

Archaeological and Biological Examination of “The Mystery Wreck” (8MO143) off Vaca Key, Monroe County, Florida

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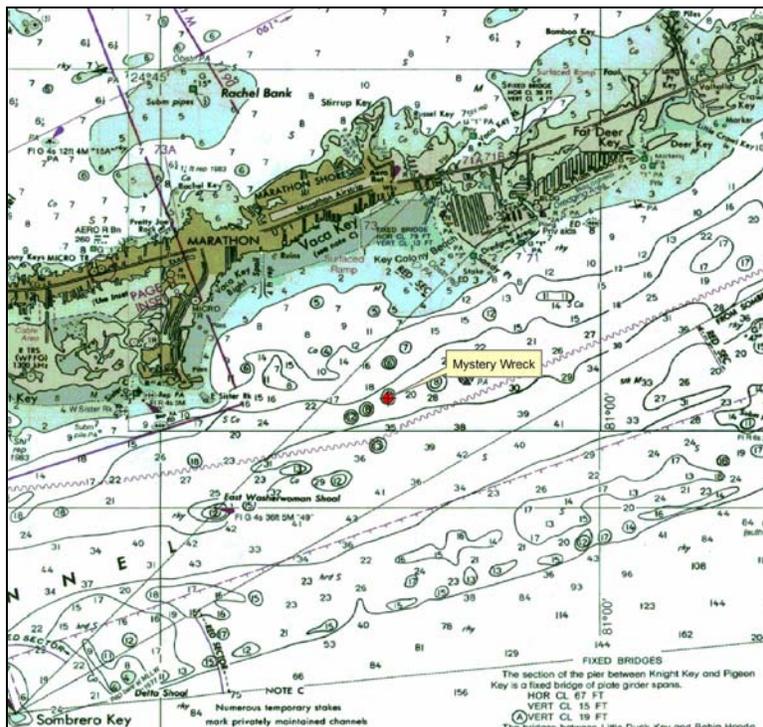
A Report Submitted to
the Florida Keys National Marine Sanctuary
in Fulfillment of a NOAA Maritime Heritage Program Mini-grant
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Introduction

During the summer of 2004, the Florida Bureau of Archaeological Research Underwater Archaeology team undertook a project to relocate, assess, and record thirteen of the shipwrecks of the 1733 Spanish Plate Fleet in the Florida Keys. One source of background information that they used was a commercially available videotape entitled “Galleon Hunter,” produced by Don Ferguson. Aside from the 1733 wrecksites, the video features another site, locally known as “the Mystery Galleon,” that was shown to Ferguson by local diver Stefan Sykora. Using location numbers supplied in Ferguson’s video, Roger Smith, Della Scott-Ireton, and Dave McCampbell relocated the site in Hawk Channel, off the city of Marathon. Later, the site further was examined by Smith, Jennifer McKinnon, and Jason Raupp, who made initial sketches, still photos, and video recordings.

“The Mystery Wreck” is situated on top of one of three small patch reefs, or coral mounts, that rise from the 28-foot deep sandy floor of Hawk Channel to within 8 feet of the water’s surface, approximately 1.8 nautical miles seaward of Vaca Key. Nourished by tidal currents, the area is home to a variety of vibrant corals and fish that thrive on the reef and remains of a sailing ship that struck it several centuries ago. Remnants of the vessel’s lower hull and its ballast stones have become incorporated into this marine environment, camouflaged by time and nature.



Location of “the Mystery Wreck.”

According to files at the Bureau of Archaeological Research, the site, which was first designated 8UW99, was worked under a state salvage contract (S-10) granted to Brown, Knott,

and Nipp Enterprises on 31 March 1972, for a period of one year. It is unclear who first discovered this shipwreck, but there was some speculation at the time that the site might possibly be *San Ignacio* of the 1733 fleet. Robert Brown was a marine biologist who collected marine specimens for sale. Wilson Knott was a land developer in Orlando. Larry Nipp was a retired pest control contractor who owned American Power Spray Company. They chartered the salvage boat *El Capitán*, owned by R. Crees and captained by Tom Gurr. They also arranged with Dick Winer of Fort Lauderdale to make a film of their salvage activities, but it is not known whether this was accomplished.

Work on the site began on 1 May and continued until 28 May 1972. The salvage crew consisted of Robert Brown, Wilson Knott, John Noland, Paul Carleton, Herman J. Clausen, Harry Jones, George Cummings, Ray Manieri, and Tom Gurr. The State of Florida was represented by Field Supervisor Alan Saltus and Field Agents Doug Sheppard and Dean Smith. A total of 20 days were spent blowing holes in the coral with the boat's propwash deflector, airlifting sand from between the holes, and moving ballast stones from stern, bow, and starboard portions of the wrecksite. On the last day, the 13-foot long anchor was raised.

As work on the site diminished, the S-10 contractors discontinued filling out the required logs of daily activities. On 16 February 1973, Robert Williams, Director of the Division of Archives, History, and Records Management (later the Division of Historical Resources), wrote to Mr. Knott to inform him that, in order to renew his salvage contract for another year, he must supply past logs and write a proposal before 15 March 1973. On 13 March 1973, Wilson Knott replied in a letter to Mr. Williams that “. . . I can only agree that there has been a breakdown in performance under this contract. The problem is one of geographic location of the partners relative to the wreck site and of the partners' location as to each other. As you recall a determined effort was made during the summer of 1972 to prove or disprove the value of this wreck and after six weeks of intensive work on the wreck it was generally concluded that there were few artifacts of any value to be found and no indication of precious metal or coins in the area. Therein lies the basic problem with engendering any further serious interest. Therefore I feel you would be justified in not renewing our contract.”

