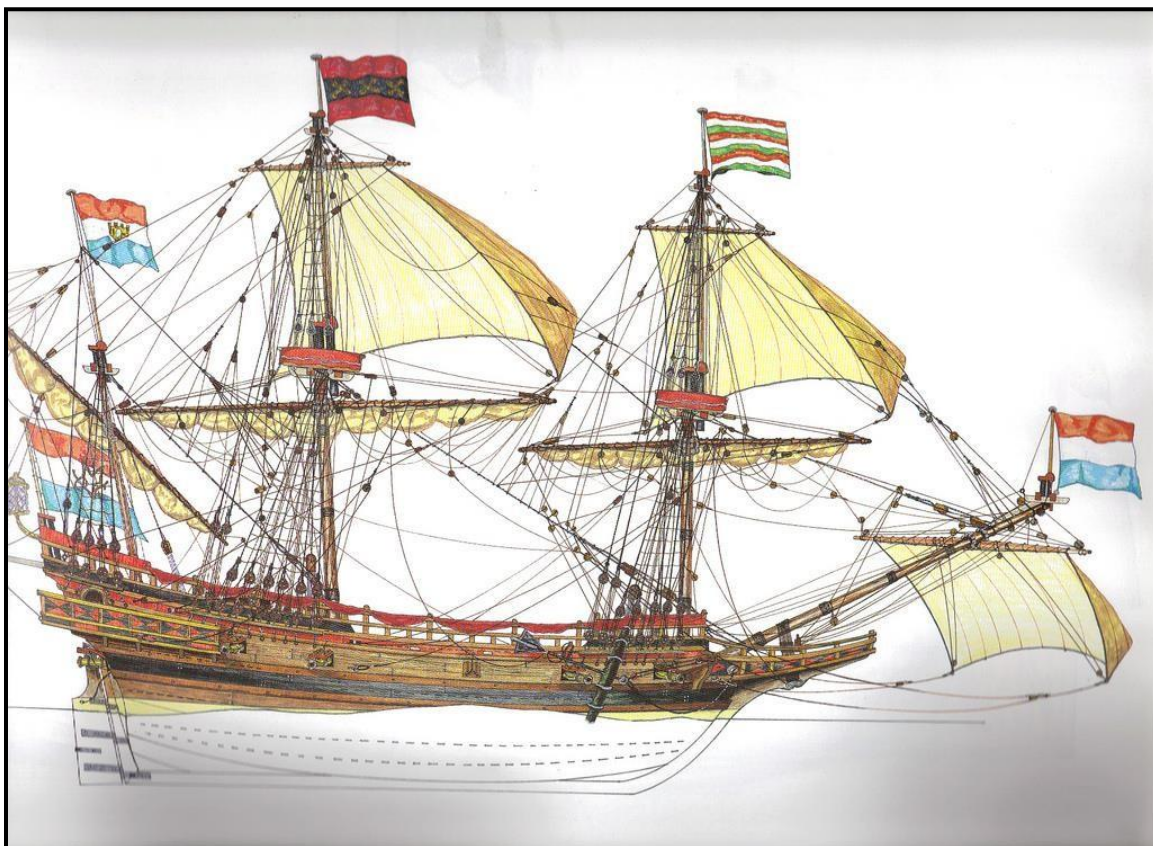


**Preliminary Report on the Phase I Pre-Disturbance Survey of the  
Morgan's Island Wreck Site,  
Somerset Bermuda, May 2017**

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## **Abstract:**

Early Bermuda Governor Nathaniel Butler commented in 1622, that one of the previous governors may have been involved in a nefarious plot with west end islanders to capture a Dutch privateer, and use the vessel and its crew for their own purposes. Three hundred and ninety-eight years later archaeologists have recovered scientific evidence that may corroborate this deed.

This report outlines the findings of the historical-archaeology study of a site located at Morgan's Island, Bermuda. The project was conducted by East Carolina University's Program in Maritime Studies in partnership with the National Museum of Bermuda and funded by a Research Initiation Grant from ECU's Thomas Harriot College of Arts and Sciences. The field portion of the archaeological survey took place in May 2017. During the project, numerous exposed scantling timbers in the shallow water near Morgan's Island were thoroughly mapped and documented (Figure 1). Far from a routine survey, the research uncovered a fascinating story seemingly straight out of a movie script.

Archaeological investigation of the Morgan's Island Wreck revealed a site that appears to represent a single disarticulated wooden ship. Construction techniques and building material indicate that the Morgan's Island vessel was likely constructed in the unique Dutch bottom-based tradition of the early 17<sup>th</sup> century. When theoretically recombined, the parts suggest that the remains are likely those of a Dutch pinnace, a class of warship that could carry cargo but was designed to protect Dutch convoys composed of lightly built and armed merchant vessels. The pinnace was a favorite of both pirates and privateers throughout the 17<sup>th</sup> century. Archaeologically speaking, the vessel's totally disarticulated nature and multitude of visible chop and pry marks suggest it was hand salvaged for hardware and lumber. It appears to have been literally torn to pieces via human intervention, not a storm process. However, without historical sources to corroborate this analysis, this is as far as archaeological interpretation can take us.

Fortunately, the unique and very unusual nature of the site and its location at Morgan's Island may point to one historical episode documented in the early records pertaining to Bermudian colonization. As mentioned, reports of Bermuda Governor Nathaniel Butler reveal that the Morgan's Island site could represent a hijacked Dutch pirate vessel that arrived in Bermuda from the Caribbean in 1619. In his written accounts Governor Butler clearly doubts islanders' assertions of the event, when they stated that although the crew was "rescued," the vessel itself was lost in a storm on the west reef, "without any efforts made by the islanders to save it". But the west reef is 20 miles from the capitol of St. George's, so the story was not easily verified. Today, cold case archaeological evidence may support Butler's suspicions. It appears quite probable that at Morgan's Island, Bermudian locals managed to "out- pirate" a pirate vessel, while fooling their own government into believing the vessel was wrecked in a storm.



**Figure 1.** An aerial view of the wreck site at Morgan's Island. While it is difficult to confirm due to the disarticulation of the wreck, the stern appears to be to the left in the photo (identified by the rudder) and the articulated bow section is out of the photo to the right.

## **I. Introduction:**

In 2008, I introduced students of the annual ECU maritime archaeological field school crew to Morgan's Island, which is in Ely's Harbor on the western end of Bermuda. Although the main objective of the field school was to document the iron hulled Black Bay wrecks, I decided to include students in the preliminary observation of some wreckage glimpsed a few years previous. What struck me in my previous visit to Morgan's Island was the fact that the scantling timbers, which were strewn over a large but relatively discrete area, appeared to be in pristine condition even though the shapes of many of the components appeared to be from a very old shipwreck. As I looked closer at the site I noticed diagnostic scantlings such as buttressed mast steps and a carved cathead, both of which are indicative of 16<sup>th</sup> and 17<sup>th</sup> century ship construction techniques. Despite the apparent age of the timbers, I will forever remember thinking as I scanned the wreckage that it looked as though somebody has managed to construct an early vessel out of practically new lumber! I also remember wondering how such an ancient site remained seemingly undisturbed and well preserved in such a shallow, exposed, and visible area.

I have learned over my decades in archaeology, however, if something looks obvious – it generally is just what it looks like! There is no need to overthink observations and data, perhaps to rationalize why you should NOT be seeing what you are seeing. This site, however, remained a quandary for quite some time. It took years to finally believe this site was exactly what it appeared to be, and longer still to fund and organize another, more detailed scientific look.

In describing to my colleague Dr. Jason Raupp that I believed an early wreck existed in Ely's Harbor he simply said, "what are we waiting for?" Again, this is that sort of obvious advice that sometimes is lost in our all too busy workaday world, especially when you have been working long enough to develop a large backlog of projects and wish lists. But Dr. Raupp's simple question was a dash of cold water; it was indeed time to go back to Bermuda to renew some old friendships and satisfy a deep-seated curiosity about the Morgan's Island Wreck site.

Funding for the project was generously supplied by a Research Initiation Grant from ECU's Thomas Harriot College of Arts and Sciences, as well as smaller funds provided through the ECU Department of History's Brewster Award. The National Museum of Bermuda (NMB) was represented ably and as always by Dr. Edward Harris and Ms. Elena Strong, who also generously agreed to host the project and become full partners with the Program in Maritime Studies (PMS) in the research. The NMB provided accommodation, laboratory space, working funds, and the assistance of archaeologist and Assistant Curator Dr. Deborah Atwood. The staff of NMB were also able to allow egress to the site and logistical support, as well as some economic support when it was clear that the project was truly operating on a shoe string.

This report, therefore, outlines our hypotheses, methodology, and the initial findings of the pre-disturbance archaeological study of the Morgan's Island Wreck site. It should be remembered that although much information was gleaned from this first survey (May 2017), additional field and archival research are needed in the years to come to confirm the identity of the Morgan's Island wreck site and to expand our knowledge of it. We have literally only begun to scratch the surface of this significant archaeological site.

What is clear now is that Morgan's Island is a very important ancient shipwreck find which dates to the little understood time-period between the 16<sup>th</sup> and 17<sup>th</sup> century. Continued research into this shipwreck could well verify it as the earliest Dutch wreck in the Americas, the earliest colonial-built ship in the Americas, and the earliest privateer/pirate vessel yet located in the Americas. This may also become the first comprehensive historical and archaeological study of a pirate/privateer salvage site conducted within the overall context of early colonialism. Diagnostics from this vessel and its history will increase our understanding of early colonial period economics, salvage, piracy, privateering, and wrecking which would demonstrate the practical side of trade and technology, and add to our knowledge of colonial island life in the 17<sup>th</sup> century. The story of this vessel could well bring to light a very personal side of early colonialism and offers a tremendous chance to combine archival research, archaeology, and public history in one tremendous resource.

## **II. Historical Background**

It is not the intent here to rewrite the entire history of Bermuda from discovery to settlement, but rather to highlight those historic activities and episodes that seem to correspond with data presented in the archaeological record near Morgan's Island. It should be noted, however, that the early history of Bermuda is intrinsically linked to navigation of the Atlantic Ocean. Pilots in the Age of Sail knew well that sighting Bermuda some 700 miles east of North America signaled the need to turn east out of the Gulf Stream, and on to the Azores and then to Europe (Quinn 1989:4). Although the islands of Bermuda were discovered by Spanish navigator Juan de Bermudez in 1505, they remained uninhabited until the 17<sup>th</sup> century (Barreiro-Meiro 2002). Prior to settlement the only encounters with Bermuda resulted from episodes of exploration or shipwreck, where crews were forced to survive on the island until they could repair damaged ships, build vessels from wreckage, or signal other ships for help. The remains of pre-habitation wreck sites still exist in Bermuda's waters and present puzzles that can only be deciphered by combining archaeological and rather spotty historical research gleaned from various national archives.

Though Spanish colonization of the islands was proposed in 1527, there is no evidence to support any serious attempt at doing so (Lefroy 1877:xlvi). But the islands are known to have hosted both pirates and privateers during the 16<sup>th</sup> century. Furthermore, numerous charts and maps indicate that Spanish, French, Dutch and English navigators were familiar with Bermuda as a strategic constriction

point in Atlantic shipping. Early in the 17<sup>th</sup> century the question of colonization was finally forced on the English by the wreck of the Virginia Colony supply ship *Sea Venture* (Quinn 1989).

Perhaps the reason why Bermuda was not colonized sooner was the dire reputation it carried – from the early 1500s Spanish mariners referred to Bermuda as the Island of Devils (Hallett 2007:30). This is hardly surprising as navigators had no way to plot longitude until late in the 18<sup>th</sup> century. Thus, finding the island on a moonless night or in bad weather would have been risky, as an unexpected rendezvous with reefs that extend out for several miles in places often spelled disaster. Limited sources of food or water, as well as intense underbrush, were additional factors that made survival difficult, at least until hogs were introduced to the island (on purpose or by accident) sometime in the 16<sup>th</sup> century (Quinn 1989).

Surrounded by a huge outer reef system, Bermuda hosted many calamitous shipwrecks in both the 16<sup>th</sup> and 17<sup>th</sup> century. It is likely that many wrecking events went unrecorded because there may not have been any witnesses on the island at the time or because 16<sup>th</sup> century shipwreck survivors often could not write even if they were rescued. Spanish historian Gonzalo de Oviedo recorded the first accounts of shipwrecked survivors in the 16<sup>th</sup> century when he interviewed sailors that had rescued themselves from the Bermuda reefs by building vessels out of shipwreck parts (Oviedo 1851). So naturally historians often rely on second hand source accounts of wrecking activity (Quinn 1989:4).

Since archaeological data from the Morgan's Island site suggests an association with a late 16<sup>th</sup> or early 17<sup>th</sup> century Dutch vessel, the reports of Bermuda's fifth governor Nathaniel Butler may be most pertinent to this study. Butler wrote a history of the islands in 1622 that covered the first decade of the colonization period (Hallett 2007). Among the important and valuable information contained within his volume is the description of an event that perhaps most closely dovetails with the archaeological data so far revealed at Morgan's Island.

