HMS Tyger
"Wine Cannon Site"

The Plenum Series in Underwater Archaeology

Series Editor:
J. Barto Arnold III
Institute of Nautical Archaeology
Texas A&M University
College Station, Texas

Maritime Archaeology: A Reader of Substantive and Theoretical Contributions
Edited by Lawrence E. Babits and Hans Van Tilburg

The Persistence of Sail in the Age of Steam: Underwater Archaeological Evidence from the Dry Tortugas
Donna J. Souza

The Persistence of Sail in the Age of Steam

Underwater Archaeological Evidence from the Dry Tortugas

Donna J. Souza
Brown University
Providence, Rhode Island

Plenum Press • New York and London

2.3.2. Cultural Processes Impacting the Pulaski Site

Pulaski Reef is located in the northeast corner of the Dry Tortugas. A total of 21 wrecks or strandings have been documented in this area since 1839. Murphy and Jonsson (1993:165) suggest that the Pulaski Reef casualties appear to be larger vessels that were using the Rebecca Channel between the Marquesas Keys and the Dry Tortugas as a short-cut rather than sailing around the Tortugas.

An area that is as hazardous to ships as the Dry Tortugas is likely to have many wrecks and strandings occur over time within a relatively small area. In fact, there are areas within the Dry Tortugas that are especially dangerous and are what Throckmorton (1964) would call "ship-traps" (Conlin, 1994). The Pulaski Reef area ranks second in total number of documented wrecks and strandings in the Dry Tortugas. Loggerhead Reef, which has 55 documented events, ranks highest.

The Nine Cannon Site that was surveyed and mapped near Loggerhead Reef in August 1990 appears to have three shipwrecks superimposed on one another (Murphy, 1990). Preliminary results of the data analysis from the Nine Cannon Site indicate that there are two nineteenth century wrecks over an eighteenth century wreck. These conclusions are based on materials scattered throughout the site. The observation of two mutually exclusive categories of artifacts such as anchors, hawsepipes, standing rigging, and chainplates indicates two distinct wrecks (Murphy, 1990). The evidence for the eighteenth century wreck is the nine cannons from which the site takes its name. An argument may be made, however, that these cannons were being carried aboard one or both of the other ships wrecked at this site. While it is difficult to imagine why this might be the case, it cannot be discounted, since no other eighteenth century materials have been located at the site.

There exist hundreds of documented accounts of ships becoming stranded in the Dry Tortugas and subsequently refloated. Often the successful release of these ships was due to the off-loading of cargo and/or ballast in order to lighten the ship (Bearss, 1971). It is reasonable to assume that an area where a ship has become wrecked is also a likely place for a ship to become stranded (and vice versa). Whether the stranding becomes a wreck depends on the tides, winds, ingenuity of the crew, and luck. Off-loaded materials from these strandings could easily be superimposed on a wreck site or on debris from a previous stranding. Since guns were often the first items to go overboard when a ship became stranded, the cannons at the Nine Cannon Site could be materials that were off-loaded in a successful attempt to refloat a stranded ship. Probably the most famous instance of refloating a stranded ship by throwing guns overboard occurred when Cook's *Endeavour* struck the Barrier Reef on his first voyage.

Ships at anchor can also have an impact on underwater sites. Such impact is most likely to occur through the positioning or dragging of the anchor, or the

disposal of food remains and other waste materials. Of the 20 events that are documented to have occurred in the Pulaski Reef area, only 3 are known to have been wrecks. All other vessels were stranded and subsequently refloated. During the 1995 and 1996 field seasons a wide-area survey was conducted to determine the extent of the Pulaski Site and to identify additional materials that may be associated with it. No materials were found that could not be identified as being associated with the primary wreck site. As a result of this survey and intensive study of the materials at the Pulaski Site, it was determined that no materials from other events have impacted the site. Dives at other loci within Block 16 identified materials that were examined for the same purpose. Only materials at B016-025, B016-027, B016-029, and B016-030 were determined to be associated with the primary site area. Objects such as spearguns, tractor tires, and galvanized anchors located at other loci were determined to be unassociated.