As of 24 September 1973, the artifact inventory for S-10 listed 235 encrusted iron objects; 208 musket balls; 127 grape shot; 34 lead shot; 75 pot sherds; 15 pottery sherds; 97 fire bricks; a piece of encrusted wood; 3 olive jar necks; 1 nail; a piece of bone; 8 fragments of wood; 3 cannon balls; a block of wood; a rudder gudgeon; a piece of melted copper; a piece of lead sheet; a broken piece of *mano* (corn grinder); an anchor; and an anchor ring. The records show that these items were turned over to the State Division of Archives, History, and Records Management on 27 April 1974. At some point in time, the site was designated 8MO143 in the Florida Master Site File.



Anchor from 8MO143.

Examination of artifacts from 8MO143 in the collections of the Bureau of Archaeological Research was undertaken to learn more about their nature and age. The anchor currently is on loan to the Historical Museum of Southern Florida in Miami, where it is on display. Collections in Tallahassee include numerous Spanish olive jar and storage jar sherds, four olive jar necks, samples of ballast stones and fire bricks, numerous lead musket and grape shot, a cannon ball, a planking nail, a ringbolt shank, lead strips, a lead patch, and a pig's tooth.



Olive jar sherds

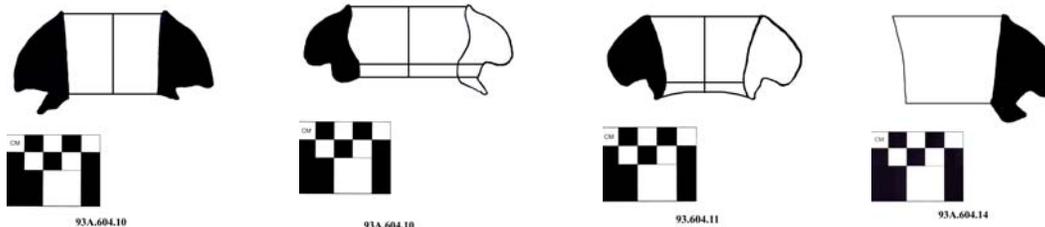


Lead musket and grape shot



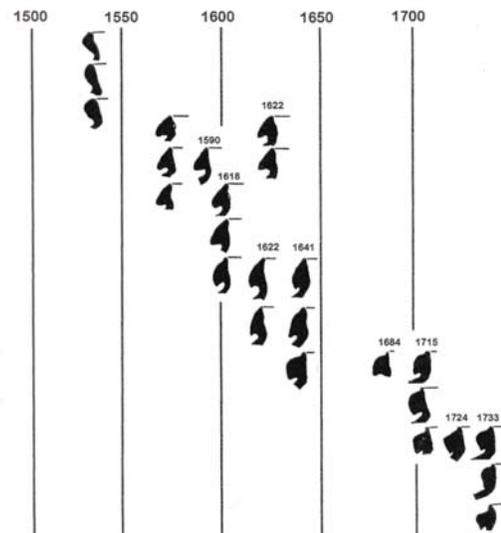
Cannonball

The most diagnostic materials in the collection are four olive jar rimsherds. These were measured and drawn in profile in order to compare their shape and characteristics with other examples from closely dated shipwreck sites.



Profiles of 8MO143 olive jar rimsherds in the state collection.

George Avery's study of Spanish olive jars contains profile drawings of rimsherds from the 1616 wreck of *San Martín*, the 1622 Plate Fleet wrecks, the 1684 wreck of *El Galgo*, the 1715 Plate Fleet wrecks, the 1724 galleons *Guadalupe* and *Tolosá*, and the 1733 Plate Fleet wrecks.¹ Comparison of the four 8MO143 rimsherd profiles with those shown in Avery's work, as well as his chronological framework of rimsherd shapes over time (shown at right), places them between those of the 1618 *San Martín* and the 1715 Plate Fleet Wrecks. Associated with the Middle Style, elongated (Shape A) olive jars, the 8MO143 rimsherds suggest that "the Mystery Wreck" is a Spanish ship that wrecked sometime in the 17th century.



¹ Avery, George. "Pots as Packaging: The Spanish Olive Jar and Andalusian Transatlantic Commercial Activity, 16th–18th Centuries," Ph.D. dissertation, Department of Anthropology, University of Florida, 1997.

Research Design and Proposal

Given the cooperative relationship between staffs of the Florida Keys National Marine Sanctuary and the Florida Bureau of Archaeological Research resulting from a 1998 Programmatic Agreement (between NOAA and the State of Florida for Historical Resource Management in the Florida Keys National Marine Sanctuary) and the subsequent investigation and interpretation of the 1733 Fleet shipwrecks, it was proposed that a joint examination of “the Mystery Wreck” should be conducted to record and assess its archaeological and biological integrity and to determine its potential for public interpretation.

The Programmatic Agreement’s emphasis on “continuing to survey the Sanctuary and prepare a shipwreck inventory of all known shipwrecks,” and a call for proposals by the National Marine Sanctuary Program’s Maritime Heritage Program for projects that would be funded in 2005, prompted LCDR Stephen F. Beckwith and Dr. Roger Smith to prepare an application for a Maritime Heritage Mini-grant. These annual grants, which are awarded to National Marine Sanctuaries and partnering agencies, are aimed at creating new and broadening existing programs in the exploration, discovery, interpretation, long-term protection, and preservation of maritime heritage resources within the National Marine Sanctuary Program.

A grant proposal, which was submitted to NOAA headquarters in November 2004, briefly described “the Mystery Wreck,” its 1972 salvage history, and curious voids beneath the ballast stones where ship’s timbers in regular and discernible patterns are exposed. Photographs of the ship’s surviving structure and ballast, which are unlike that of the 1733 shipwrecks, were included. Funding (\$6,880) was requested by Beckwith to assemble a team of archaeologists and staff from both agencies to investigate, document, and study the remains of the shipwreck. Updated documentation (site plans, cultural and natural inventories, underwater photographs, videos) would be utilized to assess the shipwreck and its management needs. Historical research both in the Florida Keys and the State Library of Florida would be conducted as well as oral interviews with local informants. Assessment data would be assembled to produce a report detailing the ship’s history, overall condition, and suggestions for future research and minimizing visitor impact on cultural and natural features. Funds from the grant would be matched in part by both the Bureau of Archaeological Research and the Florida Keys National Marine Sanctuary, and all funds would be controlled and disseminated by the Sanctuary.