In 1619, Governor Butler related that a “handsome pinnace” with a mostly Dutch crew was reportedly stranded on the rocks of the West Reef. Thought to be a privateer/pirate vessel operating out of the Caribbean, the pinnace approached Bermuda in search of supplies because the few English sailors onboard convinced the rest of the crew that they would receive fair treatment in the English colony (Hallett 2007, 118). The ship and crew arrived, however, without a pilot familiar with the Bermuda reef system and before they could react their ship sailed “among the outlying rocks” on the reef (Hallett 2007:118). It should be noted that privateers and pirates were virtually indistinguishable in the 17<sup>th</sup> century, as both carried crews that worked for the spoils taken from captured ships. Privateers, however, carried letters of marque from various governments who were at war to legalize their activities. It can be imagined, however, that most pirates and privateers carried letters of marque (legal or not), and used them as the situation dictated. As it took months to relay news of war declarations or endings, there could be no real

control over the activities of these vessels and the differences between piracy and privateering probably depended more on timing and circumstance than anything else.

The crew of the pinnace described by Butler was “rescued” by Bermudians who flocked to the stranded ship in small boats. Oddly enough, however, “no real attempt was made to salvage the ship” and the vessel reportedly disappeared with the next storm (Hallett 2007:118). Butler’s text clearly states that he did not believe the explanation given by then governor (and his predecessor) Governor Miles Kendall. Instead he noted that the islanders may have worked in league with Governor Kendall and deliberately allowed the ship to wreck so that it could be salvaged and any booty hidden within it be recovered for personal gain (Hallett 2007:118). The Dutch crewmembers were sent to St. George’s where they reportedly lived for about a year before being shipped first to England and then home (Hallett 2007). It is possible that Dutch shipbuilder Jacob Jacobson may have been a member of the crew, as colonial records indicate that he was among the crew of a vessel wrecked at Bermuda in 1619. He is considered to have been involved in the development of the famous Bermuda rig, which is thought to be based on Dutch rigging designs.

Though the exact size of the crew is not stated, a large complement (20 or more) would have been needed to operate a pinnace. And since the crew were forced to work in the fields and on various projects (including boat building), the additional labor they provided was no doubt another boon to not only the islanders, but also the governor, who reportedly hired them out for his own profit (Hallett 2007:201-205). So not only was their ship taken, but the privateer/pirate crew endured a year of hard labor at the behest of their “rescuers.”

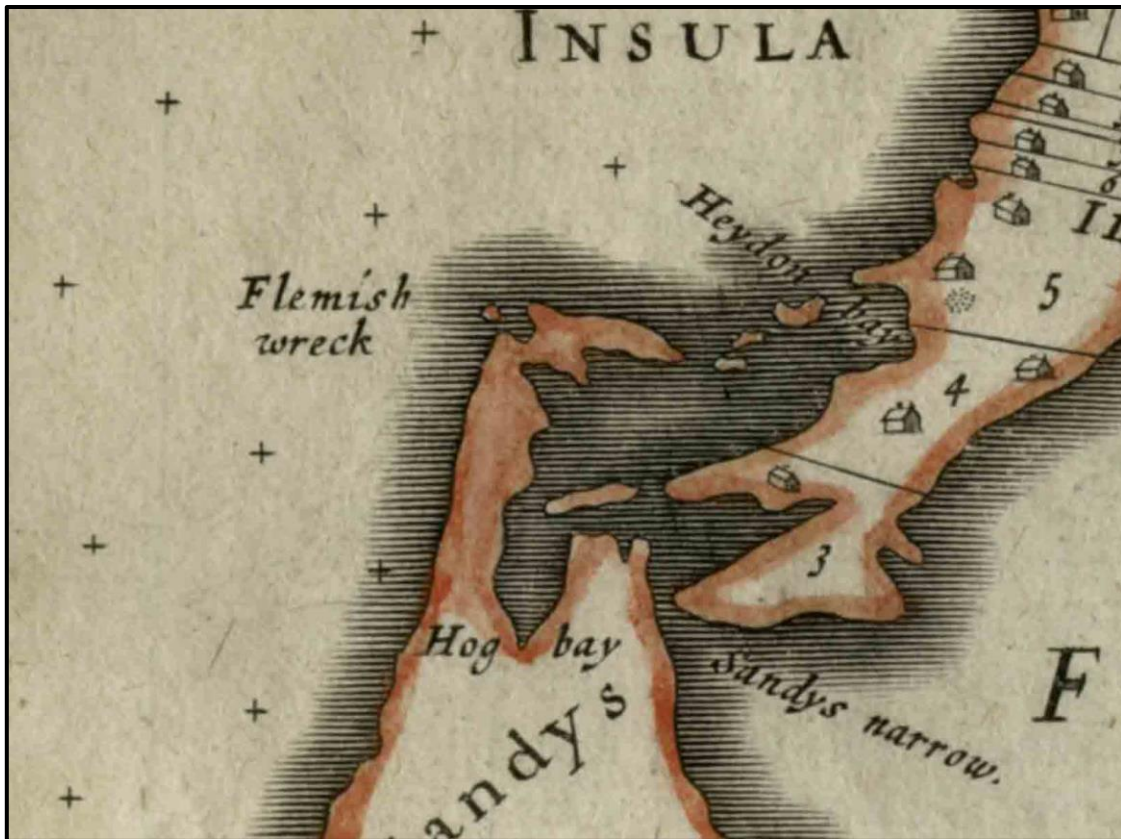
The early history of Bermuda, in the case of Morgan’s Island and the Western Reef, would not be complete without a mention of Capt. John Powell and the Flemish Wreck. Powell commanded the Sommer Islands Company’s supply ship *Hopewell*, which periodically brought supplies, colonists, and slaves from England (Craven and Hughes 1937:359). There were times, however, that Powell’s ship disappeared after arriving in St. George’s. The sail to the Caribbean from Bermuda took only eight days and its promise of plunder was apparently too much for Powell and his crew to resist. His adventures and interplay with French pirates are well documented in Butler’s reports (Hallett 2007). It was not uncommon, for instance, for Powell to arrive at King’s Castle Harbor (Bermuda) with a small squadron of captured ships and then to leave them and their cargo for disbursement with the governor as the representative of the Sommer Islands Company. Apparently, like most buccaneers of the time, Powell carried letters of marque (Dutch in this instance) to prey on Spanish and Portuguese vessels. His activities obviously aided the economy of the island, but eventually became so notorious that the governor was forced to exile him to Somerset, on the far western end of Bermuda. While in route to Somerset, Powell managed to run his ship aground on an extension of the reef offshore of Wreck Hill (Hallett 2007). Though Butler did not state whether Powell lost *Hopewell* or some other ship in his charge, he speculated that since Powell was carrying Dutch letters of marque his wreck became known as the Flemish Wreck (Hallett 2007).

In Norwood’s detailed island map of 1626 is a cryptic description of a “Flemish Wreck” just below Wreck Hill (figures 2 and 3). Archaeological surveys and hydrographic maps, indicate that it would be unlikely that an intact ship – even one in the process of wrecking – could make it over the reef to be deposited that close to Wreck Hill. It can be theorized, however, that a buoyant hull fracture (floating portion of a ship) became separated from the vessel and may have floated in over the reef only to disintegrate near Wreck Hill. What is important historically, is that the loss of the “Flemish Wreck” of 1616, is a distinct event from that of the Dutch pinnacle which disappeared in 1619. Thus, there should be two distinct Dutch-built vessel remains located near the West Reef and Wreck Hill - the Flemish Wreck (on or before 1616) and the Dutch pinnacle (1619). As research continues, historical and archival sources will no doubt prove invaluable in providing information related to the Morgan’s Island site. Future investigations of historic sources held in archives in the Netherlands, as well as the Port Royal records housed in The National Archives in London, could confirm the activities of the Dutch pinnacle, perhaps find its name, and possibly locate accounts of the marooned sailors once they returned home from Bermuda.



**Figure 2.** A Mapp of the Sommer Ilands, Once Called the Bermudas, published by John Speed, 1626/27





**Figure 3.** Detail of Speed's map depicting location of "Flemish Wreck" published by John Speed, 1626 / 27

The recent archaeological investigation of the Morgan's Island wreck site suggests that human intervention could have been the ultimate factor in site formation process. It would have been unlikely, if not impossible, for a ship without human intervention to slip its anchor lines, navigate or be blown by storm inside the reef, pass through the narrow channel into Ely's Harbor, and then glide on into the shallow, protected waters surrounding Morgan's Island. It should be noted that at the time Bermuda was scarcely populated and Morgan's Island was 20 miles from the main population center of St. George's. Passing ships wouldn't have seen a vessel hidden behind Morgan's Island, and land travel through the brush and over the steep slopes around Ely's Harbor would have been nearly impossible. It seems very probable in this instance that the clever islanders managed to deliver the ship from the reef, and move it to a protected spot, while reporting it as lost after the next storm. This explanation would also have kept Governor Kendall from having to explain to his superiors where this valuable ship had gone. By recovering the ship intact, the islanders may have outsmarted both the pirates and perhaps the Governor, unless the Governor was also in league with them.

An episode listed in Butler's *History of the Bermudas*, describes the sort of "treasure fever" that frequented the circumstances of shipwreck on the island. In March of 1615 it was reported that a treasure had been located at the "Flemish Wreck". A boat and crew of salvagers was sent by the Governor to collect the treasure but they were only able to gather a "scattering of dollars", and certainly not enough to pay for

the “long and fruitless” search for more coins that ensued (Hallett 2007, 68). Interestingly, the possible confabulation of the Flemish Wreck and the Dutch Pinnacle wreck may be the basis for this incident (see Multiple Working Hypotheses #13).

### III. Multiple Working Hypotheses:

There is a tendency in any scientific endeavor for researchers to shape evidence to fit pre-conceived notions of outcome known as ruling theory. “Ruling theory is bias laden thinking tending to make data conform to a single hypothesis, and the rejection or modification of unhelpful evidence” (Chamberlain 1965; Rodgers et al. 2005:24-25). The Morgan’s Island Wreck site ironically feeds this tendency by allowing researchers to glimpse some scantlings while hiding others under bottom sediment and seagrass. And it is, to some extent, impossible not to speculate on the possible importance of certain early diagnostic features, as these features allow archaeologists to determine if a site is important enough for continued and focused research.

But to guard against this tendency, researchers can employ multiple working hypotheses (Smith 1955; Platt 1965; Plog 1974; Babits 1998). To employ multiple working hypotheses (MWH) researchers simply make educated guesses as to the nature of the outcome before research begins and then expand on these hypotheses as recovered data reveals new possible outcomes. Based on data gleaned from previous visits to the Morgan’s Island Wreck site the list of MWH includes:

**1. Null Hypothesis: the site is not the remains of a ship or a shipwreck:**

\*This site does represent a ship, but technically it may indicate a salvage operation rather than the results of a wrecking event.

**2. Morgan’s Island is a dumping ground for materials recovered by treasure hunter(s):**

\*Diagnostics indicate this is a single ship, not random parts, as would be expected if this were a dumping ground.

**3. As reported by local history enthusiasts, the remains are those of the *Teaser*, a 19<sup>th</sup> century local sloop, used for transporting rum and other goods into the 1930s, colloquially referred to as a ‘rum barge’:**

\*The construction features documented at the site are not consistent with those of a 20- to 30-foot Bermuda-built inshore sailing sloop, whether converted for motor or otherwise.

**4. The wreck site represents a survivor camp and the ship has been salvaged to allow the survivors to build a new vessel: As one example of this theory, Spanish historian Oviedo (1576) speaks of a Portuguese crew wrecked in 1543 who managed to take parts from their wrecked ship to build another vessel to sail the Caribbean. Historian David Quinn mentions that this happened at least 4 times in the 16<sup>th</sup> century (Quinn 1989: 1,7).**

\*In the case of the Portuguese vessel from 1543, the description of the wreck site

does not match the position of this site. In addition, the wood species and ship building techniques employed on this wreck do not match known Spanish or Portuguese construction.

**5. It is a 20<sup>th</sup> century replica of an earlier vessel:**

\*The site contains internal parts that were not commonly known until the 1980s with the advent of underwater archaeology, and the discovery of 16<sup>th</sup> and 17<sup>th</sup> century shipwreck sites. Specialized historical accounts such as those of Witsen 1671, would have been available to very few specialized historians, and the construction features evident at Morgan's Island are not exact replicas of the scantlings viewed in Witsen's drawings.

**6. It is the remains of a 19<sup>th</sup> century vessel:**

\*The site contains no internal diagnostics consistent with 19<sup>th</sup> century construction, such as double frames.

**7. It is the remains of an 18<sup>th</sup> century vessel:**

\*The site contains no internal diagnostics consistent with 18<sup>th</sup> century construction, such as double frames or scarf chocks.

**8. It is the remains of a 17<sup>th</sup> century vessel:**

\*This is plausible since the site contains internal diagnostics consistent with 17<sup>th</sup> century construction, such as half frames, floors, central limbers in crutches, tumble home futtocks, and an odd flat bottom with no limbers in floors.

**9. It is the remains of a 16<sup>th</sup> century vessel:**

\*Although construction features such as buttressed mast step supports, and the vessel's size could be consistent with 16<sup>th</sup> century construction, construction details do not seem to match either English or Iberian techniques. Therefore, the question is begged, is it another type of 16<sup>th</sup> century vessel? This is possible. The site contains buttresses and half frames, floors, central limbers in crutch timbers, as well as tumble home futtocks. But a flat bottom is not expected in the Portuguese, English, or Spanish ships most likely to have visited in the 16<sup>th</sup> century. If it is 16<sup>th</sup> century, it must be from late in that century and it must be of Dutch northern build.