Wrecks and strandings in the Dry Tortugas were so numerous during the nineteenth century that salvaging was a lucrative and reliable business. More than 70 of the documented shipwreck events in the Dry Tortugas involving wreckers occurred between 1829 and 1909. During those years, if a ship ran aground or otherwise came to grief, it is almost certain that a wrecker would have been close by in Tortugas harbor waiting to salvage the vessel, cargo, rigging, or whatever other materials could be saved.

During the 1995 and 1996 field seasons no ballast was located at the site, which may indicate that the wrecked ship was using ballast material such as sand, gravel, or water that is difficult or impossible to discern archaeologically. Another explanation is that the vessel was carrying a full load of cargo that also acted in ballasting the ship. No material identified as cargo was located at the site. Any cargo may have been perishable and would therefore have left no trace at the site. However, after rescuing the crew and passengers from a vessel in distress, the first order of business for the salvagers would have been to salvage as much of the cargo as had not been damaged by seawater.

Because of their high reuse value, anchors, chains, and rigging were highly coveted by the salvagers (often referred to as wreckers). In order to acquire an insurance rating, sailing vessels of more than 300 tons were required to carry a minimum of four anchors on board (American Lloyd's, 1877). These included two bower anchors, one stream anchor, and at least one kedge anchor. Bower anchors were hung from the bows of the ship; stream and kedge anchors were utility anchors generally used in positioning the ship when coming to anchor in a harbor or for hauling off if the vessel should run aground. Only two anchors were located at the Pulaski Site. One of these, an Admiralty-type anchor (Figure 2.9), appears to have been removed from its chain, as no chain is attached to the anchor's shackle. An anchor chain and shackle, but with no anchor, was found in direct association the windlass (Figure 2.12). It is possible the Admiralty anchor observed at the site was originally attached to this chain

to do so subsequently resulted in the ship becoming stranded a second time. During a second attempt to refloat it, the kedge anchor was deployed in an attempt to haul it off the reef. This attempt was obviously unsuccessful and the anchor represented by Feature 61 was probably set in an attempt to stabilize the vessel while the cargo and other materials were being salvaged (Lanzendorf, 1996).

According to the casualty report filed May 8, 1917, in Key West, the master of the vessel, John Lapatas of Spetzai, Greece, estimated the value of the vessel to be $25,000, but did not know the estimated value of the cargo of 750 tons of lumber. While he stated that he had been carrying a deck load he indicated that the vessel was not overloaded. At the time the report was filed, Captain Lapatas said that he was not sure if the vessel was insured, but thought that it was not. He was also unsure of the insurance status of the cargo. In stating the cause of the casualty he explained that the vessel had been leaking badly, became waterlogged, and then stranded. He elaborated that the *Maria Louisa* had started to leak on April 16 (only two days after having departed Pensacola) and encountered three days of strong easterly wind and then calms. The pumps were unable to keep the water down and the vessel became waterlogged. In the meantime, he claimed, everything possible was done to lighten the vessel including jettisoning part of the deck load. Initial assistance was rendered by the lighthouse tender *Ivy* which made two attempts to tow the *Maria Louisa*, but the hawser broke each time. After *Maria Louisa* became waterlogged it was unmanageable and the captain decided to make for the Dry Tortugas. After *Maria Louisa* grounded on April 27, Captain Lapatas stayed by the vessel until May 3. He then was able to make his way to Key West on the lighthouse tender *Ivy* (National Archives, 1917).

The casualty report shows that the *Maria Louisa* was operating under high-risk conditions. It was more than 33 years old, had undergone several extensive repairs, and its structural integrity failed during the voyage. In addition, *Maria Louisa*, of 436 gross tons, was carrying a cargo of 750 tons with a deck load that quite possibly made it top-heavy. Despite the master's claim that the vessel was not overloaded, the evidence provided in the casualty report indicates otherwise. It is unknown why the master did not sail into port when his vessel began leaking just two days out of Pensacola. Perhaps he was unable to do so because of the "strong easterly winds" (National Archives, 1917), but speculation is unnecessary. Once he realized the magnitude of the situation he was unwilling to commence on a transatlantic voyage in a leaking, waterlogged vessel; the Dry Tortugas offered a last chance to find terra firma.