A timeline of objectives and tasks was proposed as follows:

Objective 1: Initiate project, first quarter (January – March).

Task 1: assemble team members including visiting NOAA archaeologist

Task 2: secure field accommodations and travel arrangements

Objective 2: Conduct historical research, second quarter (April – June).

Task 1: conduct oral interviews with local informants

Task 2: document history of Mystery Wreck

Objective 3: Inspect and assess Mystery Wreck, third quarter (July – September).

Task 1: relocate vessel and establish a temporary mooring system onsite

Task 2: survey and document features of sunken ship

Objective 4: Assemble historical and archaeological data, third quarter (July – September.).

Task 1: create site plan from data collected in field

Task 2: assemble historical information

Task 3: discuss management strategies for protecting site

Objective 5: Prepare and print report on findings, fourth quarter (October – December).

Task 1: write final report

Task 2: print final report

Task 3: update Florida State Master Site File

Objective 6: Disseminate report, fourth quarter (October – December).

Task 1: deliver paper and CD copies of report to interested parties

Mystery Wreck Project

The Maritime Heritage Mini-grant proposal was favorably received, and funding was approved to proceed with the project. A Plan of Action for two weeks of fieldwork from 19 June to 30 June 2005 called for assembling a core research team consisting of Roger Smith, Della Scott-Ireton, and Jennifer McKinnon of the Florida Bureau of Archaeological Research; Stephen Beckwith and Brenda Altmeier of the Florida Keys National Marine Sanctuary; and Bruce Terrell of the NOAA National Marine Sanctuaries Program, National Programs Branch. The team gathered at the City Marina in Marathon, where the NOAA research vessel R/V *Odyssey* was docked to serve as a field headquarters and research platform. Survey equipment, including a smaller dive boat, accompanied the state team, and diving gear was supplied by both agencies. Food, emergency supplies, and air fills were provided by the Sanctuary.

Fieldwork

Diving operations

Each day R/V *Odyssey* traveled in company with the state dive boat to “the Mystery Wreck” site and moored to a temporary Manta anchor installed for the project. The state boat rafted astern of *Odyssey*, and diving operations consisting of buddy teams using open-circuit SCUBA proceeded from both boats. Safety equipment, including first aid and oxygen, was carried on both boats. Dive logs were kept for divers from each vessel. Because the depth of the site is less than 30 feet, decompression limits were not applicable.



R/V *Odyssey* and state dive boat on site. (D. Roudebush)

Mapping



McKinnon taking offsets. (R. Smith)

Two baselines were laid on the ballast/coral mound: the primary baseline, 38 meters long, was placed directly over the center of the ballast mound with a permanent tape tied to it; a peripheral baseline was placed on the starboard side of the ship-wreck parallel with the center baseline. The baselines were laid with line, and a removable tape was placed as needed. Measurements using 90° offset and triangulation were taken from each of the baselines to reconstruct plan views of



McKinnon & Scott with plan. (B. Altmeier)

the shipwreck site and surrounding reef. Plumb bobs suspended from surface floats were used to measure vertical profiles accurately. An overall site plan depicting the extent of the ballast, timbers, and surrounding reef structure including hard and soft corals was produced. Detailed feature drawings of the exposed timbers of the bow, stern, and midships areas were made.

Metal detector survey

A metal detector survey was conducted around the periphery of the ballast mound to search for wreck scatter. Pin flags were used to mark locations of targets registered during the metal detector survey. Minimal hand fanning of selected targets revealed encrusted objects that likely represent ship fasteners. Additionally, a diver visual and metal detector survey was conducted along the ocean side of the ballast mound. According to veteran shipwreck hunter Robert Weller, a smaller shipwreck is located on the lower ledge or edge on the ocean side of the main ballast pile. This alleged shipwreck was not located; additional exploration of the area to seaward of “the Mystery Wreck” is recommended for the future.

Photographic recording

The site was recorded using extensive digital still, digital video, and 35mm print photography. Plan view photos, profile photos, work shots both above and below water, and sea life photos were taken. Still and video photographers included state and Sanctuary staff, volunteers, and journalists. Aerial photographs of the site from a helicopter were produced by staff of the Florida Fish and Wildlife Conservation Commission’s local office.



Altmeier videotaping wrecksite. (J. Anderson)

Marine life survey

On 23 June, Sanctuary Resource Management Specialist Lauri MacLaughlin examined the wrecksite to create a list of observed marine life inhabiting the lower hull, ballast pile, and displaced ballast stones. She remarked that the patch reef containing the wreckage was particularly vibrant and healthy. Her list included:

Stony Corals

Porites porites, finger coral
Porites astreoides, mustard hill coral (green/brown variety)
Oculina diffusa, ivory bush coral
Acropora cervicornis, staghorn coral
Solenastrea bovrnani, smooth star coral (1 colony observed)
Stephanocoenia michilini, blushing star coral
Montastrea faveolata, mountain star coral
Montastrea annularis, knobby mountain star
Montastrea franksii, knotty mountain star
Montastrea cavernosa, cavernous star coral
Dichocoenia stokesii, elliptical star coral
Dichocoenia stellaris, elliptical star coral
Siderastrea siderea, massive starlet coral
Siderastrea radians, lesser starlet coral
Diploria strigosa, brain coral
Diploria labyrinthiformis, grooved brain coral
Meandrina meandrites
Colpophyllia natans, giant brain coral
Mycetophyllia ferox, cactus coral (red eyes)
Mussa angulosa, spiny flower coral
Acropora cervicornis, staghorn coral
Millepora alcicornis, encrusting/branching fire coral