**10. It is a 17<sup>th</sup> century French vessel:**

\*Possible, but not likely. Again, the flat bottom indicated at the site would not have been a characteristic seen on any 17<sup>th</sup> century French vessels.

**11. It is a 16<sup>th</sup> or 17<sup>th</sup> century pirate ship:**

\*This is possible. Certainly, the view from the hill across Ely's Harbor would be conducive to observing the reef and sighting passing ships as possible prey and the protection afforded by Morgan's Island would have been favorable for mooring a vessel. But even the flat bottom and shallow draft of the vessel found at the site would not allow it to sail over the reef. Furthermore, since there is no appreciable difference in the archaeological record between a pirate vessel and any other ship, only the historical record can say what a ship and crew were doing at any given time.

**12. The wreckage may represent an "afbreekboot", a pre-fabricated Dutch vessel which is built and dismantled for shipment elsewhere (Parthesius 2010); perhaps the ship was being laid out for construction at Morgan's Island and never finished.**

\*Though possible, the archaeological indicators (chop, cut, and pry marks), indicate this vessel was being taken apart, not put together.

**13. The Dutch pinnacle historical episode described by Governor Butler, and the “Flemish Wreck”, indicated on early maps near Wreck Hill, are not two separate events, but a confabulation of cultural memory. In other words, this site near Morgan’s Island may in fact be the Flemish Wreck.**

\*This may be true. Cultural memory in regard to the identity of ship wreckage is notoriously suspect after only a few years. Certainly Flanders, a Dutch influenced area in Northern Belgium from which the Flemish wreck apparently received its name, indicates a Dutch origin for the vessel. The location of the “Flemish Wreck” in both the Speed and Norwood maps of 1626 and 1622, indicate an area a very short distance from the Morgan’s Island wreckage. For the period, this degree of accuracy is quite possibly very significant. However, it should be noted that the historic record of the term “Flemish Wreck”, clearly indicates its use as early as 1615 (Hallett 2007, 68), whereas it is very clear the Dutch pinnacle episode takes place in 1619 (Hallett 2007, 118).

#### **IV. Methodology:**

The Morgan’s Island Wreck site is located on the southeastern corner of Morgan’s Island in Ely’s Harbour (Sandys Parish). The site measures approximately 75 meters x 45 meters (250 feet x 150 feet) and is situated at depths of 1-3 meters (2-7 feet) of water and just off the beach on the south end of the island. The methodology employed for recording the site included non-invasive, phase one procedures which are standard for pre-disturbance surveys. No excavation was undertaken at the site and only hand fanning of individual timbers was allowed. Non-invasive techniques included drawing, photographing, and mapping the entire site using a datum point set up on the shore of Morgan’s Island.

The results of mapping operations at the site were used to create an overall plan of the site (figure 4). A steel baseline attached to rebar stakes was stretched across almost the entire site. A small number of timbers and the bow section of the vessel were located off the main area and could not be mapped with the baseline; these were tied into the site map using trilateration to known points on the baseline. From the baseline a portable line grid (base/grid) was laid over the site and mapped from an Electronic Distance Meter (EDM) and transit set up over the datum. Students were assigned five-foot grid squares in which they recorded remains using pencil, Mylar, and measuring tapes. To eliminate any appreciable impact to ship scantling pieces or protected turtle grass at the shallow site, students hovered over their designated grids using flotation devices and mask/snorkel. Situated in the deepest portion of the site, the bow section of the wreck required the use of scuba to record it in detail.

Each scantling timber was also thoroughly documented using photography, and video of the site was taken via a swimming recorder with a Go-Pro camera. A drone equipped with video recorded aerial imagery of the site.

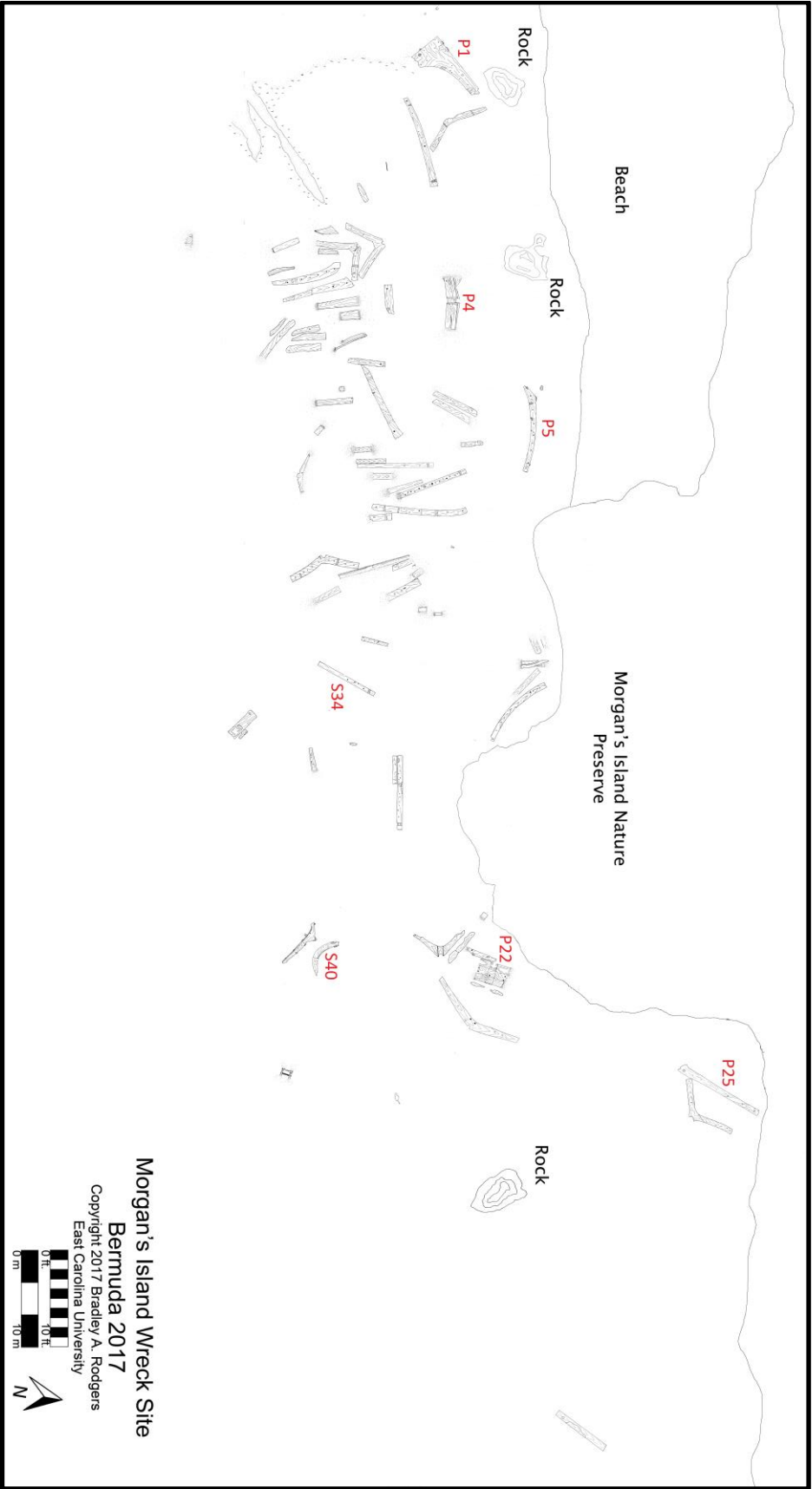


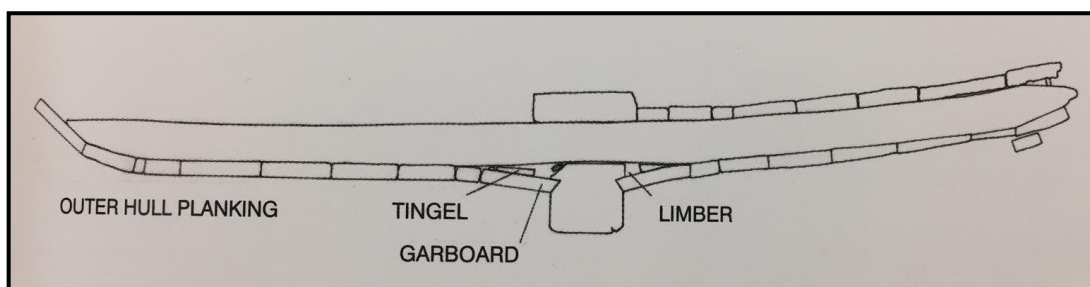
Figure 4. Morgan's Island Wreck site plan.

## V. Key Diagnostic Feature Analysis:

Archaeology, like physics, operates on the principle of “Conservation of Information”. The information from human interactions is recorded in artifacts as well as alterations to the natural environment in areas where human activity takes place. If researchers are well versed in data collection, clever enough to interpret the evidence, and the environment has not erased the evidence; an analytical interpretation should be possible, much like a forensic cold case study at a crime scene. In the Morgan’s Island case the remains of a wooden ship are interpreted here both on a macro and micro level.

It should be noted in this section that the ship remains documented at Morgan’s Island presented many obstacles to both archaeological recording and analysis. The island was easily accessible, however, in over three decades of looking at hundreds of shipwrecks this author has never noted a single site that was as completely disarticulated as was the Morgan’s Island Wreck site. Over the course of the investigation it became clear that the site could easily be nick-named, the “Blender Wreck”, as not a single scantling was noted to remain fastened to another. This seemed a deliberate human act (discussed below in the *Salvage Marks* section) and does not seem to reflect the peaceful setting where the ship lies today nor could any known storm or wrecking event cause this sort of disarticulation. This fact seemed to obscure another fact reflected in the Morgan’s Island Wreck site, namely that we were investigating a bottom-based northern European shipbuilding tradition that is seldom seen in the archaeological record of Mid-Atlantic America.

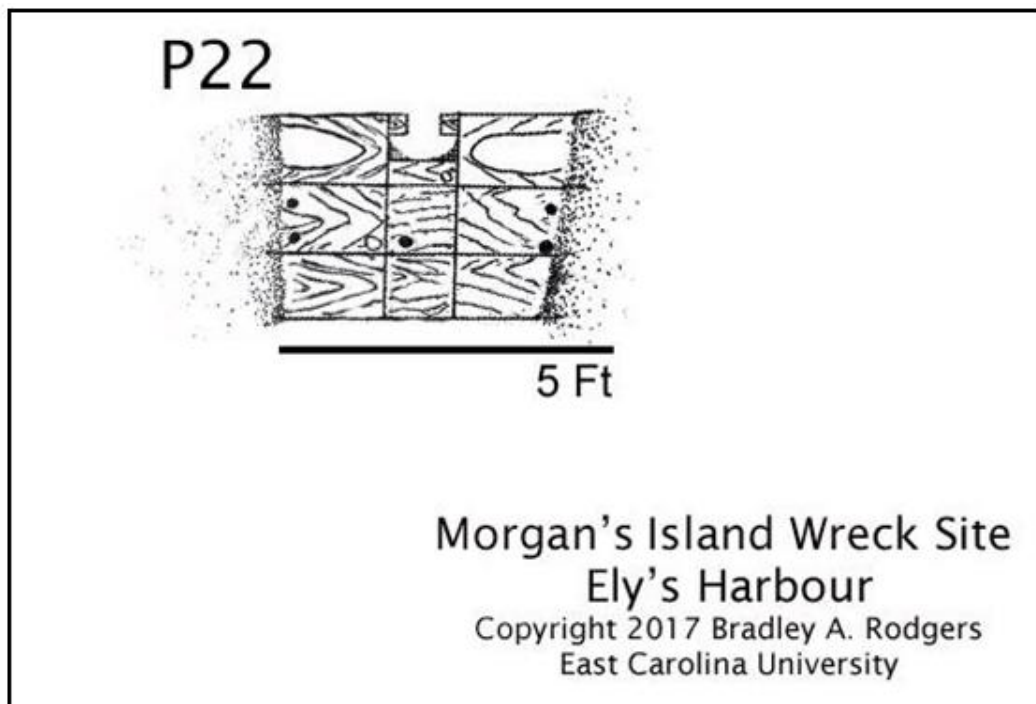
The closest known relative to this vessel was also wrecked on Bermuda’s western reefs and is known as the New Old Spaniard (NOS). Representing the possible remains of a late 16<sup>th</sup> or early 17<sup>th</sup> century Dutch-built ship, this site was found and investigated by Teddy Tucker and Mendel Peterson in the 1960s and subsequently investigated by archaeologists from the Smithsonian Institute and later East Carolina University (Watts 2014:109-112). The experience of having previously worked on this site allowed me to better visualize how the flat bottom of the ship was designed and why there were no limbers – channels cut into floor timbers that allowed water to drain into the pump well (Steffy 1994:274) (figure 5).



**Figure 5.** Flat bottom construction of New Old Spaniard (Watts 2014:111).

What follows is a discussion of diagnostic timbers and features that have been singled out as the most important archaeological attributes thus far noted at the Morgan's Island Wreck site. The numbers associated with ships parts correspond to numbers printed on the overall site map. These numbers relate to the original baseline placed on the site to help archaeological technicians and students orient their drawings. This analysis is based on a careful examination of the collected data, including hand measured drawings of each exposed timber. This approach has revealed information related to ship construction techniques, the shape of the exposed scantlings, the type and use of fasteners, wood species, and associated artifacts. Most importantly perhaps, although the wreck is badly disarticulated, the shape of individual scantlings demonstrates, in puzzle-like fashion, the original shape of the ship and how it was assembled into the unmistakable flat-bottomed Dutch style, unique to their northern shipwrights.

