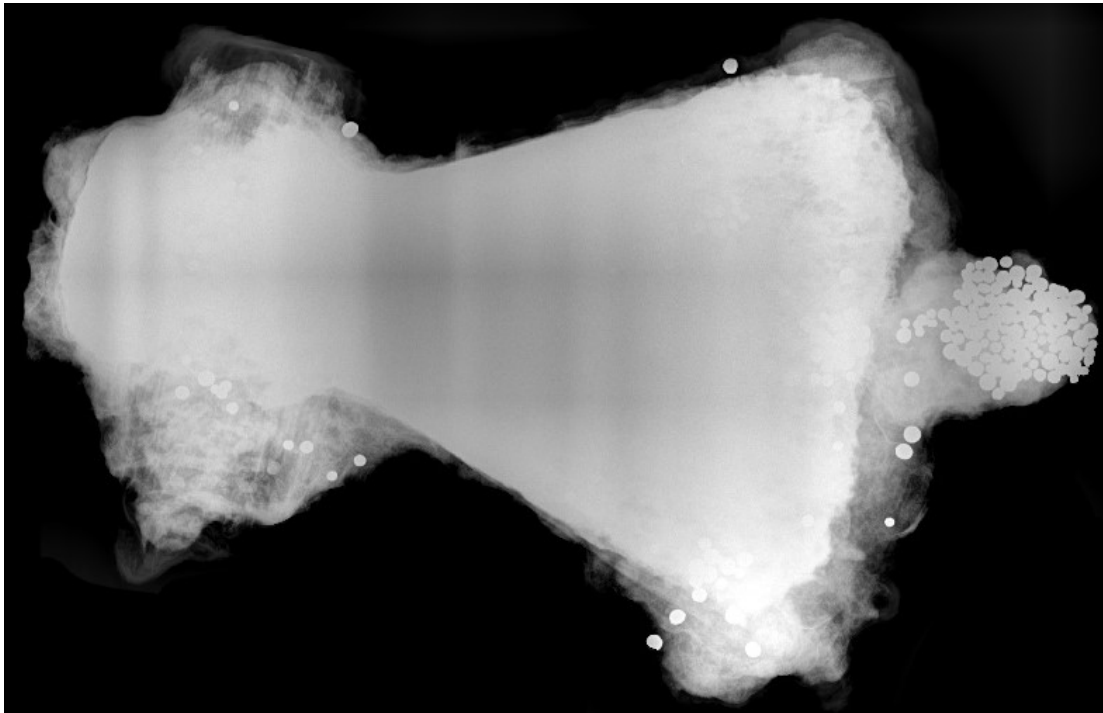
*Concretion 13S-330.1: Axe Head and Lead Birdshot*

13S-330.1 is a concretion that was found in the northeast quadrant of Unit 30, measuring 32.0 cm long and 21.7 cm wide. X-rays revealed a hafted axe head measuring 26.3 cm long and 17.7 cm at the widest part of the blade. There is also an *in situ* section of the axe's wooden handle, and several lead birdshot (Figure 194). This axe has been deconcreted and is described on pp. 195-196, while birdshot are discussed on pp. 161-166.

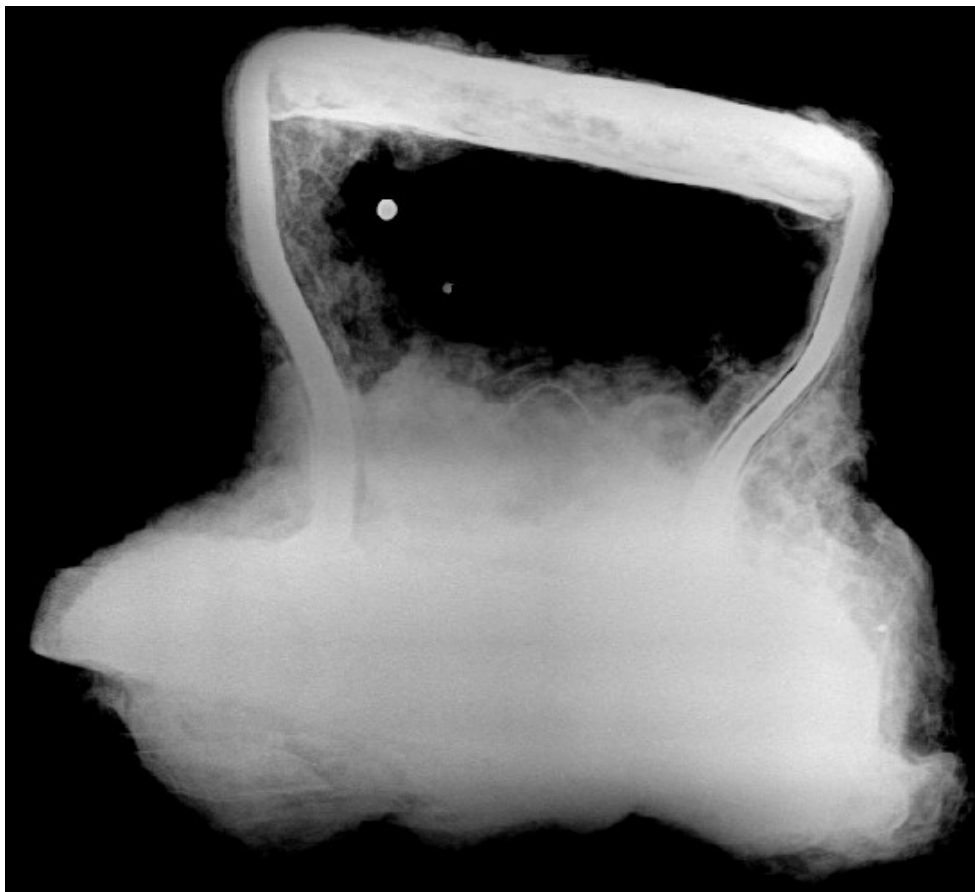
*Concretion 13S-331.1: Clothing Iron, Creamware Royal Pattern Rim Sherd, and Lead Birdshot*

13S-331.1 was discovered in the southern half of Unit 30 at an elevation of 68 cmbd. This concretion measured 18.2 cm long and 15.8 cm wide. X-rays revealed a clothing iron measuring approximately 15.5 cm long, with its handle measuring about 12.0 cm long, and its base measuring around 3.0 cm thick. There also appears to be a solitary lead birdshot (Figure 195). This concretion was airtscribed and taken apart, unearthing the iron (13S-331.2) (Figure 154, p. 230) and a ceramic rim sherd (13S-331.3) and glass sherd (13S-331.4) which were not readily apparent in the x-ray image. The sherd has been identified as





**Figure 194. X-ray image of concretion 13S-330.1 showing a hafted axehead and birdshot. These artifacts have been deconcreted.**

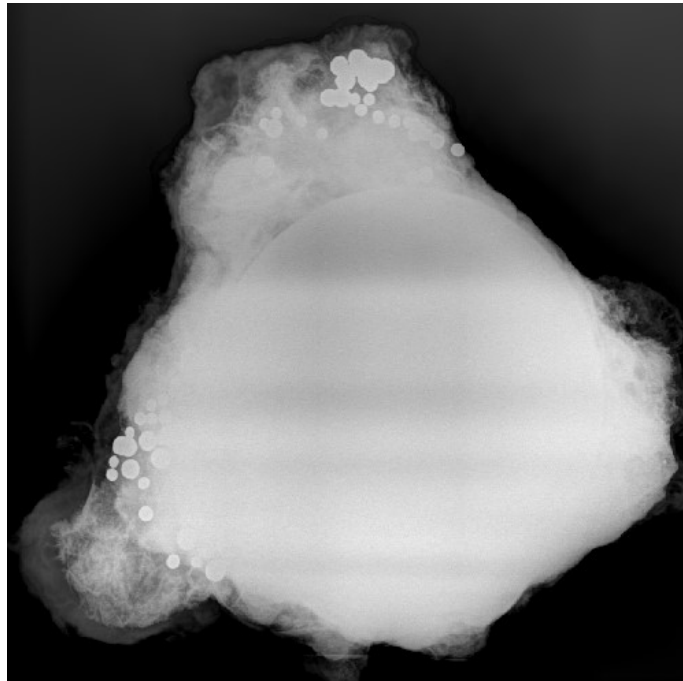


**Figure 195. X-ray of concretion 13S-331.1 showing a clothing iron and a single birdshot. Not apparent is a creamware rim sherd displaying the Royal pattern edge style. These objects have been deconcreted.**

creamware, and appears to be a dinner service design known as the Royal pattern (Figure 157, pp. 233-235).

*Concretion 13S-332.1: Cannonball, Lead Birdshot, and Cloth Fragment*

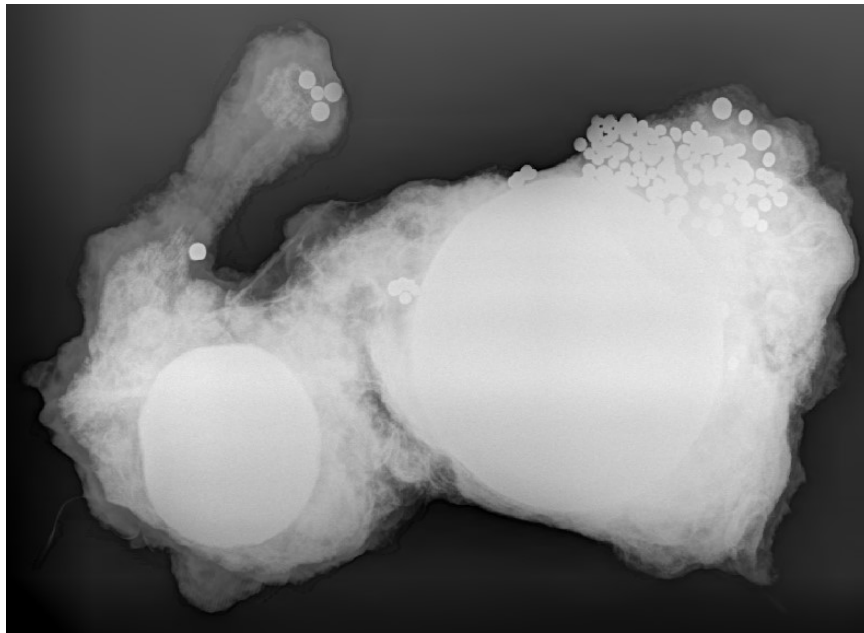
Field Specimen 13S-332.1 is a small concretion measuring 19.0 cm long and 18.0 cm wide, and was found in Unit 30 in the northeastern quadrant near the unit center, at an elevation of 72 cmbd. X-rays revealed several lead birdshot and a cannonball measuring 11.3 cm in diameter (Figure 196). In the conservation laboratory, the cannonball (13S-332.2), birdshot (13S-332.3), and a previously unknown small fragment of cloth (13S-332.4) were successfully removed from concretion. Cannonballs recovered from Storm Wreck are described on pp. 135-140, birdshot on pp. 161-166, and cloth remains on pp. 244-248.



**Figure 196. X-ray of concretion 13S-332.1, showing a cannonball and birdshot. A small fragment of cloth was also removed from this concretion, which is not readily apparent in this image.**

*Concretion 13S-333.1: Cannonball, Grapeshot or 1-pdr Cannonball, Lead Birdshot, Unidentifiable Void*

13S-333.1 is a concretion recovered from the southeastern quadrant of Unit 30, measuring 22.0 cm long and 17.0 cm wide. X-ray analysis revealed multiple lead birdshot mostly concentrated on one side, a cannonball measuring 8.5- 8.8 cm in diameter, and a grape shot measuring 4.8-5.4 cm in diameter. There is also an unidentified void along one side (Figure 197). This concretion has been aircsribed by conservators and the objects within have been removed and cataloged: 4-pdr cannonball 13S-333.2, grape shot (or possibly a 1-pdr cannonball) 13S-333.3, and birdshot 13S-333.4. Cannonballs and grapeshot are discussed on pp. 135-140 and birdshot is addressed on pp. 161-166.



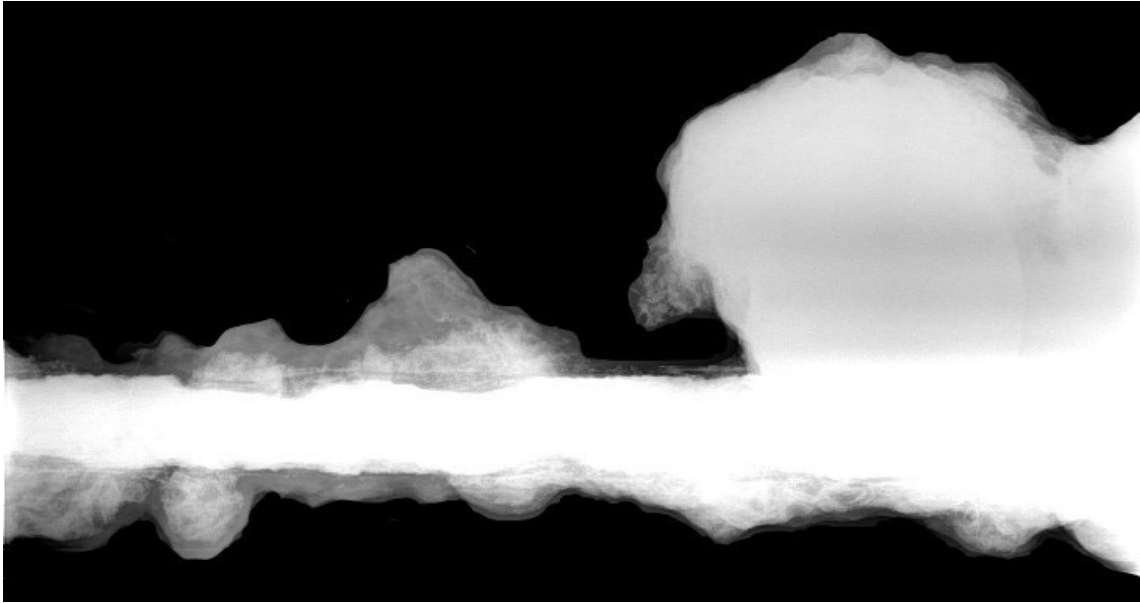
**Figure 197. Field Specimen 13S-333.1. X-ray image showing a cannonball, several lead shot, and an unidentifiable void.**

*Concretion 13S-335.1: L-Shaped Bracket, Cannonball, Rigging Thimble, Glass, Lead Birdshot, and Iron Fasteners*

13S-335.1 was discovered in Unit 31 in the southeastern quadrant towards the unit center. It is a long L shaped concretion measuring 76.0 cm long and 24.8 cm wide. X-ray imaging revealed an L-shaped bracket, a cannonball, lead birdshot, and nail hollows (Figures 198-200). Due to the size of the concretion, it had to be x-rayed in three parts, rendering the digital measuring tool inoperable. adequate measurements could not be taken, and x-rays were taken in three parts. The concretion also had to be rotated for a better view during the x-ray process.



**Figure 198. First x-ray image of concretion 13S-335.1, encompassing the non-L-shaped end, showing one end of the bracket, part of the cannonball, and lead shot.**



**Figure 199.** Second x-ray image of concretion 13S-335.1, encompassing the middle section, showing the middle of the bracket, and the cannonball. View is in same plane as Figure 23EA above.

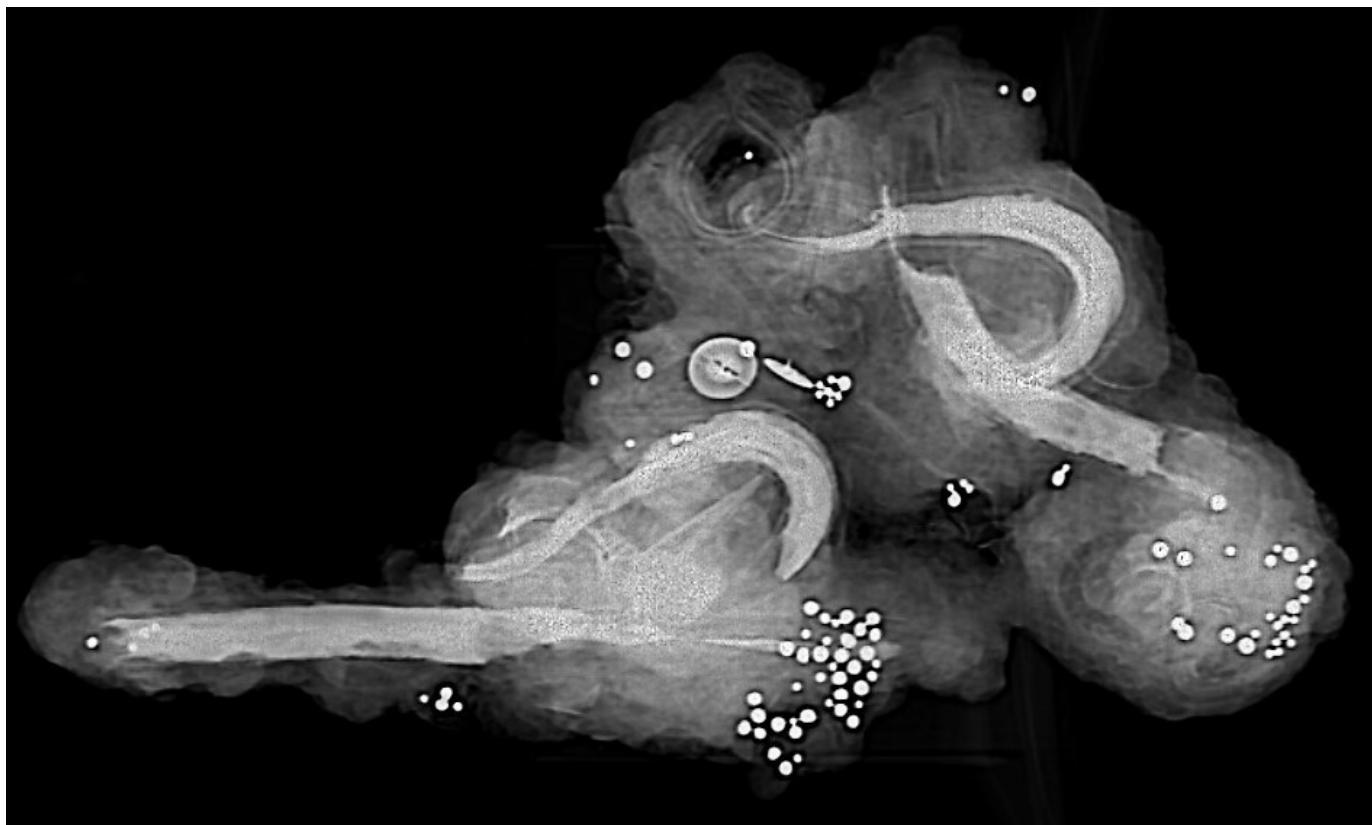


**Figure 200.** Third view of 13S-335.1, encompassing the L-shaped end of the concretion after it was rotated approximately 45°, showing the bend in the end of the bar or bracket. This concretion has been aircscribed and the artifacts within have been removed.