Mountain Star Coral. (R. Smith)

Soft Corals

Gorgonia ventalina, sea fan
Briareum asbestinum, corky seafingers
Erythropodium caribaeorum, encrusting gorgonian
Pseudoplexaura sp., sea rod
Plexaurella nutans, giant sea rod
Pseudopterogorgia sp., americana (probable) sea plumes

Dominant Species

Colpophyllia natans
Siderastrea siderea
Gorgonia ventalina
Erythropodium caribaeorum

Miscellaneous

Eucidaris tribuloides, slate pencil urchin

Sponges

Mycale laevis, orange encrusting sponge
Iotrochota birotulata, green finger sponge
Spheciospongia vesparium, loggerhead sponge
Callyspongia vaginalis, green vase sponge
Pteria colymbus, Atlantic wing-oyster



Sea Whip. (R. Smith)

Macro Algae

Halimeda opuntia, oatmeal algae (green)
(possibly also *Halimeda discoides*?)
Variety of coralline algae

Fish

Threespot damselfish
Dusky damselfish
Bicolor damselfish
Coca damselfish
Yellowtail damselfish
Sergeant major
Beaugregory
Bluehead wrasse
Grey angelfish
Blue angelfish
Queen angelfish (juvenile)
Townsend angelfish
Bluestriped lizardfish
Trumpetfish
Harlequin bass
Blue tang
Slippery dick
Ocean surgeonfish
Spanish hogfish
Neon goby
Spanish grunt
French grunt
White grunt
Bluestriped grunt
Spotted scorpionfish
Bar jack
Barracuda
Queen parrotfish
Stoplight parrotfish (adult and juvenile)
Midnight parrotfish
Princess parrotfish
Striped parrotfish
Nassau grouper
Nurse shark
Southern stingray



Townsend angelfish. (*R. Smith*)

Sclerochronology

The profusion of corals growing on top of the ballast mound was of particular interest because they obviously had colonized the shipwreck after its deposition on the existing coral patch reef. One specimen of mountain star coral (*Montastrea faveolata*), 3 feet in diameter, was selected for testing to determine its age. It was situated directly on top of the ballast pile, adjacent to the thwartships crevasse in the stones. Using the relatively new technology known as sclerochronology (*sclero*, Latin for rock, and *chronos* for time), a hydraulic drill equipped with a core barrel drill bit, measuring 3 inches in diameter, was used to core a sample from the top to the base of the coral head. On 17 June, Sanctuary Senior Biologist Harold Hudson, Jeff Anderson, and Brenda Altmeier prepared for the coring process by delivering the equipment piece by piece to the seafloor. The drill-stabilizing frame was set into position at the top of the

coral head and adjusted by stainless steel screws and long bolts to ensure that it was perfectly level and the drill made a perfect vertical and even core. The bit was inserted into the stabilizing frame that has an entry hole a fraction of a size larger than the dimension of the drill bit. The hydraulic drill was weighted to help compensate for the buoyancy necessary to maintain adequate tension. Once the bit had established its path, the stabilizing frame was removed, allowing the drill to cut a vertical core through the coral. The core was extracted from the core barrel and laid to rest alongside the parent. The core was then taken to the boat and immediately labeled by date, location, species, and core orientation.

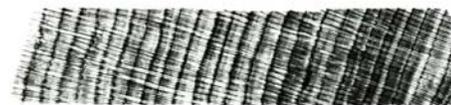


Hudson coring. (J. Anderson)



Extracted core. (J. Anderson)

The extracted core sample measured 34 inches long by $2\frac{3}{4}$ inches in diameter. The core was sliced into three sections using a Great Western industrial diamond-bladed wet saw used for cutting geological rock samples. A thin (3/16-inch thick) slab was cut along the growth axis of each section. The three slabs were sent to Noreen Buster, Research Assistant for the United States Geological Survey, in St. Petersburg, Florida. Ms. Buster X-rayed the limestone slabs and created X-radiographs to examine the yearly increments of growth delineated by distinct density bands within the core sections. The X-radiograph enables the researcher to relate optic density to skeletal density and to measure the extension and calcification of the limestone. Coral skeletal records reveal isotopic ratios of Carbon ($\delta^{13}\text{C}$), an indicator of photosynthetic rates, temperature and fossil fuels, and Oxygen ($\delta^{18}\text{O}$), a proxy for salinity. The bands appear as couplets, consisting of a wide, pale low-density band capped by a thin, dark high-density band. Density indicates that the colony secreted a higher volume of calcium carbonate found within the growth bands. Skeletal density is an indication of stress. Thin dark stress bands (decreased extension and increased density) occur at the end of each summer and reveal the animal's stress as it prepares for its annual reproductive cycle. The thick, less dense band contains the remaining year's growth. In near-shore Florida waters, *Montastrea faveolata* grows at a rate of approximately $\frac{1}{2}$ inch per year. Therefore, the core sample extracted from "the Mystery Wreck" is estimated to be approximately 100 years old.



HC2 3 14 89

X-radiograph of coral slab. (H. Hudson)

Archaeology

Site Formation Processes



View of ballast mound. (*J. Anderson*)

was a colonial shipwreck, its cut ballast, unlike the smooth, egg-shaped river rock ballast of the 1733 wrecks, indicated that this shipwreck was not related to the 1733 fleet disaster.

