

An Analytical Comparison of Two 16th Century Shipwrecks

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ABSTRACT

In 1559, a small Spanish fleet arrived in what is now known as Pensacola Bay in Pensacola, Florida. They were to attempt the first Spanish settlement in Florida. Shortly after their arrival, severe weather crippled and sank several of the Spanish ships. Underwater archaeologists found the first of the lost fleet in 1992, and have conclusively identified it as one of the missing Spanish ships. A second ship has been found nearby and is undergoing excavation. Hundreds of artifacts have been recovered and are being compared to those from the first shipwreck. Through comparative analysis of site features, wreckage, and the artifacts recovered, it is possible to determine if this second wreck is indeed part of the same Spanish fleet.

INTRODUCTION

In 1559, the Spanish first attempted to settle what is known today as Florida. The expedition and fleet of ships was the responsibility of Don Tristan de Luna y Arellano (Scott-Ireton, Della 1998). The Spanish viceroy of New Spain wanted to establish a claim to the new territory in an effort to keep other European powers, especially the English and French, out of the fringes of the new area of the empire. This new colony would also “protect the route of treasure fleets as they returned to Spain and provide relief to shipwrecked Spaniards” (Scott-Ireton, Della 1998).

Tristan de Luna set sail from the New Spain port of Vera Cruz on June 11, 1559. His destination was to be Ochuse (Pensacola Florida). Eleven ships “loaded with 1500 people, including entire families of settlers, slaves, soldiers, priests, artisans, craftsmen, and Aztecs” and “sufficient materials and supplies to build an entire Spanish town” as well as several hundred horses and cattle (Scott-Ireton, Della 1998) entered Pensacola Bay on August 15, 1559 (appendix figure 2).

September 19 saw the arrival of a massive hurricane. The fleet had only been in Pensacola a short time; hence, not all of the materials and supplies had been unloaded. Three of the smaller ships survived the storm, but the larger ships that contained much of the supplies were lost (Scott-Ireton, Della 1998). With the loss of the majority of their supplies, chances of the settlements survival deteriorated.

Tristan de Luna's colonization attempt became known not only as a failure but proved a valuable lesson for the Spanish Crown. This attempt proved many of the difficulties in establishing a presence in the Northern Gulf and allowed for a better-prepared attempt when the Spanish would return to Pensacola over 100 years later in 1698. (Scott-Ireton, Della 1998).

In 1992, a group of archaeologists from the Florida Bureau of Archaeological research located the first suspected shipwreck from the ill-fated de Luna fleet in Pensacola Bay during a magnetometer survey. Magnetometer surveys detect small variances in the earth's normal magnetic field and can detect even the smallest potential targets (Dean et. al. 1995). The historic Pensacola Preservation Board along with the University of West Florida conducted investigations and found the lower hull of the colonial Spanish ship and much of its contents to be well preserved. After years of excavation and analysis it was conclusively determined that this shipwreck was indeed part of the Tristan de Luna Fleet. The finished planform drawing from this site is shown in the appendix, figure 1.

After further magnetometer survey and subsequent dives, archaeologists from the University of West Florida located a second potential shipwreck during the summer of 2006. A single stone was found resting on the sandy bottom of Pensacola Bay, Florida. Natural stone does not occur in this region and is usually associated with either a ballast pile or a ballast dump site. Excavations began on this site in the spring of 2007. Test excavations on a 1m x 1m unit revealed timbers. The discovery of timbers along with ballast stones in close proximity of the first Tristan de Luna shipwreck roused suspicions that perhaps a second ship from Tristan de Luna's fleet may have been found. After three

months of excavation, striking similarities were revealed about both sites. I, along with the other students and supervisors, collected hundreds if not thousands of artifacts, all of which are undergoing preservation and cataloging at the conservation lab located at the University of West Florida. Among the artifacts recovered are fragments of Spanish ceramic vessels, rope, mercury, and organics consisting of botanical remains, faunal remains, and residues found on olive jar fragments.

As the excavation progresses, more similarities between the two sites have been noted. The orientation of the wrecks, depth of water, ship construction comparisons, and continuing artifact analysis lends support to the theory that a second Tristan de Luna ship has been found.

This impact of this new find has significant cultural, historical and archaeological implications for Pensacola and Florida. St. Augustine, Florida is recognized as the oldest continually occupied city in United States history. However, few people know that the first settlement attempt was in modern Pensacola, Florida. The Tristan de Luna fleet is an important part of Pensacola history and creates a cultural identity for the city. The developing knowledge of Tristan de Luna's fleet also contributes to Florida history and will expand our knowledge of Spanish settlement attempts.

Most of the shipwrecks that are of interest and have been investigated are either treasure ships or warships. This new fleet lets archaeologists examine a relatively neglected aspect of history. For one of the first times it is possible to gain an insight into the preparations that were made and necessary for a successful colonization. Although to the public this is not as glamorous as the earlier mentioned ships, to archaeologists these newly found ships are a rare and important source of knowledge.

METHODOLOGY

The methodology employed for this research is focused into three subcategories site elements, ship elements, and artifact comparisons. The two sites being compared have been termed the Emanuel Point One and the newer Emanuel Point Two. After 12 weeks of excavation and over 90 hours of diving operations on the Emanuel Point Two, I have gathered enough data to compare the many aspects of both sites. Two questions that I need to address are; is the Emanuel Point Two ship Spanish, and did it sink during the same catastrophic event that was described by Tristan de Luna? Since the Spanish did not return to Pensacola for over one hundred years, when answered, these two questions will help support my hypothesis that the Emanuel Point Two is indeed a Tristan de Luna ship.

The data and information that I used to base my research about the Emanuel Point One comes from site reports filed by the archaeologists who fully excavated that site. The excavation spanned over six years, with the second and final report of findings being published in 1999.

Data for the Emanuel Point Two was gathered during my field school experience and is supplemented by my field notes and lab work that I performed during the summer of 2007. All photos used in this paper were taken during the 2007 field school unless otherwise noted.

SITE ELEMENTS

Both Emanuel Point One and Emanuel Point Two are located just off the northern coast of Pensacola Bay east of Three Mile Bridge. The locations of the sites have been placed on the map in the figure below, but not in their exact positions. This was done intentionally to protect the sites while archaeologists continue excavations. Each site is located under approximately 12 to 14 feet of water, depending on tidal conditions and is located under similar strata (Schoenleben 2007).



Figure 1.0: Aerial view of modern day Pensacola Bay from 2.0km above the surface with approximate locations of Emanuel Point sites

The bottom of Pensacola Bay is composed of fine sand and silt. Strong tides combined with shallow water create significant movement of the sandy bottom. When the ships sank and were destroyed, the movement of the sand quickly covered the remains and created an efficient condition for preservation. Below the sand, a second strata composed of mollusk shell creates a dense layer. Wreckage creates a temporary artificial reef on which oyster, crabs, and fish thrive (Muckelroy 1998). Years of deposition created these secondary strata. Below these strata, loose sand and silt created the original depositional strata on the sites. This strata infiltrated the remains of the wreckage as it was covered and disintegrated. It is in the strata, “artifacts and other remains associated with the wrecking and subsequent slow collapse of the ships are found, while those that accumulated in the bottom of the vessel during its sailing career are trapped in a dense but soft organic deposit between the ship’s frames and in its bilge” (Smith et al. 1999).