This concretion has been airtreated in the laboratory, and the artifacts within have been removed, cleaned and catalogued as 13S-335.1 (the L-shaped bar or bracket), 13S-335.2 (4-pdr cannonball), 13S-335.3 (rigging thimble, broken into three pieces), 13S-335.4 (thick glass fragment), and 13S-335.5 (glass fragment with shiny coating, possibly mirrored). The iron bar is discussed on p. 176 and pictured in Figure 107, cannonballs are discussed on pp. 135-140, birdshot on pp. 161-166, the thimble is presented on pp. 179-180 and in Figure 109, and glass on pp. 243-244.

*Concretion 13S-336.1: Iron Hooks, Thimble, Buttons, Lead Birdshot, Unidentifiable Iron Objects, Brass Pin, and Cloth Fragments*

Concretion 13S-336.1 was discovered in Unit 31, mostly in the southwest quadrant but partially within the southeast, between 74 and 81 cmbd. It is a large concretion measuring 38.0 cm long and 24.2 cm wide. X-ray images revealed an abundance of lead birdshot, two degraded iron hooks, three buttons, and several other degraded unknown iron objects, at least one a possible fastener (Figure 201). Two of the buttons that could be measured in the x-ray appear to be 2.1 cm and 1.8 cm in diameter. This concretion has been airtreated and the objects within have been removed for conservation. They have been catalogued as 13S-336.2 (pewter button, 30th Regiment, Figures 129-130), 13S-336.3 (pewter button, plain, Figures 129-130), 13S-336.4 (wood button, Figure 129), 13S-336.5 (bent brass pin), 13S-336.6 (multiple birdshot), 13S-336.7 (iron hooks), 13S-336.8 (eight cloth fragments), 13S-336.9 (washer or rove), 13S-336.10 (iron spike), 13S-336.11 (iron hook and thimble, Figure 108), and 13S-336.12 (unidentified iron object).

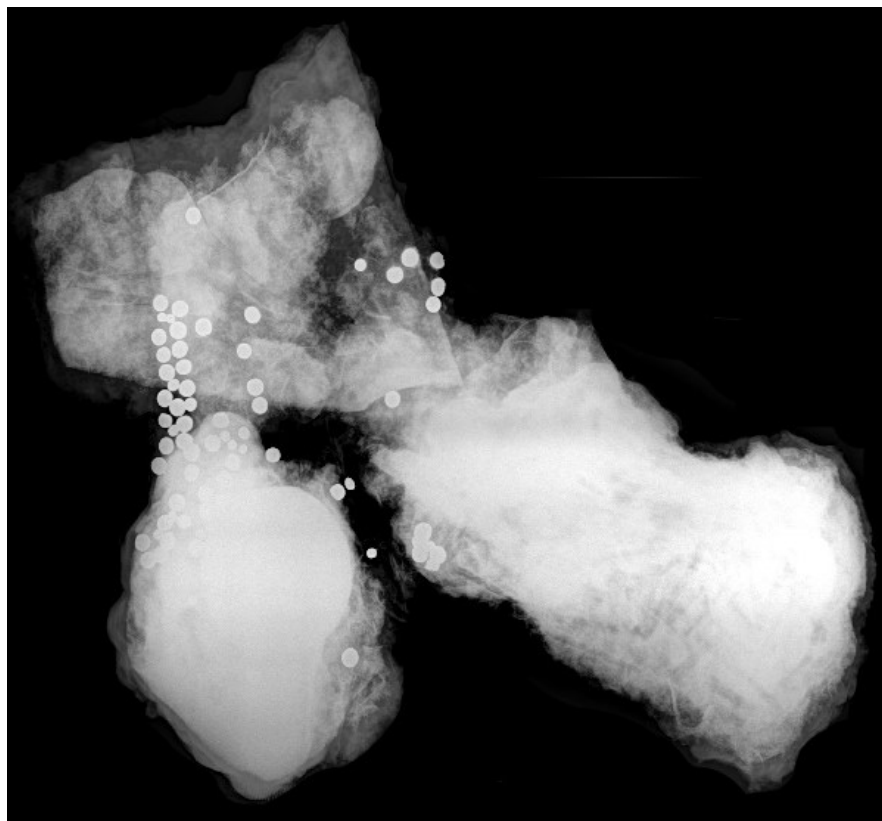


**Figure 201. X-ray image of concretion 13S-336.1 showing hooks, a thimble, birdshot, unidentified iron objects, buttons, including a 30th Regiment uniform button, and other objects hard to discern in this view. All of these items have all been removed from concretion, including cloth scraps and a brass pin.**

Military and civilian buttons are discussed on pp. 197-206, hooks and thimbles on pp. 176-180, fasteners on pp. 173-176, birdshot on pp. 161-166, brass pins on pp. 207-210, and the cloth fragments on pp. 244,247-248.

*Concretion 13S-337.1: Lead Birdshot, Grape Shot, Unidentifiable Iron Objects*

13S-337.1, recovered from the southwestern quadrant of Unit 31 at a depth of 77 cmbd, is a concretion measuring 29.5 cm long and 20.5 cm wide. X-ray images reveal lead birdshot, a grapeshot measuring 4.8 to 5.1 cm in diameter, and other unidentified objects (Figure 202). One object is speculated to be the side of a cauldron. As many other examples of these kinds of artifacts have been conserved to date, this concretion is one designated to be returned to the site for reburial. Birdshot is described on pp. 161-166, and grape shot on p. 139.



**Figure 202. X-ray image of concretion 13S-337.1, showing birdshot, grape shot, and two unidentified objects, one or both of which may be cauldron body pieces. It is planned to rebury this artifact on site.**

*Concretion 13S-338.1: Cannonballs, Lead Birdshot, and “S”-marked Pewter Spoon*

13S-338.1 is a concretion retrieved from Unit 31 in the southeastern quadrant near the eastern border of the unit. It measured 30.5 cm long and 17.2 cm wide. X-ray imaging revealed a probable cannonball, which was not defined enough to measure, and also multiple lead birdshot, a grapeshot measuring 5.2 cm in diameter, and a spoon measuring 20.5 cm long and 4.5 cm wide at the bowl (Figure 203). Upon opening 13S-338.1, it was discovered that the spoon (13S-338.4) had an “S” scratched on the handle, as was presented earlier on pp. 222-223 and Figures 147-148. Other artifacts removed from this concretion include a grapeshot or 1-pdr cannonball (13S-338.2; Table 8), many birdshot (13S-338.3), a 9-pdr cannonball (13S-338.5; Table 8), and three fragments of cloth (13S-338.6; Table 25). Cannonballs and grapeshot are discussed on pp. 135-140, birdshot on pp. 161-166, and cloth fragments on pp. 244-248.

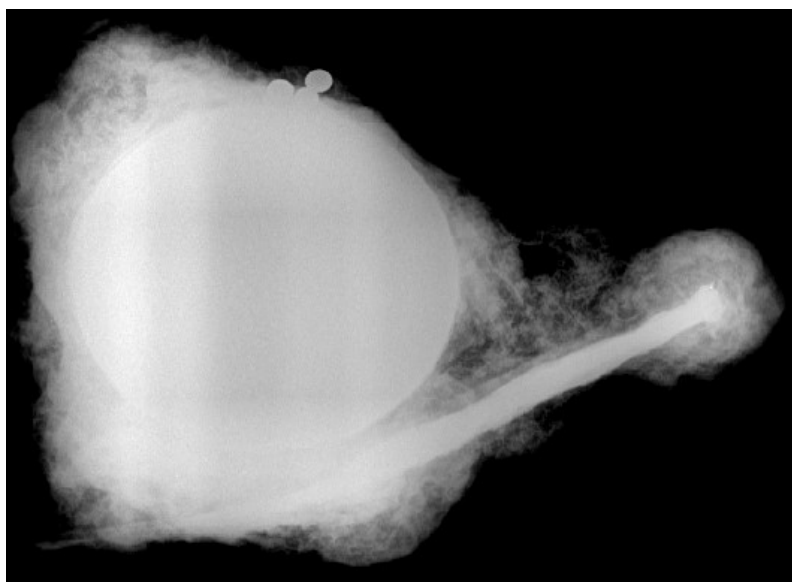




**Figure 203.** X-ray image of concretion 13S-338.1 showing a grapeshot or 1-pdr cannonball, a 9-pdr cannonball, numerous lead birdshot, and a pewter spoon. These objects, along with cloth fragments, have been removed from this concretion for conservation.

*Concretion 13S-339.1: Cannonball, Lead Shot, Iron Fastener*

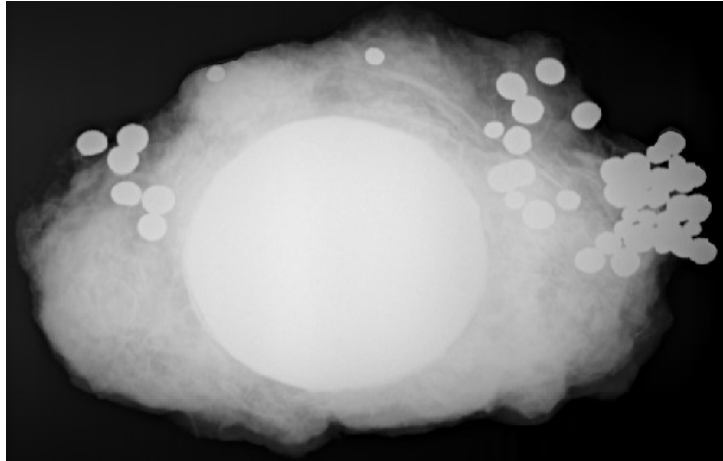
Concretion 13S-339.1 was recovered from the northeastern quadrant of Unit 31. It is relatively small at 16.0 cm long and 13.5 cm wide, and had a modern, rubbery, balloon-like object attached to it. X-ray images revealed a cannonball measuring around 8.5 cm in diameter, three lead birdshot, and a probable iron fastener (Figure 204). This concretion has been aircsribed and was found to contain the remains of not one but two bolt-like fasteners, designated 13S-339.3 (Figure 105). One of these was mostly intact, the other mostly degraded, as discussed in a previous section on p. 173. The cannonball, once cleaned of concretion, was designated 13S-339.2, measured by hand as 7.561 cm in diameter, and proved to be a 4-pdr shot (Table STT4). Three birdshot (13S-339.4) were also recovered.



**Figure 204.** X-ray image of 13S-339.1 showing a 4-pdr cannonball, three birdshot, and a fastener. These have all been removed from the concretion, along with another fastener fragment.

*Concretion 13S-340.1: Grape Shot or 1-pdr Cannonball and Lead Birdshot*

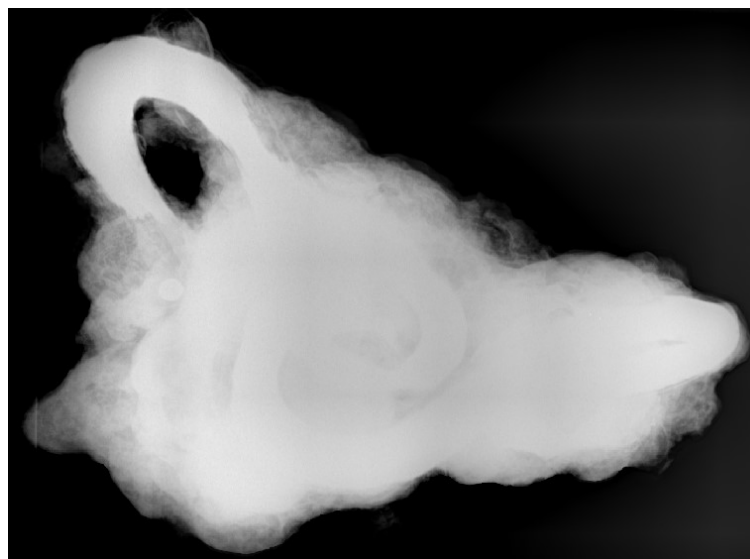
Field Specimen 13S-340.1 was discovered in the center of Unit 31, at a depth of 84 cmbd. It is a small concretion measuring 11.5 cm long and 8.5 cm wide. X-ray imagery revealed a grapeshot or 1-pdr cannonball measuring 5.5 cm in diameter and several lead birdshot (Figure 205). The concretion was airtscribed to separate these artifacts, and the iron shot is now designated at 13S-340.1 and the birdshot 13S-340.2. Cannonballs and grape shot are described on pp. 135-140 and birdshot 161-166.



**Figure 205.** X-ray image of 13S-340.1 showing one lead grape shot or 1-pdr cannonball at least two dozen lead birdshot. Image is enlarged to show detail. These projectiles have been removed from concretion.

*Concretion 13S-342.1: Iron Hooks or Chain and Lead Birdshot*

13S-342.1 was recovered from the northeast quadrant of Unit 31 at an elevation of 81 cmbd, and is a concretion measuring 19.0 cm long and 13.8 cm wide. X-ray radiographs seem to show either iron hooks or chain, and at least one lead birdshot (Figure 206). In at least one other case when x-ray images appeared to show chain, the embedded artifact was actually an eye hook with a thimble attached. This concretion has not been airtscribed, and is currently in wet storage awaiting deconcretion and conservation. Hooks found on the site are presented on pp. 176-180 and birdshot on pp. 161-166.



**Figure 206.** X-ray image of concretion 13S-342.1 showing either hooks and possibly thimbles or a segment of chain, and lead birdshot. This concretion has not been airtscribed.

*Concretion 13S-343.1: Glass Stopper, Cannonball, and Lead Birdshot*

Field Specimen 13S-343.1 was found in Unit 31, northwest quadrant. It is a concretion measuring 24.5 cm long and 12.3 cm wide. X-ray imaging revealed a cannonball measuring 8.2 cm in diameter, some lead birdshot, and a leaded green glass stopper measuring 7.8 cm long and 4.3 cm wide (Figure 207). These artifacts have been removed from concretion and designated 13S-343.2 (glass stopper, Figure 168), 13S-343.3 (4-pdr cannonball, Table 8), and 13S-343.4 (birdshot). The glass stopper is described in more detail on p. 243. Cannonballs are described on pp. 135-140 and birdshot on pp. 161-166.



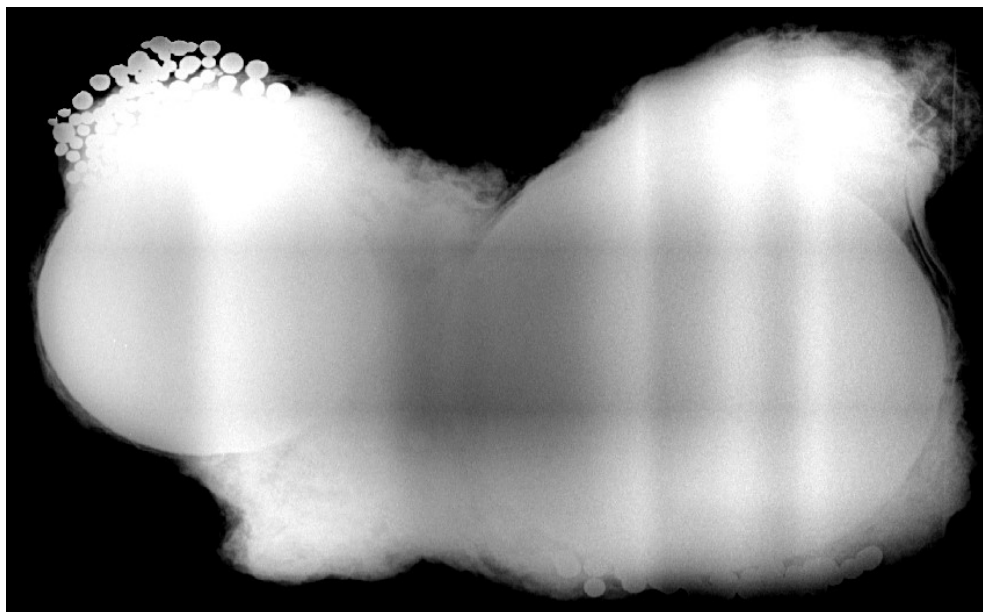
**Figure 207. X-ray image of 13S-343.1 showing 4-pdr cannonball, lead birdshot, and a black glass stopper on the left. These objects have been removed from concretion and the stopper is fully conserved.**

*Concretion 13S-344.1: Cannonballs, Lead Birdshot, and Cloth Fragments*

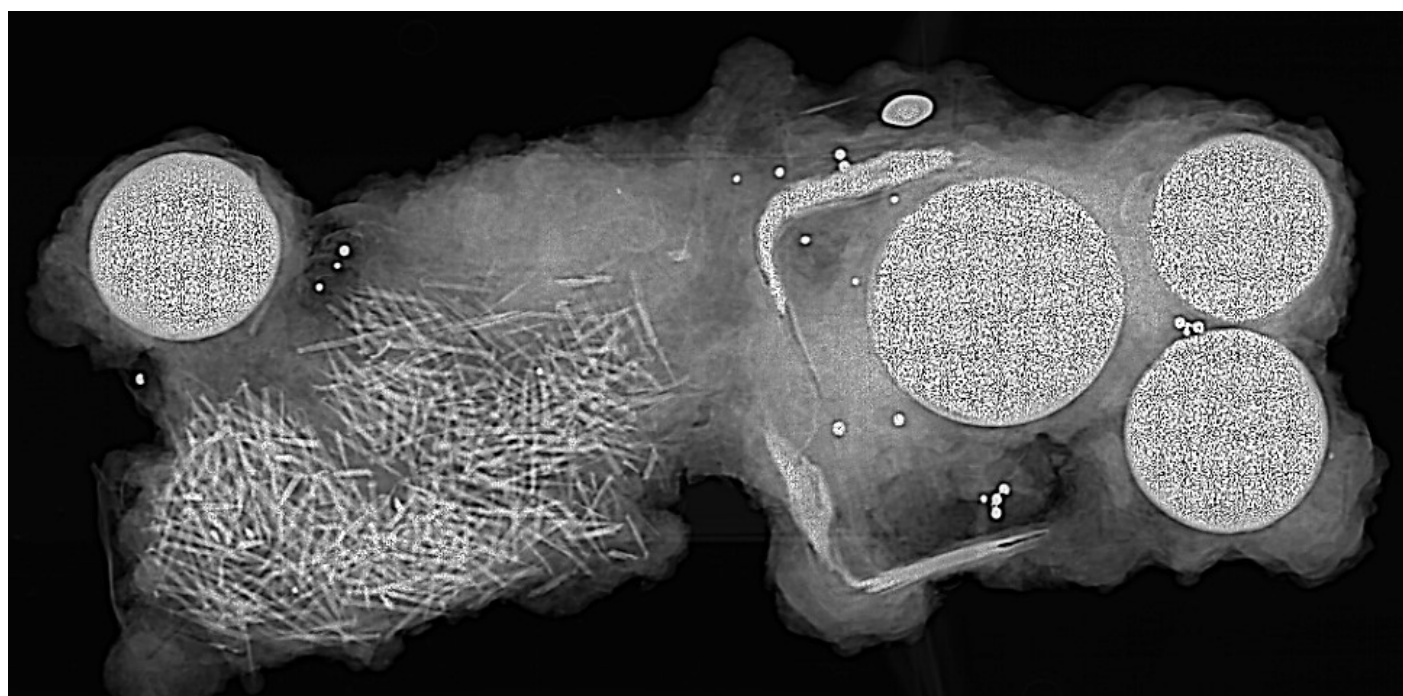
Field Specimen 13S-344.1 is a concretion found in the northwest quadrant of Unit 31, measuring 24.0 cm long and 16.5 cm wide. X-ray images revealed lead birdshot and two different sized cannonballs (Figure 208). One was measured at 12.3 cm in diameter and the other 8.5 cm in diameter, and they were designated 13S-344.2 upon deconcretion (Table 8). The birdshot was cataloged as 13S-344.3, and four fragments of cloth discovered during aircsribing were assigned the number 13S-344.4. Cannonballs from the site are described in detail on pp. 135-140, birdshot on pp. 161-166, and cloth remains on pp. 244-248.