Perhaps the most unusual feature of “the Mystery Wreck” is the site formation processes that affected the shipwreck. The ship grounded on a shallow patch reef and could not be refloated. Stripped of its cargo and equipment, the vessel appears to have been abandoned shortly after the incident. Over time, as the ship’s superstructure disintegrated, its ballast and lower hull were incorporated by the environment, becoming an integral part of the composition and ecosystem of the reef community. When first discovered by modern salvors, instead of digging straight down into the wreck through the ballast in a systematic manner, they picked at the loose stones along the lower edge of the ballast mound. Because the wreck rested on a coral reef instead of in sand, stones that had fallen along the bottom exterior of the hull could be accessed and removed. This created a surprising and interesting visual experience. The wreck appears to be resting on its keel with lower hull planking removed, allowing a diver to look into the bottom portion of the shipwreck and see intact frames exposed underneath the ballast mound and slightly protruding from the edge of the mound. Shining a light into the void between frames under the ballast shows sections of the keel, as well as groupers, large lobsters, and a huge green moray eel living in the space.



View of frames beneath the ballast. (*J. McKinnon*)

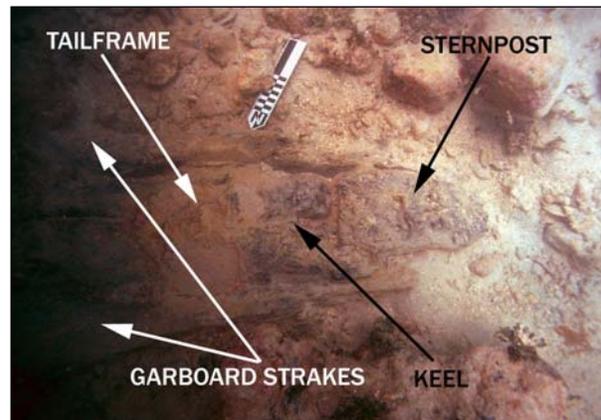
Shipwreck

The ship is approximately 19 meters in length, with a beam of at least 7 meters. Ballast extends beyond the exposed ship remains and measures 22 meters by 15 meters. Exposed sections of the hull include stern timbers, portions of the bow assembly, and what appear to be timbers along the midship area. Stern timbers consist of the eroded sternpost, three closely spaced tail frames, and the remains of both port and starboard garboard strakes. Remains of the bow include the forward end of the keel and two small, curved disarticulated bow frames. Timbers along the midships, exposed by past salvage activities, represent the vessel's keelson, two floors, a rider, a fragment of ceiling plank, and what appears to be a small section of the pump box. Along the starboard side, several frame or futtock ends were observed protruding from the ballast pile. Each of these architectural features was given a numbered tag to facilitate its documentation.

Architectural Features

Tag #	Description
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- | | |
|---|--|
| 1 | Assembly of Sternpost, Keel, impressions of Tail Frames 1, 2, and 3, where they were fastened to the Keel. The starboard Garboard Plank is 3.64 m long. The port Garboard Plank is 3.48 m long. The Keel shows caulking or bedding compound where tail frames were fastened. |
|---|--|



- | | |
|---|--|
| 2 | Tail Frame 4 is a U-shaped floor with a semi-circular depression in the upper surface. The floor is .3 m molded, .16 m sided. This feature is located at the entrance to the "cave" beneath the ballast. In the foreground can be seen the Sternpost, Keel, and Garboard assembly. |
|---|--|



- | | |
|---|---|
| 3 | Tail Frame 5 is an opened V-shaped floor, and has a large crack through the starboard limb, .35 m from the end. The floor is .25 m molded, .12 m sided. Tail Frame 6 is seen forward of this floor in the cave. |
|---|---|



4 Futtock corresponding to Tail Frame 5 is .89 m long, .20 m molded, and .15 m sided.

5 Futtock corresponding to Tail Frame 6 is .85 m long, .20 m molded, and .20 m sided.

6 Futtock is .50 m long, .20 m molded, and .25 m sided.

7 Futtock is .65 m long, .20 m molded, and .20 m sided.

8 Futtock is .70 m long, .20 m molded, and .20 m sided. Another partial futtock (8½), .50 m long, can be seen.

9 Flat futtock is .44 m long, .09 m molded, and .30 m sided. The fissure, or crevice, in the ballast pile is located here: circa .25 m wide.

10 Futtock is .20 m long, .17 m molded, and .18 m sided.

11 Futtock is .60 m long, .20 m molded, and .20 m sided.

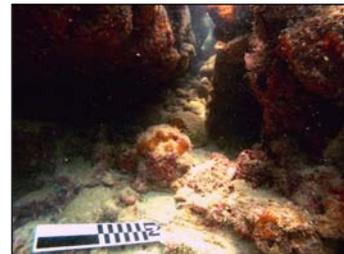
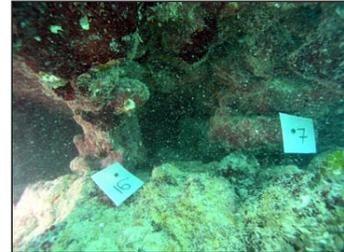
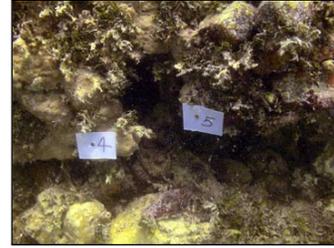
12 Futtock is .50m long, .19m molded, and .25m sided.