4.3. THE IRON BALLAST SITE (B002-006)

The Iron Ballast Site is located at the north end of Loggerhead Key and has been identified as a late nineteenth or early twentieth century sailing ship (Murphy, 1993c:201). This site was dived during the 1996 field season and some

of the features were recorded in detail to compare with the materials located at the Pulaski Site. The features located at the site include an iron anchor, a windlass chain, three sizes of iron ballast, and a well-preserved manually operated cargo winch (Figure 4.4). The barrel and spur wheel of the cargo winch are still visible, as are the gypsy warping hubs.

The overall length of the winch is 5 feet, 1 inch. One of the warping hubs is 10 inches long and has a diameter of 11 inches. The other is slightly smaller, being 9 inches long and 9 inches in diameter. It was not unusual for warping hubs to be different sizes in order to accommodate different sizes of wire or hemp rope. The pawl rim is 4.5 inches thick and has a diameter of 2 feet, 3 inches. This type of winch was in common use throughout the nineteenth century.

No steam-related components were located at the Iron Ballast Site. Earlier work on this site by the Submerged Cultural Resources Unit helped to determined that the materials represent those of a late nineteenth or early twentieth century sailing vessel. Nothing else is known about the vessel that wrecked at this site. The materials do illustrate, however, that manually operated machines continued to be used throughout this time period.

4.4. THE NINE CANNON SITE

The Nine Cannon Site was surveyed and mapped by the Submerged Cultural Resources Unit of the National Park Service in August 1990 (Figure 4.5). This site

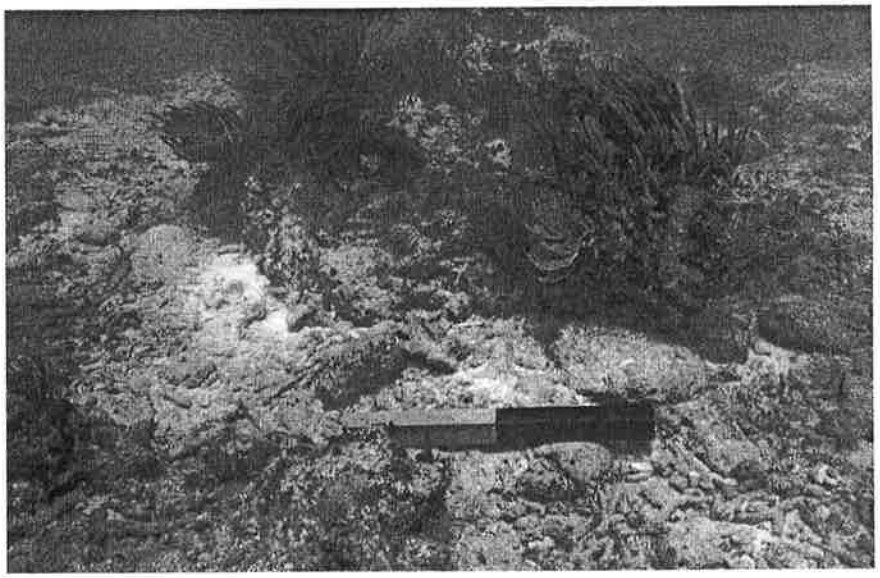

Figure 4.4. The manually operated winch from the Iron Ballast Site.