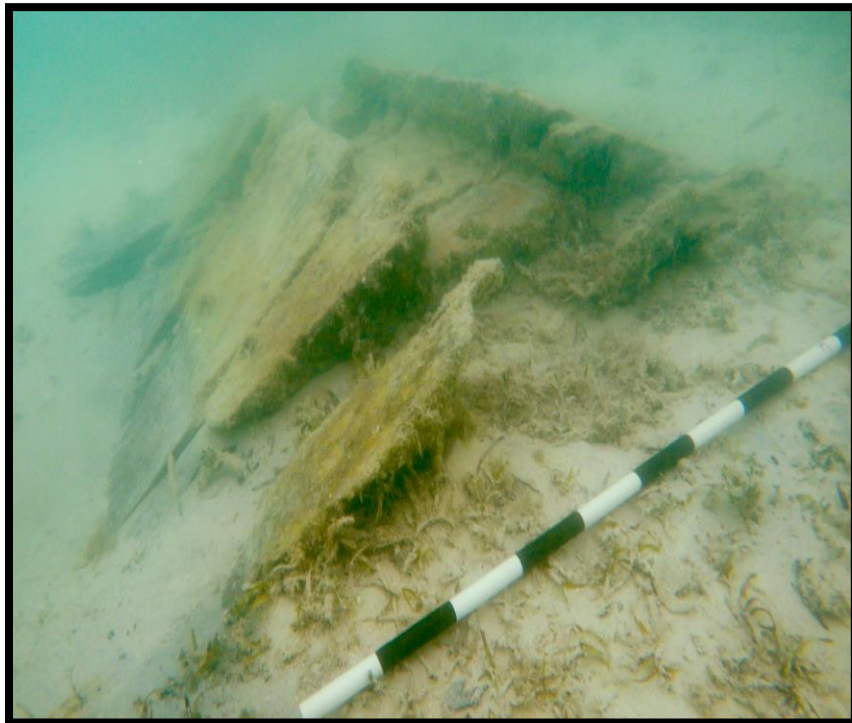
*Buttressed mast support timbers (P22 and P4):* The most salient and diagnostic features of the Morgan's Island wreck are perhaps the mast step partners; one large, three-buttressed step support feature (figures 6, 7 & 8) and a smaller, single-buttressed step support feature (figure 9, 10 & 11). First appearing in the archaeological record in the mid-15<sup>th</sup> century, buttressed mast steps remained a fixture on ships of all nationalities until 1600, when they were quickly replaced by other designs. The existence of buttressed mast supports on the Morgan's Island Wreck may indicate that the ship was built in the 16<sup>th</sup> century, or that the importance of this mast step tradition lasted longer than previously thought.



**Figure 6.** Morgan's Island Wreck timber feature P22, which is possibly a triple buttressed mast support structure.

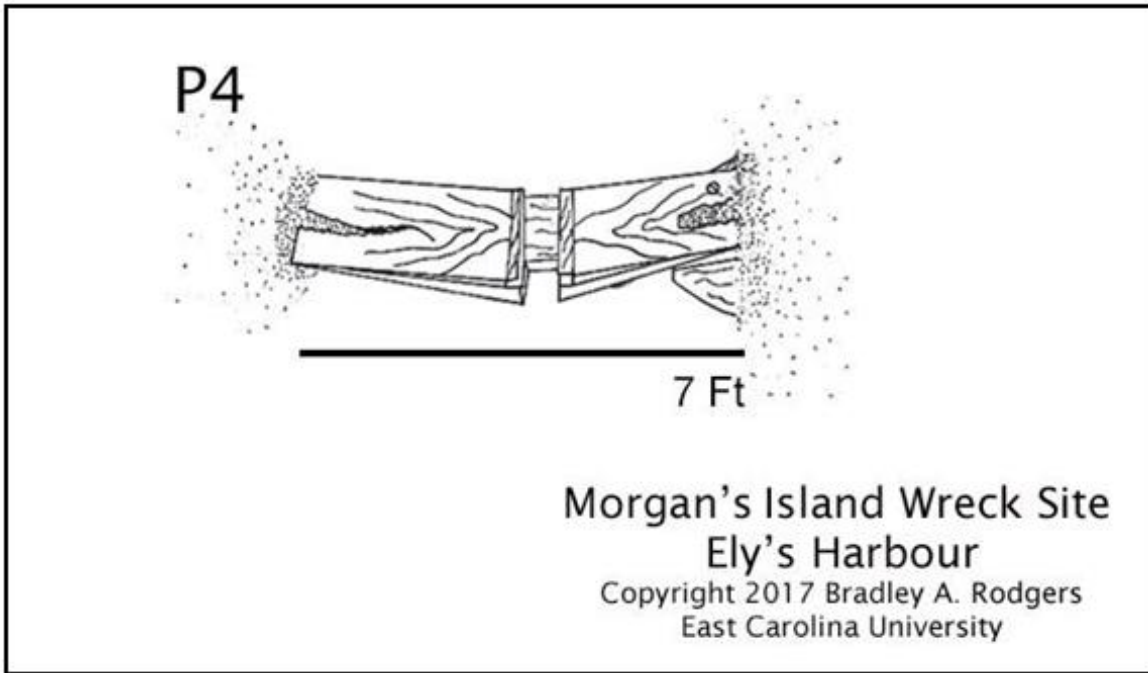


**Figure 7.** Morgan's Island Wreck timber feature P22. Note deterioration of southernmost of the three buttress pieces.

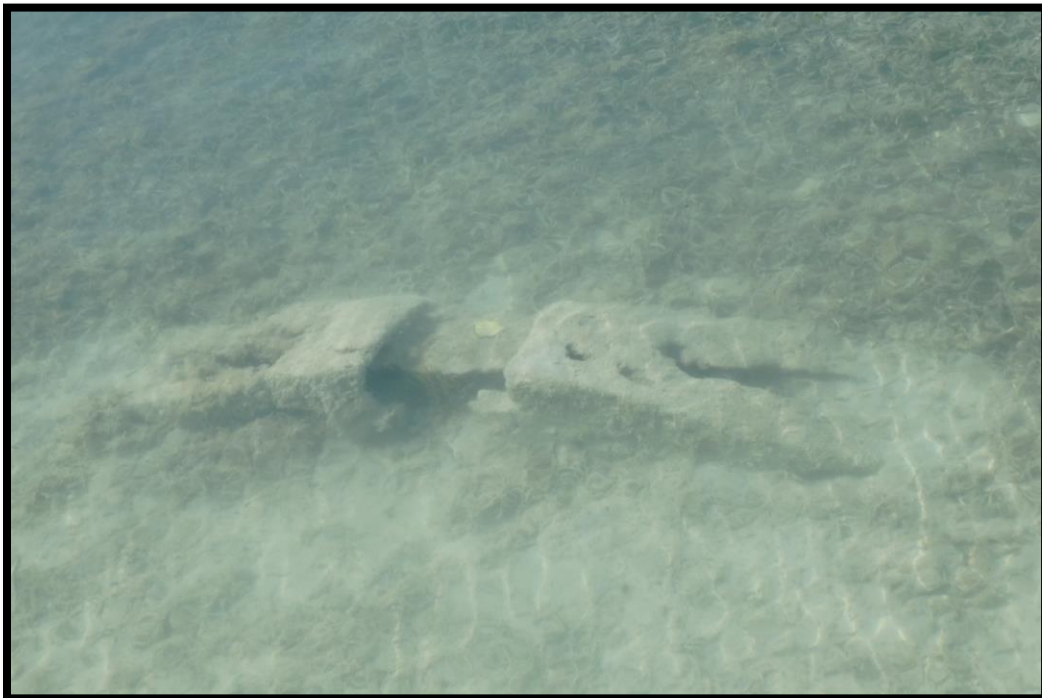


**Figure 8.** North facing photograph of Morgan's Island Wreck timber feature P22.





**Figure 9.** Illustration of Morgan's Island Wreck timber feature P4, which is possibly a single buttressed mast support structure.



**Figure 10.** Morgan's Island Wreck timber feature P4, it is unclear if the buttressed mast supports are double or split timbers.



**Figure 11.** Morgan's Island Wreck timber feature P4; note rounded edge on face.

*Possible Bow Feature:* The bow section (figure 23) is a very rare and interesting find from a wreck of this period. Generally speaking the bow and hawsers located high up on the stem of the ship are lost when the upper works of a ship are broken away in the wrecking process. If not lost during wrecking, they are subject to water movement and biological attack as site formation progresses. The decks, upper works, and bow of a ship are simply not expected to survive archaeological interment, and are not often seen at all on wreck sites. The Morgan's Island site is very special in this instance, the bow has not only survived but gives us invaluable insight into interpreting and dating the site.

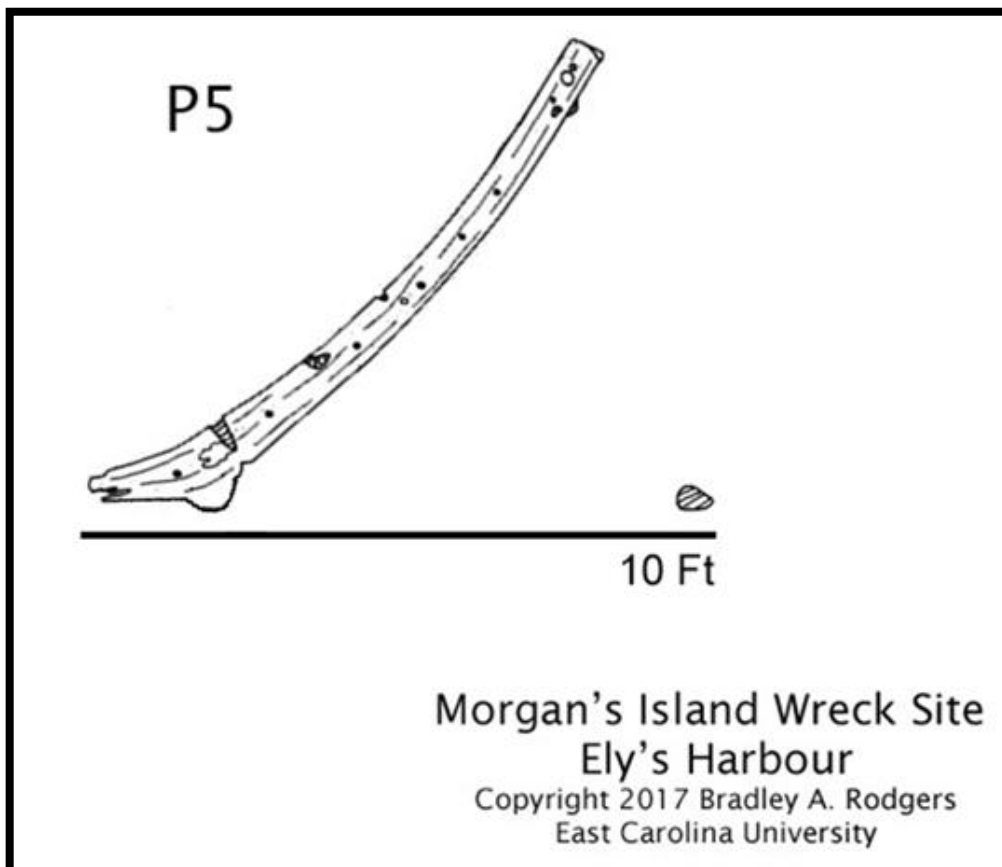
The fact that the bow, rudder, and floors have survived indicates that the site, or the ship it represents, was NOT subject to the energy of a storm fueled wrecking process. Put simply a storm would have likely torn away these areas of the ship, particularly if it had been heavily anchored, as was the story the islanders told the Governor in 1619.

The double hawser configuration on the port and starboard sides dates, in its earliest forms, to the 16<sup>th</sup> century and was used until the end of the 18<sup>th</sup> century and perhaps beyond. Of more importance than the hawser configuration, is the fact that the timbers that are left represent a type of construction in which the bow section is supported by a single large wooden apron piece. The single piece apron backs the stem post and the hull planks that attach in to the stem. At the beginning of the 18<sup>th</sup> century, the design was replaced by a blocked-up apron, and by 1750, by cant frames. Although the apron piece is missing, the bow construction exhibited at Morgan's Island is strictly 16<sup>th</sup> and 17<sup>th</sup> century in origin. There are no heavily fastened apron blocks, or cant frames still attached to the stem as there would be if the apron had not been broken off via the salvage process. For a discussion of the hawser liners

themselves, please refer to the non-sequitur section.

*Futtock Timber (P5) and Floor Timber (P25):* Possibly the most important evidence concerning the Morgan's Island Wreck site began to take shape when the detailed drawings of individual scantling timbers were completed. The first inkling of the shape of the Morgan's Island ship came from the careful observation of timber P5 (figure 12). This timber is a well-preserved transitional futtock that connected a floor, or where the ship turns at the bilge, to where the ship begins to tumble home. It was marked with fasteners for trunnels and iron nails on all four sides.