13 Futtock with another hollowed futtock between 12 and 13.

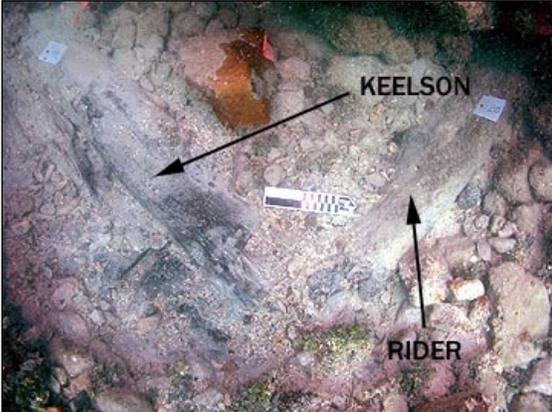
14, 15, 16 Futtocks

17 Futtock is .05 m molded, and .16 m sided.

18 Futtock is .45 m long, .09 m molded, and .20 m sided.



19 Keelson is .15 m molded and .25 m sided. Ceiling Plank on its starboard side is .09 m thick and .20 m wide. There is caulking or cement between the Keelson and Ceiling Plank. What appears to be the side of a worm-eaten box (perhaps for the pump sump) rises from the ceiling alongside the Keelson. The thickness of the side is .07 m and it rises .25 m high. Floor frames below this portion of the Keelson are close together (.045 m).

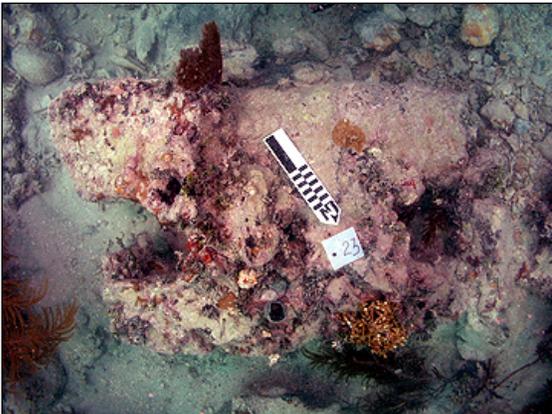


20 Rider over port side of keelson, caulked at join, is .11 m molded, and .26 m sided.

21 Piece of frame is eroded.

22 Piece of same frame runs outboard of port side.

23 Bow Floor Frames 1 and 2 are .50 m molded, and .25 m sided, and spaced .20 m apart. Evidence of Bow Frame 3 is on the Keel sistered to Bow Frame 2. The Keel (.31m sided) is exposed aft of these three frames and has a remnant of Bow Frame 4, which is .16m sided. Bow Frame 5 is U-shaped (just like Tail Frame 4) and appears to have been sistered to Bow Frame 4 (just like Tail Frames 3 and 4). Bow Frame 6 is visible behind in the cave.



24 Futtock corresponding to Bow Frame 6 on the port side is 1.4 m long, .20 m molded, and .15 m sided. It sits on a remnant of hull planking .35m wide, and .10m thick. A log-shaped piece of hardwood (.06 m outer dia.) was found under this plank with its end jutting forward.



25 Displaced possible half frame forward and to port of the ballast pile is .85 m long, .40 m molded, and .20 m sided.

Wood sampling

Small samples of wood were taken from all accessible timbers, including the ship's keel, keelson, sternpost, garboard strakes, floors, and frames. During this process, investigators discovered that most of the tail and bow frames and all of the futtocks along the starboard edge of the ballast pile are not made of wood. Rather, they seem to be composed of a concrete-like substance. Archaeologist Corey Malcom, who assisted with the sampling, described of a cement consisting of lime, sand, and small pebble gravel that sometimes was poured between the frames of 17th-century Iberian ships. This mixture was specified by contract to be used in the building of *Nuestra Señora de Atocha* (Alonso Ferrera contract of 1616 [AGI *Contratación* 4895] for four 550-ton galleons, including *Atocha*), wrecked in 1622.

The lower hull(plan) and crutches(piques) from stem to stern must be filled with lime and sand and gravel of small pebbles between frame and frame, and above it they must place the planking of the ceiling(granel) , from stern to stem, up to the extreme end floor timbers.

While no evidence of this substance was found associated with the lower hull of the *Atocha* shipwreck and may not have been supplied by the shipbuilding contractor, the cement may have been intended as permanent ballast, as well as protection for the floors and lower frames from damage due to shifting cargo. The same or a similar substance appears to have been used in the construction of “the Mystery Wreck.” What first was thought to be wooden frames actually is poured permanent ballast that filled the spaces between frames, providing a sort of “negative” image of the lower hull timbers, which have deteriorated over time. The poured ballast extended to approximately the turn of the bilge on the starboard side and allowed the recording of frame spacing (.25 m at bow and stern; .45 m midships).

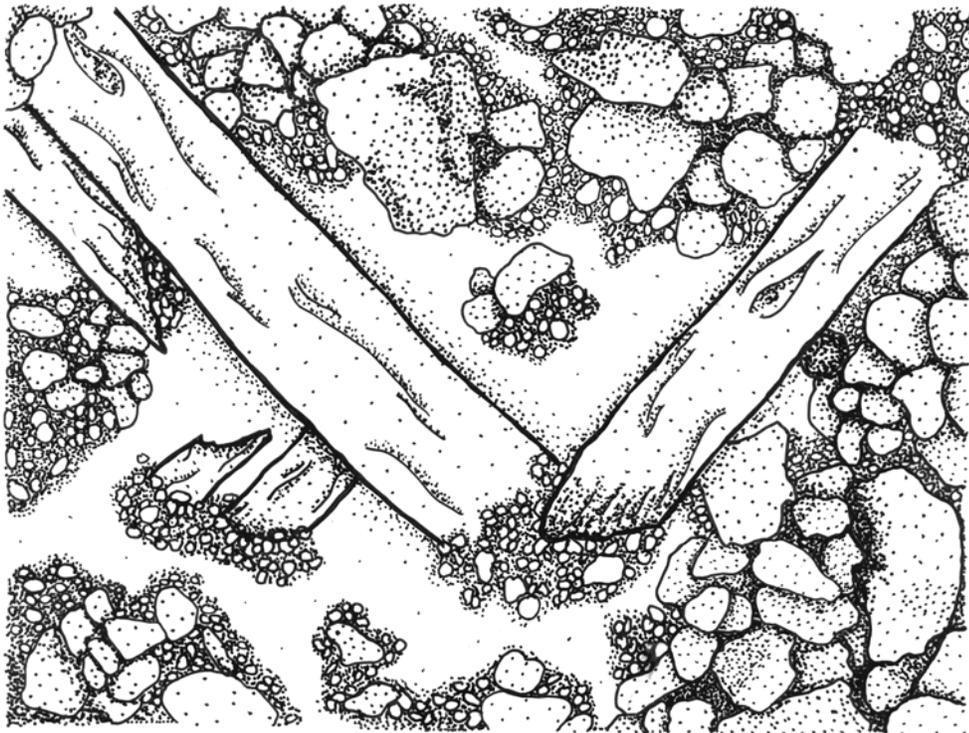
Wood and cement samples were sent to Dr. Lee Newsom of Pennsylvania State University for identification. Results of her wood analysis are as follows:

- 1) Keel — *Quercus* sp., white oak anatomical group
- 2) Keelson — *Quercus* sp., white oak anatomical group (perhaps more closely or clearly conforming to European taxa, although such a division between Old World and New World oaks in the various groups is inexact)
- 3) Hull planking #24 — *Pinus* sp., *Sula* anatomical group, includes European species, especially *P. halepensis* (Aleppo pine, Mediterranean region), also *P. canariensis* (Canary Islands)
- 4) Sternpost — *Quercus* sp., white oak anatomical group
- 5) Rider #20 — *Quercus* sp. (difficult sectioning, poor preservation due to shipworm damage)
- 6) Floor frame #19 — *Quercus* sp., white oak anatomical group
- 7) Ceiling plank #19 — *Pinaceae* (pine family), probably (very likely) spruce, *Picea* sp.
- 8) Garboard plank — cf. spruce, *Picea* sp.
- 9) Logwood — *Guaiacum* sp., lignum vitae (circum-Caribbean)

The cement sample has yet to be completely analyzed. Preliminary examination of the sample indicates a combination of relatively large quartz and carbonate grains from a location close to mountain ranges and close to warm latitudes where coral reefs form.

Site Plan

The accompanying site plan indicates the complex cultural and natural features of “the Mystery Wreck” site. The central undisturbed ballast of compact stones is denoted by dark shading. Scattered ballast on the outboard edges of the site is less compact, the result of natural site formation processes as well as past salvage activities. Reef structure including hard and soft corals exists around the ballast mound. Few corals have colonized the central mound, but a dense and vibrant forest of colorful corals and sea fans surrounds the wreck site. The ship is embedded in living reef, not all of which could be depicted in this perspective. Extreme bow and stern timbers are exposed at the forward and aft ends of the ballast mound. “Frames” protruding from the ballast actually are negatives formed by the poured permanent ballast. More ship structure, indicated by dotted lines, is visible than could be shown in plan view. This structure extends at least 4 meters into the void under the ballast. The unusual crack or fissure can be seen bisecting the stern section. A mountain star coral cored to determine its age is visible on the ballast near the starboard midship edge.



Keelson and Rider. (*I. Franklin*)

Artifacts

Few artifacts were encountered during the investigation, since the research design called for non-intrusive recording rather than excavation. A piece of kaolin pipe stem and a small sherd of undecorated white tin-enameled coarse earthenware, identified as majolica, were recovered near the pump box.



Kaolin pipe fragment. (A. Newsom)



Majolica sherd. (A. Newsom)

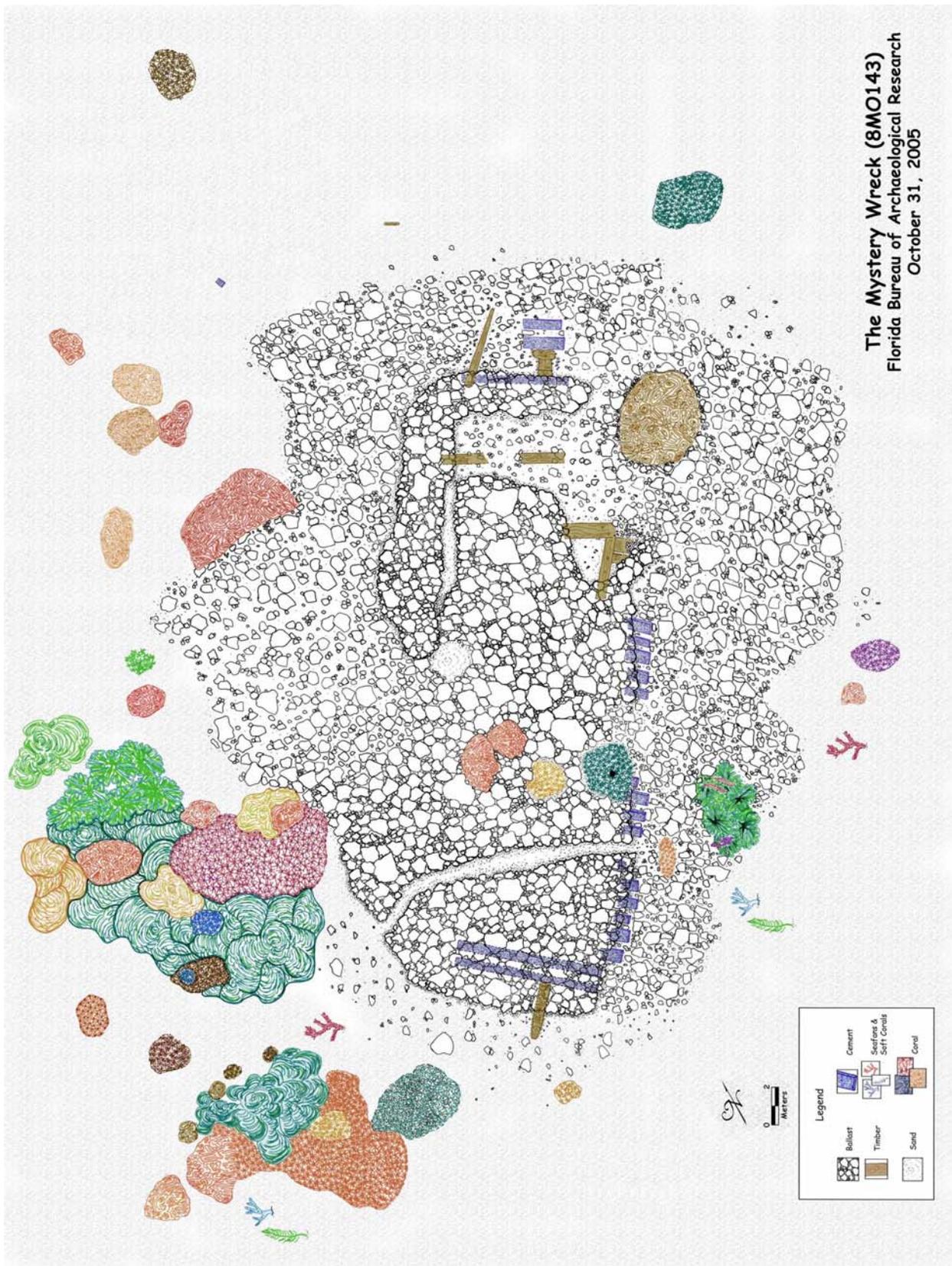
The hole diameter of the pipe stem measures 1/8 inch (3 mm), corresponding to the 1620–1680 date range on the Harrington chart.¹ Small undiagnostic sherds of olive jars were scattered around the shipwreck; none were collected.