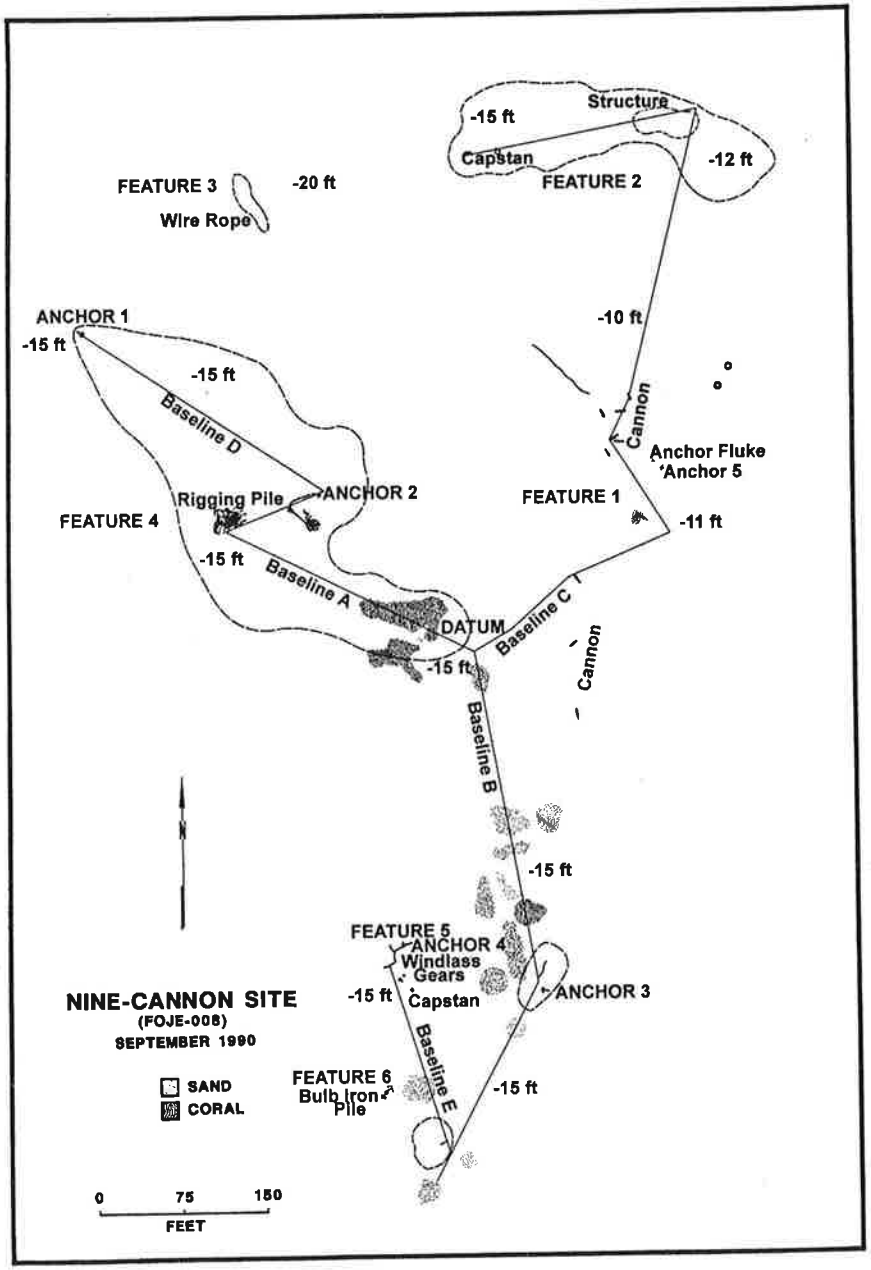

Figure 4.5. The Nine-Cannon Site. Reprinted from Murphy (1993). Map by Jim Bradford.

was dived during the 1996 field season, and several features were measured and recorded in detail in order to compare to various components located at the Pulaski Site. The Nine Cannon Site is located approximately 180 meters inside the 18-foot contour on the southwest side of Loggerhead Reef and includes material widely scattered over an area of more than 550,000 square meters. The depth of the site ranges from 11 to 15 feet. Preliminary results of the analysis indicate that there are two nineteenth century wrecks over an eighteenth century wreck. These conclusions are based on materials scattered throughout the site. The observation of two mutually exclusive categories of artifacts such as anchors, hawsepipes, standing rigging, and chainplates indicates two distinct wrecks (Murphy, 1993a). The evidence for the eighteenth century wreck are the nine cannons from which the site takes its name.