Furthermore, there were two very unusual things about P5. First, as it curved down to the turn of the bilge it contained a bulbous knob that would have protruded out from the chine. Second, at the chine the futtock still contained the cut surface where it lap scarfed with the floor to form the bottom of the ship. The angle of the lap joint with the floor showed that the bottom of the ship turned at nearly 130 degrees from the chine, which gave the vessel an almost completely flat bottom and gently outward sloping sides. This is a very unusual way to build a ship and indicates its northern European origin



**Figure 12.** Morgan's Island Wreck timber P5, a futtock timber.

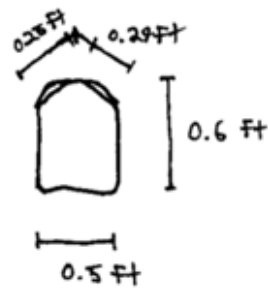


**Figure 13.** Concretion associated with timber P5, dimensions indicate the room and space of the floor/futtock timbers. Interior of concretion contains an iron fastener. The cross section (top) shows the "D" shaped chine knob.

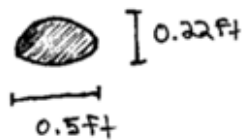


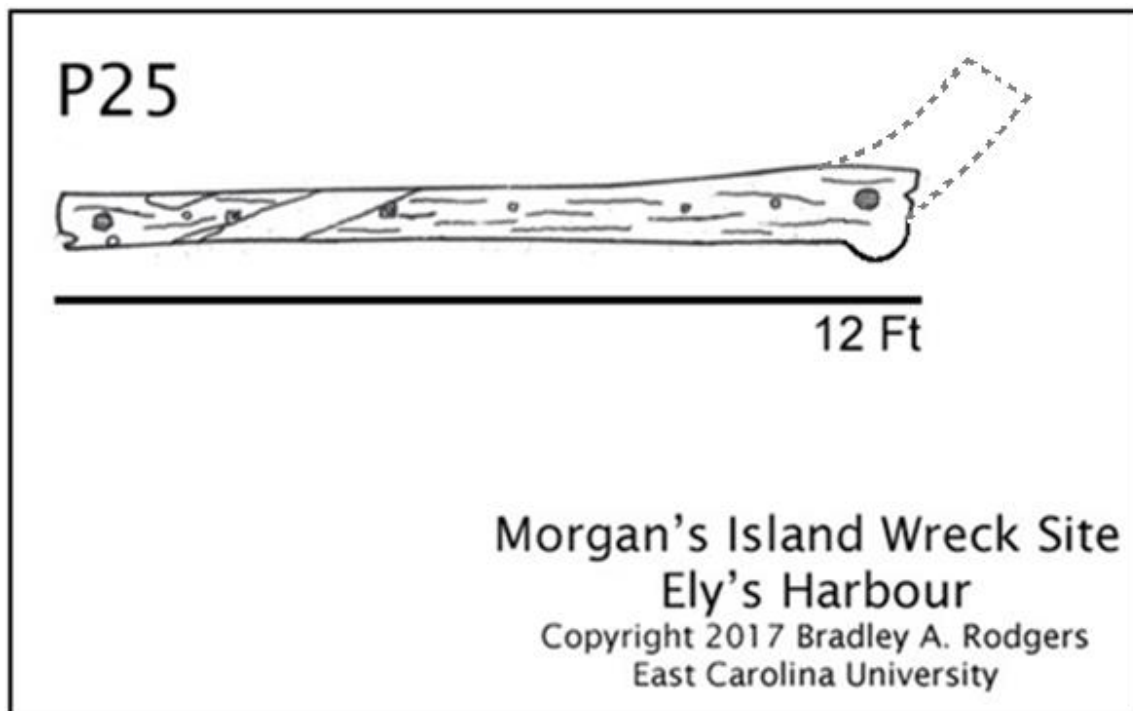
### P5 Concretion Measurements

Profile



Plan



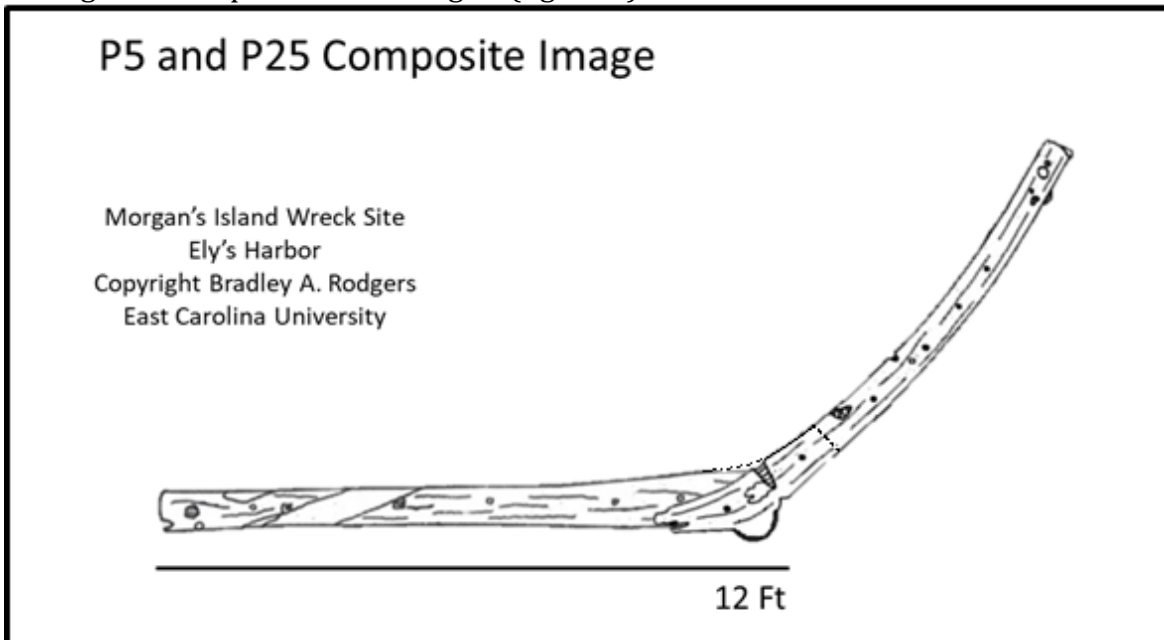


**Figure 14.** Morgan's Island Wreck timber P25, a floor timber.

It was also noticed that the bulbous knob described above as an unusual feature on P5 was reflected in timber P25, though P25 was certainly not a futtock. Timber P25 (figure 14), nearly straight in appearance, is a very long and heavy timber with fastener marks on all four surfaces. With the help of a paper cutout of both pieces it could be seen that when the bulbous knobs were aligned at the turn of the bilge, P25 became a straight, flat floor timber situated 130 degrees from the side of the ship. As further evidence that this is how the floor and futtock were attached to one another, a fastener concretion was found near P5 that had obviously lain for some time in the bilge at the chine (figure 13). Because it was iron, it had concreted and corroded to expand and fill the space between the futtocks. This concretion gave us the shape of the chine, and its measurements as well as the space between the futtocks (0.6 feet). It was "D" shaped in cross section giving us a perfect mold of the bulb or knob at the turn of the bilge. This bulb was likely planked with a single heavy plank with the interior scooped to contain the bulb shape. Thus, the bottom of the ship represented by the Morgan's Island Wreck remains was almost entirely flat.

The one problem with P25 being a floor was that it had no limber holes. Limber holes were channels cut into timbers that allowed water to run to the pump well for removal via the bilge pump. In northern European ship construction timbers, however, limbers were naturally formed by rabbeting the garboard strake further down on the keel, thus allowing for two triangular limbers to form below the floors and removing the need for notching. A good example of this can be seen on the NOS shipwreck site, where the garboard and natural limbers are further supported with

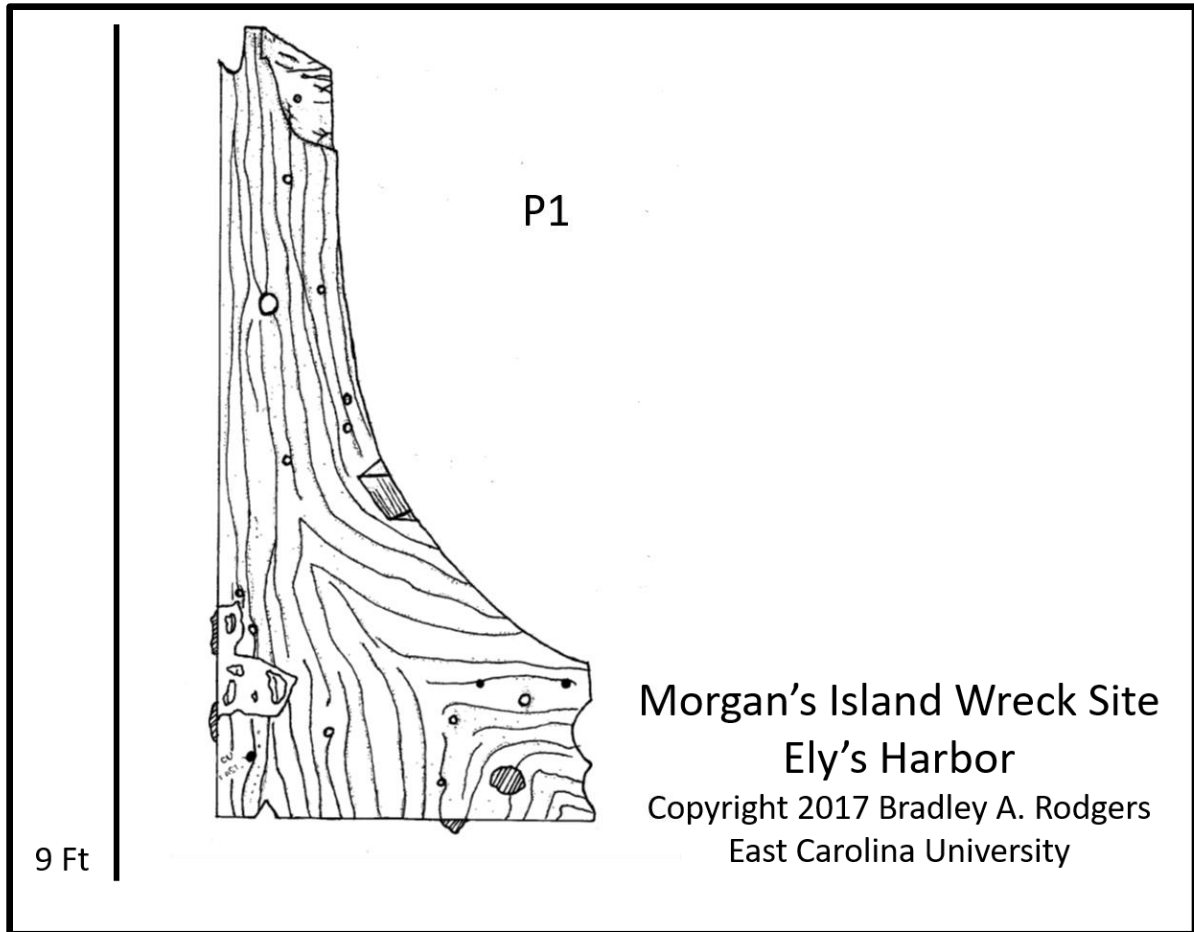
triangular filler pieces called tingles (figure 5).



**Figure 15.** Composite image of P5 and P25 timbers as they would fit together on the ship.

Aside from more modern vessels, such as 18<sup>th</sup> and 19<sup>th</sup> century scow schooners, river flats, steam river boats, and plantation schooners, one of the few ship construction traditions that extolled the virtues of flat bottomed ships is the northern Dutch tradition. After the examination of timbers P5/P25, site analysis and historical research took a decidedly new turn, towards northern European shell-first, bottom-based ship construction.

*Rudder (P1):* The rudder of this vessel is a very important find (figure 16). The shape of the rudder indicates Dutch construction. The blade nearest the ship is not mortised to accept the angular keel spur common on most other nationality ships. The keel spur is a protrusion of the keel that projects under the front of the rudder blade to protect it from unshipping should the ship ground. This is apparently not necessary on a Dutch vessel. In addition, the rudder not only indicates that the ship was lead sheathed, but according to a shipbuilding treatise penned by Witsen (1671), it can provide the size of the ship that carried it. When plugged into the Witsen formula, the size of this rudder (4.4 feet wide) gives us a total length of this ship as 120 feet and a beam of 30 feet (Hoving et al 2012).



**Figure 16.** Morgan's Island Wreck timber P5, a floor timber.

This is a sizable ship for the early 17<sup>th</sup> century and would have been a formidable warship for those times. Yet the fact that the rudder is still intact and remains part of the site gives our analysis an entirely new archaeological interpretation. When a ship wrecks, even if the wrecking event is intentional as in Governor Butler's speculation (Hallett 2007:118), the rudder is generally the first part to detach. As mentioned in the bow discussion, the fact that the rudder is present on the Morgan's Island Wreck site suggests that the ship was floated unharmed to its resting place. **As such, this site does not represent the remains of a wrecking event, but rather those of a salvage event.**

*Greenheart (Ocotea reodiei)*, is a very dense hard tropical wood native to Guiana, Surinam and northern Brazil. Often confused with teak and lignum vitae, it is great shipbuilding material because of its hardness, but also because as it grows it

forms alkaloid compounds within its structure (Humphrey 1915:205). These compounds are poisonous to living things so the wood can survive virtually unchanged in the archaeological record for very long periods. Importantly, the Portuguese controlled the greenheart producing areas in the 16<sup>th</sup> century but were gradually supplanted by the Dutch toward the end of the 16<sup>th</sup> when they began trading in the area in 1581 (Paasman 1984: 170). One sample of wood taken from the Morgan's Island Wreck site was tested and identified as greenheart. Ten other samples were taken during this project and although those have yet to be tested, they demonstrate the same hardness as the tested sample and when the wood was cut it created identical clouds of a green chemical plume in the water. The harvesting and cutting of greenheart can be an unhealthy activity and precautions were taken when the samples were recovered.