*Concretion 13S-345.1: Cannonballs, Iron Fasteners, Probable Staples, and “RP” Button*

13S-345.1 is a large concretion from Unit 31, near the middle of its north border, measuring 51.0 cm long and 29.0 cm wide. X-rays reveal lead birdshot, several nails, two partially preserved staples (or perhaps one broken staple), a button, and three large and one smaller cannonballs (Figure 209). The button measured 2.2 cm in diameter and the cannonballs measure 7.6 cm, 7.7 cm, 8.3 cm, and 10.1 cm in diameter. This concretion has been aircsribed and the objects within it have been separated, cleaned, and cataloged as follows: 13S-245.2 (a pewter Royal Provincials military button, labeled with a crown over the letters “RP”; Figure 129), 13S-245.3 (9-pdr cannonball; Table 8), 13S-245.4 (4-pdr cannonball; Table 8) 13S-245.5 (4-pdr cannonball; Table 8), 13S-245.6 (4-pdr cannonball; Table 8); 13S-245.7 (two iron staple pieces, Figure 104), 13S-245.8 (multitude of iron nails), and 13S-245.9 (one birdshot).



**Figure 208. Field Specimen 13S-344.1 X-ray image showing two cannonballs and lead birdshot. Cloth was also found within the concretion, but did not show up on the radiograph.**

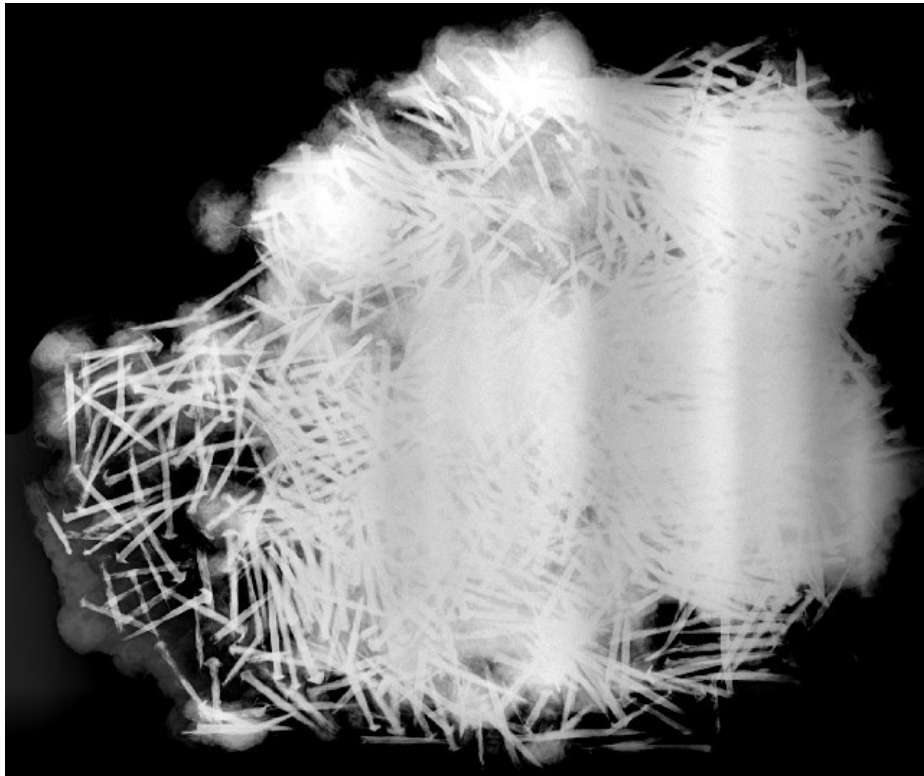


**Figure 209. X-ray image of concretion 13S-345.1 showing four cannonballs, a cluster of nails, two partially preserved staples, and a Royal Provincial military button. These objects have been successfully removed from concretion and some have been fully conserved.**

The RP button is discussed on pp. 201-204, the staple fragments are presented on pp. 173-174, cannonballs are summarized on pp. 135-140, fasteners are summarized on pp. 173-176, and birdshot are presented on pp. 161-166.

*Concretion 13S-346.1: Iron Nails*

Concretion 13S-346.1 was recovered from the northeast quadrant of Unit 31 and measures 36.0 cm long and 30.0 cm wide. X-ray scanning revealed a solid mass of hundreds of nails (Figure 210). This nails in this concentration are intact rather than hollows left from corroded fasteners. As there are many examples of nails and fasteners that have been collected for conservation, this concretion will be returned to the site for repatriation in its original provenience. Nails and other iron fasteners are discussed in detail on pp. 173-176.



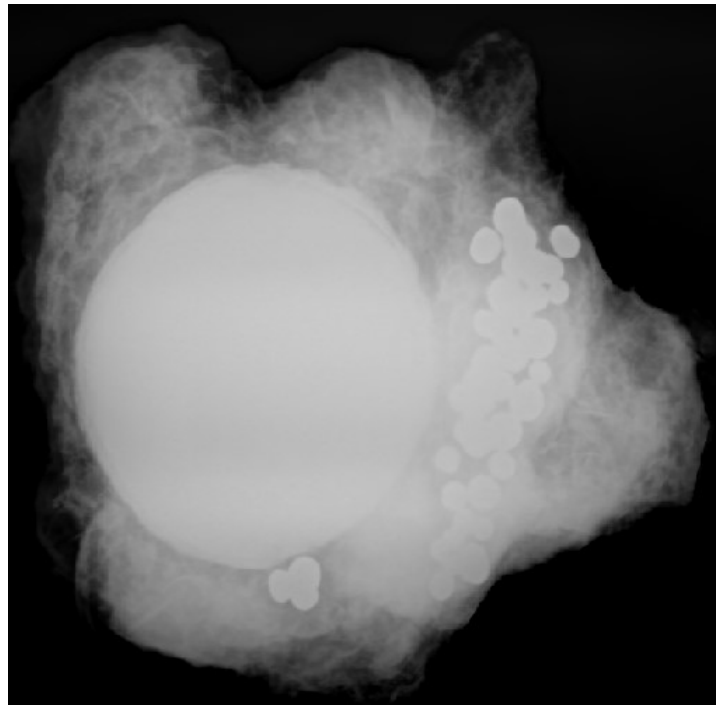
**Figure 210. X-ray of concretion 13S-346.1 showing a mass of preserved iron nails. It is planned to return this concretion, which contains hundreds of nails, to the site for reburial.**

*Concretion 13S-347.1: Grapeshot or 1-pdr Cannonball and Lead Birdshot*

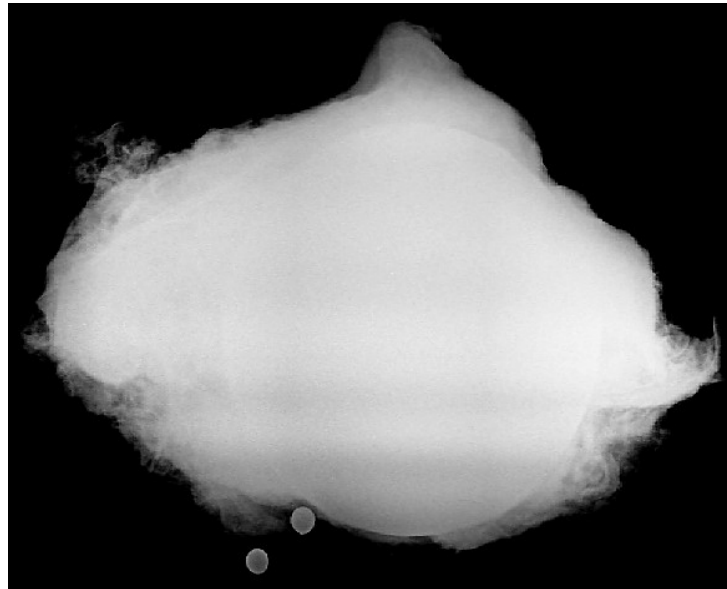
Field Specimen 13S-347.1 was discovered in the northwest quadrant of Unit 32, and was a small concretion measuring 11.0 cm long and 9.5 cm wide. X-ray images revealed several lead birdshot and a either a grapeshot or a 1-pdr cannonball measuring 5.2 cm in diameter (Figure 211). This concretion has been aircsribed to separate, clean, and catalog the embedded projectiles. With the concretion now nonexistent, the number 13S-347.1 now refers to the grapeshot or 1-pdr projectile (Table 8), and 13S-347.2 refers to the numerous Rupert shot or birdshot recovered from the concretion. Cannonballs and grapeshot recovered from the wreck site are discussed on pp. 135-140, and Rupert shot or birdshot are on pp. 161-166.

*Concretion 13S-348.1: Possible Cannonball and Lead Birdshot*

13S-348.1, found in the northeast quadrant of Unit 32 near the northern border with Unit 33, is a concretion measuring 17.5 cm long and 12.5 cm wide. X-rays indicated a probable cannonball measuring 7.9 to 8.5 cm in diameter, and a few lead birdshot (Figure 212). This concretion was aircsribed and produced a 4-pdr cannonball (Table 8). With the concretion no longer extant, the field



**Figure 211. X-ray image of concretion 13S-347.1 showing a number of lead birdshot and one iron grapeshot or possibly a 1-pdr cannonball. X-ray is enlarged to show detail. This concretion has been airtscribed and the artifacts removed and cleaned for conservation.**



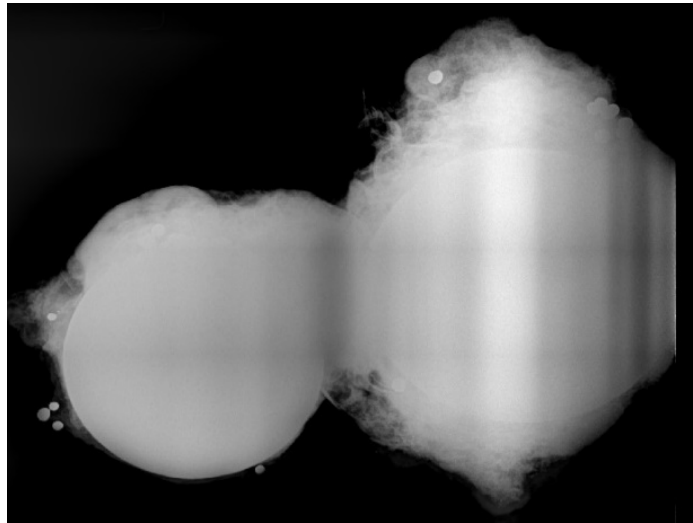
**Figure 212. X-ray image of concretion 13S-348.1 showing a 4-pdr cannonball and a few lead birdshot. This artifact has been airtscribed and the artifacts inside have been removed for conservation.**

Specimen number 13S-348.1 now refers to this cannonball. Four-pounder cannonballs are the most common to have been found on the Storm Wreck, not surprisingly as most of the ship's battery is made up of 4-pdr cannons (Meide 2016). The cannonballs recovered from the wreck are summarized on pp. 135-140.



*Concretion 13S-349.1: Cannonballs and Lead Birdshot*

Concretion 13S-349.1 was found in the northwestern quadrant Unit 32, at a depth of 67 to 77 cmbd. It measured 27.3 cm long and 17.5 cm wide. X-ray images revealed two cannonballs of different sizes (Figure 38EA). One was measured at 11.2 cm in diameter and the other at 9.8 cm in. Also in the concretion were some lead birdshot pellets. The cannonballs, designated 13S-349.2, have been removed from concretion (Table 8). The larger is a 9-pdr ball, and the smaller appears to be a 6-pdr (Figure 75), which is somewhat interesting as this caliber does not match any of the artillery pieces encountered on the wreck. The 32 extracted Rupert shot were assigned the Field Specimen number 13S-349.3.



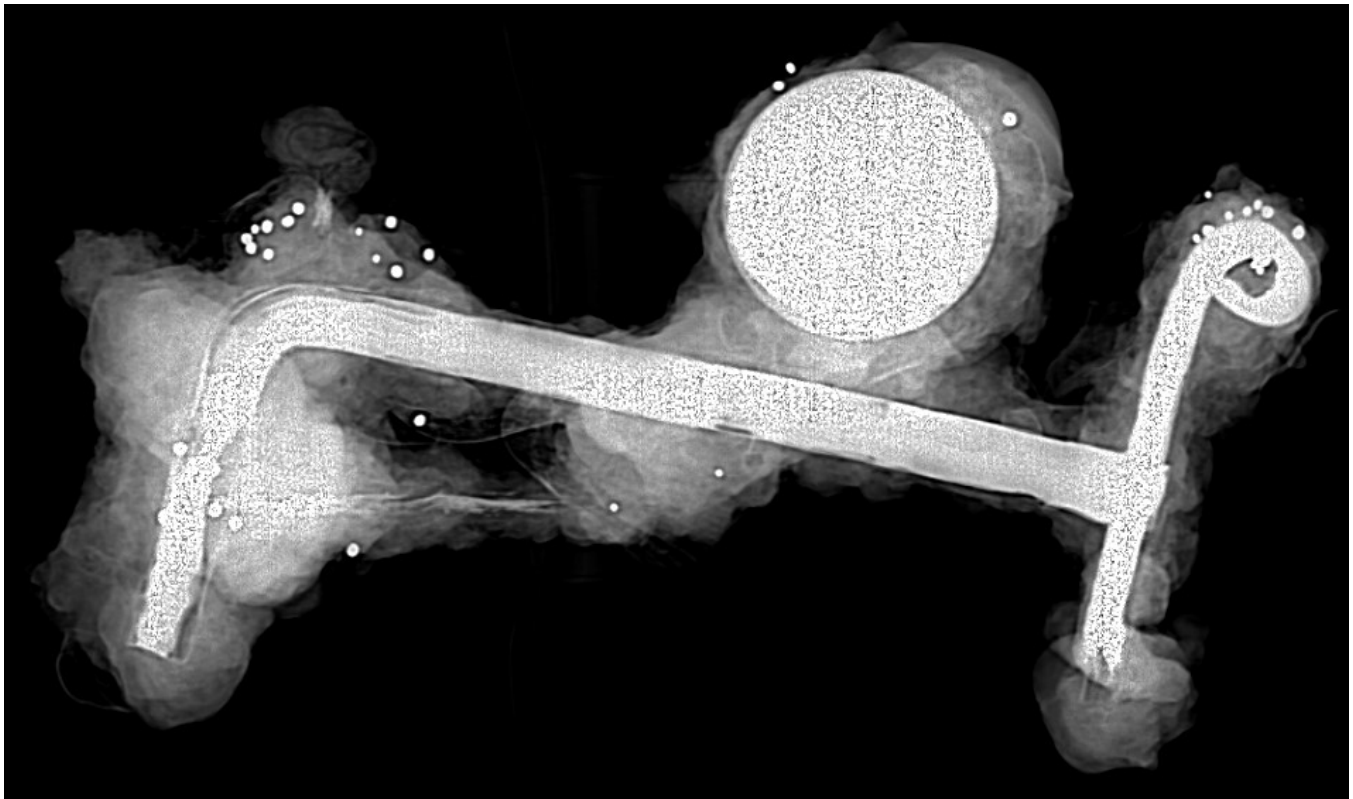
**Figure 213. Field Specimen 13S-349.1 X-ray image showing two cannonballs and several lead birdshot.**

*Concretion 13S-350.1: Cannonball, Lead Birdshot, Andiron, and Glass Wine Bottle Base*

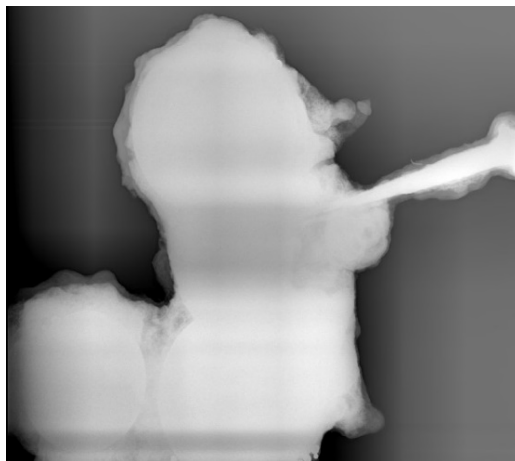
13S-350.1 is a large concretion found in the northwest quadrant of Unit 32 positioned between 67 and 78 cmbd. It measured 51.5 cm long and 28.5 cm wide. A broken wine bottle base was attached to the outside of the concretion and was visible. X-ray imagery further revealed a cannonball measuring 10.1 cm in diameter, more than two dozen lead birdshot, and a large wrought-iron object identified as an andiron, a device generally used in pairs to support logs burning in a fireplace (Figure 214). This single andiron is missing its two front legs. This concretion has been airdescribed and the objects within have been removed, including 13S-350.2 (cannonball; Table 8), 13S-350.3 (the wine bottle base; Figure 166, p. 243), 13S-350.4 (iron spike), 13S-350.5 (numerous birdshot; pp. 161-166), 13S-350.6 (andiron; Figure 161, pp. 237-238), 13S-350.7 (cloth fragment), and 13S-350.8 (a cylindrical metal fragment of unknown function).