Five major feature areas comprise the Nine Cannon Site. Only three of these, Feature 2, Feature 4, and Feature 5, are relevant to the research at the Pulaski Site. It has been determined that Feature 2 is an American-built merchant sailing vessel of the middle to late nineteenth century. It is estimated that the vessel was approximately 600 tons in size. Because of the small amount of ballast located at the site, it has been determined that the vessel was most likely carrying a full cargo of heavy materials that were salvaged or have deteriorated. Feature 4 consists of material associated with two undeployed anchors and a wire-rope rigging pile 6.7 meters in diameter and two undeployed anchors. Feature 5 is representative of a separate wreck event and consists of stud-link chain, an anchor, a hawsepipe with stud-link chain inside, wooden structure beneath a small anchor with its shank raised about 30 to 40 degrees above the seabed, a set of iron gears, and a small capstan (Murphy, 1993a:289).

4.4.1. Feature 2 of the Nine Cannon Site

The Feature 2 area of the Nine Cannon Site is composed of a wooden hull-bottom portion, ballast, steam fittings, ground tackle, iron rigging, structural elements, and deck furniture, representing a shipwreck that broke up in a relatively discrete area (Murphy, 1993a). Figure 4.6 illustrates approximately 4000 square meters of mapped seabed.

The most prominent features contained within Feature 2 are the stud-link chain and a capstan that is 4 feet in diameter. There is approximately 140 feet of stud-link chain in close association with the capstan; the chain is not wrapped around the capstan. Components of a steam-operated windlass are also located at the site. No anchors were located in direct association with Feature 2, but two anchors were located nearby. These are discussed in conjunction with Feature 4 below. Several components of steam machinery were observed in Feature 2. These include sections of a 6-inch-diameter pipe and a small steam engine used to power deck machinery, a machinery mount base-plate, wheels, and shafts.

Figure 4.6. Feature 2 area of the Nine-Cannon Site. Reprinted from Murphy (1993). Map by Larry Nordby and Jim Bradford.

These components are diagnostic to the last quarter of the nineteenth century (Murphy, 1993a).

4.4.2. Feature 4 of the Nine Cannon Site

In addition to the wire-rope rigging pile recorded in 1989 by Larry E. Murphy of the Submerged Cultural Resources Unit and Richard A. Gould of Brown University, Feature 4 consists of lengths of chain, iron bars, numerous hull fasteners, mast caps, and other material that is indicative of a primary wreck site rather than a secondary deposition. Two anchors in close association with the rigging pile were located at the site and were determined to not have been deployed (Murphy, 1993a). No indication of cargo was located at the site.

Anchor number 1 is located at the end of Baseline B (Figure 4.5). This anchor is 9 feet, 5 inches in length, with arms 7 feet, 4 inches wide. It has a collapsible iron stock, an innovation first patented in 1860 (Campbell, 1974:49). No anchor chain cable was located in association with this anchor. Anchor number 1 was calculated to weigh 9.7 ctw., or 1075 pounds. If this anchor was onboard as a bower, it would indicate a vessel of approximately 200 tons. If this was a stream anchor, it would be appropriate for a vessel of 700 tons. This anchor was found unrigged; Murphy (1993a) speculates that it was most likely stowed below decks and represents a stream anchor.

Anchor number 2 lies directly northeast of the ballast pile. This anchor is 10 feet, 1 inch in length and weighs 12 cwt., or 1320 pounds. A length of anchor chain with a diameter of 1.5 inches was found in direct association with the anchor. According to the figures in Table 3.3, a bower anchor of this size would be appropriate for a vessel of approximately 300 tons. If anchor number 2 is a stream anchor, the vessel would be approximately 1100 tons. The diameter of the chain, however, indicates a vessel of 600 tons. When the 1.5-inch-diameter of the chain is adjusted to account for expansion due to exposure to seawater, a true diameter of 1 7/16 inches is estimated, indicating a vessel of approximately 500 tons. Taking into consideration the sizes of the two anchors, it is likely that anchor number 1 represents a stream anchor and anchor number 2 represents one of the bower anchors of a vessel of approximately 300 tons. While the diameter of the chain appears to be much larger than is required for an anchor of the size of anchor number 2, it should be kept in mind that the figures appearing in contemporary tables indicate minimum sizes only.