It is possible that the greenheart that makes up the fabric of this shipwreck was harvested in South America and sent to Europe for fabrication. Or the ship could have been fabricated as an "afbreekboot" in the Americas (Parthesius 2010); perhaps only the history of this particular ship can give us the answer to this question.

*Salvage Marks:* As mentioned previously, the Morgan's Island Wreck site is replete with salvage marks. As may be imagined, any ship deposited in very shallow water presents an easily accessible and valuable resource. Islanders would have seen the wreck as a source of building materials and any artifacts brought in by a shipwreck would have been a windfall. This vessel was without a doubt, no exception to that practice. The timbers are so sturdy and resistant to rot that they are in use today around the harbor holding up things and delineating gardens (Pers. Comm. Nash 2017). Extensive chop marks on the ship's scantlings show how fasteners were removed and how valuable these bits of hardware would have been to people living on a frontier without means of getting hardware. It should also be noted that thus far there is no sign of planking anywhere on the wreck site. This is likely explained by the fact that seasoned planking would have been extremely valuable to islanders for construction and was most likely recovered from the site soon after deposition.

Yet the true extent of the salvage efforts may reflect another motive of islanders that is captured or reflected in the archaeological record. If the ship was deliberately wrecked, or smuggled in over or around the reef, as perhaps is alluded to in Butler's comments relating to the Dutch pinnace, it may point to the search for loot within the pirate vessel (Hallett 2007:118). The notion that a pirate captain may have hidden treasure in any nook or cranny on the ship – including between its scantlings – could have driven islanders into literally chopping the ship to pieces to find it! This activity should be well represented in the archaeological record; and perhaps is. Marks that demonstrate salvage operations can be found on almost every timber and were, for a time, a mystery in the archaeological analysis. These marks are represented by conical indentations in the scantling timbers usually located between major drift bolt fasteners (see timber P5). These marks are without doubt the result of wrecking pins or conical stakes being placed and driven between the scantlings to force them apart, much as a wedge is used to split wood. Some of the



pin marks penetrate from the interior surface of a lapped scantling all the way through to the other surface, indicating the scantlings were hard to split apart, while some scars indicate only short indentations, as the timbers split apart quickly (See P5). It seems no coincidence that the splitting pin mark on P5 also matches the exact spot on P25 where the upper part of the floor has split off the end of the floor.

These “rat tail” marks (as we came to call them) indicate that the salvage tool kit at Morgan’s Island included not only axes, pry bars, and hatchets, but heavy wrecking pins and sledges to accomplish the truly remarkable dismantling of each heavily fastened scantling from its partners. It should be noted that these marks are NOT found high on futtocks but only at the bottoms. Very importantly, this indicates that the futtocks are single and not paired as they would be in centuries after the 1600s.

This type of forensic archaeology is rarely, if ever, seen in archaeology; it indicates that this area was used as a ship breaking yard. Typically, a wooden ship is simply burned on a beach (since many of the timbers from an old ship would be rotten and useless for building) and the fastenings raked up from the ashes. The type of wrecking indicated at Morgan’s Island demonstrates that the wood was still valuable for salvage and was not burned, and that perhaps the wreckers were looking for coins placed in secret by the pirates between frame sets and scantlings. Treasure hunting scenes from the American West, where entire fields are pock marked with burrows from frantic digging efforts are perhaps the closest metaphor to the carnage visited on this ship by salvagers in search of coin.

*Lead Sheathing:* Lead sheathing fastened with brass tacks was found in-situ on portions of the bow section and rudder of the Morgan’s Island Wreck. A small section of disarticulated lead sheathing was also noted in an anchor scar near the main concentration of timbers. Since the piece of disarticulated sheathing was found to be loose, it was considered to be in peril of removal by cultural or natural forces. An addendum to the research permit was granted and the artifact (figure 17) was recovered for study and curation at the National Museum of Bermuda.

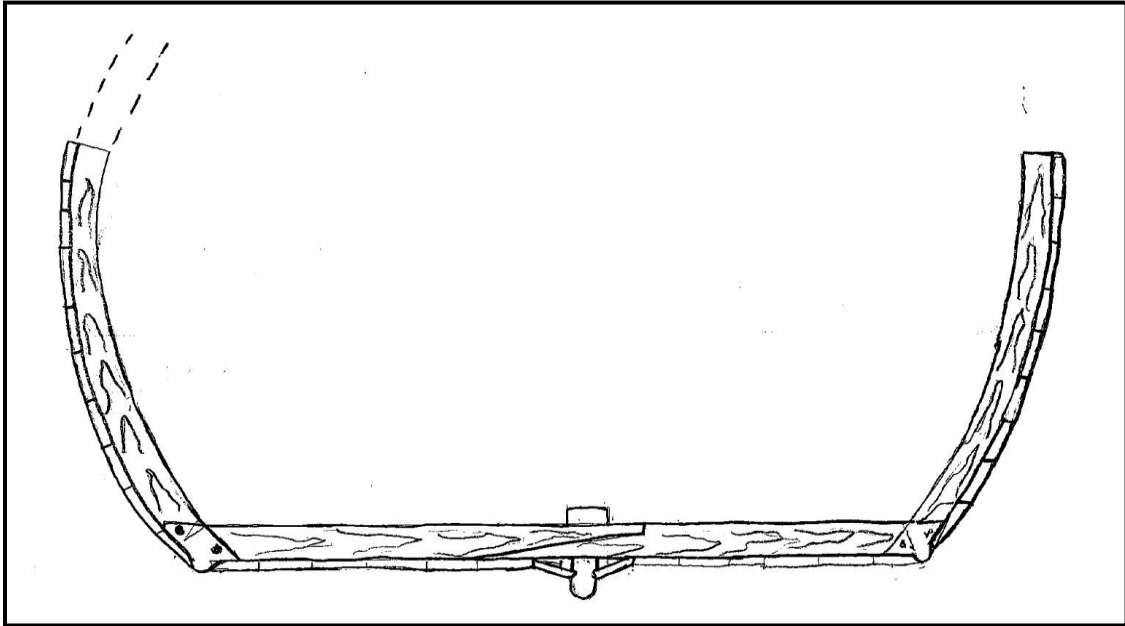
Lead sheathing has been well studied in various ship construction treatises. Though used extensively by ancient Mediterranean shipbuilders its use waned by the middle ages and is not seen in the archaeological record until its reemergence with 16<sup>th</sup> century Spanish and Portuguese shipwrights (McCarthy 2005: 102). Likely influenced by the southern European designs, the Dutch incorporated the use of lead to sheath vessels at the end of the 16<sup>th</sup> century. Importantly, the Dutch discontinued using only lead sheathing around 1606 and, thereafter, combined it with sheet copper in alternating layers (Van Duivenvoorde 2015). Lead was also used by English shipwrights for a short period beginning around 1670, but they soon found that it did not work well with iron fittings and they soon discontinued the practice (Harris 1966).



**Figure 17.** Folded sheet of disarticulated lead sheathing with included copper tacks recovered from the Morgan's Island Wreck site.

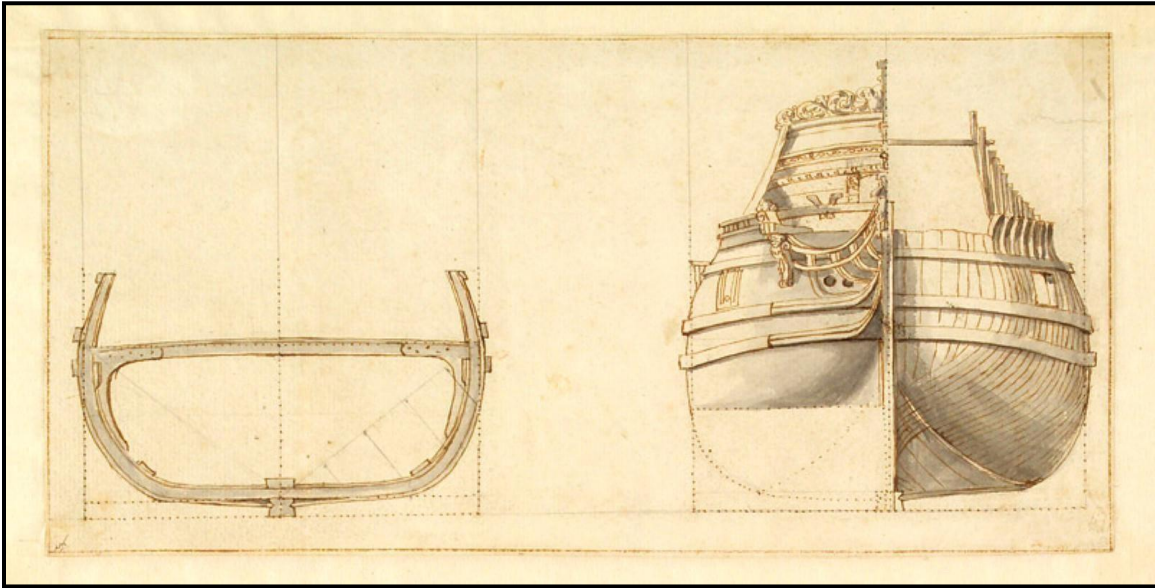
*Dutch Bottom-Based Shipbuilding:* This is a subject that has been documented for centuries and requires a great amount of research, particularly for this project. However, some recent translations of original Dutch treatises, such as that by Nicolaes Witsen (1671), are extremely valuable to this study (Hoving et al 2012). On May 17<sup>th</sup> of the Morgan's Island field project the Principal Investigator was able for

the first time to see enough of the scantlings at the wreck site to diagram a conjectural cross section of the ship using the connection of timbers P5/P25 (figure 18). This was done without knowledge of Witsen's translated text. Herein is included this sketch, as compared with some original drawings by Witsen (1671). The cross-section drawings speak for themselves and are nearly identical.



**Figure 18.** A hypothetical reconstruction of the floor and futtock timbers from Morgan's Island Wreck (illustration by author).

*Pinnace:* The definition of the term pinnace, sometimes spelled *pinas*, *pinnance*, *pinnasen*, changes over time. In reference to the early to mid-17<sup>th</sup> century, it can generally be defined as a heavily armed version of a Dutch *fluyt*. Pinnaces were used to escort convoys of *fluyts* and allowed the Dutch to expand their trading empire in a cost-effective manner. Other nations built their trading vessels with an eye to converting them to warships when need be, thus making them on average more expensive and much heavier than the purpose built Dutch vessels. Though much like the flat bottomed *fluyt* in form, the pinnace was more heavily-constructed to accommodate additional ordnance (figure 19). Most importantly, however, 17<sup>th</sup> century pinnaces were made of hardwood, unlike the *fluyt*. The remains of the vessel investigated at Morgan's Island certainly meets the definition of Pinnace. Interestingly, it is thought that the term pinnace and the ship class it represents, later evolved into the type of vessel known as the frigate.



**Figure 19.** Seventeenth century Dutch pinnace cutaway illustration (<https://www.flickr.com/photos/49225014@N05/8398082134>).

*Miscellaneous Artifacts:* During the course of the survey a few artifacts were noted laying on the seabed at the Morgan's Island Wreck site. This seems odd at a site so visited as this, but may be an indicator that much of the site and artifacts lay out of sight under the bottom sediments.

A singular piece of earthenware ceramic was located on the surface near 140 feet along the baseline (figure 20). Through visual observations, artifact recordings, and typology research the ceramic fragment was identified as a piece of Spanish lead glazed coarse earthenware (Deagan 1987:47). Though this red-bodied dark glazed ceramic is generally considered to date from the 16<sup>th</sup> century, its terminus post quem looks to be 1622. Since the sherd was found to be loose, it was considered to be in peril of removal by cultural or natural forces. An addendum to the research permit was granted and the artifact was recovered for study, conservation and curation at the National Museum of Bermuda.