*Concretion 13S-351.1: Cannonballs, Iron Fastener, Lead Birdshot*

13S-351.1, found in the northwest quadrant of Unit 32 at an elevation of between 67 and 78 cmbd, was a concretion measuring 29.2 cm long and 25.0 cm wide with a rod or linear extension protruding from its main body. X-ray imaging revealed three cannonballs, a large fastener, and several birdshot (Figure 215). Digital measurements were possible on only two of the cannonballs: 10.8 cm and 8.5 cm in diameter. This concretion has since been airdescribed to remove the artifacts preserved within its matrix. As the concretion is no longer extant, its Field Specimen number has been reassigned to the two largest cannonballs. Field Specimen 13S-351.1 therefore represents two 9-pdr cannonballs (Table 8), 13S-351.2 is a 4-pdr cannonball (Table 8), and 13S-351.3 is a large, iron fastener. Cannonballs from the wreck are summarized on pp. 135-140 and fasteners on pp. 173-176.



**Figure 214. X-ray image of concretion 13S-350.1 showing a cannonball, scattered lead birdshot, and a mostly complete andiron. The andiron is seen in side view, facing to the right. It is missing its two front legs. The glass bottle attached to the concretion is not apparent in the x-ray.**

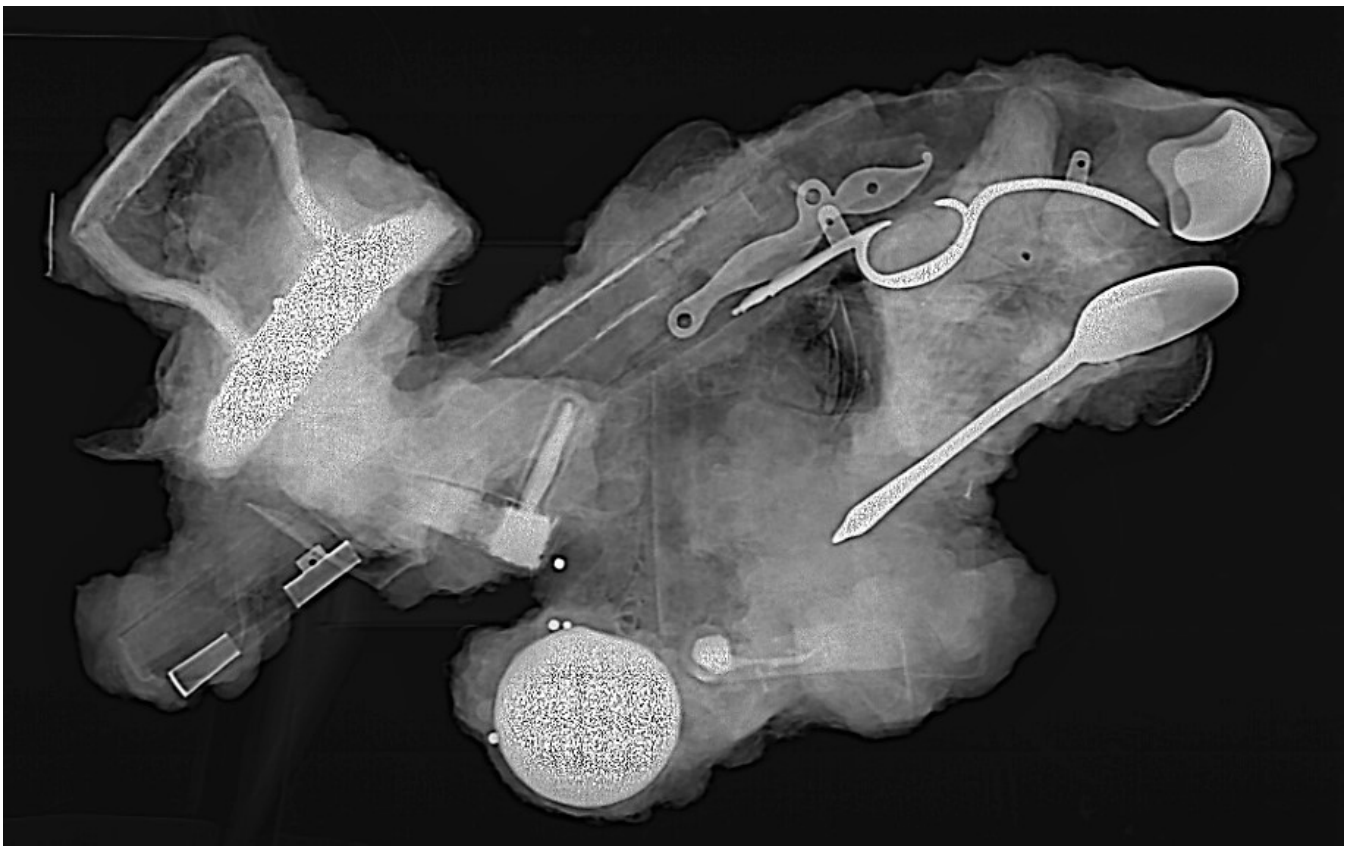


**Figure 215. Field Specimen 13S-351.1 X-ray image showing three cannonballs, one large fastener, and lead birdshot.**

*Concretion 13S-353.1: British Sea Service Pistol, Clothing Iron, Spoon, Cannonball, Lead Birdshot, Iron Hinge, and Cauldron Fragment*

Concretion 13S-353.1 was recovered from Unit 33, largely protruding into the unexcavated area to the east of the unit and at an elevation of 65 cmbd. It is a rather large concretion measuring 54.5 cm long and 35.0 cm wide. A large brass hoop was attached at one end, but broke away from the concretion in

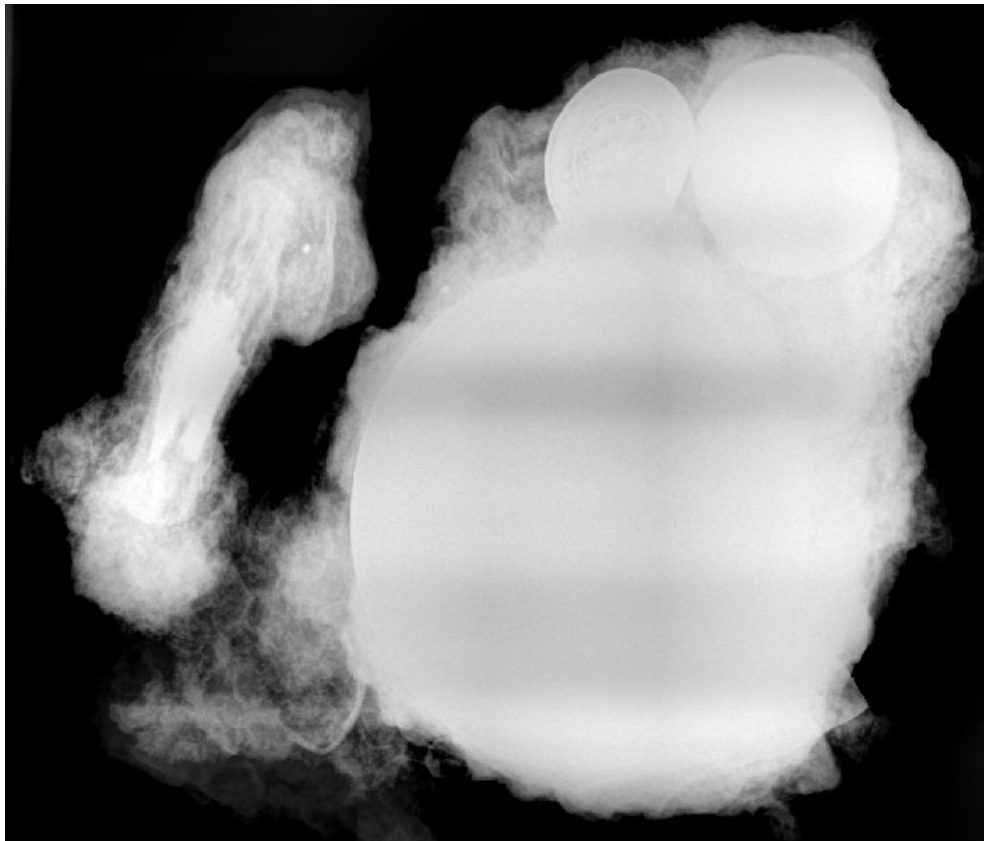
the laboratory after recovery but prior to transport to the hospital for CT scanning. This loop, which has a noticeable linear ridge running along the middle of the interior surface, has not been further conserved or fully analyzed, and its function remains a mystery. It is visible in Figure 94 (bottom view) but is not discussed elsewhere in this report. X-ray images of the concretion revealed a British sea service pistol which appeared to be missing its iron components, a dog-nose handled pewter spoon, a clothing iron, a cannonball in poor condition, a cauldron leg and side, lead birdshot, and an unknown iron object which was later identified as an iron hinge from a door or box (Figures 94, 216). The spoon was digitally measured as approximately 19.1 cm in length. The clothing iron was measured as approximately 13.7 cm long, and the cannonball as 7.3 cm in diameter. Since that time this concretion has been airtight by conservators and all cultural material inside has been removed for cleaning, cataloging, and eventual conservation. The sea service pistol is now designated 13S-353.2 (Figure 95), the clothing iron 13S-353.3 (Figure 155), the 4-pdr cannonball 13S-353.4, the pewter spoon 13S-353.5 (Figure 149), the cauldron fragment 13S-353.6, and the iron hinge 13S-353.7. The sea service pistol (pp.155-159), spoon (pp.222,224), cannonball (Table 8), and clothing iron (pp. 230-232) have all been presented earlier in this report.



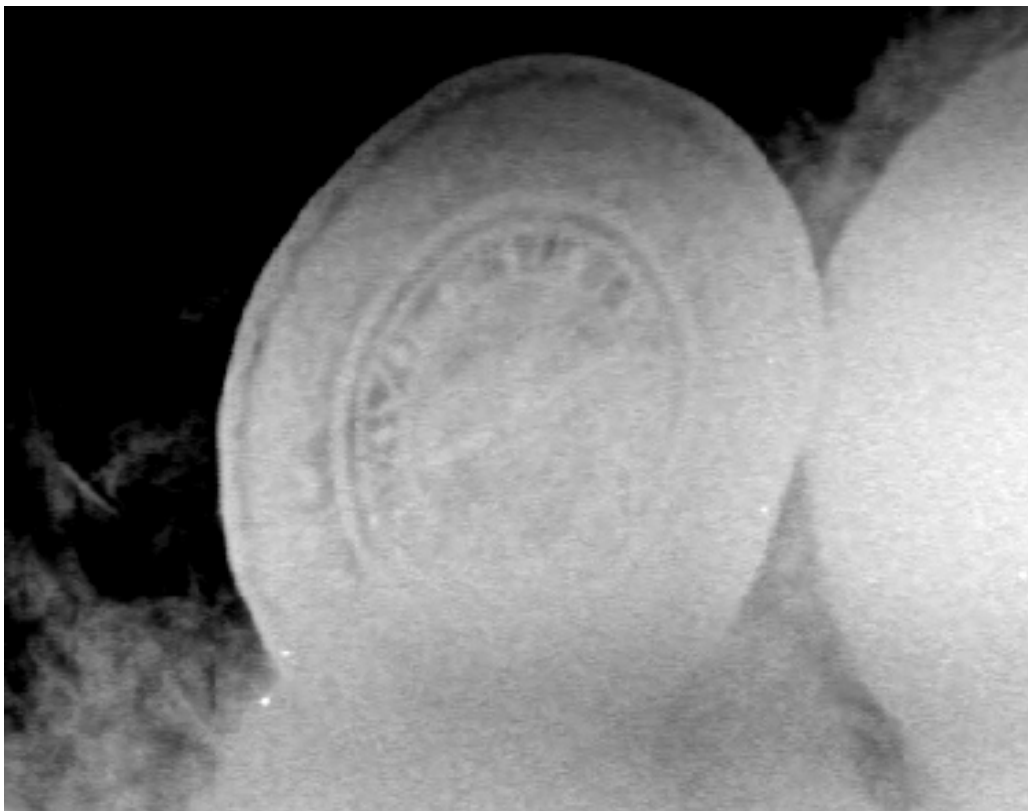
**Figure 216. X-ray image of concretion 13S-353.1 showing a British sea service pistol, clothing iron, dog-nose-handled spoon, 4-pdr cannonball, a cauldron fragment, a small iron hinge, and a few lead birdshot. See also Figure 94. These artifacts have all been removed from this concretion and are in various stages of conservation.**

*Concretion 13S-360.1: Cannonball, Grape Shot, False Watch, and Unidentified Iron Object*

13S-360.1 was found in the northwestern quadrant of Unit 18, and is a concretion measuring 23.0 cm long. X-ray images reveal a cannonball measuring 10.6 cm in diameter, one grape shot measuring 5.2



**Figure 217. X-ray image of concretion 13S-360.1 showing a cannonball, lead shot, an unidentified iron object, and a false watch face. These objects have since been removed from concretion.**

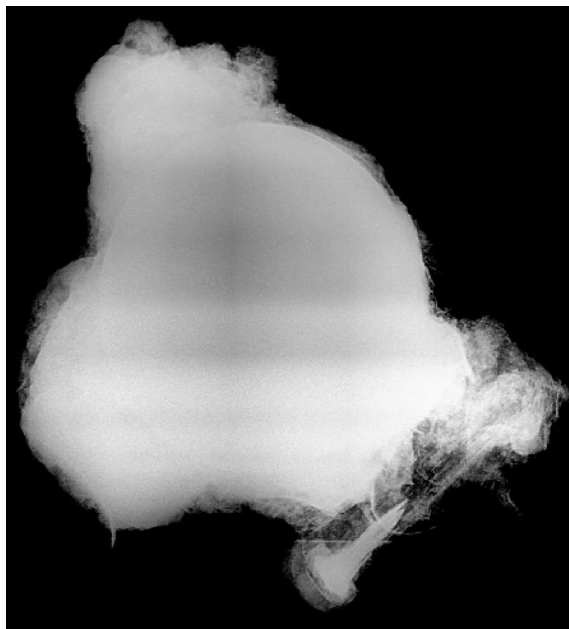


**Figure 218. Detail of the false watch face in concretion. Its design was discernable in the X-ray image.**

cm in diameter, an unidentified iron object, and a flat metal disk of some sort measuring 3.4 cm to 4.2 cm in diameter (Figure 217). Upon closer inspection of the radiograph, it was observed that the disk displayed some kind of intricate decoration which seemed to include a circular row of lettering around the border of one of a series of concentric circles (Figure 218). Conservators proceeded to airscribe the concretion, exposing and cleaning all of the encrusted objects. The decorations on the disk, cast into the pewter, were noted as mimicking a clock or watch, with hands in the 6 o'clock position and Roman numerals arranged in a circle I through XII (Figures 139-140). This object was identified as the face of a false watch or *fausse montre* and is described in detail on pp. 213-215. The false watch face was assigned the field specimen number 13S-360.2, the 9-pdr cannonball is 13S-360.3, the grapeshot or 1-pdr cannonball is 13S-360.4, and a fragment of a possible iron fastener is 13S-360.5. Cannonballs and grapeshot are discussed on pp. 135-140 and fasteners on pp. 173-176.

*Concretion 13S-361.1: Cannonball and Iron Fastener*

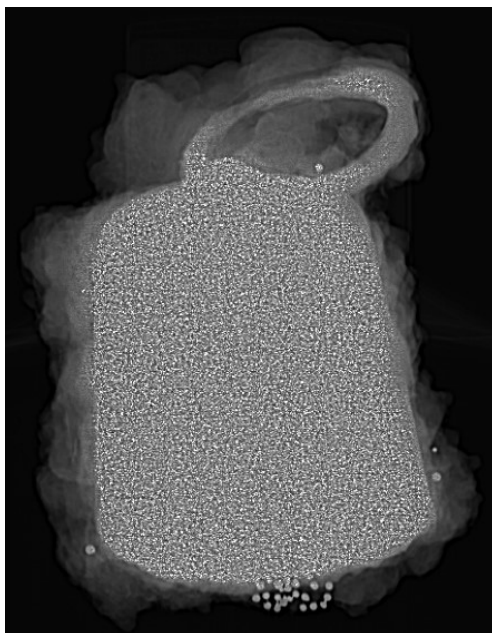
Field Specimen 13S-361.1 was unearthed when excavating in the northwest quadrant of Unit 18, though most of the concretion was positioned in the northeast quadrant of the neighboring Unit 14. It measures 21.5 cm long. X-ray analysis revealed a cannonball measuring 11.0 cm in diameter, and a large fastener measuring 10.1 cm long and 2.2 cm wide at the head (Figure 219). This concretion has not been airtscribed yet, and because the artifacts within are redundant with numerous other examples in the Storm Wreck assemblage, it is planned to return this object to the shipwreck site for reburial.



**Figure 219. X-ray image of concretion 13S-361.1 showing a cannonball and a large fastener. It is planned to return this concretion to the site for reburial and *in situ* preservation.**

*Concretion 13S-362.1: Livestock Tether and Lead Birdshot*

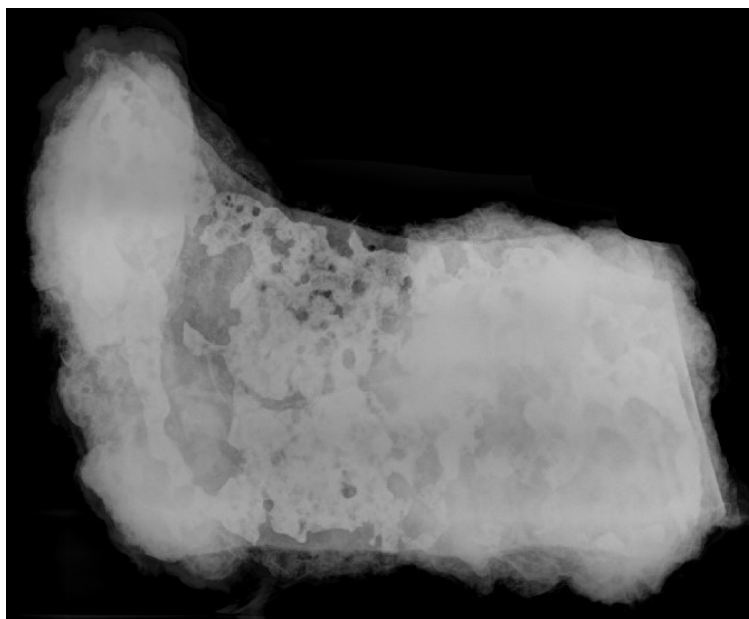
Field Specimen 13S-362.1 was recovered from Unit 18, in the center of the eastern half of the unit at a depth of 101 cmbd. It was a large concretion measuring 29.0 cm long and 20.5 cm wide. X-rays revealed several lead birdshot and a large weight with a sizable ring at its top (Figure 220). The weight was measured at 19.0 cm tall, not including the ring which is bent over, and 16.9 cm wide at its base. Once deconcreted this weight was identified as a livestock tether (pp. 184-185, Figure 114). The weight has been cleaned and is currently undergoing conservation treatment.