Below the hull timbers is the original sterile sand from the sand bar on which the ships ran aground. This sediment layer is characterized by its clean, gray sand mixed with pieces of ancient shell and even worms. Figure Two demonstrates the stratigraphic layers present at the sites. This photo was taken by a University of West Florida diver during the summer of 2007 field school.

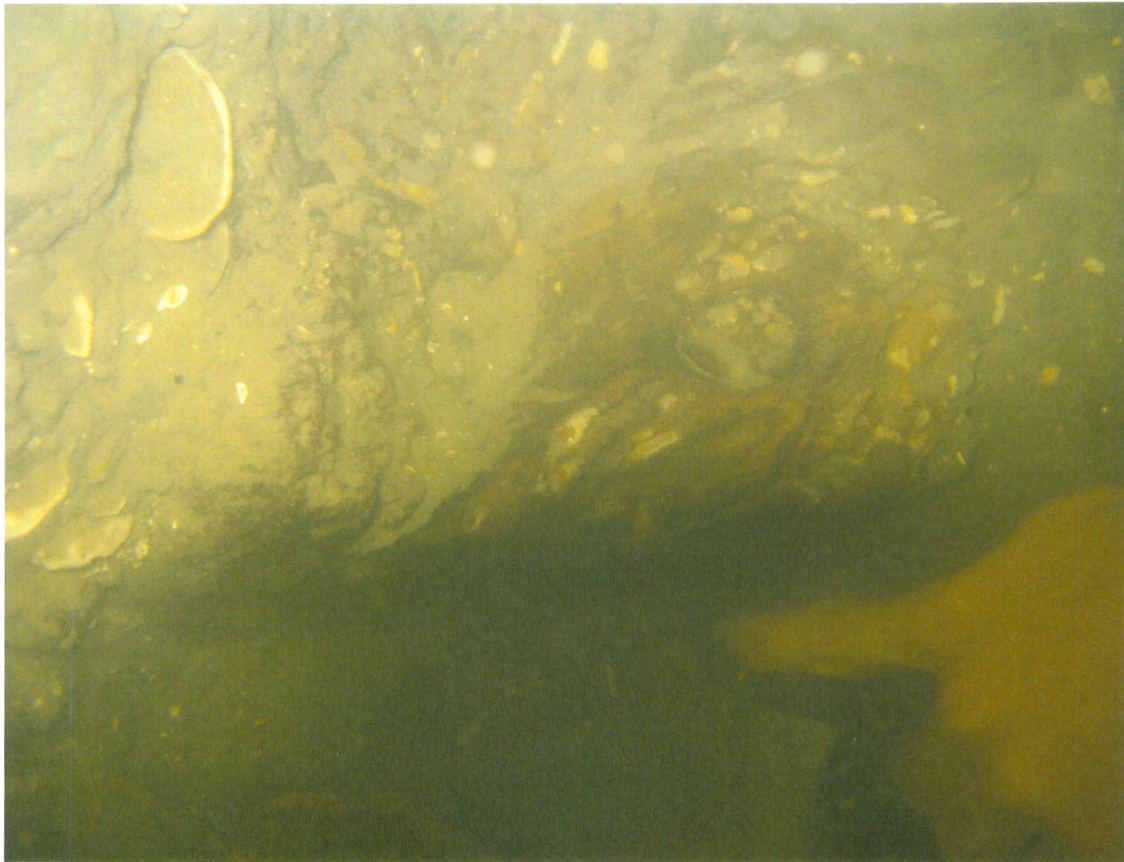


Figure 2.0: This photo illustrates the different strata of the Emanuel Point Two. The sandy, silty layer is present in the upper left corner of the photo, just covering the dense mollusk strata. The diver is pointing to the fine sand fill that penetrated the wreck as it decomposed. Just below the index finger is a small olive jar sherd. Notice the boring marks on the wood from marine worms.

SHIP ELEMENTS

CONSTRUCTION

Construction elements of both Emanuel Point shipwrecks will indicate the overall size and perhaps function for each. Keel length and the ship's beam are particularly

useful for determining ship length and cargo capacity. Overall tonnage of the ships can then be calculated. Although it will not be possible to know the exact original capacities and sizes, comparisons to known Spanish ships that sailed during the turn of the century will allow us to make valuable and accurate assumptions.

The Spanish fleet was composed of vessels termed galeones, naos, caravelas, frigates, and barcas. The newest ship to appear and be utilized in American waters was the galleon. This new ship was created due to a need for increased speed and defensive power, especially for transatlantic travel. This sixteenth century design was large, with three or four masts, and tended to be unstable and top heavy when overloaded. (Smith et al. 1999)

The nao is a term that has been well defined as a type of merchant vessel. These ships became great cargo ships, with strong hulls and a combination of square and triangular sails on three masts (Smith et al. 1999). These workhorses of the fleet were the preferred carriers of supplies, cargo, and colonists to build new settlements. Seven naos, along with four other ships, arrived in Pensacola Bay under Tristan de Luna's command on August 15, 1559 (Priestly 1928).

Name	Type	Disposition
San Juan de Ulua	Galleon, or nao	His Majesty's ship (the new galleon) built in Veracruz for the expedition, sent back before the hurricane, became a relief ship
San Anton, a.k.a. Tanton	Nao	His Majesty's ship, purchased for expedition, probably sent back to Veracruz, participated in relief voyage
San Andres	Nao (498 tons)	Master Salvador Fernandez, pilot Francisco Martin, to carry people, horses, and munitions
Espiritu Santo, a.k.a. Santo Espritutu	Nao, navio, or caravel (42 tons)	His majesty's ship, master Alonsa Carillo or Jn de Guerto, pilot Joan Balenciano, to carry people, horses, and provisions
Santa Maria de Ayuda	Nao (100 tons)	Master Anton Martin, to carry people, horses, and provisions
Santiago	Nao	May have survived hurricane, a patax(patache) named Santiago was a relief ship
Santo Amaro	Nao	Master Christobal de Sobar
San Luis	Barca	Master Hernan Rodriguez, pilot Gaspar Goncales
La Salvadora a.k.a. Salvadora	Barca	Built new in Veracruz
Corpus Cristi	Barca	His Majesty's ship, master Francisco Guadalupe, pilot Cristobal Rodriguez, probably lost in hurricane
Unknown	Frigata	Built in Veracruz

Table 1: Chart copied from Smith et al. 1999

Diego Garcia de Palacio published one of the first volumes on Spanish shipbuilding, the *Instruccion Nautica para navegar*. In this published work Palacio outlines the dimensions required to build a nao of 400 tons. This is a useful bit of information to create a hypothetical reconstruction of Emanuel Point One.