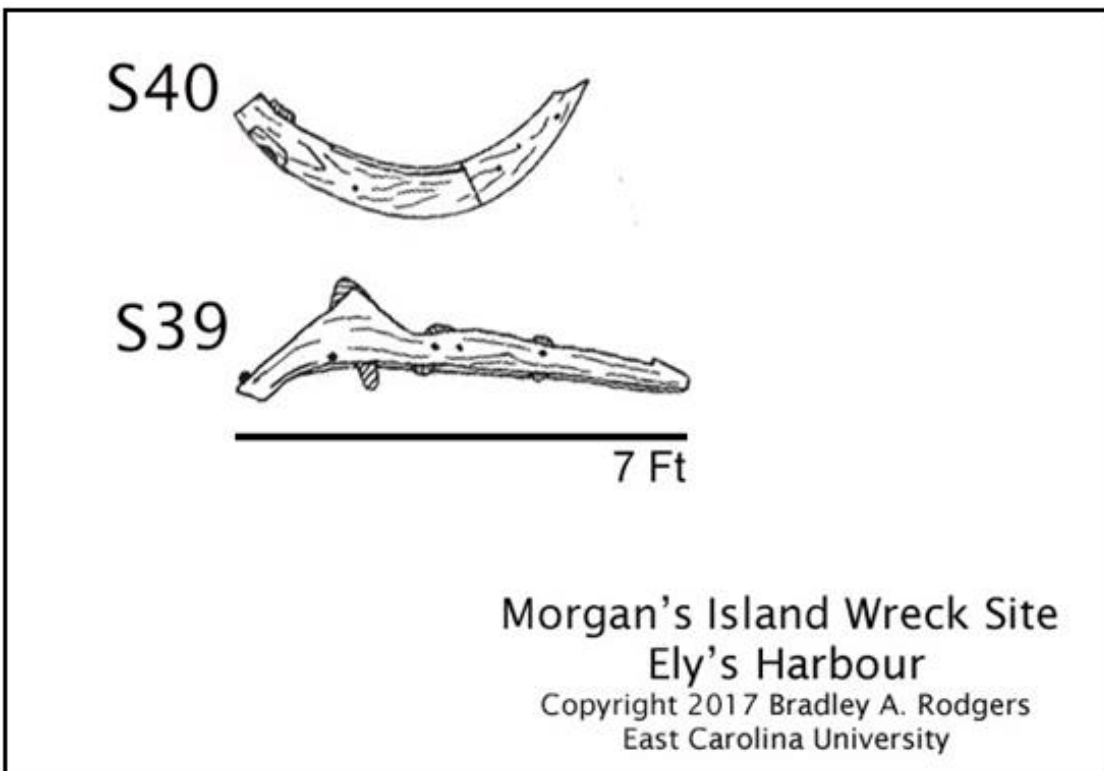


**Figure 20.** Sherd of Lead Glaze Coarse Earthenware recovered from the Morgan's Island Wreck site.

In addition to the ceramic, a gun truck wheel was also located on the surface near 140 feet along the baseline (figure 21). These artifacts are ubiquitous on armed vessels of the time period and do not shed a great deal of light on the project analysis – other than proving beyond doubt that this was an armed vessel. This gun carriage wheel appears to be made of greenheart (*Ocotea reodiei*) wood and its specific gravity can be tested for this in the future. If this artifact is indeed crafted using greenheart it may show that the ship was completely built and fitted out in the Americas. A knee timber also recorded at the site (timber S39) corroborates that this was an armed vessel as it includes an eye bolt mounted through its throat that would have likely been used to attach gun tackle (figure 22). Since the wheel was found to be loose, it was considered to be in peril of removal by cultural or natural forces. An addendum to the research permit was granted and the artifact was recovered for study, conservation and curation at the National Museum of Bermuda.



**Figure 21.** Wooden gun truck wheel recovered from the Morgan's Island Wreck site.

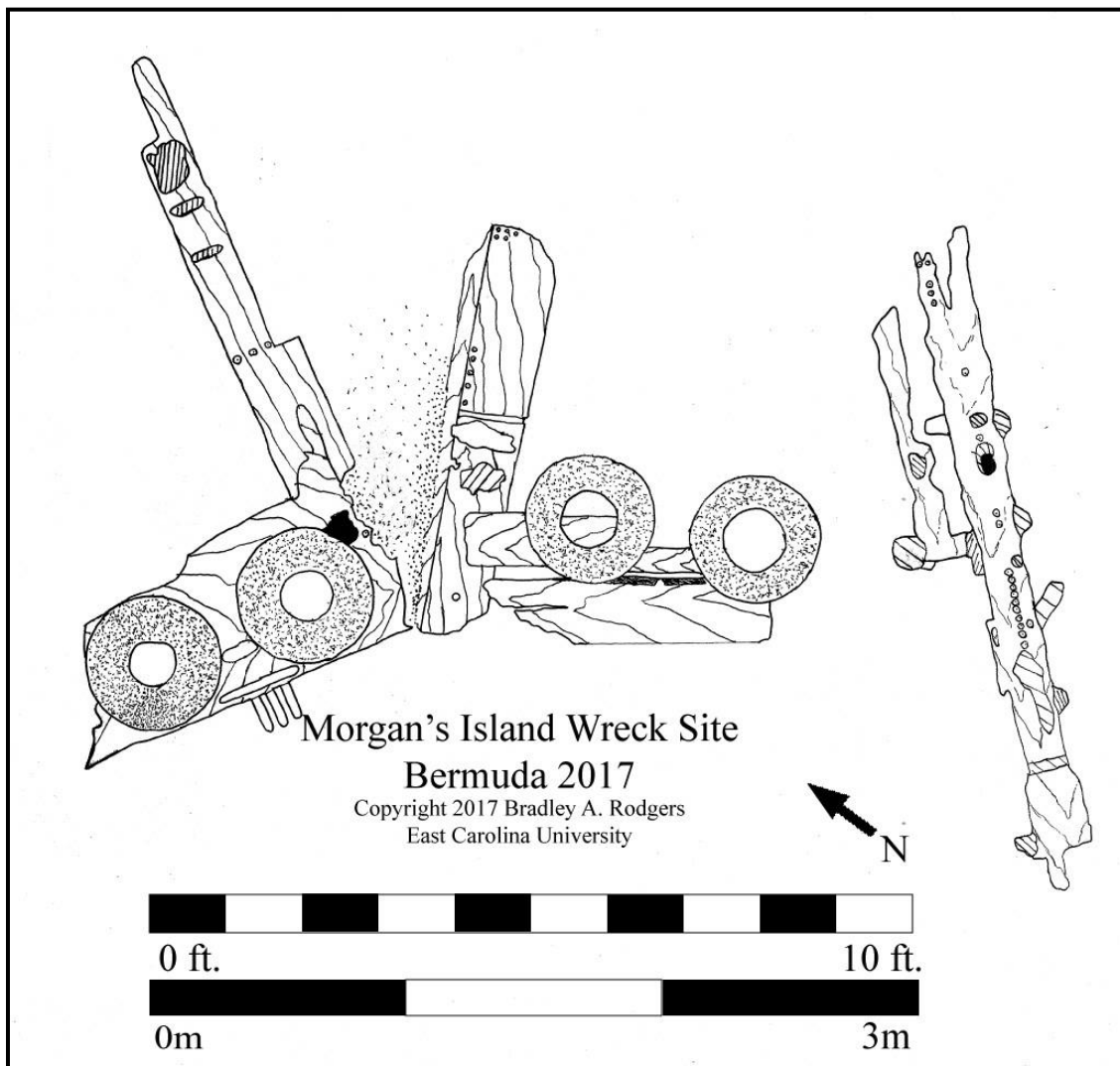


**Figure 22.** Wooden knee timber (S39) recorded at Morgan's Island Wreck site.

## VI. Non Sequitur Data:

**Hawse Hole Liners:** The Morgan's Island Wreck site includes a section off the baseline that is thought to be a partially intact piece of the ship's bow (figure 23). This area includes planking timbers, a possible portion of the stem, and four round objects situated in two pairs. On visual inspection, these were determined to be iron lined anchor hawser holes, two on each side of the stem (figure 24).

The double hawser per side arrangement appears to date to at least the 16<sup>th</sup> century, as many illustrations dating to that period depict working ships with two holes on each side of the stem. The use of iron for hawser hole liners is not a well studied subject, however, and is subject to argument from different view points. First, the most common historical argument carries that hawser holes on vessels roughly



**Figure 23.** Bow section of the Morgan's Island Wreck site with four possible hawse pipes.



**Figure 24.** Two of the four possible iron hawse pipes recorded on the bow section of the Morgan's Island Wreck site.

correspond with the practice of catting an anchor, which began in the medieval period, when integrated upper works on ships made it impossible to throw an anchor over the bow without a hoisting mechanism or a hole in the bow of the ship. Some early depictions on coins and tapestries dating to that period show that hawsers do seem to be lined, though the type of lining is impossible to determine. So far the only archaeological example that has been found from this time period (the Vasa 1628) indicate that early lining seems to be wood.

But hawsers are not a common archaeological find. During site formation the sides of most vessels tend to collapse outward when the hull degrades. This leaves the hawser well away from the main structure, therefore, it may not be the subject of excavation, and there are very few finds. Historic logic states that iron hawser liners would NOT be necessary until iron chain comes into vogue for grounding tackle in the late 18<sup>th</sup> century. But we know for instance that the Blackfriars vessel had iron chain and an iron anchor indicating that iron was used for anchor design by 130 AD (Conway 1996:70)

The antithesis of this logic, however, comes from various ship reconstruction exhibits



whereby it has been found necessary in most instances to incorporate iron hawser liners to save undo maintenance and wear on the replica ship itself. In this argument, it can be noted that iron liners were easily made and well within the technical means of iron contractors in the 16<sup>th</sup> century when they devised a technology to pour cast iron cannon and anchors. These through hull fittings would be a cost-effective way to mitigate damage to hulls from heavier anchors and grounding tackle necessary for the ever-increasing size of the ships and anchors. Economic cost effectiveness, therefore, dictates that early examples of these devices would have saved money and were probably considered a reasonable expense for ship owners. Using this logic, it seems quite likely that early examples of these should be found on 17<sup>th</sup> century vessels.

**Carbon-14 Analysis:** A sample of wood taken from one of the timbers was radio-carbon (C-14) dated in an effort to help pinpoint a date for the vessel's construction. As a rule, archaeologists consider carbon dates over 500 years before present (BP) as fairly accurate, or within an acceptable range; dates less than 500 years BP, however, tend to be far less meaningful or significant. This is due to the fact that the margin of error in c-14 readings increases as the dates get closer to present.

Since the original main working hypothesis considered this site to be an Iberian caravel – possibly dating up to 500 BP – it was thought the radio carbon date may be significant evidence of its origin. This does not seem to be the case. The C-14 date of the sample of wood recovered from the Morgan's Island Wreck site offered a range of dates; the highest probability, however, indicates an early or mid-18<sup>th</sup> century date (see Appendix A). Even though early 17<sup>th</sup> century is within a statistical margin of error, the 18<sup>th</sup> century time frame is highly unlikely given the much earlier date suggested by both the diagnostics recorded at the site and the historical sources. The chemistry of greenheart wood (*Ocotea reodiei*), however, could provide some insight into this discrepancy.

It seems entirely probable that the C-14 date has been skewed by the oceanic carbonate equilibrium system in Bermuda, in conjunction with the highly basic greenheart. In theory shallow tropical water absorbs a great deal of carbon dioxide both from plant photosynthesis (dark cycle releases carbon dioxide (CO<sub>2</sub>) / light cycle releases oxygen) and waves mixing in atmospheric gases which include more CO<sub>2</sub>. The absorbed CO<sub>2</sub> in turn forms carbonic acid and supersaturates the water with calcium carbonate. When this calcium carbonate comes into proximity of the alkaloids trapped in the greenheart, the calcium carbonate precipitates out of the water to form a white coating on the wood much in the same way carbonates form a concretion on corroding iron (Rodgers 2004:77-81) - this much of the process is easily observable on site. The same process is no doubt happening on a microscopic level inside the wood lumina of each cell as water filters into the wood, filling the cells and cell walls with calcium carbonate. This trapped carbonate cannot be rinsed, even in an acid bath, because of the tylose and cell wall system within greenheart, which tends to compartmentalize each group of cells. Therefore, the intrinsic ultra-basic nature of greenheart, in this type of environment, has a higher probability of throwing off the C-14 readings beyond the normal margin of error. In

theory the newly formed carbon would throw the carbon 14 readings off making them appear less old. Thus, it seems unlikely, on a theoretical basis, that greenheart wood in warm, shallow-water oceanic conditions will ever be able to give accurate C-14 measurements.

## **VII. Conclusion:**

With certainty, the vessel remains at Morgan's Island are those of a single ship. The site, however, does not technically represent a shipwreck; rather it is the remains of a salvage event. Furthermore, the ship remains represent evidence of the northern European bottom-based ship construction tradition. This tradition is certainly different from what is generally seen in shipwrecks in the Western Atlantic and thus represented a challenge (as outlined below). Dutch vessels were built using preconceived mathematical ratios concerning how parts relate to each other. Witsen's formulas, for instance, allow for the deduction of all the major dimensions needed for a theoretical reconstruction of this vessel. If Witsen's formulas hold true for rudder size, the original overall length of this ship was 120 feet and the beam was up to 30 feet – much larger than originally theorized. But as well as being a challenge, these unique features provide an opportunity to study a site that is possibly 400-year-old and has obviously been through much history of its own. It can teach us a great deal about site formation process in archaeology. This is particularly true for island archeology which is not just, as Schiffer would put it, an N transform (natural) but in this case an almost exclusive C transform (cultural) (Schiffer 1987). The wrecking process in this case, literally has human agency written all over it in the form of location, as well as total disarticulation, chop cuts, and salvage pin and stake marks. Historic sources also point to the notion of human intervention in wrecking events on the island (Hallett 2007:118). Butler's account of a wayward Dutch pinnacle lost on the Western Reef in 1619 seems to dovetail nicely with the wreckage investigated at Morgan's Island. In this instance, human agency is also undoubtedly involved with the ship loss (or intentional hiding of the vessel), with both the archaeology and history aligning well to explain the evidence.