**Figure 220. X-ray image of concretion 13S-362.1 showing a livestock tether with an angled ring at the top, along with a number of Rupert or birdshot. This concretion has been aircscribed and the weight is undergoing conservation treatment.**

*Concretion 13S-363.1: Unidentified Ferrous Object (Possible Cauldron Fragment)*

Field Specimen 13S-363.1 was found in Unit 18 at the unit center, and is a concretion measuring 27.5 cm in length. X-ray radiographs reveal a concave/convex object which remains unidentified (Figure 221). Hypotheses consist of a possible cauldron side, or a distorted sheet of metal. Judging from the x-ray images, the object is not well-preserved. This concretion has been recommended for repatriation on the site for *in situ* preservation.

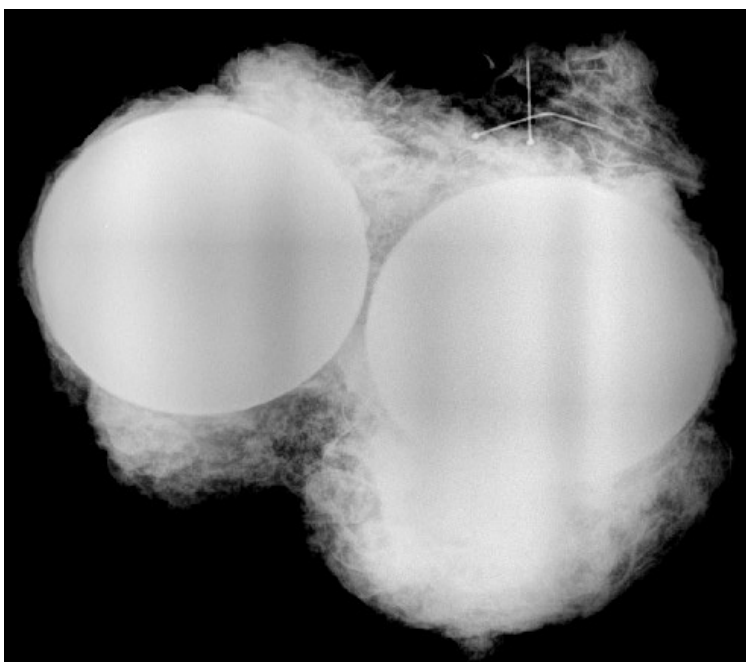


**Figure 221. X-ray image of concretion 13S-363.1 showing the oddly shaped object inside, which could be a cauldron fragment. It is planned to return this concretion to its original location on the shipwreck.**



***Concretion 13S-364.1: Cannonballs, Brass Pin, and Iron Nail Hollows***

13S-364.1 is a concretion found in the northwest quadrant of Unit 18, which measured 18.0 cm in length. X-ray imaging revealed two cannonballs measuring 7.7 cm and 8.8 cm in diameter. Also present were two or more brass straight pins and at least one and probably more nail hollow (Figure 222). This concretion has been airtscribed in the conservation laboratory and the historical material has been deconcreted. As the concretion itself is no longer existent, its Field Specimen number, 13S-364.1, is now assigned to the first 4-pdr cannonball, while 13S-364.2 is assigned to the other. The two brass straight pins were cataloged as 13S-364.3. All of these objects are undergoing conservation treatment. Cannonballs collected from the site are described on pp. 135-140, straight pins on pp. 207-210, and fasteners on pp. 173-176.



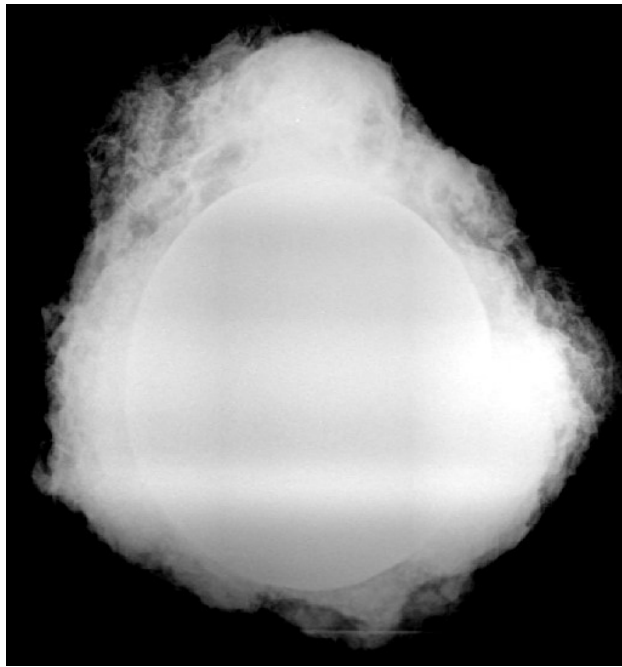
**Figure 222.** X-ray image of concretion 13S-364.1 showing two cannonballs, brass pins, and nail hollows.

***Concretion 13S-365.1: Cannonball***

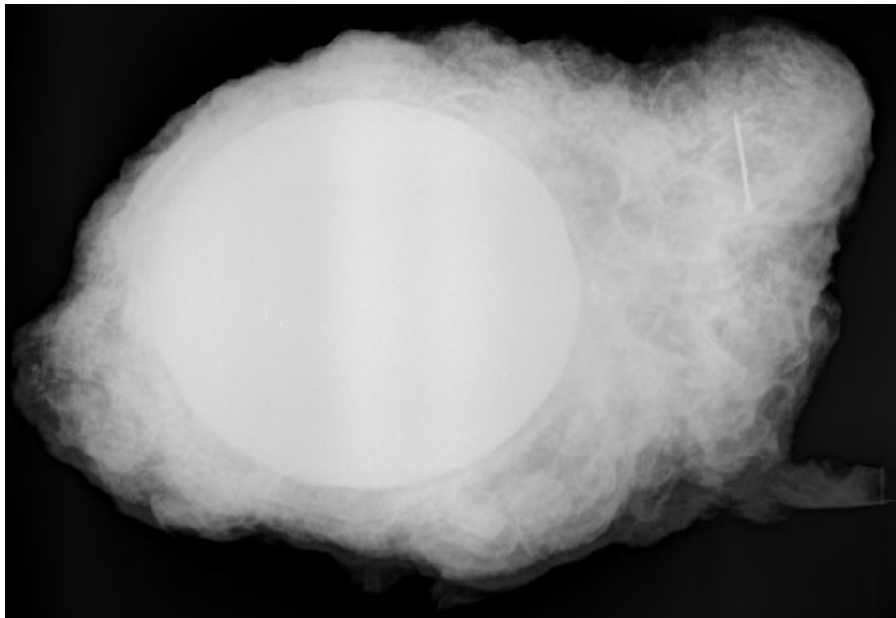
Field Specimen 13S-365.1, found in Unit 18 at the east border of the northeast quadrant, was a concretion measuring 15 cm long. X-ray images showed a cannonball measuring 8.4 cm in diameter, and little else (Figure 223). This 4-pdr cannonball has been deconcreted and is included in Table 8. More discussion of cannonballs from the Storm Wreck is presented on pp. 135-140.

***Concretion 13S-366.1: Cannonball and Straight Pin***

13S-366.1 is a concretion measuring 16.0 cm long and was found in the northwest quadrant of Unit 18. X-rays reveal a cannonball measuring 7.7 cm in diameter, and a brass straight pin measuring 1.8 cm in length (Figure 224). It is believed to be a 3-pdr cannonball (Table 8). This concretion has been airtscribed to separate and clean the two objects, which have been designated 13S-366.2 (cannonball) and 13S-366.3 (pin). Cannonballs are discussed in detail on pp. 135-140, and pins on pp. 207-210.



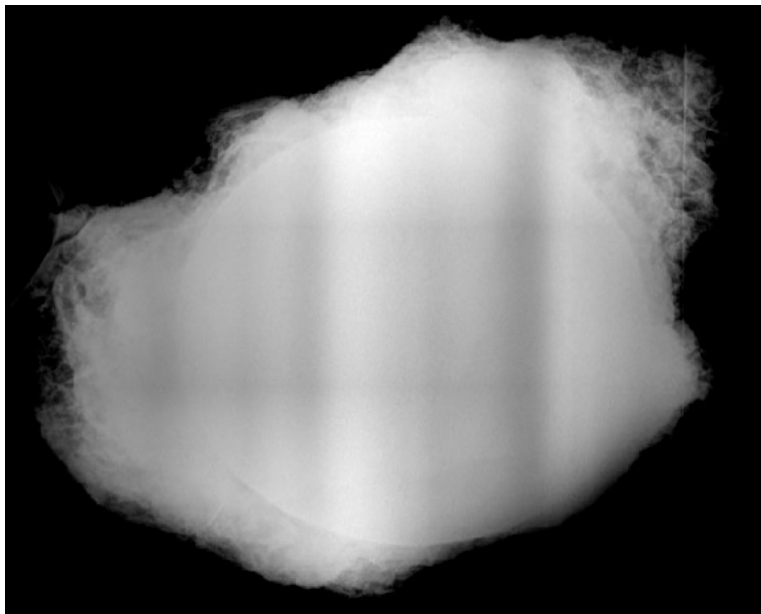
**Figure 223. X-ray of 13S-365.1 showing a 4-pdr cannonball.**



**Figure 224. X-ray image of concretion 13S-366.1, showing a 3-pdr cannonball and a brass straight pin, both of which have been deconcreted.**

*Concretion 13S-367.1: Cannonball and Cloth Fragment*

13S-367.1 was a concretion with a large whelk shell attached which was recovered from the northwest quadrant of Unit 18. It measured 29.0 cm in overall length. X-ray analysis (Figure 225) revealed a cannonball measuring 11.2 cm in diameter, identified as a 9-pdr after deconcretion (Table 8). This concretion was airtscribed to recover and clean the cannonball, now designated 13S-367.1. A tiny scrap of fabric was also recovered, 13S-367.2. Cannonballs are discussed in detail on pp. 135-140, and cloth remains are on pp. 244-248.



**Figure 225. X-ray of concretion 13S-367.1 showing a cannonball. The attached whelk shell has been cropped out of image for clarity. The tiny bit of fabric (13S-367.2) is not visible in this radiograph. These artifacts have been removed from concretion.**

*Concretion 13S-368.1: Iron Nails and Cannonball*

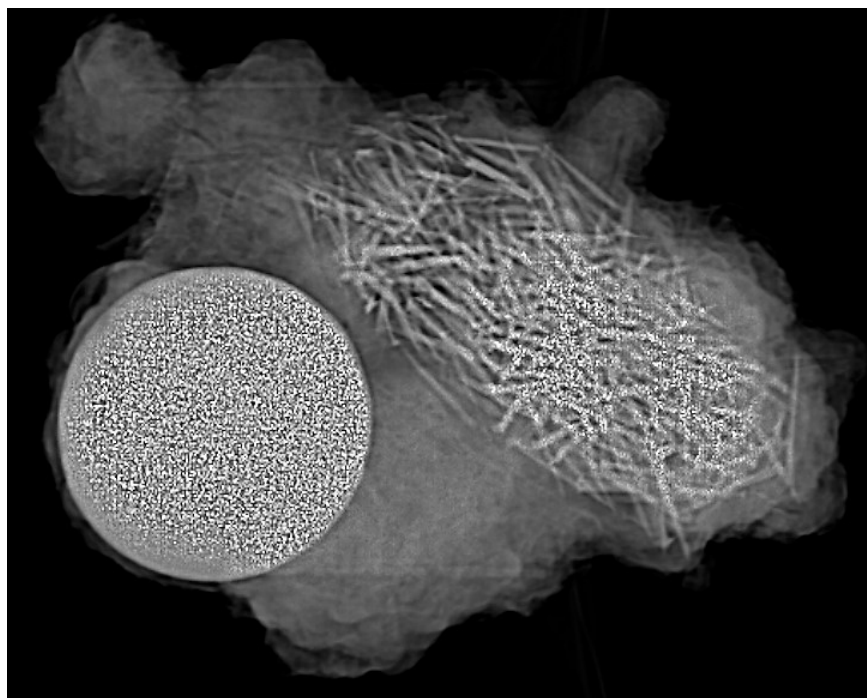
Concretion 13S-368.1 was recovered from Unit 18, just north of the unit center. It measures 29.5 cm long. X-ray imaging revealed a large amount of nails and a single cannonball measuring 10.1 cm in diameter (Figure 226). This concretion has not been cleaned or airscribed. As a large number of cannonballs and nails have been collected already from the Storm Wreck, this concretion has been selected to be returned to the shipwreck site for reburial and *in situ* preservation. Cannonballs are discussed in detail on pp. 135-140, and nails and fasteners on p. 173-176.

*Concretion 13S-369.1: Iron Nails, Partial Barrel Hoop, and Unidentifiable Iron Object*

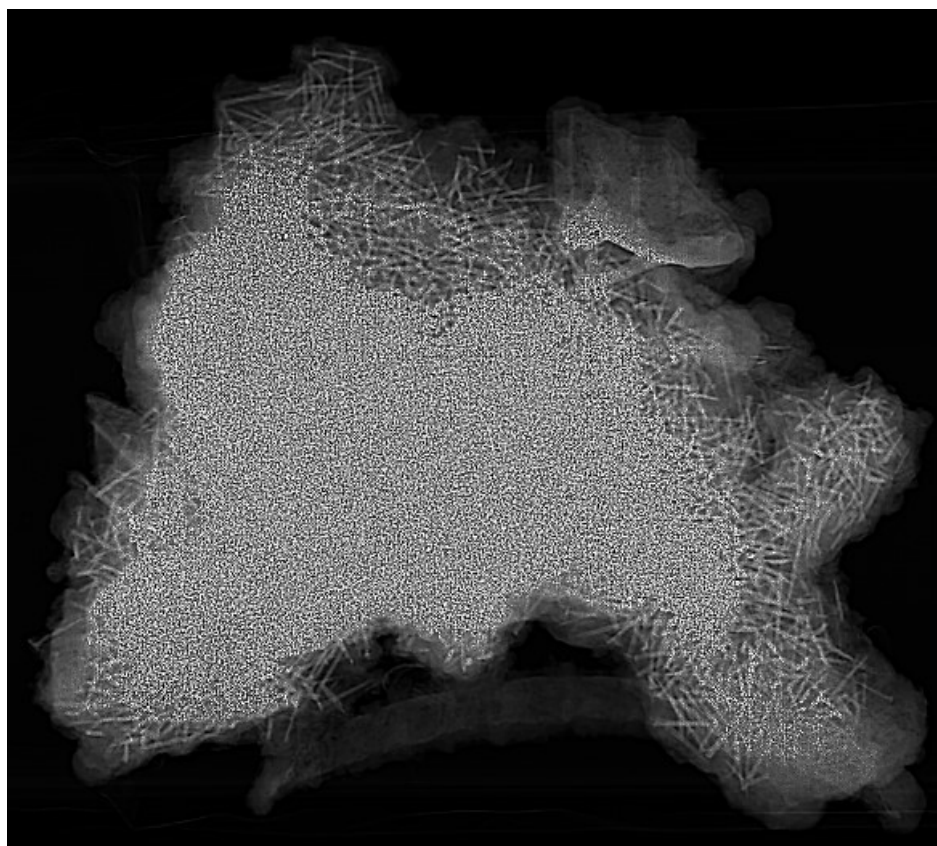
13S-369.1 is a large concretion measuring 48.5 cm long. The concretion was recovered from the southeastern quadrant of Unit 18. The southeastern end of the concretion was positioned at an elevation of 95 cmbd, and the northwest end of the object was at 121 cmbd. X-ray analysis revealed a very large mass of iron nails, a poorly preserved barrel loop, and an unidentified iron object (Figure 227). This concretion has not been airscribed. As nails have proven ubiquitous on the shipwreck site, and there is likely little diagnostic value to the possible barrel hoop, this specimen has been selected for redeposition on the shipwreck.

*Concretion 13S-370.1: Lead Pan Weight*

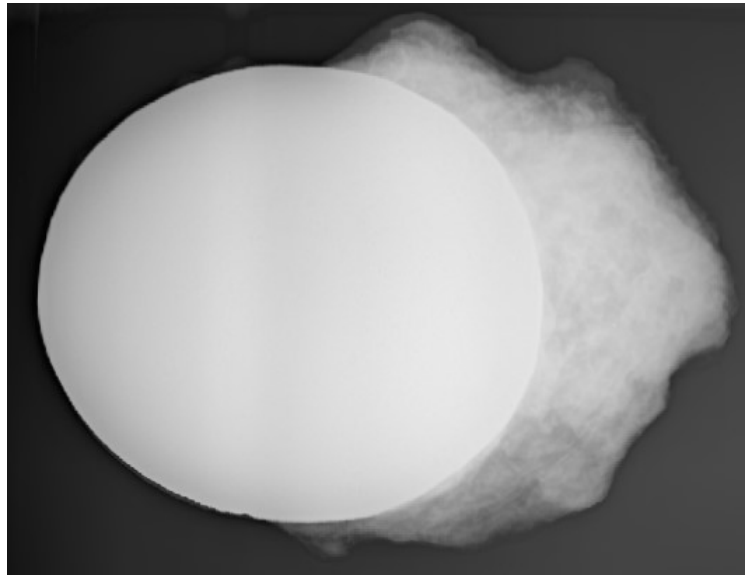
13S-370.1 was discovered in Unit 18, northeast quadrant, and was a concretion measuring 11.5 cm long. It contained a lead pan weight which has since been deconcreted and fully conserved (Figure 111; pp. 181-182). X-rays revealed only the weight which the radiograph has perhaps distorted to seem more oblong than round, measuring 7.6 cm to 8.4 cm in width (Figure 228). Only one view was taken to maximize the exposure of the concretion so no measurement of the height of the weight was obtained while in concretion, though it has since been fully recorded. This is the largest pan weight found on the shipwreck site.