Spanish shipwrights used a standard of measurement called the codo, or cubit. The value of the codo has varied through time and regional usage. The standardization of measurements was attempted by the Spanish government, but quite often traditional

values persisted. (Smith et al. 1999) The modern value of the codo (royal cubit) is 56.5cm. (Smith et al. 1999) This value is only 0.1cm larger than the mathematical average of the variable traditional values of a codo. Therefore, the value of the codo for the purpose of all Emanuel Point calculations has been based on the codo value of 56.5cm.

The overall length of the Emanuel Point One was estimated to 29.5m or 52.21 codos by the Archaeology Department at the University of West Florida. When compared with proportions recorded by the shipwright Palacio, the measurement is equivalent to Palacio's 400-ton model. Palacio wrote that a ship of 400 tons should have 34 codos of keel and 16 codos of beam, 11.5 codos depth of hold, and a length of 51.33 codos. The Emanuel Point One is estimated to have 35.65 codos of keel and 16.77 codos of beam, 8.05 codos depth of hold, and a length of 52.21 codos. (Smith et al. 1999) A common Spanish formula common in Spain during the 16th and 17th centuries for determining tonnage - $[(\text{depth of hold} \times \text{beam})/2] \times \text{length on deck} = A$, then $A/8 =$ tonnage - can be applied to the Emanuel Point One to give a tonnage of 441 toneladas or 418 metric tons.

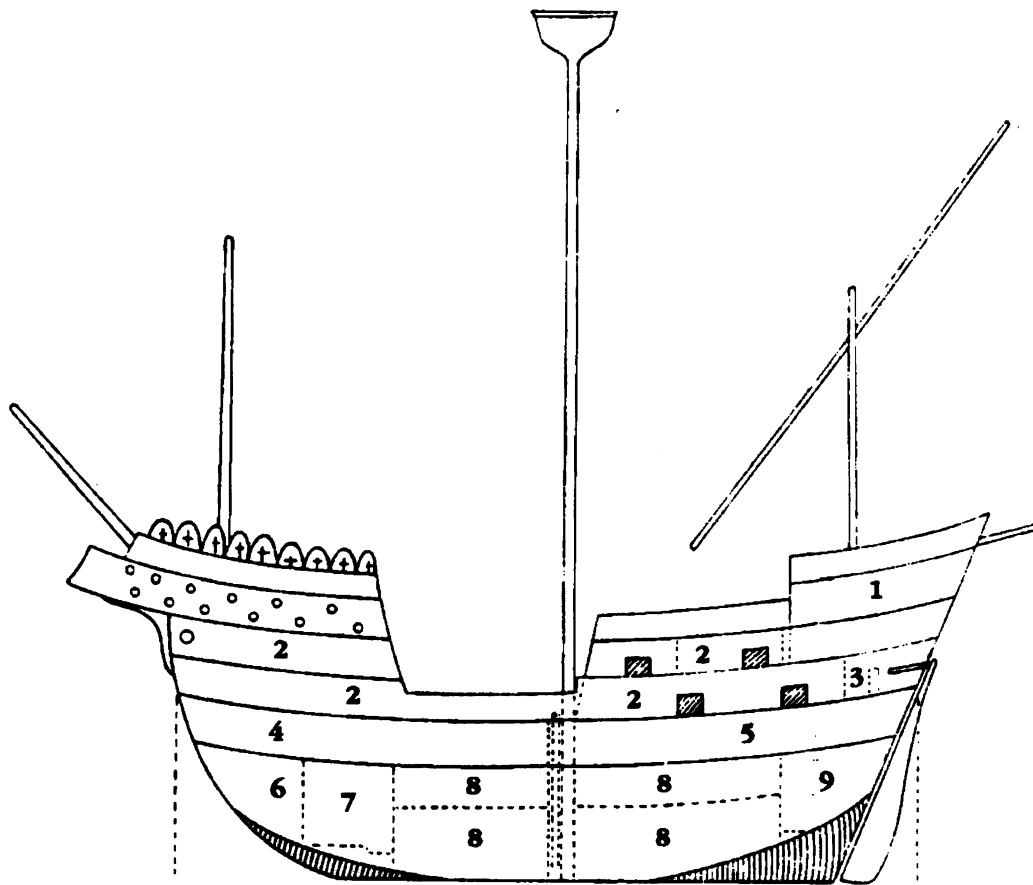


Figure 3.0: Cross section view of a 400 ton Spanish Nao of the 16th Century, with two decks and carrying 150 men. 1) Quarters of the officers and pilot; 2) quarters of the minor officers and mariners; 3) pilot house; 4) passenger's quarters; 5) soldier's quarters; 6) locker of anchors and cable; 7) provision storeroom; 8) cargo hold and ballast; 9) boatswain's storeroom. Image reproduced from Roger C. Smith, James Spirek, John Bratten, and Della Scott-Ireton

Excavations of the Emanuel Point Two are ongoing and basic ship dimensions may have to be updated as more is learned about the ship. When we probed the limits of the ship remains, we noticed that this ship is significantly shorter than the Emanuel Point One, 18.6m as opposed to 29.5m, with a narrow beam of 5.5m. When I substituted these values into Palacio's formula, I estimate that the ship is approximately 50 tons.

According to the manifest of ships under de Luna's command, a 42 ton nao, the *Espiritu Santo*, carried horses and provisions for the colonists and was lost with the rest of the fleet (Priestly 1928). The full list of vessels present in Tristan de Luna's fleet is represented in Table 1.

Wood core samples have been taken from both sites by students from both previous field schools and the 2007 field school of which I was a part of. The species of wood can potentially show where each ship was constructed. Although the information garnered from this will potentially prove that each of the Emanuel Point ship was built in the same region, there is a possibility they were not. However, this in itself does not disprove my theory. It was common for ships to be commandeered from different nations or merchants. Therefore, a fleet sailing under the Spanish flag could be, and commonly were, a varied and eclectic bunch.

Wood samples from Emanuel Point One were taken from 18 stations. Seventeen samples were positively identified as *Quercus* sp., white group, commonly referred to as white oak (appendix table 1). The origin of white oak is both the new and old world. One core sample taken from tail frame #6 was unidentifiable but was a hardwood. All wood samples were examined and identified by the Forest Products Laboratories in Madison Wisconsin and the Center for Archaeological Research, Southern Illinois University at Carbondale.

Dunnage is wood in the form of branches and loose timber used to pack around cargo to keep the cargo from shifting. Dunnage samples from Emanuel Point One were identified as *diospyros* sp., common name persimmon, and is found in both the old and

new world. Other dunnage samples were identified as *carpinus* sp. (*C. caroliniana*), common name ironwood or blue beech, and is found in North America.

Wood samples from the Emanuel Point Two have also been positively identified as *Quercus* sp., white group as well (appendix table 3). There is one sample that has been identified as red oak.