4.4.3. Feature 5 of the Nine Cannon Site

Feature 5 is located in the southern part of the site area (Figure 4.4). Materials located here consist of stud-link chain, two anchors, wooden structure, iron gears, and a small capstan. One anchor is 8 feet, 6 inches long and weighs 7 ctw., or 770

pounds. The other anchor, located directly to the east of Feature 5, is similar in size and weight and is 8 feet, 10 inches long, and 7.8 ctw., or 858 pounds. This anchor is considered part of Feature 5 due to the similarity of the anchor design and stud-link chain in association (Murphy, 1993a). These anchors, if stream anchors, indicate a vessel of approximately 550 tons. If these anchors are kedges, they would be appropriate for a vessel of 1600 tons. These anchors are both too small to have been used as bowers. Since a vessel only requires one stream anchor and one kedge, it is most likely that these two anchors are from different vessels.

The gears present in Feature 5 represent the windlass pawl rims and purchase rims. The wooden carrick-bitts, cheeks, and standard-knees have deteriorated. The pawl rim is 2 feet in diameter with an inside diameter of 1 foot, 8 inches. The purchase rims have an outside diameter of 2 feet, 3 inches and an inside diameter of 1 foot, 6 inches (Murphy, 1993a). Research on the gear wheels confirms that they are part of a wooden, manually operated windlass.

4.4.4. Summary of the Nine Cannon Site

The Nine Cannon Site is a complicated site consisting of at least three, possibly four, sites spread out over a wide area. The materials located at the features discussed in this section provide evidence of a full range of technological adaptations in contemporary deck machinery that include both manually operated and steam-operated windlasses and capstans. The undeployed anchors are indicative of the sudden and unexpected nature of the wreck events.

An important anomaly was observed in Feature 4. According to historical sources (see Table 3.2), the chain associated with Feature 4 is much larger than is required for the size of the vessel with which it is associated. This same anomaly was observed on the Pulaski Site. It is also significant that not only are the anchor chains on both sites larger than are required, but the differences between the size of the vessel and the anchor chain on the two sites are proportionally the same. This observation, made on two wooden merchant sailing vessels of the late nineteenth century, could indicate that vessels of this type and time period routinely carried anchor chains with a diameter significantly larger than was required and that the larger than necessary chain functioned in some manner beneficial enough to offset any disadvantage of carrying extra weight. While two examples are too few to draw any conclusions, the evidence suggests that more sites of late nineteenth century merchant sailing vessels should be examined for this anomaly.

4.5. B013-030

This site, located southwest of Bird Key, was discovered during the survey conducted by the Submerged Cultural Resources Unit and has not yet been

recorded in detail. A variety of materials of interest to the Pulaski Site findings were described, however, by Navy divers during the ground-truthing portion of the System-wide Archaeological Inventory Program survey. These materials include a large windlass, mast caps, a capstan, chainplates, numerous fasteners, and some wooden structure. Elements of standing rigging, including wire rope, a shroud block, and head gear such as turnbuckles, a spider band, and a martingale stay were observed (System-wide Archaeological Inventory Program, 1993). During the 1996 field season this site was dived and several details were recorded. No evidence of steam-related components was located.

The windlass (Figure 4.7) is well articulated with a connecting drive shaft that worked in conjunction with a capstan that is located in close association. The overall length of the windlass is 7 feet. It has two wildcat hubs, one on each end of the windlass. Each hub is 1 foot, 2 inches wide with a diameter of 2 feet, 5 inches.

The capstan (Figure 4.8) is 2 feet, 3 inches high. The crown is missing, but the top of the capstan has a diameter of 1 foot, 6 inches. The diameter of the base is 1 foot, 8 inches. There are three pawls, each 8 inches long, visible on the base of the capstan. The capstan deck mount, or pawl rim, is located nearby. This component has an inside diameter of 1 foot, 8.0 inches and an outside diameter of 2 feet, 2 inches. Four spokes that radiate out from the center can be seen on

Figure 4.7. The windlass from B013-030.