**Figure 226. X-ray image of concretion 13S-368.1, showing a mass of preserved nails as well as a 9-pdr cannonball. It is planned to return this concretion to the site for reburial.**



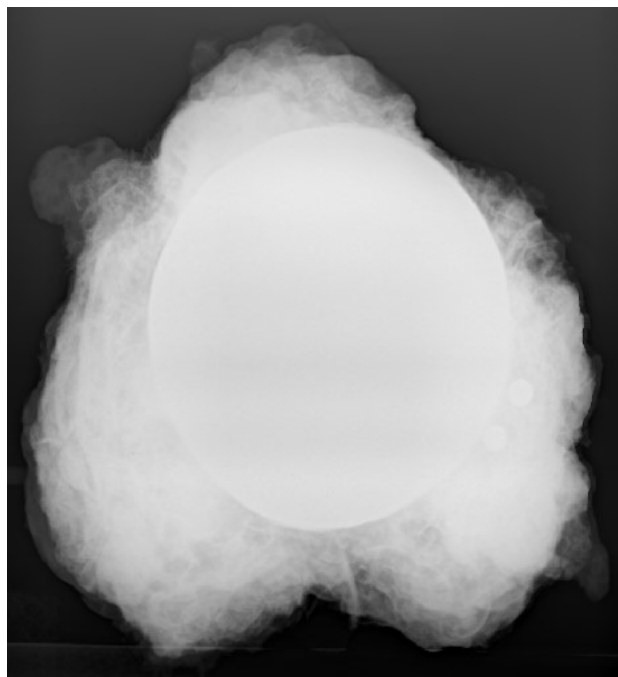
**Figure 227. X-ray image of concretion 13S-369.1 showing a large mass of preserved nails with a possible, partial barrel loop. It is planned to return this concretion to the site for reburial.**



**Figure 228. X-ray image of concretion 13S-370.1, showing a lead pan weight. The weight, now assigned number 13S-370.1, was the only artifact in this concretion, and it has been cleaned of encrustation and conserved.**

*Concretion 13S-371.1: Cannonball or Lead Weight and Lead Birdshot*

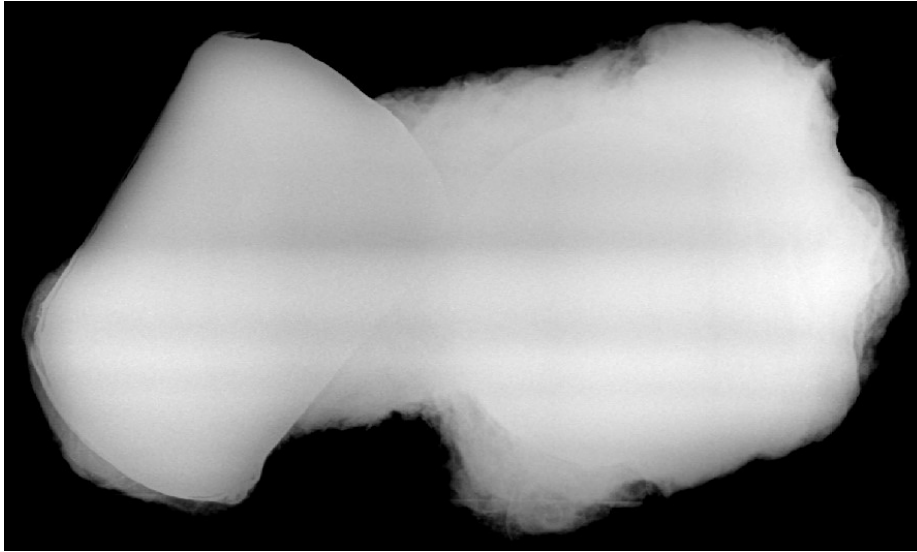
Concretion 13S-371.1 was recovered from Unit 18, just south of its center. It measures 16.2 cm in length. X-rays reveal what is most likely a cannonball measuring between 7.9 cm to 8.7 cm in diameter (Figure 229). It could possibly be a round lead weight of some type. Also present are two lead birdshot. This concretion has been selected for repatriation and will be re-buried on the site. Cannonballs are discussed in detail on pp. 135-140, weights on pp. 180-189, and birdshot on pp. 161-166.



**Figure 229. X-ray image of concretion 13S-371.1, showing a round object that is most likely a cannonball, but possibly a lead weight, along with at least two lead birdshot. It is planned to rebury this artifact on site.**

*Concretion 13S-372.1: Lead and Brass Steelyard Weight and Cannonball*

13S-372.1 was a heavy concretion measuring 22.6 cm in length. X-ray images indicated a cannonball measuring 8.8 cm in diameter and an apparent lead weight measuring 11.2 cm tall and 7.7 cm wide (Figure 230). This concretion has been airtscribed and the weight was subsequently identified as a steelyard weight, fashioned of lead with a copper alloy sheathing, designated 13S-372.2 (Figure 113; pp. 182-184). The cannonball is a 4-pdr and is cataloged as 13S-372.3 (Table 8). Cannonballs are discussed in detail on pp. 135-140.



**Figure 230. X-ray image of concretion 13S-372.1 X showing the lead and brass steelyard weight and a cannonball. They have since been removed from concretion.**

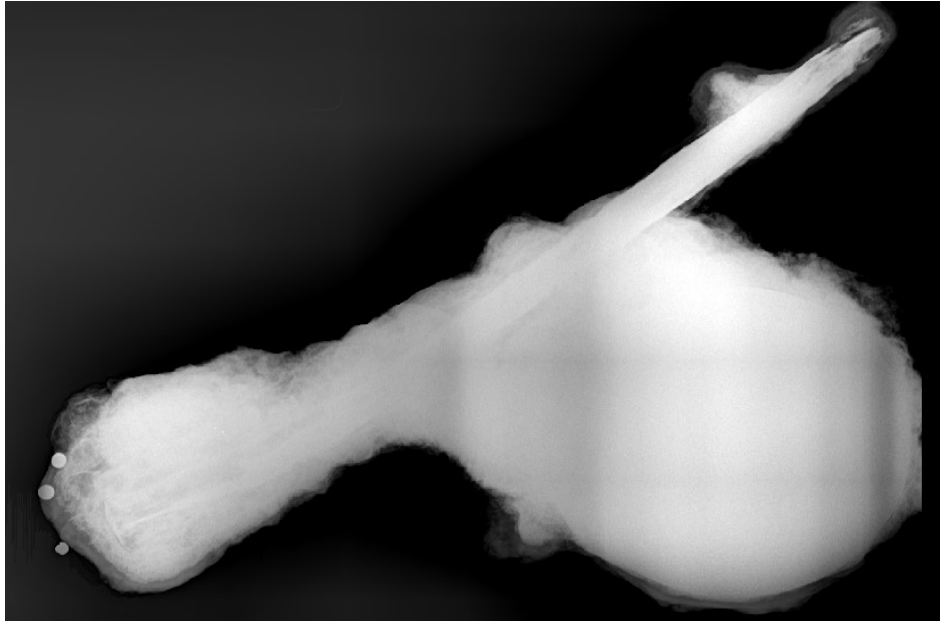
*Concretion 13S-373.1: Cannonball and Iron Fastener*

Concretion 13S-373.1 was discovered in the southwest quadrant of Unit 18 at a depth of 117 cmbd. It measured 29.0 cm long and x-ray analysis revealed a cannonball measuring 10.7 cm in diameter, a large probable fastener measuring 30.7 cm, and three lead birdshot (Figure 231). It has since been airtscribed and the artifacts within have been cleaned, and designated 13S-373.2 (9-pdr cannonball; Table 8), 13S-373.3 (fastener), and 13S-373.4 (birdshot). Cannonballs from the wreck site are described in detail on pp. 135-140, fasteners on pp. 173-176, and birdshot on pp. 161-166.

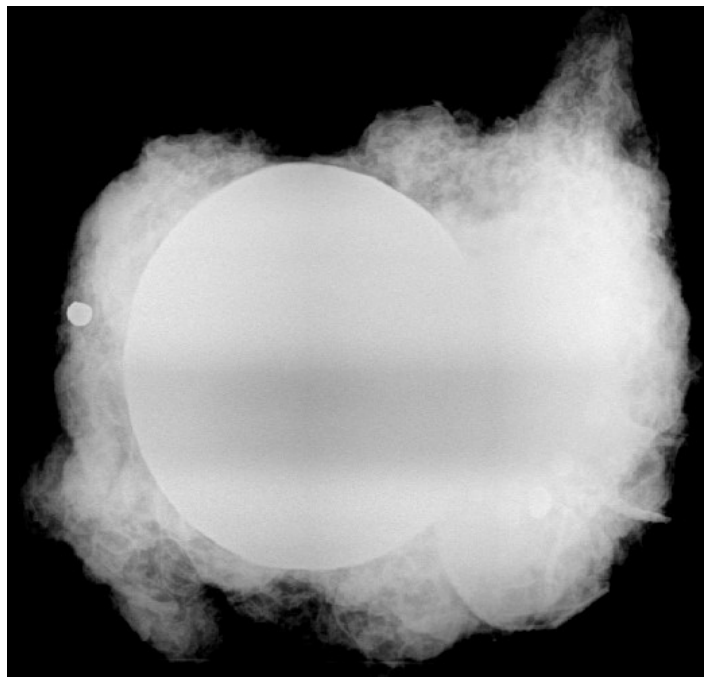
*Concretion 13S-374.1: Cannonball and Lead Birdshot*

Field Specimen 13S-374.1 was found in the southwest quadrant of Unit 18 and is a concretion measuring 17.0 cm long. X-rays reveal a cannonball measuring 8.7 cm in diameter and several birdshot (Figure 232). These objects have since been removed from concretion and designated 13S-374.1 (4-pdr cannonball) and 13S-374.2 (four birdshot). Cannonballs from the site are presented on pp. 135-140, and Rupert shot or birdshot are on pp. 161-166.





**Figure 231. X-ray image of concretion 13S-373.1, showing a 9-pdr cannonball, a very large fastener, and three birdshot. These items have since been removed from concretion.**



**Figure 232. X-ray image of concretion 13S-374.1 showing a 4-pdr cannonball and several birdshot. These items have since been removed from concretion.**

### Identification of the Storm Wreck as a Member of the Charleston Evacuation Fleet

By the end of the 2010 season, researchers had surmised that most of the cultural material from the wreck site seemed to be of British origin and dated to the 18th century, with some materials seeming to date to the second half or even last quarter of the 18th century. These items included the Queen Anne's pistol (still in concretion 10S-44.1), which appeared likely to date to the second half of the century, the wine glass foot (10S-35.1), which was tentatively dated to ca. 1780-1805, and the carronades, which had been observed but not yet raised, and were believed, due to their trunnions, to date to no later than 1782, and no earlier than 1778 (Meide et al. 2011:188). After analysis of the material recovered in 2010, researchers believed they had a small merchant vessel, either British, British colonial, or possibly early American, that had wrecked sometime during or after the American Revolution but before the War of 1812. One working hypothesis considered by archaeologists at that time was that this shipwreck represented a Loyalist refugee ship, perhaps one of sixteen lost at St. Augustine that had evacuated Charleston in December 1782.

Great strides were made during the 2011-2012 field seasons towards defining the cultural parameters of the shipwreck site, that is, its nationality, date, and function. More and more materials were unearthed that appeared to be British in national origin. The most prominent of these was the carronade that was raised (11S-154.1), which was produced at the Carron Company in Falkirk, Scotland, and marked with the date 1780 (Figure 233). The other object bearing an absolute date was also of British origin, the gold guinea minted in 1776 (12S-303.1) (Figures 137-138). As the later of the two, the carronade has defined the *terminus post quem* for the shipwreck; in other words, the Storm Wreck could not have wrecked before 1780.



**Figure 233.** The right trunnion of the Storm Wreck carronade (11S-154.1), noting the caliber of the gun (“9 P” or 9-pounder) and the year of its casting, 1780. Inset is a drawing of the markings by Brian McNamara.

The case was gradually strengthened for the argument that the Storm Wreck was a member of the December 1782 Loyalist fleet to evacuate Charleston. During 2011, when airscribing the concretions from the ship's bell recovered the previous December, a pewter button was found that displayed a tiny crown (10S-64.2). Once subjected to electrolytic cleaning the letters "RP" were made clear under the crown, signifying it came from a Royal Provincial unit, and that its owner was without doubt a Loyalist (Figure 131). This was considered strong circumstantial evidence that the shipwreck had Loyalist origins.

Even more compelling evidence came when another military uniform button was identified, the pewter button (12S-258.1) from the 71st Regiment of Foot, a Scottish regiment known as Fraser's Highlanders (Figure 129, second row, second from the right). This was found in dredge spoil from the 2012 excavations, and it proved significant after a week-long archival research trip to the British National Archives in January 2013. Documents discovered in the archives confirmed that after the 71st Regiment was decimated at Yorktown, there were 189 men left who were evacuated from Charleston in December 1782, on the same fleet that lost 16 ships in St. Augustine later that month (BNA 1782:CO5/108,f.38) (Figure 59EA). LAMP archaeologists are confident that this button links the final evacuation of Charleston to the Storm Wreck and identifies the wreck beyond a reasonable doubt as one of the ships lost from this fleet.

This does not answer all of our questions, however. The 71st Regiment left Charleston for Jamaica in the 317 ton *Sally*, under the command of a Captain Bell. It was initially thought that perhaps the *Sally* was the identity of the Storm Wreck, and that she wrecked in St. Augustine instead of reaching her final destination in Jamaica. Further research disproved this scenario, however. Researchers were able to identify the *Sally* in question, captained by W. Bell, in Lloyd's of London insurance records, and that vessel clearly did not sink in 1782 because it was insured not only in that year but in subsequent years. Additionally, a newspaper account was discovered that confirmed the *Sally* did arrive safely in Port Royal, Jamaica, on 13 January 1783 (*Kingston Morning Post* 1783). So if the 71st Regiment was sent to Jamaica, which was confirmed by other documents found in the archives (cf. BNA 1782:CO/5/107,ff.281-282), why did at least one soldier end up in St. Augustine, on board the Storm vessel? It has been speculated that perhaps one or more soldiers were assigned guard duty on other ships, including one bound for St. Augustine, or perhaps a wounded soldier was deemed in such critical condition that he was sent on the shorter trip to St. Augustine. The aforementioned newspaper account does state that the *Sally* arrived in Jamaica with "part of the 71st Regiment on board," so it is plausible that some of the men in this Regiment, for some reason, were diverted to St. Augustine (*Kingston Morning Post* 1783).

The case was made even stronger after the 2013 field season, again primarily through the discovery of military buttons. Three more crowned "RP" buttons were discovered (13S-310.6a, 13S-310.6b, and 13S-345.2), strengthening the presence of Loyalist Royal Provincial soldiers on board. Even more convincing were three additional buttons not from generic units but from specific regiments. These were a button from the 63rd Regiment of Foot (12S-223.4; Figure 129, second row center), a button from a provincial regiment known as the 3rd American Volunteers, also known as the New York Volunteers (13S-310.7; Figure 129, bottom row far left), and a button from the 30th Regiment of Foot (13S-336.2; Figure 129, bottom row second from left) (McNamara 2016:210). All three of these regiments, like the 71st Regiment of Foot, were in Charleston and evacuated on the last fleet to depart, on 18 December 1782 (Figure 234).

Copy *List of Transports, appointed to receive the Garrison of Charles Town,* 38

Regiments or Corps	Strength	Ships Names	Tons	How distinguished
3 <sup>d</sup> Reg <sup>t</sup> or Buffs.	388	Trident	360	688 Red... Main topmast head
63 <sup>d</sup> ←	262	Dorothy & Catherine	328	White... Main topmast head
64 <sup>th</sup>	316	Nautilus	420	Red... Fore topmast head
71 <sup>st</sup> ←	189	Ocean	299	White... Fore topmast head
17 <sup>th</sup>	94	Colus	218	Red with white Fly... Main
	214	Sally (Bell)	317	White... Fore topmast head
		Peggy	360	Red with white Fly... Main

Regiments or Corps	Strength	Ships Names	Tons	How distinguished
New York Vol <sup>t</sup> ←	211	Kingston	338	Red with blue Fly... Main
King's A. Reg <sup>t</sup>	222	Commerce	355	Red with white Fly... Fore

*List of Ships bound to Saint Lucie, under Convoy of His Majesty's Ship Hornet*

		Tyger	230	Baggage & part of the 19 <sup>th</sup> & 30 <sup>th</sup> Reg <sup>t</sup>
X		Symetry	333	Black Pioneers

Figure 234. Detail views of a document entitled "List of Transports appointed to receive the Garrison of Charles Town," dated 19 November 1782 (BNA 1782:CO5/108,f.38-40). Compiled a month before the fleet departed, the document lists all of the ships, their tonnages, and what Army regiments, cargo, or number of civilian refugees and slaves were assigned to each vessel. The black arrows point to references to regiments whose uniform buttons have been found on the Storm Wreck. From top to bottom: the 63rd Regiment of Foot were scheduled to depart on the 420-ton *Nautilus* for New York, the 71st on the 317-ton *Sally* for Jamaica, the New York Volunteers (also known as the 3rd American Volunteers) on the 338-ton *Kingston* for New York, and the 30th Regiment of Foot on the 230-ton *Tyger* for St. Lucia. When this document was produced, the ships to evacuate soldiers and civilians to East Florida had not yet been assigned, so the names of those ships, including the original name of the Storm ship, are not included. Courtesy of the British National Archives.

Again, not all questions have been answered. Like the 71st Regiment, the 30th Regiment, the 63rd Regiment, and the 3rd American Volunteers were all intended to sail to destinations other than St. Augustine, either New York or islands in the Caribbean. Other documentary sources confirm their arrival at these destinations. Again, it can be speculated that perhaps some soldiers from these regiments were diverted to St. Augustine, due to injuries or expedience or for some other reason. It may also be that these buttons were from a store of extra uniforms, that might have been sorely needed in the backwater outpost of St. Augustine. Regardless of the circumstances, it is believed that these military buttons are the key pieces of evidence tying the Storm Wreck to the Charleston evacuation fleet, especially when considered with the larger body of evidence from the shipwreck assemblage. The high proportion of domestic items, including cookware, tableware, architectural hardware, and clothing irons, along with a wide array of personal possessions and a few military items such as the Brown Bess muskets, are what would be expected on an evacuation ship loaded with civilian refugees and at least some British troops. This is the only wartime refugee vessel to have been archaeologically excavated from the Revolutionary War period, and perhaps from any time period, and it promises to be very interesting and of great research value as analyses and investigations continue.

The following section summarizes the archival research that has taken place overseas to compile this evidence, and provides a detailed historical overview of Florida's Loyalist Influx, the evacuation of Charleston at the end of the Revolution, the convoy to East Florida, and the shipwrecks on the St. Augustine Bar. This was a very dynamic event in St. Augustine's history, when in just a few short years the city's population would skyrocket as thousands of Loyalists sought refuge from the war torn colonies to the north. It is an underappreciated period of our history that has been explored by few historians, and, informed by recent research in the British National Archives, it is included here to help set the story of the Storm Wreck into a more in-depth context.

### **Archival Research and the Historical Context of the 1782 Evacuation of Charleston and the Loss of the Storm Wreck<sup>1</sup>**

The association of the shipwreck with the evacuation of Loyalists from the southern colonies meant that there was a rich documentary record which could be used to supplement and better understand the archaeological data. The British, waging a war that spanned the globe, were experts in military logistics and recordkeeping (Syrett 1970). But, in large part because the victors write the history books, the paper trail was cold. Few American scholars have focused their research on the Loyalist experience (with notable exceptions including Siebert 1929; Wright 1971; Williams 1976; Troxler 1981; Lambert 2010; Smith 2011).