Dendrochronology is a technique that has been used to date other wooden shipwrecks, but none as old as the Emanuel Point wrecks. According to Wendy Welsh, assistant conservator to the State of North Carolina in charge of the Queen's Anne Revenge, dendrochronology can be tedious and difficult at best. Wood samples are cross sectioned and either air dried or stabilized with a bulking agent such as PEG (polyethylene glycol) prior to examination. The variances between growth rings are then analyzed for climatic stresses imposed on the timber while it was still growing. These stresses are presented as thinner than normal lines while thicker lines are evidence of prosperous healthy growth years. The results are then compared to a known dendrochronological timeline to estimate an age. Comparative analysis of the samples taken from both Emanuel Point One and Emanuel Point Two would be useful in determining if the two ships were constructed from timbers of the same relative age.

This technique has not been used on the Emanuel Point Wrecks; instead more positive dating techniques based on the recovered artifacts from both wrecks have been and are being employed.



Figure 3.0: Example of White Oak sample removed from Emanuel Point Two

LEAD SHEATHING

Lead sheathing is a construction technique that shipwrights utilized to protect and seal seams between planks and around through-hull fittings. Wooden ships sailing through southern Atlantic waters and around the Americas were subject to predation by the *Teredo navalis*, or shipworms. These worms thrive on a diet of white oak and quickly bore holes in timber, much like termites. One of the more inexpensive methods of dealing with this problem was to cover the hull of the ship with a very thin sheathing of pine planking that was nailed into place. This sacrificial sheathing could be replaced as

needed. A more permanent method was to attach thin lead sheets to vulnerable areas of the hull. (Smith et al. 1999)

Large amounts of lead sheathing have been recovered from both of the Emanuel Point One and Emanuel Point Two shipwrecks. The pieces from the Emanuel Point One range in lengths from 7cm to 75cm, widths from 6 to 21cm, and thicknesses from 1mm to 3mm (EM92). Around 35 pieces of lead have retained their original straight, flat shapes. Some 200 other fragments are too mangled to be considered diagnostic (Smith et al. 1999).

Analyzing tack hole patterns and lead sheathing shapes indicates that the Emanuel Point One had much more lead on the hull than those of other 16th century ships (Smith et al. 1999)

Large amounts of lead sheathing have been recovered from the Emanuel Point Two. The unordinary amount of lead from this second ship indicate that this ship was sheathed in much more lead than its 16th century contemporaries as well. Much of the lead sheathing recovered is in a mangled, contorted state and is not diagnostic. However, the amount of lead recovered still gives a clear indication of the amount of sheathing used.

The amount of lead recovered from both sites suggest “extensive, though not total, sheathing of the hull, primarily to protect planking seams” and “the ship was in use long enough to require at least some patching of leaks that developed over its sailing career” (Smith et al. 1999). It is not only unusual to recover such a large amount of lead sheathing from a single site, but it is remarkable that large amounts are being recovered

from both sites. This is a clear indication that the ships were most likely maintained as part of the same fleet and most likely had a long history of sailing together.

ARTIFACTS

Hundreds of artifacts, if not thousands, have been recovered from Emanuel Point Two. My dive partner and I recovered many types of artifacts that are common between both ships, these include: Spanish ceramics, rigging, mercury and organic items such as botanical and faunal remains. The majority of the items that we recovered were found in the layer of silt that initially infiltrated the wreckage, underneath the mollusk strata.

CERAMICS

The Spanish ceramics that we recovered are primarily fragmented olive jars (with and without organic residues), and tin glazed Majolica sherds (appendix table 2). The vast majority of the ceramics recovered from both ships have been of Spanish coarse earthenware in the form of olive jars. Olive jars are descendent from the amphorae containers of the Mediterranean. James Hunter III of the University of West Florida created several drawings of rim shapes and of a reconstructed olive jar which are shown in figure 3 in the appendix. They were used for storing a variety of goods ranging from dried food stuffs to liquids such as wine, olive oil, and honey (Smith et al. 1999).

Containers which held liquids were sealed on the internal surface using a pine pitch. This

pitch residue is still on many of the fragments of the olive jars that have been recovered from both Emanuel Point One and Emanuel Point Two (figure 4.0). Future chemical analysis of the pitch residue may reveal which liquids had been stored in certain olive jars.

Centuries of shipbuilding in Southern Europe depleted wood supplies. The lack of wood required the use of versatile alternatives to wooden barrels and casks. Olive Jars offered an easy to transport and stackable method of transporting goods. The high strength and ease of reusability made these containers valuable. They are commonly found in Spanish colonial sites, and are especially common on Spanish Shipwrecks (Smith et al. 1999).

“The traditional work of olive jars is the work of Goggin (1960), who divided the containers into three distinct styles (early, middle, late), based on vessel form and rim shape” (Smith et al. 1999). The paste characteristics and rim thicknesses of the Emanuel Point One olive jar sherds fit within the middle style as defined by Goggin. (Smith et al. 1999)

George E. Avery has documented for the first time, a gradual change in rim styles. “Using examples of rimsherds from the St. Johns wreck (1500-1550), the Padre Island wrecks (1554), the Spanish Armada wrecks (1588), Rosario (1590), San Martin (1618), an unidentified wreck believed to be from the 1622 fleet, Concepcion” and a few early 18th century Spanish wrecks “Avery has recorded the transition from an early to mid 16th-century inverted teardrop rim shape, to a curved, triangular in profile rim shape that begins in the 1580’s” (Smith et al. 1999). The rim shape evolved to an “elongated, question-mark shape, culminating in a fat, donut rim profile” (Smith et al. 1999).

When compared with the chronological outline compiled by Avery, the rimsherds from both Emanuel Point One and Emanuel Point Two are similar to those from the “St. Johns and Padre Island sites, which date from the early to middle of the 16th century” (Smith et al. 1999). George Avery’s chronological chart demonstrating changing rim styles is shown in figure four in the appendix.



Figure 4.0: This photo demonstrates the interior surface of an olive jar sherd, exhibiting pine pitch sealant

The other form of Spanish ceramic I recovered from the Emanuel Point Two that is common between both Emanuel Point sites is tin-glazed majolica. Majolica is a

ceramic characterized by a soft paste and a vitreous opaque glaze (Smith et al. 1998). Majolica is a ceramic considered to be middle to high class item (Smith et al. 1998). The relatively low number of sherds recovered would indicate a low number of middle to higher status passengers, or that most of the majolica had been salvaged.

Most of the sherds were heavily discolored to a dark gray or black color, as evident in figure 5.0. “This discoloration results from a chemical infusion of sulfur and iron compounds in the reduced oxygen atmosphere” of the sites (Smith et al. 1998). The natural coloration of the sherds is attained by a short period of immersion in a low concentration solution of hydrogen peroxide (usually 3-5%).



Figure 5.0: An example of recently recovered majolica is seen in top center of this collection of artifacts. Notice the dark black appearance.