The largest artifact recovered was a long, pole-shaped log of wood found wedged under the forward-most bow frame. The log is of *lignum vitae* wood, measuring 1.6 m (just over 5 feet) in length with one chopped end, and initially was thought to possibly be a gunner's wedge or other tool used to try to heave the ship off the reef where it had grounded. Further analysis indicates it more likely was among the cargo and became trapped under the hull as the ship disintegrated. Based on analysis of artifacts recovered by salvors, in addition to construction features and material collected during “the Mystery Wreck” project, the site likely is 17th-century Iberian.



Beckwith recovering the *lignum vitae* log. (J. Anderson)

¹ Harrington, J.C. Dating Stem Fragments of Seventeenth and Eighteenth Century Clay Tobacco Pipes, in *Historical Archaeology: A Guide to Substantive and Theoretical Contributions*, edited by Robert L. Schuyler. New York: Baywood Publishing, 1978.



Interpretation of “the Mystery Wreck”

The ship called “the Mystery Wreck” appears to have been a small vessel built in the Iberian tradition, approximately 19 meters long and at least 7 meters in beam. It possibly was an *aviso* or dispatch vessel traveling in company with other ships. Sometime during the 17th century, the ship was sailing along the remote islands of the Keys in sight of land when it left the deep water of Hawk Channel and ran hard aground on an isolated patch reef. Damaged and stuck fast by the bow, the crew was unable to get it off the reef, and the ship was stripped and abandoned. As the ship slowly deteriorated, the ballast concreted together in a solid mass. When the keel finally collapsed and no longer supported the ballast, the concreted mass broke in two, producing a fissure that bisects the mound. Wooden timbers not covered by sediments were consumed by marine organisms and destroyed by waves and currents, leaving behind ghost impressions in permanent ballast poured into the lower hull. The surrounding reef community engulfed the wreck and marine life colonized the ballast, helping to protect the remains from natural erosional forces. An example of an early grounding incident, “the Mystery Wreck” is part of the maritime heritage resources of the Florida Keys National Marine Sanctuary and the State of Florida and presents an opportunity for future research and interpretation of our colonial maritime history.

Among potential candidates for the identity of “the Mystery Wreck” are ship losses reported in documents housed at the Archivo General de Indias (AGI) in Seville Spain:

Year 1630 – Two galleons of the Armada of Tierra Firme were sent, under the command of the Maestre de Campo Antonio de Oteyca, to carry supplies to St. Augustine from Havana, but both were wrecked at the head of the Florida Keys. All of the men on both wrecks were saved, and the fifty-six bronze and iron cannons on the two wrecks were also recovered and taken to Havana, where they were distributed for use in the various forts of that port. [AGI, *Indiferente General*, legajo 1154]¹

Year 1665 – The Spanish merchant ship Santa Anna María was wrecked on Key Largo on February 15th and there is no mention of what she carried or if she was salvaged. [AGI, *Santo Domingo*, legajo 150]²

Year 1688 – Brief mention of an unidentified merchant nao was lost in the Florida Keys this year. [AGI, *Santo Domingo*, legajo 168]³

¹ Marx, Robert F. *Shipwrecks in Florida Waters*, The Mickler House, Publishers, Chuluota, Florida, 1985, p. 78.

² Ibid., p. 80.

³ Ibid., p. 81.

Recommendations for “the Mystery Wreck”

The following recommendations are offered for consideration:

1. The wrecksite should be visited periodically to monitor the condition of its natural and cultural features. Periodical storms and human visitation may affect its situation over time, and their impacts should be noted.
2. Further historical research may shed light on the ship’s identity and details of its wrecking in relationship to the maritime history of the Florida Keys. Since the ship appears to have been stripped of its apparel, equipment, armaments, supplies, and cargo, its salvage may have been recorded and inventoried. Documents pertaining to this activity might reside in the *Archivo General de las Indias* (AGI) in Seville, Spain.
3. Additional sampling of the cement-like material beneath the ballast pile will allow additional analysis of its composition and origin to be performed.
4. A systematic reconnaissance of the environment surrounding “the Mystery Wreck” might produce evidence of the smaller shipwreck site mentioned by Robert Weller in the sand on the seaward side of the patch reef.

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