LAMP researchers therefore conducted a series of archival research trips to depositories in the United Kingdom (Meide 2013; McNamara 2014:27-30). The first of these was a five day period spent in the British National Archives (BNA) by Chuck Meide in January 2013. Around 900 pages of relevant documents were photographed at that time. These were primarily official correspondences pertaining to the military operations, evacuations, and Florida's Loyalist influx; they also included logbooks and muster rolls from naval escorts HMS *Belisarius* and the armed galley *Viper*. Other documents were related to the 71st Regiment, at that time the only specific British Army unit represented in the artifact assemblage (subsequently buttons from the 3rd American, 30th, and 63 regiments were recovered, as discussed above and in McNamara 2016). Among the most significant finds was a document titled "List of transports appointed to receive the Garrison of Charles Town" dated 19 November 1782 (BNA 1782:CO5/108,ff.38-41). This list, compiled before the evacuation, detailed the transports slated to

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<sup>1</sup> This section is an updated version of a paper presented at the 2016 Conference on Historical and Underwater Archaeology and published as Trivelpiece and Meide 2016.



<i>Destination</i>	<i>Number of Ships</i>	<i>Number of Tons</i>
Bound for New York {under the directions of Capt <sup>n</sup> Chads, Lieutenants Laughorn Carter & Shapcott, Agents, under Convoy of his Majesty's Ship Assurance, W <sup>m</sup> Sweeney Esquire Commander	48	15,406.
Bound for Jamaica, {under the directions of Lieut <sup>t</sup> Curling, Agent, and under Convoy of his Majesty's Emerald, William Knell Esquire, Commander	29	8,131.
Bound for St. Lucia, under Convoy of his Majesty's Ship Narcissus	5	1,363.
Bound for England {under the directions of Lieut <sup>t</sup> Arnold, Agent, and under Convoy of his Majesty's Ship Adamant	20	4,929.
Left at St. Augustine to sail for New York in the Spring.	7	1,230.
Bound for St. Augustine, under Convoy of his Majesty's Ship Belisarius	8	1,387.
Sailed for Halifax, under Convoy of his Majesty's Ship Perseverance, Nov <sup>r</sup> 1 <sup>st</sup> 1782	9	2,843.
Cartel for the Havannah	1	175
Taken Sep <sup>r</sup> 30 <sup>th</sup> 1782 off the Barr,	1	159.
Lost on the Barr,	1	135
<i>Total</i>	<i>129</i>	<i>35,758</i>

**Figure 235.** Detail from “Abstract of the distribution of Transports, Army & Navy Victuallers, and Oat Vessels, appointed to receive the Garrison at Charles Town, Stores, Inhabitants, etc., etc.” Dated 3 January 1783, some 16 days after the fleet set sail, this is a summary of the preceding pages, now missing, which would have listed details for all of the ships in the evacuation fleet grouped by destination, similar to the document in Figure 59EA. The fleet bound for St. Augustine (and also St. Johns) included eight ships registering a total of 1,387 tons (BNA 1783:CO5/108,f.76, courtesy of the British National Archives).

evacuate the city (Figure 59EA). It survived among the papers of the Commander-in-Chief of the British Army in New York, General Sir Guy Carleton. A corresponding document discovered was the “abstract,” or summary, of the ships that actually did sail with the fleet (BNA 1783:CO5/108,f.76). This latter document, dated 3 January 1783 (after the fleet sailed) gave the number and aggregate tonnage, but not the names or individual tonnages, of the ships that were sailing to St. Augustine and other destinations (Figure 235).

A second research trip was undertaken by Lillian Azevedo, who spent five days in the BNA and also the National Maritime Museum in January 2014. She discovered additional information on the evacuation fleet, including its sailing instructions, along with the log of HMS *Belisarius*’ lieutenant. Additional research was carried out by Loren Clark, who spent four days in the National Archives of Scotland in Edinburgh, also in January 2014, and found Carron Company records related to the Storm Wreck carronade. In September 2014 Clark also spent three days in the BNA, research that was coordinated by Brian McNamara (2014:29) for his master’s thesis. This resulted in the acquisition of all of the remaining escort vessels’ logs from the Charleston evacuation fleet. McNamara has conducted a study of these logs, resulting in a sophisticated understanding of the fleet’s movement and the weather patterns between Charleston and St. Augustine. He has also studied the 1782-1783 editions of Lloyd’s Register of Shipping, available online, successfully identifying most of the privately-owned transport vessels that sailed in the Charleston evacuation fleet (McNamara 2014:43-53,61-64).

The remainder of this section is a historical overview of Florida’s Loyalist Influx, the evacuation of Charleston, and the wrecking event that resulted in the loss of the Storm ship, informed by the research carried out in British archives.



### ***The Loyalist Influx of East Florida, 1775-1782***

As early as 1775 Loyalist refugees displaced by the American Revolution in Virginia sought haven in East Florida (Smith 2011:262). This followed a November 1775 proclamation issued by East Florida's Governor Patrick Tonyn offering asylum and land grants to loyal subjects displaced by the insurgence. Tonyn's declaration was distributed throughout the southern colonies, and rebel governments passed laws encouraging Loyalists to flee to St. Augustine (Williams 1976:465). As the war progressed, the numbers of Loyalist refugees arriving in East Florida skyrocketed, so that the white population of St. Augustine grew from its pre-war figure of 1,000 to over 4,500 by late June 1782 (Lambert 2010:187; Smith 2011:262,271).

After Yorktown, as decisive battles were replaced by hinterland skirmishes, treaty negotiations took precedence for the remainder of the war. Panicked Loyalists spread rumors that Britain was planning to abandon her colonies to the rebels. By March 1782 public notice was given in Savannah that an agent was available to meet "Refugees who are desirous of going to East Florida to settle there, agreeable to the encouragement contained in Governor Tonyn's proclamation" (Lambert 2010:178). Throughout the summer and fall of that year, the anxieties of southern Loyalists and the energies of British officials were dominated by the problems of evacuation.

The lack of available shipping necessitated separate evacuations for each major port. Savannah, seen as vulnerable to rebel attack, was first. On 11 July 1782, some 11,014 tons of shipping, representing all available military transports on the continent, were assembled to remove civilians, slaves, troops, and supplies from the city. Almost a fifth of the fleet, seven ships totaling 1,880 tons, were bound for St. Augustine with 485 white refugees, 748 slaves, provisions, and trade goods intended for Indians. The fleet lacked the capacity for these masses, so even after Lieutenant Governor John Graham chartered five additional ships, many evacuees had to make their way to St. Augustine on "canoes, boats, and such small craft" (BNA 1782:CO5/106,ff.166-169; Siebert 1929[1]:107; Syrett 1970:236-237). Siebert (1929[1]:105-106,109) estimates that some 5,148 souls—1,042 Loyalists, 1,956 slaves, 500 militiamen, 350 Indians, and 1,300 regular troops—arrived in St. Augustine by 18 July, doubling the white population of East Florida and increasing the black population by one fourth or more.

This opened the floodgates, heralding a demographic explosion in St. Augustine, which had beforehand been the smallest colonial capital in British North America. East Florida was the closest safe haven for southern Loyalists. Many from the Carolinas and Georgia, especially planters, preferred Florida to the Canadian colonies due to its geographical similarity, more suitable for the slave-based economy under which they had flourished (Smith 2011:279; Troxler 1981:21). It was also a relatively easy move, and many refugees likely saw East Florida as a potential opportunity to re-take possession of their lost properties should the war take a turn in their favor or if the fledgling republic collapsed, as many anticipated (Lambert 2010:186; Smith 2011:279; Wright 1971:377).

### ***The Evacuation of Charleston, Fall 1782***

Charleston was the next major port to be evacuated (Barnwell 1910). It was a much greater organizational challenge, believed to require three times as much shipping as was used in Savannah (BNA 1782:CO5/106,ff.166-169). By mid-August more than 4,200 Loyalists had registered for evacuation, including around 2,500 women and children and 7,200 slaves (Lambert 2010:182). Because of the sheer volume of humanity and requisite supplies, Charleston had to be evacuated in stages. Enough ships were gathered for the first evacuation fleet by the end of September, though it would not depart until the second week of October. Of those departing for East Florida was its new military commander, Lt. Colonel Archibald McArthur, along with a number of provincial regiments, and many Loyalist families, including some "substantial" merchants and planters. Rations sent to East Florida for

these refugees were sufficient for 1,000 whites and 2,000 slaves (Siebert 1929[2]:114,124,133-136; Lambert 2010:182).

A British officer in Charleston reported a particularly vivid eyewitness account of the tribulations of the beleaguered refugees:

To provide in some measure for these poor wretches, the commanders of the garrisons (though contrary to their orders) protracted the evacuations as long as they possibly could without offending the Ministry. Transports were procured, and several hundreds with their personal property went to St. Augustine, in Florida, the Governor of which granted each family a tract of land upon which they sat down and began the world anew. . . . There were old grey-headed men and women, husbands and wives with large families of little children, women with infants at their breasts, poor widows whose husbands had lost their lives in the service of their King and country, with half a dozen half-starved bantlings taggling at their skirts, taking leave of their friends. Here you saw people who had lived all their days in affluence (though not in luxury) leaving their real estates, their houses, stores, ships, and improvements, and hurrying on board the transports with what little household goods they had been able to save. In every street were to be seen men, women, and children wringing their hands, lamenting the situation of those who were about leaving the country, and the more dreadful situation of such who were either unable to leave or were determined, rather than run the risk of starving in distant lands, to throw themselves upon, and trust to, the mercy of their persecutors, their inveterate enemies, the rebels of America (Jones 1879[2]:235-236).

The next fleet to depart, comprised of nine ships, left for Halifax with troops, munitions, and about 500 refugees on 1 November (BNA 1783:CO5/108,f.76; Lambert 2010:183). Charleston's final evacuation fleet was assembled and laded by the middle of December. A total of 111 transports set sail from Charleston, the last crossing the bar on 18 December 1782 (BNA 1782:CO5/108,ff.38-41; BNA 1783:CO5/108,f.76; Lambert 2010:183). This considerable fleet had been separated into five squadrons, each bound for a different destination: 48 ships to New York with troops and supplies, 20 ships to England with officers, colonial officials, and some (probably wealthier) refugees, 5 ships bound for St. Lucia with 200 Black Pioneers (comprised of free blacks judged too "obnoxious" to stay behind without facing retribution), 29 ships to Jamaica with, 1,260 refugees (591 men, 291 women, and 378 children), and 2,613 slaves (a total of 3873 souls), and eight ships totaling 1,387 tons to St. Augustine with refugees and their possessions. Governor Tonym estimated that the St. Augustine convoy included 1,000 Loyalists and 1,500 slaves on board the convoy (BNA 1782:PRO30/55/57/6476:5).

The names and individual tonnages of the ships departing for East Florida, along with numbers of refugees, slaves, troops, and the nature and amount of cargo, remain unknown. The previously mentioned document "List of Transports" (BNA 1782:CO5/108,ff.38-41) dated 19 November 1782, a month before the fleet departed, makes no mention of a Florida-bound fleet. The "Abstract of the distribution of Transports" (BNA 1783:CO5/108,f.76) dated 3 January 1783, a fortnight after the fleet departed, does note the number and total tonnage of the Florida-bound ships escorted by HMS *Belisarius*, but the preceding pages of this abstract or summary, which would have listed these ships and their tonnages individually, appear to be missing from the BNA. As the Storm Wreck's artifact assemblage indicates it carried at least some troops in addition to civilian refugees, researchers believe that it was a hired military transport (as opposed to a civilian merchantman leaving Charleston under its own authority), and as such it would definitely have been listed by name in these missing pages.

There were actually many more ships evacuating Charleston for East Florida with the fleet. The St. Augustine squadron was escorted by the sixth-rate, 24-gun frigate HMS *Belisarius* and a number of smaller armed galleys including *Viper* and *Rattlesnake*. There was almost certainly an additional, unknown number of vessels owned and operated by civilians (i.e., not hired transports) taking advantage of the convoy to leave Charleston under its protection. Two examples from the documentary record support this hypothesis. *Belisarius*' captain's log noted 120 sail in the convoy headed south (the combined St. Augustine, Jamaica, and St. Lucia flotillas, with their naval escorts), suggesting that as many as 72 vessels in addition to those on "List of Transports" were sailing with the convoy (BNA 1782-1783:ADM52/2161 Book 3, 19 December 1782). The other evidence indicating more ships were bound for St. Augustine than the eight hired transports comes from two accounts of the wrecking, each independently noting that 16 ships from Charleston's final evacuation fleet wrecked at St. Augustine, double the number of Florida-bound ships arranged by the evacuation planners (Johnston 1901:210; Schoepf 1911:227-228).

### ***The Convoy to Florida***

McNamara (2014:48-53), in his analysis of the logs from eight naval escorts accompanying the combined south-bound squadrons, has reconstructed the events that took place between 14 December 1782, four days before the entire fleet departed Charleston, to 1 January 1783, believed to be the day after the wrecking event. As was usual practice, all three fleets—Florida, Jamaica, and St. Lucia—sailed together in one convoy as long as their courses lied together. Within 48 hours of departure, various escort vessels began to report problems common enough for naval vessels on convoy duty: a galley fell out of the position, a schooner had to be taken under tow, and a strange sail, likely a rebel privateer, was spotted and temporarily pursued. On 20 December, *Belisarius* took the galley *Viper* under tow back to its station, the 32-gun frigate HMS *Emerald* saw another possible privateer and gave brief chase, and HMS *Magicienne* (another 32-gun frigate) took the schooner *Polly* with an unshipped rudder under tow. The following day, the weather began to worsen, and another potential privateer was pursued, this time by the 44-gun HMS *Endymion* (McNamara 2014:48).

On 23 December, in rainy weather, *Belisarius* sighted St. Simons Island, Georgia, and *Endymion* gave chase to another strange sail. At 11 am that morning the convoy arrived off the St. Johns River bar (present-day Jacksonville, 55 km or 34 mi. north of the St. Augustine Inlet). In the afternoon, the Jamaica and St. Lucia squadrons parted company with the Florida fleet and sailed on to the Caribbean. *Belisarius*, the only frigate remaining, lingered off the St. Johns for seven days (McNamara 2014:51-52).

The St. Johns River, which offered safer access than the St. Augustine Inlet, was an important destination during the Loyalist Influx. A new and rapidly growing settlement, had sprung up near St. Johns Bluff on river, known as St. John's Town or simply St. John's (Siebert 1929[1]:117-188; Williams 1976:474; Lambert 1987:187). By this time the nascent town saw over 300 hastily-built frame houses, several stores and taverns and even a freemason's lodge. After first arriving, most refugees gathered at either St. John's or St. Augustine, until arrangements were made to secure property and agricultural tools (BNA 1782:PRO30/55/57/6476:5; Williams 1976:474).

It was not uncommon for incoming fleets to linger at the mouth of the St. Johns for a week or longer before continuing on to St. Augustine, despite the potentially dangerous exposed position between the Atlantic and the sandbar. That is what happened to refugee Elizabeth Johnston (1901:210) who was delayed a week there "waiting for a convoy round" before her ship's captain decided to risk the last leg of the voyage to St. Augustine without an escort. According to *Belisarius*' master's log, upon their arrival (23 December) the transports bound for St. Johns were ordered across the bar, but those bound

for St. Augustine, likely concerned about their exposed position (in terms of both weather and privateers), stood on for their final destination “without leave contrary to their instructions” (BNA 1782-1783:ADM52/2161 Book 4, 24 December 1782). On Christmas Day *Belisarius* busied itself laying buoys on the St. Johns Bar, and signalling for pilots for what remained of the convoy. Still at anchor two days later, a privateer attacked a vessel in the convoy, the brig *James*, but was driven off when a boatload of *Belisarius*’ crew came to its aid (BNA 1782-1783:ADM52/2161 Book 3, 27 December 1782). That same day, the schooner *Sally*, perhaps spooked by the privateer attack, “Weigh’d down for St. Augustine contrary to orders,” (BNA 1782-1783:ADM52/2161 Book 4, 27 December 1782).

After several days of trying to get pilots for the waiting vessels the *Belisarius* finally did so on 31 December. That afternoon *Belisarius*’ officers appear frustrated as they frequently order vessels to cross the St. Johns bar, while the captains of these vessels repeatedly refuse to do so even with pilots aboard. Sometime after 5 pm *Belasarius* and the ships that had long been waiting to depart for St. Augustine finally did so. They arrived off the St. Augustine bar at 8 am the following morning, New Year’s Day. The pilot boat *Kathy* arrived on 2 January and itself was driven on shore trying to cross the bar.

McNamara (2014:63), analyzing the logs of all the frigates spread across the region, speculates that Florida was affected by an offshore weather system known as a nor’easter between the dates of 31 December 1782 and 3 January 1783. Elizabeth Johnston (1901:210) seems to corroborate this hypothesis as she wrote on 3 January that the weather was “constantly wet or cloudy” without “a fair day” since her arrival several days earlier. While nor’easters may not seem alarmingly windy on land, they can have a great effect on the St. Augustine inlet, where incoming swells are intensified in the narrow channel and the sandbar is prone to shifting (McNamara 2014:63). These conditions would be even more dangerous for transports that were likely too large to comfortably navigate the inlet and unfamiliar with its idiosyncrasies. It is little wonder why some captains refused to comply with the *Belisarius*’ orders to cross the St. Johns bar.

Why would captains risk their vessels navigating the inlet in these conditions? It is clear that the officers of the *Belisarius*, who undoubtedly like any self-respecting Royal Navy frigate crew loathed convoy duties, were deliberately pressuring ships to cross the bar so they could complete their mission. But a greater pressure may have come from the fear of privateers. It is clear from the various frigates’ logs that the convoy’s wake was teeming with rebel privateers hoping to pluck an easy prize. The anxiety over privateer attacks implied by these accounts is underscored by the fact that two of the muskets on the Storm Wreck were found loaded and in the half cock position, ready to fire. Even in rough conditions, captains may have decided to risk crossing the bar before the weather worsened and trapped them in an even more vulnerable position.

### ***Shipwrecks on the St. Augustine Bar***

Exactly when did the multiple shipwrecks take place, and how many wrecks were there? While we are fortunate to have at least five documentary accounts of this shipwreck event, they are often contradictory. Only one account gives a specific date for the tragedy. This is noted in a letter (Figure 236) written in St. Augustine on 9 January 1783 by East Florida’s military commander, Lt. Colonel McArthur to General Carleton in New York:

I have the honor to inform Your Excellency that the fleet under convoy of the *Bellisarius*, with Refugees and Provisions, arrived off this Bar on the 31st Ult<sup>o</sup> but in coming over it, the Rattlesnake Galley and two Provision Vessels, with six others (private property) were

lost; the Eighteen pounder and Rigging of the Galley were saved, four lives from the private vessels were lost, the Cash arrived safe (BNA 1783:PRO30/55/60/6728:1).