Other Ceramic material recovered from the Emanuel Point One was identified as Central American in origin. Similar red ceramic was recovered from the Emanuel Point Two, and is undergoing analysis at the University of West Florida conservation lab. It is well documented that Tristan de Luna incorporated many Aztecs into his colonization group (Priestly 1928). If the unidentified ceramics are Central American in origin, it would be a decisive indication that the Emanuel Point Two sailed with the rest of the de Luna Fleet into Pensacola Bay in 1559.

RIGGING

A few samples of rope have been recovered from both Emanuel Point ships. Samples of 2cm diameter and 6cm were found on the Emanuel Point One site, while smaller 2cm diameter rope has been found on the Emanuel Point Two. Although the samples varied in states of preservation, they are easily identified as a hemp variety of rope (Smith et al. 1998).

MERCURY

Quantities of mercury have also been found at both sites. Approximately 250ml (3,270 grams) was recovered from Emanuel Point One. We also recovered trace amounts of liquid mercury from Emanuel Point Two, but with only partial excavations having been completed at this time this is not surprising.

Loose mercury was found “adhering to small concretions recovered from the mast step assembly and again from the sternpost area” (Smith et al. 1998) of Emanuel Point one. The loose mercury recovered from Emanuel Point two was also found near the stern deep in the excavated test units.

Mercury, also called quicksilver, is smelted from cinnabar ore and was an important material used to separate silver and other precious metals from crude ores. The “liquid metal formed an amalgam with nobler metals when heated in a mixture of their ores; it was then extracted through distillation for reuse” (Smith et al. 1998).

“Mercury first came to Florida with the expedition of Luna in 1559. Viceroy Velasco wrote to Luna that he was sending a special red stone (cinnabar) of quicksilver metal and the pellet (gouarro) that when with it, as well as instructions on how to use them”(Smith et al. 1998).

The historical account of mercury being present with Luna is important when considering the presence of such quantities of mercury as a diagnostic trait of the Emanuel Point sites.

VERTEBRATE FAUNAL REMAINS

According to written records, several hundred horses and other livestock were transported by Tristan de Luna’s fleet from the New Spain port of Vera Cruz to modern day Pensacola (Priestly 1928). Faunal remains have been recovered from both Emanuel Point sites which indicate a variety of animals were present on board, just as recorded. A tally of faunal remains from the Emanuel Point One is listed in table five of the appendix.

“Three hundred ninety-four butchered bones were recovered” (Smith et al. 1998) from Emanuel Point One during the 1997 archaeological excavations. The majority of the bones were ribs from larger mammals such as cows and horses. Some smaller examples were representative of domestic chickens, pig, deer, sheep or even goat.

Along with the mammal remains, another 169 specimen were fish remains. However, none of the marine remains showed signs of butchering and are considered intrusive remains (Smith et al. 1998).

A few remains of different fauna were recovered from Emanuel Point Two. Most notable were a rib most likely from a pig that we found in a partial concretion, and small leg bones thought to be from a turtle. Marine remains were also recovered and are thought to be intrusive remains as with the Emanuel Point One.

BOTANICAL REMAINS

Botanical remains from Emanuel Point One included 108 specimens. Along with 59 olive pits, several other botanical species have been identified by the conservators working in the conservation lab at the University of West Florida and Southern Illinois University (appendix tables 3 and 4). These specimens include acorn, unidentified seeds, nutshell fragments, and cherry stones.

Two species of olive pits have been identified as Gordal olives, as they are known in Spain, and the mission olive. Mission olives were one of the first varieties introduced to the new world. The name refers to the fact that they were brought to California by missionaries (Smith et al. 1998).

Olive pits (both gordal and mission), acorn, hazelnut, hickory nut, plum, and peanut husk has been recovered from the Emanuel Point Two site. However, it is most likely that the peanut was an intrusive deposit that found its way into the site. Although early Spanish accounts of the peanut can be traced as far back as 1502, peanuts weren't introduced to North America until the 17th century.

RESULTS

As with any archaeological excavation, artifacts are arguably the most important form of data collected. The artifacts recovered from both Emanuel Point shipwrecks are revealing clues about the origin, function, construction, and life of the ships before their untimely destruction.

The sheer volume of data we recovered gives us enough information to interpret the sites and compare them with one another to determine if they are indeed part of the same fleet.

I measured both ships at approximately twelve to fourteen feet under water (depending on tidal conditions) with a meter of sand, shell, and silt covering the wreckage. The strata layers are composed of a top layer of sand, followed by a layer of mollusk shell, another layer of sand that was deposited by shifting currents at the time of the ships destruction, and finally the sterile sand and silt that formed the sand bar that the ships came to rest on. The stratigraphic layers are identical at both sites and artifacts from both sites were recovered from similar stratigraphic positioning. Without any indication of secondary deposition and intrusive activities from marine life, the recovered

artifacts at both sites appear to have been deposited at the same time, indicating the ships sank as a result of the same catastrophic event.

Wood samples indicate that both ships were constructed of white oak. The number of samples taken from various locations along both ships eliminates the chances of misidentification due to bad sampling.

By applying the measurements from both Emanuel Point One and Emanuel Point Two to Diego Garcia de Palacio's published volume on Spanish shipbuilding, the *Instruccion Nautica para navegar*, we can compare the Emanuel Point ships to a model of a 400 ton nao (a common form of large galleon that sailed in the 16th century). The results show that the Emanuel Point One was a large ship, displacing approximately 418 tons. The Emanuel Point Two was a much smaller ship, displacing only 50 tons. The smaller size of the Emanuel Point Two explains why some of the artifacts that were recovered off of the Emanuel Point One are not found on the smaller ship.

The Emanuel Point Two was a supply ship to the colony. It most likely was loaded with horses and provisions, and did not have the room to carry armaments such as cannons. Swivel guns may have been in place on the top deck, but these would have been easily salvaged by the settlers after the ships sank. This smaller ship would not have carried a large crew and was protected from attack by the rest of the fleet, particularly the larger, heavily armed ships such as the Emanuel Point One.

Lead sheathing has many uses for the protection and repair of wooden sailing ships. Lead can be used to seal seams and planking from leaks, especially around through hull fittings. It also creates an effective barrier to protect the white oak hull from *Teredo navalis*, or shipworms. The intensive use of lead sheathing on the Emanuel Point

ship wrecks is unusual and indicates that the ships were managed and cared for under the same fleet. An alternative to lead sheathing is a thin planking of pine that covers the white oak hull. *Teredo navalis* do not attack the pine with the same appetite as they do with the white oak. The thin planking is cheaper and replaceable but not nearly as permanent as lead.

Ceramic analysis has proven that both ships carried the same type of Spanish coarse earthenware olive jars and majolica. Based on the research by George E. Avery, the rim styles of the olive jars have been identified as early to mid 16th century. Olive jar sherds recovered from both sites also exhibit similar impurities and inclusions in the paste. The vessels appear to have been constructed quickly and the pastes were not processed as thoroughly as usual. Further analysis of the paste matrix would show if the clays are Central American in origin and that the olive jars were constructed in Vera Cruz and not Spain.