It should be admitted, however, that there is much work left to do and that interpreting this site was certainly no walk – or swim – in the park. The Morgan's Island Wreck site in Bermuda has presented a unique challenge to the archaeologists of ECU and the NMB. The vessel's unexpected construction, disarticulated condition, and its unlikely shallow deposition have combined to push the deductive, intuitive, and methodological skills of the project team to their limits. Even the chemistry of the unique greenheart wood type, of which the ship was constructed, as well as the oceanic conditions of Ely's Harbor, have combined to possibly throw off carbon testing and can only be explained through research and a full grasp of the oceanography and chemistry of the area.

Table 1. Archaeological Evidence of Seventeenth Century Origin.

| <u>Area of Site</u>                              | <u>Positive evidence for both Flemish Wreck 1615 &amp; Dutch pinnace of 1619</u>                           |
|--|--|
| Buttressed Mast Steps                            | 16th century   |
| Bow Section                                      | 16th or 17th century   |
| Futtock and Floor Timber Shapes                  | Late 16th - 17th century, Northern European  |
| Cross Section                                    | Dutch Northern flat bottom, late 16th - 1671   |
| Rudder   | Dutch 16th or 17th Century   |
| Wood Type  | Greenheart, <i>Ocotea reodiei</i> , Surinam or Guiana (Dutch plantations, end of 16 <sup>th</sup> century) |
| Salvage Marks                                    | The area is not a breakers yard, this salvage was a one-off incident                                       |
| Lead Sheathing Brass Tacks                       | Late 16th to 1606  |
| Artifacts (Cannon Truck Wheel and Ceramic Sherd) | Early 17th century   |
| Iron Hawser Liners                               | Technically feasible 16th through 20th centuries   |
| C-14 Analysis (see non-sequitur section)         | Early 18th century   |

Archaeologists rely heavily (perhaps too heavily) on visual observations; these too became skewed at Morgan's Island. The wreck, what can be seen on the surface, simply looks too pristine to be 400 years old. Furthermore, other parts of the ship look – and actually feel – like iron because of the chemistry and tremendous hardness and density of greenheart wood. The lack of wood borer attack and total lack of degradation by ligniferous marine fungus caused a great deal of confusion on many occasions, and likely delayed the scientific analysis of this site for years because it simply looked too pristine. In other words, the condition of the site did not match the diagnostic evidence.

Oddly enough the shallowness of the water also inhibited perspective. Gentle curves in the drawing of timbers often became straight lines because we could not back off far enough from the scantlings to observe them properly. This is not a problem in deep clear water where the site is always seen in miniature while descending towards it. Photographing of five-foot grid sections were also impossible as the camera lenses could not cover the entire area from the height the camera was held. Attempts made at three-dimensional imaging timbers were also thwarted in most instances by a lack of perspective combined with the suspended calcium carbonate load in the water which clouded visibility at the kick of a fin.

Research difficulties aside, the Morgan's Island Wreck is a tremendously important archaeological site and this cannot be overemphasized. Not only does it appear to represent a rare ship type, a Dutch pinnace, but its preservation is remarkable. When considering the condition of nearly every timber examined at the site, it can be conjectured that much of this four-century old vessel may exist under the seabed. Although no planking has yet been identified on the site, planking is actually the least important part of a ship for theoretical reconstruction: the frame should provide clues to its shape.

If remains represented at the Morgan's Island Wreck site are in fact those of the vessel that Butler reported on in his history, it will be the exact 400<sup>th</sup> anniversary of the event in two years. In all probability, this vessel represents perhaps the oldest Dutch-built vessel yet found in the Americas. And considering the fact that every timber sampled is likely constructed of greenheart wood, it may well be the oldest colonial built vessel yet discovered in the Americas.

Perhaps most importantly, this ship represents a tremendous asset and gift to the study and promotion of Bermudian history. This history should include the impact of privateering, wrecking, and salvage events on the island's early economy. With continued study this site may represent the first archeological/historical study of its kind, designed to follow an artifact through 400 years of history from working ship, through site formation, and finally as museum exhibit.

Final deductions here must take into account the meshing of historical sources, which are fairly complete and steady after Bermuda became a colony, with the archaeological evidence presented. History indicates that there should be two Dutch-built wrecks on the West Reef from the early 17<sup>th</sup> century: Flemish wreck (1615) and the Dutch pinnace (1619)

The Morgan's Island Wreck site, however, is anything but a classic shipwreck site, with salvage marks, the total disarticulation of scantlings, and its position all but ruling out anything but human intent. Archaeology, therefore, seems to corroborate Governor Butler's thinly veiled suspicions that the ship was intentionally wrecked or stolen and salvaged, in perhaps a "cleverly planned trick of the Governor's cunning advisors to let the ship become a wreck" (Hallett 2007:118).

Archaeological evidence from Morgan's Island suggests that this ship was recovered intact from the reef, since floors (representing the bottom of the ship), bow, and the rudder are all present on site. It seems doubtful these scantlings would survive a wrecking event that took place over a shallow reef.

The economics of wrecking events and salvage on a colonial island's economy and infrastructure are not well studied or understood. Although wreckers and salvors offered a valuable service to communities, they were often viewed as outlaws and it is certain the wreckers themselves kept few records of these activities. The Morgan's Island Wreck site must have offered the small colony the equivalent of a hardware store, a lumber yard, and an armory of weapons including the 8 to 16 cannon that would have been on board the pinnace. Since the Sommer Islands Company certainly could not have afforded to ship this kind of material wealth from England on a regular basis, the periodic wrecks (though tragic at the time for the victims), must have supplemented the island economy to a large extent.

Finally, although this site proved a hard nut to crack (both methodologically and in terms of interpretation), once the initial "ah ha" moment was reached, historical and archaeological data flowed nicely. The Morgan's Island Wreck will allow researchers to expound on unrecorded subjects such as salvage, piracy, privateering, and

wrecking, while placing them within the context of colonial economics. There is every reason to believe that continued research will be able to cover this 400-year old story with an interdisciplinary and reasonably complete overall perspective – a perspective that is afforded through historical reports, viewed in the reality of hard material evidence.

### **VIII. Recommendations**

Obviously, the Morgan's Island Wreck site deserves more research both in the field and in the archives. As one of the oldest sites in Bermuda, perhaps the oldest privateering vessel in the America's and perhaps the oldest American built colonial vessel, it will be important to document every detail of the ship's construction while also searching archives for more details and clues concerning its history. A ship as large and important as this will have records concerning it that exist in Dutch repositories that record its activities in the Caribbean.

The archaeological information from this site will also go directly to the classroom; the ECU ship construction class being offered in the Fall semester 2017 will begin to model the Morgan's Island wreck based on recorded archaeological details. Though the shape of the hull is classic and well described by Witsen, the details have not been emphasized by any other archaeological study and may indicate an older and never before recorded set of Dutch shipbuilding methods.

### **IX. Next Phase**

Only an archaeological excavation can determine and corroborate the information already collected on this site, as we as provide proof of its origins. A team from ECU will return to Bermuda in October 2017 to carry out post survey analysis and begin planning for the next phase of the project. Proposed future activities will include:

- \* Small test excavation units placed in areas of the site that have no turtle grass covering them. Furthermore, a test trench placed in the western portion of the site might also help to determine if more of the wreck lies buried under the seedbed.
- \*A visual search from the edge of the Western Reef to Wreck Hill in an effort to identify possible buoyant hull fractures or material culture trails.
- \*Historical research in various archives in the Netherlands and United Kingdom.
- \*A reexamination of archaeological and archival records for the New Old Spaniard
- \*Contact and consultation with Dutch colleagues and archaeological experts.
- \*The development of a research strategy of public education and outreach including possible outdoor exhibit design and maritime heritage trails.

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## APPENDIX A. Radio Carbon Dating Results



Consistent accuracy  
delivered on time

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**Darden Hood**  
President

**Ronald Hatfield**  
**Christopher Patrick**  
Deputy Directors

April 07, 2017

Dr. Jason Raupp  
East Carolina University  
Program in Maritime Studies  
302 E. 9th Street  
Greenville, NC 27858  
United States

RE: Radiocarbon Dating Results

Dear Dr. Raupp,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported  $\delta^{13}C$  was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS  $\delta^{13}C$  which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

Darden Hood



## REPORT OF RADIOCARBON DATING ANALYSES

Dr. Jason Raupp

Report Date: April 07, 2017

East Carolina University

Material Received: March 29, 2017

| Sample Information and Data  | Sample Code Number | Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes          |                           |  |
|--|--------------------|---|---------------------------|--|
|  |                    | Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD) |                           |  |
| <b>Beta - 482066</b>   | <b>ECUBDAMW262</b> | <b>147 +/- 18 BP</b>  | <b>IRMS δ13C: -26.0 ‰</b> |  |
| Submitter Material: Wood   |                    | (84.8%) 1720 - 1782 cal AD  | (230 - 168 cal BP)        |  |
|  |                    | (18.4%) 1915 - 1948 cal AD  | (35 - 4 cal BP)           |  |
| Analyzed Material: Wood  |                    | (16.6%) 1887 - 1700 cal AD  | (283 - 260 cal BP)        |  |
| Pretreatment: acid/alkali/acid                                     |                    | (16.4%) 1832 - 1880 cal AD  | (118 - 70 cal BP)         |  |
|  |                    | (11.3%) 1786 - 1818 cal AD  | (164 - 131 cal BP)        |  |
| Analysis Service: AMS-Standard delivery                            |                    |   |                           |  |
| Percent Modern Carbon: 98.2 +/- 0.2 pMC                            |                    |   |                           |  |
| Fraction Modern Carbon: 0.9819 +/- 0.0023                          |                    |   |                           |  |
| δ14C: -18.13 +/- 2.32 ‰  |                    |   |                           |  |
| Δ14C: -26.06 +/- 2.32 ‰(1950:2017)                                 |                    |   |                           |  |
| Measured Radiocarbon Age: (without δ13C correction): 163 +/- 19 BP |                    |   |                           |  |
| Calibration: BetaCal3.18: HPD method: INTCAL13                     |                    |   |                           |  |

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. δ13C values are on the material itself (not the AMS δ13C). δ13C and δ15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

## Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables:  $\delta^{13}C = -26.0$  ‰)

Laboratory number    Beta-462055

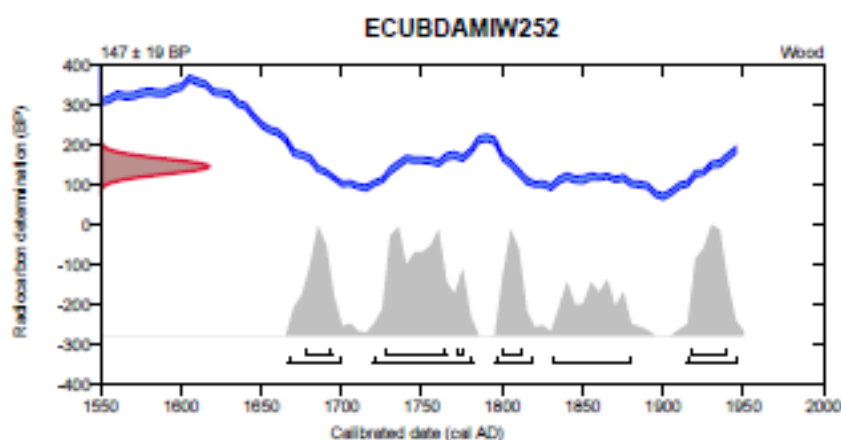
Conventional radiocarbon age     $147 \pm 19$  BP

95.4% probability

|         |                    |                    |
|---------|--------------------|--------------------|
| (34.8%) | 1720 - 1782 cal AD | (230 - 168 cal BP) |
| (18.4%) | 1915 - 1946 cal AD | (35 - 4 cal BP)    |
| (15.5%) | 1667 - 1700 cal AD | (283 - 250 cal BP) |
| (15.4%) | 1832 - 1880 cal AD | (118 - 70 cal BP)  |
| (11.3%) | 1796 - 1819 cal AD | (154 - 131 cal BP) |

68.2% probability

|         |                    |                    |
|---------|--------------------|--------------------|
| (28.5%) | 1727 - 1765 cal AD | (223 - 165 cal BP) |
| (16.7%) | 1918 - 1940 cal AD | (32 - 10 cal BP)   |
| (11.6%) | 1678 - 1694 cal AD | (272 - 256 cal BP) |
| (9.4%)  | 1800 - 1812 cal AD | (150 - 138 cal BP) |
| (2.1%)  | 1772 - 1776 cal AD | (178 - 174 cal BP) |



### Database used

INTCAL13

### References

#### References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

#### References to Database INTCAL13

Reimer, et al., 2013, *Radiocarbon*55(4).

## Beta Analytic Radiocarbon Dating Laboratory

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APPENDIX B: BERMUDA SURVEY LISENCE



GOVERNMENT OF BERMUDA

Ministry of the Environment

**Department of Environment and Natural Resources**

**Office of Marine Heritage**

**The Custodian of Historic Wrecks.**

17 North Shore Road, Hamilton Parish, FL04

Phone: (441) 293-2727

**Pre-disturbance Survey License**

**(as per Historic Wrecks Act 2001 III 8 (1))**

**Wreck Name. Morgan's Island Wreck**

**Location: 32.287114, -64.8778208**

**Granted to: East Carolina University and the National Museum of Bermuda**

**Valid for 1 year from May 3<sup>rd</sup> 2017**



Authorization Signature: \_\_\_\_\_

Custodian of Historic Wrecks

Date: May 3<sup>rd</sup> 2017