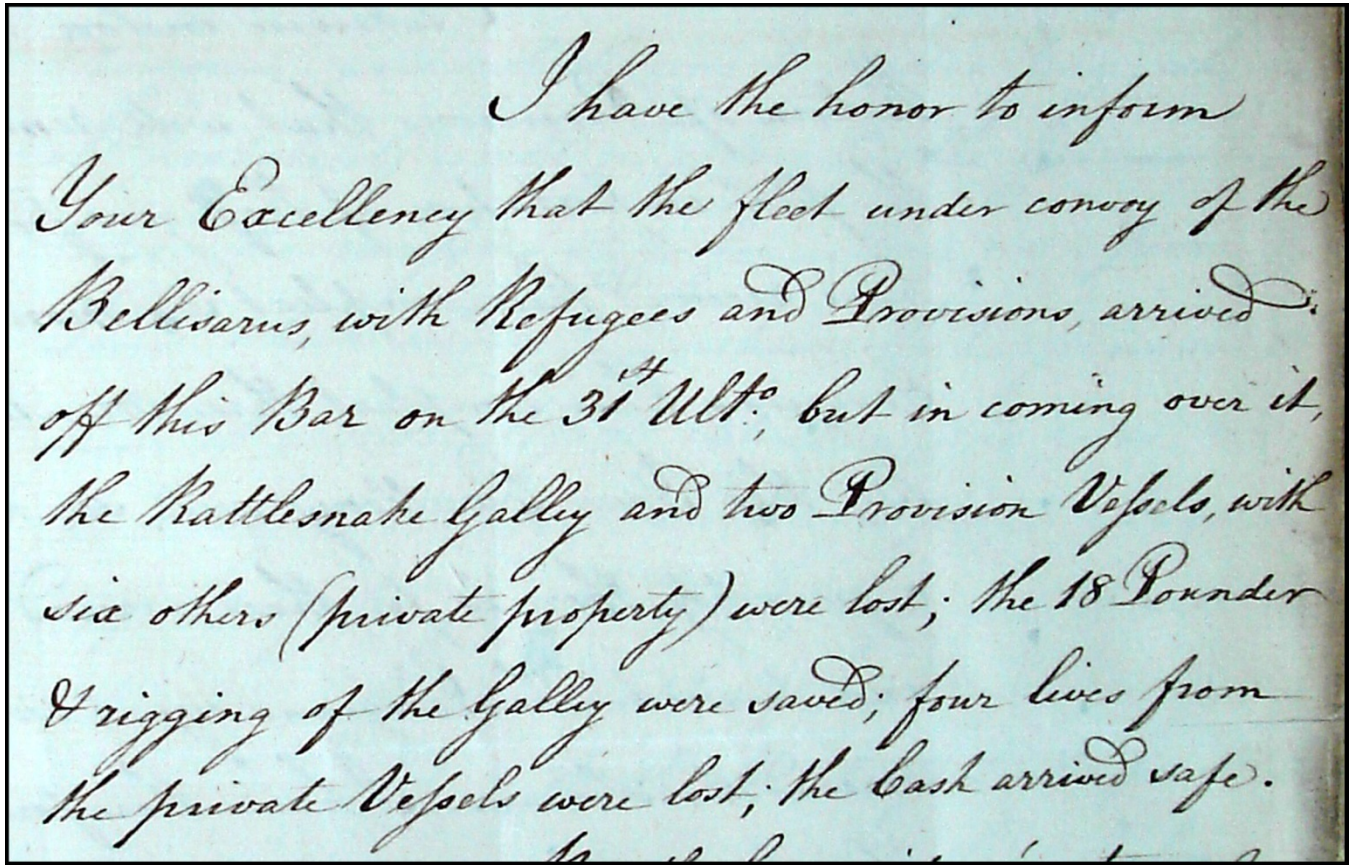


Figure 236. Detail from a letter from Lt. Colonel Archibald McArthur, commander of East Florida to General Sir Guy Carleton, Commander-in-Chief of the North American British forces. It was written on 9 January 1783, and reports the loss of the armed galley *Rattlesnake* along with two provision vessels and six privately-owned transports at St. Augustine on or around 31 December 1782 (BNA 1783:PRO30/55/60/6728:1, courtesy of the British National Archives).

This letter is the source of the 31 December date that researchers had long assumed corresponds to the Storm ship's loss (note the title of Meide 2015b). The logs of *Belisarius*, however, indicate it actually arrived off St. Augustine the following morning, so McArthur may have mistakenly provided the wrong date. There is also no way to know for sure if all of the ships were lost in one day, or if some or even all may have been lost before the arrival of *Belisarius* (which would explain why no such losses are recorded in its logbooks). The German military surgeon Johann Schoepf (1911:227-228), who visited the city about a year after the wreckings, wrote that "After the surrender of Charleston in 1782, within two days no less than 16 vessels, bearing refugees and their effects, went to pieces here and many persons lost their lives." It was not immediately clear if Schoepf meant the wrecking occurred two days after Charleston's surrender, or if he meant the wrecks occurred over a two day period, but the latter seems more likely. Schoepf's statement that there was great loss of life directly contradicts McArthur's tally of four dead, though the former may have exaggerated the story to make a more exciting memoir. Another contradiction between the two is the number of wrecks. McArthur reports that nine ships were

lost, compared to Schoepf's 16. Elizabeth Johnston's account, written within three days of *Belisarius*' arrival, confirms Schoepf's figure:

Out of the last fleet from Charleston there have been sixteen sail of small vessels lost on and about the Bar. There are six or eight high on the beach. One of these had the greatest part of Dr. Baron's property on board, and I much fear he will be a great sufferer. 'Tis amazing how such a place was ever settled (Johnston 1901:210).

Because these two sources corroborate each other, and there is no way either could have read the other's work (Johnston wrote hers before Schoepf did, but didn't publish hers until decades after his), it seems likely that 16 was the actual number of wrecks and that remembered by the local community. Why would McArthur's number differ? Probably he only felt the need to report the loss of military-owned and hired transports to his superiors, and omitted mention of the loss of additional civilian ships. There is also some question as to whether Johnston meant there were six or eight wrecks on the beach in addition to those lost on the bar, though it seems likely she refers to 16 wrecks in total. It is also significant that Johnston specifies that the 16 shipwrecks were from the last fleet to evacuate Charleston, which is the same fleet escorted by *Belisarius* referred to by McArthur. Her letter provides a *terminus ante quem* of 3 January 1783 for the shipwreck event.

A fourth account of the wrecking was found in a Philadelphia newspaper, *The Freeman's Journal*, dated 12 March 1783, only about 2.5 months after the wreckings. It states that "Ten sail of vessels and twelve lives were lost in a hard gale of wind proceeding over Augustine bar last December. They were part of the Charlestown fleet." This article has discrepancies in both the number of wrecks and the lives lost, which may simply represent errors of the type not uncommon in journalism of either the 18th or 21st centuries.

One final reference to shipwrecks from the *Belisarius* convoy has recently caused researchers to reevaluate their interpretation that the wrecking event took place on 31 December. In a letter (Figure 237) from Governor Tonyn to General Carleton dated 23 December 1782, Tonyn writes:

A thousand Loyalists and about fifteen hundred negroes are supposed to have arrived under the convoy of the *Belisarius*, the exact number I cannot as yet ascertain, General Leslie's information on that head will no doubt be particular. They are disembarked with the loss of some small craft owing to their rashness in venturing over the bar without sufficient guides (BNA 1782:PRO30/55/57/6476:5-6).

It is clear that Tonyn is referring to vessels from *Belisarius*' convoy lost while crossing a bar. It is also clear that Tonyn has not yet made contact with *Belisarius*, but has heard reports of its arrival, perhaps through the shipwreck survivors. His letter is dated 23 December, the same day *Belisarius* arrived at the St. Johns, and the day some ships in the convoy disregarded orders and continued sailing for St. Augustine. The earliest these ships could have left was noon, and they may have departed along with the Caribbean squadrons which left at 2 pm. If a group of these ships were impatient enough to ignore orders in order to get to St. Augustine, they probably would have sailed as rapidly as possible, to reduce the risk of capture by privateers. A small group of ships could make faster time than a large convoy, which were notoriously slow. It is plausible, then, that a group of ships could sail the 55 km (34 mi.) to St. Augustine and wreck while crossing the bar, with the survivors reporting the arrival of *Belisarius* at



observing the smallest  
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 particular, they are disembarked with the loss of  
 some small craft owing to their rashness in  
 venturing over the bar without sufficient guides.

Figure 237. Excerpt from a letter written by East Florida's Governor Patrick Tonyn, to General Carleton in New York. It was written the same day that the convoy under command of HMS *Belisarius* arrived off the St. Johns River, and it reports that some of its ships wrecked due to their "rashness in venturing over the bar without sufficient guides" (BNA 1782:PRO30/55/57/6476:5-6, courtesy of the British National Archives).

St. Johns, in time for the Governor to write a hasty letter noting both the wrecks and the arrival of the convoy, which he had not yet confirmed. The news of the convoy's arrival got to Tonyn very quickly, within 13 hours, and this scenario might explain how that was possible. Tonyn's description of the "rashness" of captains willing to cross the bar without pilots would also describe impatient captains willing to disobey orders to stay with the convoy. Bold action could get them to their destination in a matter of hours, or it could cost them their ships.

This hypothesis is a relatively new one that was first presented in Trivelpiece and Meide 2016. The fact that none of *Belisarius'* logs ever report any members of the convoy wrecking can be seen as evidence supporting the interpretation that these renegade transports were lost late on 23 December. Had any of the 16 shipwrecks happened under the frigate's watchful eye, then surely they would have been recorded in the log, as was the loss of the pilot boat *Kathy*. It seems plausible that some wrecks occurred on the 23rd, and others, up to 16 in all, may have taken place at any point from then until the arrival of *Belisarius* at 8 am on 1 January.

### ***Historical Context: Conclusion***

The American Revolution was a dynamic period in St. Augustine's history, when in just a few short years the city's population would skyrocket as thousands of Loyalists sought refuge from war-torn colonies to the north, many arriving destitute because of shipwreck. The Storm Wreck, as a wartime refugee vessel with a diverse range of well-preserved material culture, promises to give unique insights

into this largely forgotten but important episode of Florida history, and into the lives of Loyalists during a time of extraordinary crisis. Combining the archaeological record with an abundant and complex documentary record results in an even more powerful tool for understanding these past human experiences that encompass suffering and tragedy as well as perseverance and survival.

### **2013 Investigation of the Storm Wreck: Conclusion**

By the end of the 2013 season, after four summers of excavation, 33 square meters of the Storm Wreck site had been fully or partially excavated.<sup>2</sup> A total of 398 individual field specimen numbers were assigned to artifacts collected, many comprised of more than one object for an aggregate assemblage (including lead shot) that numbers in the thousands. In the years since 2013, not only has fieldwork continued (through 2015), but archaeological analysis and conservation efforts in the laboratory, along with archival research in depositories as far away as England and Scotland, have resulted in a massive amount of information which has led to an increasingly better understanding of this shipwreck and its historical context. The Storm Wreck has been confidently identified, if not by name then by fleet and function, and has been associated with a particular historical event, the mass evacuation of Loyalist refugees and British troops from Charleston in December 1782. In many ways this historical correlation is almost as valuable for research potential as identifying the ship by name, as there is a great body of archival evidence related to the evacuation that can be used in conjunction with archaeological data to paint a vivid and detailed picture of this ship, the kinds of people who were on it, and its role in history.

What do we know of the ship itself? It is fair to assume that it was a relatively small sailing vessel, since it wrecked while trying to enter the inlet and make safe harbor at St. Augustine. Analysis of port records from 1765-1766 in the early British period indicates that the great majority of vessels entering the harbor here were between 10 and 30 tons, the largest being 80 tons (Turner 2010a; Meide et al. 2010a:422). According to Schoepf (1911[1788]:227; see pp. 9-11 in this report), writing in 1784, the bar at St. Augustine was well-known and “unquestionably the most dangerous” in North America because of its shallow depths (only 4 to 4.5 ft/1.2 to 1.4 m at low tide and 8-9 ft/2.4 to 2.7 m at high tide) and exposure “to the total force of the ocean.” The channels leading into St. Augustine, he declared, “admit nothing but small and light vessels.” A captain of a large vessel would only attempt to enter the channel at St. Augustine if his ship was in immediate danger, as it was common knowledge that such a ship would almost certainly run aground, and be in danger of being dashed to pieces by the “wild tumult of these breaking seas” (Schoepf 1911[1788]:227). In the case of the Storm Wreck, there was an active threat from American rebel privateers (as noted in the historical context section above), which may have played a role in the large number of ships lost in a single incident. Corroborating archival evidence suggesting the Storm Wreck was a small vessel comes from the letter written on 3 January 1783 by Loyalist refugee Elizabeth Johnston to her husband, which notes that “of the last fleet from Charlestown there have been sixteen sail of small vessels lost on and about the Bar” (Johnston 1901:210). Physical evidence supporting the assumption that the Storm Wreck was a small sailing vessel comes in the form of a timber which appears to represent one of the ship’s frame members (Meide et al. 2011:154-155). While its identity as a frame is uncertain, if so its scantlings are quite diminutive, indicating it came from a small vessel, almost certainly under 100 tons and perhaps under 50.

It is believed the Storm ship was a merchant vessel, probably rigged as a sloop, schooner, or brigantine. The presence of an early carronade is an indicator that the ship was a merchantman, rather than a Royal Navy vessel, as carronades were popular on civilian vessels in the first few years of their manufacture,

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<sup>2</sup> At the time of this writing, after the close of the 2015 field season (the final major excavation season on this shipwreck), a total of 48 square meters has been excavated. Excavation at this site for the foreseeable future will be limited to the reburial of artifacts for *in situ* preservation.

before their widespread introduction on board naval vessels. The caliber of the carronade, a 9-pounder, also supports this assumption, as the 9-pounder carronade was never adopted by the Royal Navy and was known as a civilian piece (Caruana 1997:186). The light scantlings of the ship, as reflected by the probable frame timber, are also more suggestive of a merchant vessel than a naval one. While it is assumed the ship was privately owned, it is quite possible that it was operating as a hired transport for the British Army. The aforementioned letter (Figure 61EA) written by Lt. Colonel McArthur relates that five privately owned transports were wrecked in the event, in addition to the *Rattlesnake* galley, two provision vessels, and as many as ten other merchant ships that were apparently evacuating independently though under the de facto protection of the main fleet's naval escorts. The presence of troops on board (reflected by military hardware such as uniform buttons and muskets) may indicate the Storm Wreck was likely to have been operating as a hired transport.

Archaeological data has also lent insight into the circumstances of wrecking event, supporting the historical documentation that this ship ran aground while trying to enter the notorious inlet. This comes from evidence of a desperate attempt to save the ship in the moments immediately after it ran aground. The most notable example of this was the heavy deck pump, which bore obvious cut marks and whose plumbing was folded to facilitate moving (Meide et al. 2014:208-215). It is clear that this piece of equipment was hurriedly cut free from the ship using axes or cutlasses, so as to throw its heavy bulk overboard in an attempt to re-float the grounded vessel. The six cannon discovered nearby were positioned in a pattern suggesting that they too were jettisoned, and the ship's bell and two barrels of nails, all in that same location, were probably also thrown overboard for that purpose.

What will undoubtedly prove of most interest in the future years of study promised by this shipwreck is the rich assemblage of material culture. Hundreds of individual artifacts have been preserved, many in excellent condition. The artifactual signature of this shipwreck is what would be expected from a colonial period, wartime refugee vessel that was loaded with troops and evacuating civilian families, along with whatever household possessions they could manage to bring with them on short notice. Cooking pots, a gridiron, spoons, and plates all reflect the fundamental need for subsistence, an immediate requirement for survival in a new, unfamiliar, and uncertain environment. Clothing-related items were also prevalent, represented by buttons, pins, and buckles. The first thoughts in the minds of every evacuating household would be to secure shelter upon arrival, and to be able to feed and clothe their families. Items such as clothing irons, a tea kettle, and porcelain teawares speak to the need to maintain a sense of normalcy despite the desperate situation, an attempt to uphold family rituals such as regular tea time and to preserve standards of dress and personal appearance. Other household items, related to the basic needs for security and lighting, include the padlock and candlestick. Tools such as hammers, axes, and the possible baling hook reflect that many of these refugees were hoping to establish farmsteads in their new homes, and the door lock packaged with its key also speaks to the intent to rebuild homes and lives. Specialized tools such as the cobbler's hammer, upholsterer's hammer, and cooper's croze are a reminder that craftsmen as well as farmers were seeking to rebuild their livelihoods.

Against all odds, there is one other example of a member of the Charleston evacuation fleet that has been archaeologically excavated: the *General Carleton*, a Baltic trader that entered the government service in 1782 as a transport ship, and was coincidentally named after the same general responsible for organizing the evacuation (Ossowski 2008). She took American prisoners of war from England to New York in May 1782, and then may have participated in the evacuation of Savannah. She did participate in the evacuation of Charleston in December, as a member of the Jamaica squadron (Baines 2008:85)<sup>3</sup>.

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<sup>3</sup> Baines' research indicates *General Carleton* was a member of the Jamaica fleet, though she does not appear on the November 1782 "List of Transports" document (BNA 1782:CO 5/108:40), another example of inconsistency in the historical records.

After the war, she continued her earlier career plying the commodities trade—timber, tar, iron, etc.—in the Baltic Sea, before wrecking in Polish waters in 1785. The wreck was excavated by archaeologists from the Polish Maritime Museum from 1995-1999, producing a wealth of material culture, remarkably preserved by the cold waters of the Baltic. But unlike the Storm Wreck, this member of the Charleston evacuation fleet wrecked and was excavated years after her career as a military transport. The material culture preserved and recovered on this shipwreck represents the life on board and the economic systems represented by a Baltic trader. Most likely no trace of the lives of the Charleston evacuees endured in the remains of the *General Carleton* for archaeologists to find.

This is in direct contrast with the Storm Wreck. This ship was lost almost at the moment of salvation for these beleaguered passengers. It represents the hopes and dreams of refugees forced to leave their homes and former lives behind in an attempt to make new lives for themselves and their families in a different land. All of the possessions they could possibly manage to bring with them were on board when this ship came crashing to a halt on the notorious St. Augustine Bar. What could not be salvaged before the ship was torn to pieces by surf and storm, what was not washed or corroded away, what settled into the sand and was preserved for the following two and a third centuries, remains for archaeologists to scrutinize. The assemblage that has been amassed to date is truly unique and its continued study promises to lend insight into human behavior in the face of adversity. While at the time of this writing field research is largely over, continued artifact analysis and conservation, in conjunction with a new museum exhibit funded by the State of Florida's Division of Historical Resources, will bring this forgotten story to life not only for archaeologists but for the hundreds of thousands of visitors who frequent the St. Augustine Lighthouse & Museum each year.

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