According to historical accounts, Tristan de Luna included Aztecs in his colonization attempt. Evidence for this is limited, but is supported by an assemblage of unusual ceramic sherds. This assemblage of red pottery from the Emanuel Point one was positively identified by the University of West Florida Conservation Lab as being Central American in origin. Small amounts of unidentified red ceramic has been recovered from the Emanuel Point Two and is awaiting analysis.

Organic remains are extremely rare on old shipwrecks. Marine life eats and destroys most organics in short order. However, rope has been found and preserved from both of the Emanuel Point ships. Two sizes of rope with different diameters, 6.0 cm and 2.0 cm, are associated with the larger ship while only the smaller variant has been found

on the smaller Emanuel Point Two. All rope samples are hemp in origin, but further analysis would show the exact construction and makeup of the rope rigging. It has been possible to test rope rigging from other shipwrecks for pollen samples that were embedded in hemp fibers at the time the ships sank, but the samples removed from the Emanuel Point ships may be too deteriorated to apply this technique.

Varying amounts of liquid mercury is present on both Emanuel Point ships. Mercury is a heavy, tricky material that penetrates the lowest, deepest recesses of the ships. Most of the mercury recovered was found in the stern of the hull remains at both sites. Mercury was first introduced to Florida by order of the viceroy of New Spain. The mercury suddenly becomes a very important diagnostic artifact when it is placed on a mid 16th century Spanish ship in Pensacola Bay.

Faunal and botanical remains recovered from both sites are similar and support Tristan de Luna's historical records of the variety of provisions that the Spanish carried to Pensacola Bay (Ingram 1928).

CONCLUSIONS

On September 15, 1559 the first Spanish attempt to establish a new colony in modern day Pensacola met disaster with the arrival of a powerful hurricane. Many of the ships under command of Tristan de Luna broke apart and settled in the shallow water off of Emanuel Point. Soft sand and strong currents covered the remnants of the ships and preserved them for future excavations.

After the storm subsided, salvage efforts by the settlers recovered some of the ships equipment and cargo.

The ships were constructed by traditional Spanish methods of building vessels for transatlantic travel. Timbers of white oak were chosen for their proven seafaring reliability and durability (Muckelroy 1998). Measurements taken of both Emanuel Point ships reveal a large difference in size. The Emanuel Point One was a very large, armed 418 ton galleon. The artifacts that recovered from the Emanuel Point One show a large crew, and a large number of passengers.

The much smaller Emanuel Point Two was a supply ship that was lightly armed and sailed by a much smaller crew. An unusually large amount of olive jar fragments support the idea that this ship was heavily laden with provisions.

Results from archaeological excavations and artifact analysis show that both of these ships are Spanish and that their last port of origin was most likely Vera Cruz, Mexico.

Artifact analysis has provided an estimated date range from the early to mid 16th century. Tristan de Luna's expedition was destroyed in 1559, and the Spanish did not return to the area for almost 100 years. This long period of Spanish absenteeism from the gulf coast of Florida, along with the overriding evidence from site and artifact analysis supports the hypothesis that these shipwrecks are members of the fleet lost by Don Tristan de Luna y Arellano and are not part of any other Spanish fleet.

APPENDIX

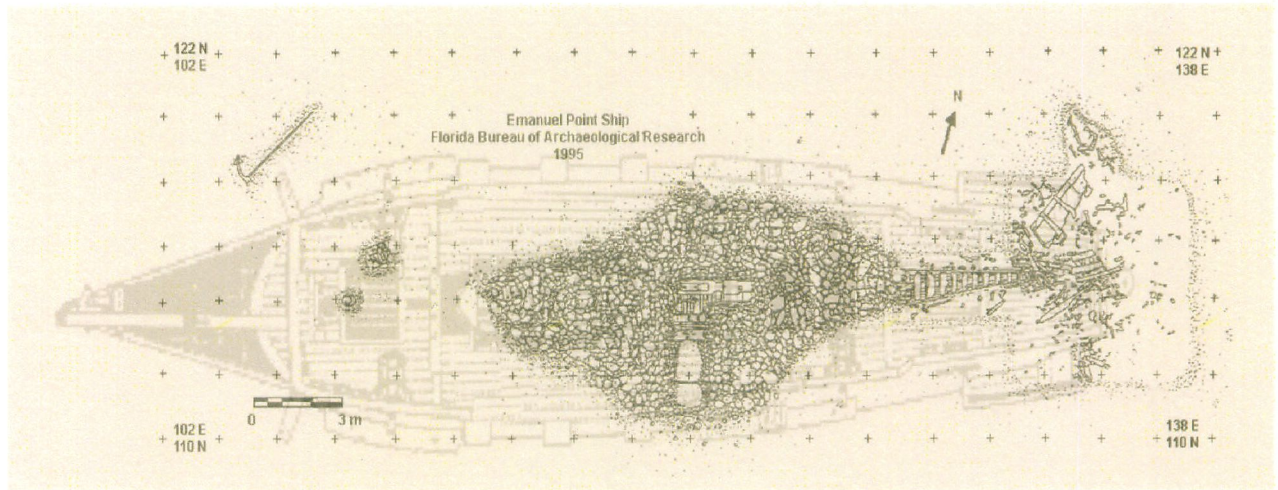


Figure 1: Plan form drawing of Emanuel Point One illustrating the distribution of hull remains and ballast pile distribution



Figure 2: Projected route from Vera Cruz to Ochuse (Modern Day Pensacola Bay, Florida)

Table 1: Wood core sample results from the Emanuel Point One. Charts are reproduced from Smith et al 1998

Wood Sample Identifications from Forest Products Laboratories,
Madison, Wisconsin

Hull Timber	Identification
Stern post	oak, white group
Rudder, aft edge	oak, white group
Frame #2	oak, live group
Keel (between frames 9 & 10)	oak, white group
Frame #6	oak, live group

Timber Identification from the Center for Archaeological Research, Southern
Illinois University at Carbondale.

Hull Timber	Identification	Comments
Frame #1	oak, white group	inclined toward European forms
Frame #2	oak, white group	inclined toward European forms
Frame #3	oak, white group	inclined toward European forms
Frame #4	oak, white group	inclined toward European forms
Frame #5	oak, white group	inclined toward the European forms; the growth rings are so well matched to those in the Frame #1 specimen as to suggest that these frames derive from the same tree or at minimum the same forest (certainly at least a neighboring tree).
Frame #6	oak, live group	inclined toward American affiliation
Frame #7	oak, live group	inclined toward American affiliation
Frame #8	oak, live group	inclined toward American affiliation
Frame #9	oak, white group	inclined toward European forms
Frame #10	oak, white group	inclined toward European forms

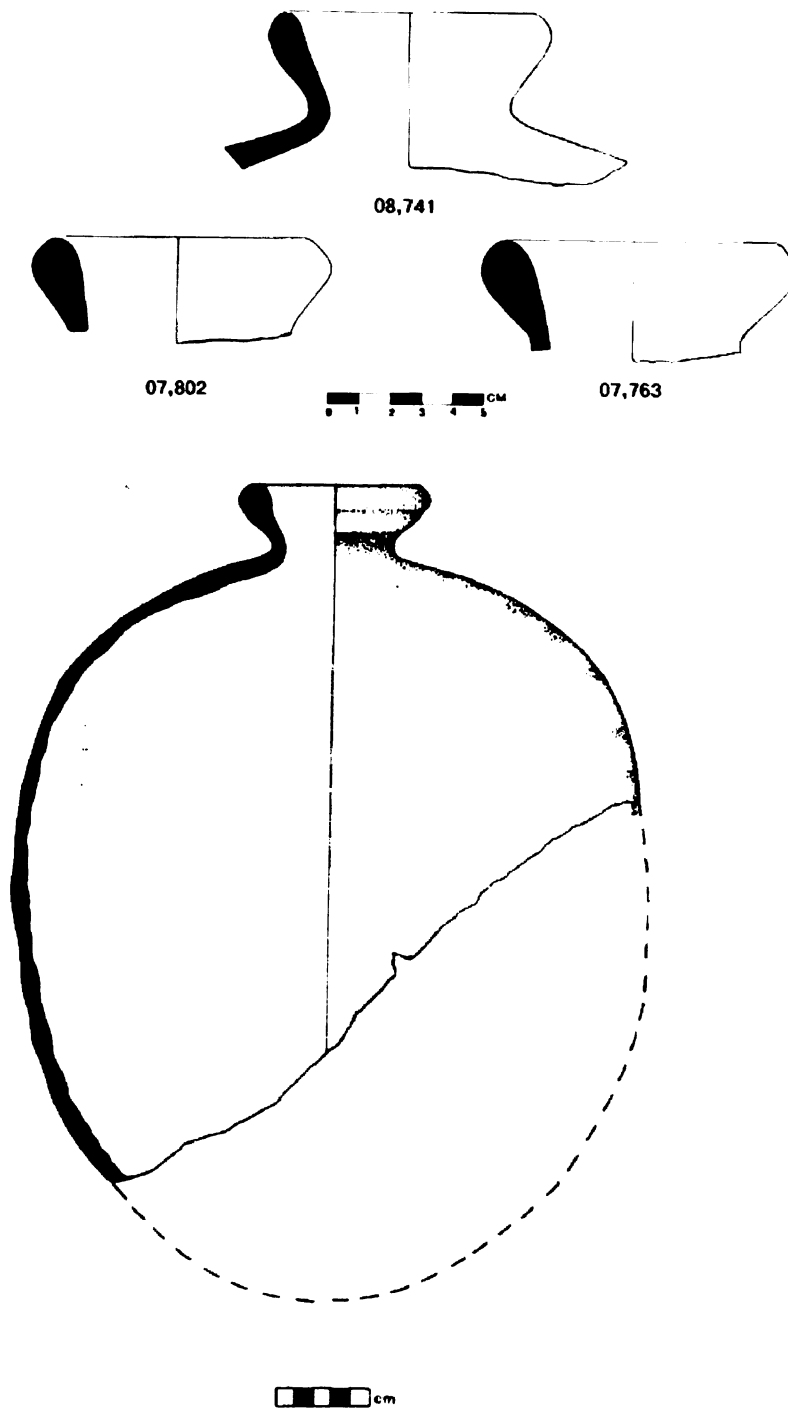
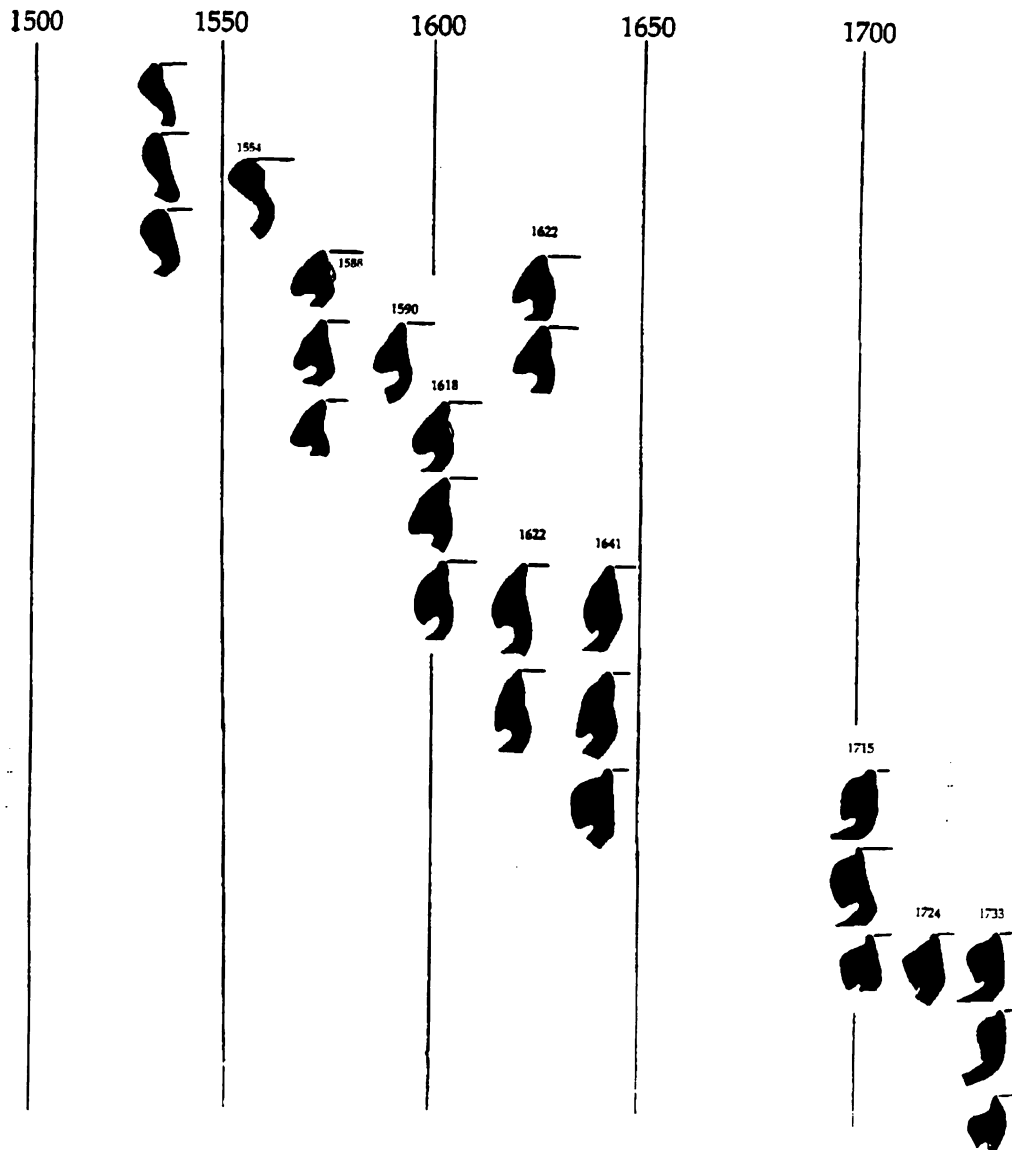


Figure 3: Rim profiles and partially reassembled olive jar. Drawing by James Hunter III of the University of West Florida

Chronological Chart of Middle Style Olive Jar Rim Profiles from Shipwrecks*



* Courtesy of George E. Avery (1993)

Figure 4: Chart reproduced from Smith et al. 1999

Ceramics Recovered from the Emanuel Point Ship

Ceramic Type	No. of Sherds	Weight of Sherds	% of Sherds
Olive Jar (unglazed)	712	13,813.2 gr	92.2%
Olive Jar (lead glazed)	9	171.1 gr	1.1%
<i>cantimplora</i>	10	556.9 gr	1.3 %
Majolica	4	104 gr	0.5 %
El Moro	13	58 gr	1.7 %
Melado	7	51.3 gr	0.9 %
Aztec	6	126.8 gr	0.8 %
Unidentified	8	575 gr	1.0 %
Brick	2	588.8 gr	0.3 %
Tile	1	134.8 gr	0.1 %
Total	772	16,179.9 gr	100 %

Table 2: Chart developed by the University of West Florida and Roger C. Smith, James Spirek, John Bratten, and Della Scott-Ireton

Archaeobotanical Identifications from the Emanuel Point Ship*

Specimen	Taxa	Common Name	Count	Origin**
Pits	<i>Olea europaea</i>	olive	434	OW
Pits	<i>Prunus cerasus</i>	cherry	8	OW
Flt	<i>Prunus domestica</i>	plum/prune	1	OW
Pits	<i>Prunus amygdalus</i>	almond	3	OW
Seeds	<i>Diospyros virginiana</i>	persimmon	12	NA
Seed	<i>Magnolia grandiflora</i>	southern magnolia	1	NA
Seed	<i>Nyssa aquatica/N. ogeche</i>	water or swamp tupelo	1	NA
Spiny seed/fruit	(unidentified)	-	1	
Seed fragment	<i>Pouteria</i> sp.	sapote	1	NWT
Seed fragments	<i>Diospyros virginiana</i>	persimmon	8	NA
Seed fragment	<i>Diospyros virginiana</i>	persimmon	1	NA
Nutshells	<i>Carya</i> sp.	hickory	2	NA
Nutshell	<i>Coryleus</i> sp. (<i>C. avellana</i>)	hazelnut	1	OW
Nutshell fragment	<i>Coryleus</i> sp. (<i>C. avellana</i>)	hazelnut	9	OW
Nutshell fragment	<i>Carya</i> sp.	hickory	1	NA
Nutshell fragment	<i>Cocos nucifera</i>	coconut	1	PT
Acorns	<i>Quercus</i> sp.	oak	2	UC
Gourd rind	<i>Lagenaria siceraria</i>	bottle gourd	2	OWNW
Stems	cf. <i>Carica papaya</i>	papaya (tentatively)	3	NWT
Leaf	cf. <i>Acer</i> sp.	maple (red maple, tentatively)	1	NA
Leaf	<i>Quercus</i> sp.	oak	1	UC
Twigs	(unidentified)	-	5	
Bark	cf. <i>Pinus</i> sp.	pine (tentatively)	1	
Bark fragments	(unidentified)	-	2	
Rope sample	<i>Cannabis sativa</i>	hemp	± 25 ml	OW
Rope sample	Poaceae	grass family	± 20 ml	UC
Resinous mass	(unidentified)	disaggregated resin?	-	
Misc. organic	(unidentified)	inner bark?	4	

Table 4: Data and analysis by Lee Newsom, Center for Archaeological Investigations Southern Illinois University, Carbondale, Illinois, June 1995 and originally developed by Roger C. Smith, James Spirek, John Bratten, and Della Scott-Ireton

Faunal Specimens Identified From The Emanuel Point Ship

Class	Order	Taxon	Element	No. of Specimens
Vertebrata	indeterminate	indeterminate	fragments	4
		small indet.	long bone	1
		medium indet.	rib fragment	1
			fragment	1
Mammalia	indeterminate	very large indeterminate	rib shaft fragment	6
		large/very large indeterminate	fragment	3
		large indeterminate	rib fragment	1
			long bone shaft fragment	3
			flat bone fragment	1
		medium indeterminate	rib fragment	1
		med./large indeterminate	epiphysis indeterminate	1
			pisiform	1
			fragments	10
			long bone shaft fragment	1
	Artiodactyla	small indeterminate	condyle	1
		medium indeterminate	lumbar vertebra	1
		<i>Sus scrofa</i>	rib fragment	1
			humerus	2
			tibia	2
			lower tooth PM3	1
		<i>Sus</i> indet.	scapula fragment	1
		Bovidae sp.	rib fragment	1
		Bovidae c.f. <i>Bos taurus</i>	ribs, vertebral end	4
			rib epiphysis	1
			thoracic vertebra	2
	Rodentia	<i>Rattus rattus</i>	See Table VII	206
		<i>Mus musculus</i>	tibia	2
Aves	Galliformes	<i>Gallus gallus</i>	tibia	2
			ulna	1

Table continued.....

	Charadriiformes	Scopacidae	upper beak cover/sheath	1
	indeterminate		coracoid	1
			cervical vertebra	1
Chondrichthyes	Lamniformes	Carcharinidae	vertebra indeterminate	2
	Selachii	indeterminate	vertebra indeterminate	2
	Rajiformes	family indeterminate	pharyngeal plate	4
Osteichthys	indeterminate		spine indeterminate	6
			scale indeterminate	2
			vertebra indeterminate	1
			fragment	2
	indeterminate	med. fish indet.	scale indeterminate	1
			ctenoid scale	1
			cycloid scale	1
			atlas vertebra	1
			thoracic vertebra	2
			precaudal vertebra	5
			caudal vertebra	4
			centrum vertebra	1
			ultimate vertebra	1
			vertebra indeterminate	3
			hyomandibular	1
			dorsal spine	1
			haemal spine	2
			spine indeterminate	4
			fragment	2
	indeterminate	Small fish indet.	centrum vertebra	1
			spine indeterminate	1
	Perciformes	Sciaenidae	caudal vertebrae	2
		Lutjanidae	dorsal spine	1
	Siluriformes	Ariidae	pre frontal	1
			parasphenoid	1
			pectoral spine	1
		indeterminate	pectoral spine	1

Table 5: Table created by Roger C. Smith, James Spirek, John Bratten, and Della Scott-Ireton

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