

# MAHS NEWS



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## MAHS Video Survey and Field School in Florida, 2009

By Tom Berkey, James Smailes, Steven Anthony, Dennis Knepper

In June of 2009, MAHS conducted a survey project and Field School in Underwater Archaeology on Molasses Reef, in the Florida Keys National Marine Sanctuary. The survey portion of the project was carried out under a permit from the National Oceanic and Atmospheric Administration (NOAA) and consisted of a video survey focusing on an area selected in consultation with Dr. Roger C. Smith, State Underwater Archaeologist for Florida, and John Halas, Manager of the Upper Region of the Florida Keys National Marine Sanctuary. The area includes a range of ship debris and artifacts and is close to the wreckage of *Slobodna*, a 19<sup>th</sup>-century shipwreck that was the site of MAHS' 2008 underwater archaeology field school.



*K. Flamm and D. Cushman taking trilateration measurements. Photo by T. Berkey.*

The project also provided an opportunity for MAHS to conduct its 2009 Field School in Underwater Archaeology. The field school was authorized under the NOAA permit, and data from the site mapping exercises conducted by the

students will become an important component of the survey project.

Molasses Reef is characterized by a linear orientation referred to as spur-and-groove. The reef morphology results in part from persistent currents on the reef that promote the development of troughs between the coral heads. The bases of the troughs, or grooves, are rocky or sandy. Bottom relief can be dramatic: we recorded a difference of more than 12 feet between the tops of several coral heads and the bases of adjacent troughs. The top of the reef is shallow, the water being sometimes as little as 15 feet in depth. Ships have regularly wrecked here, particularly although not always in storms. Not surprisingly, much of the wreckage from ships

colliding with the reef ultimately settles to the bottoms of the grooves. Our survey was the start of an effort to

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## Notes from the Prez – Steven Anthony

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The 2009 diving season has been one of our most challenging and productive of all. In addition to our ongoing projects in Maryland and Virginia, MAHS members volunteered in June to document shipwreck remains on Molasses Reef under a permit with the Florida Keys National Marine Sanctuary.

Molasses Reef lies inside the sanctuary and due east of Islamorada, Florida. Dive conditions are considered to be almost perfect there which is why Molasses Reef is one of the busiest diving locations in the world. Shipwrecks and related features are strewn all across the reef. . Roger Smith, Florida State Underwater Archaeologist, suggested that MAHS conduct a video survey of certain shipwreck features found in an area near the *Slobodna* wreck site. The purpose of the study is to determine if the features are associated with the *Slobodna*, an Austrian built wooden schooner that foundered on the reef in 1887. See the enclosed article for more information about this project and the related field school.

Later in June, I teamed with Dennis Knepper and Dave Shaw to provide a presentation on the Bodkin Creek Project to the Friends of Hancock's Resolution. Jim Morrison, President of the society, was our host for the evening. Everyone seemed to enjoy the presentation and several members approached us afterwards to offer assistance with the project.

The Bodkin Creek Project was the primary focus of our efforts this year. A mid-project report was filed in August and MAHS received the second disbursement under the contract. Don Kentopp and Dave Shaw continued their research efforts and followed leads to the British Columbia Archives in Canada. Jim Smailes conducted research at the National Archives in Kew, England and Tom Berkey continued his research in the National Archives in Washington DC and the Library of Congress. In September Dave Shaw lead a team of MAHS divers into the field to explore Wreck No. 2 and Dennis Knepper began wrapping up the terrestrial investigations for the final project report which is due at the end of the year. See the enclosed article for more information.

The archaeology community received some important news this year and I would like to applaud the Kingdom of Spain and their attorney Jim Goold, for their watershed legal victory against Odyssey Marine Exploration. In June, a federal district court ruled against Odyssey for plundering the wreck site of *Nuestra Senora de las Mercedes*, a Spanish frigate that sank in 1804 laden with precious cargo from South America.

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*MAHSNEWS* will consider articles and notices for publication which enhance public awareness and appreciation of maritime history, archaeology, and heritage preservation.



*Satellite image of Molasses Reef. On the left is the characteristic spur and groove configuration of the reef. The spurs are the dark-colored coral heads, the grooves are the light-colored, sand-filled troughs. Photo by the Florida Keys National Marine Sanctuary.*

document the debris in this part of the reef to address questions such as how widespread the wreckage might be, what types of artifacts or other features are present, and how many ships might be represented.

We dove again with Quiescence Dive Services, operating out of Key Largo. As in the past Quiescence took very good care of us, which allowed us to focus our attention on the task at hand: archaeology. We worked out of two dive boats, both of them identical “6-packs,” captained by John Peacock, Steve Campbell, and Tim Shaw. For the video survey we were joined by Glenn Patton, an experienced underwater videographer recommended to us by Roger Smith. Patton has worked widely with NOAA in the Florida Keys National Marine Sanctuary and throughout the region.

MAHS personnel split into two teams, one to carry out the video survey and one to conduct the field school. The video survey team traveled out to the site on Molasses Reef first in order to inspect the area, determine the best location in which to start working, and lay a baseline to be used as a reference for both the video survey and the field school. The initial dive began with a circle search, a 30-meter sweep around our mooring buoy to assess the immediate area and verify that we were in the part of the reef containing the debris field in question. The current was fairly strong near the surface, which made the reconnaissance a little challenging. Nevertheless, we were able to confirm that we were in an area littered with shipwreck remains, and

we made sketch maps of the immediately surrounding reef configuration. After the initial survey, we selected one of the troughs that contained a suitable number and distribution of artifacts for the field school’s site mapping exercises and that also made a good starting point for the video survey.

The next task was to lay the baseline and set up grid controls for the video survey. Our permit authorized us to install two datum points using rebar driven into the sandy bottom. We extended a 25-meter baseline between the datum points and created the survey grid by running perpendicular lines from each end of the baseline, then connecting the lines every 3 meters to form lanes for the videographer to follow. A tape measure was laid down the center of each lane and lettered tiles were used to mark 5-meter increments along the tape as visible reference points.

The videographer, Patton, then ran along each lane documenting the bottom with high-definition video, using a Sony HVR V1U camcorder in an Amphibico Endeavor underwater housing with a wide angle dome port and a Discovery Pro Arc Lamp lighting system. At the end of each video run, MAHS divers moved the tape measure and lettered tiles to the next lane. In this manner we systematically worked our way down the grid lines to get 100 percent video coverage of the bottom. This may sound easy, but with the current and the speed that the divers needed to maintain in order to keep up with the videographer it was hard work. Everyone worked well together though, and despite the challenges, we recorded a continuous survey of a 975-square-meter area.



*J. Smailes placing a scale on a feature in preparation for photographic documentation. Photo by J. Landon.*

Meanwhile, the field school prepared for their in-water exercises. First though, came a review of the mapping technique that we use most commonly, baseline trilateration. The review included a dry-land



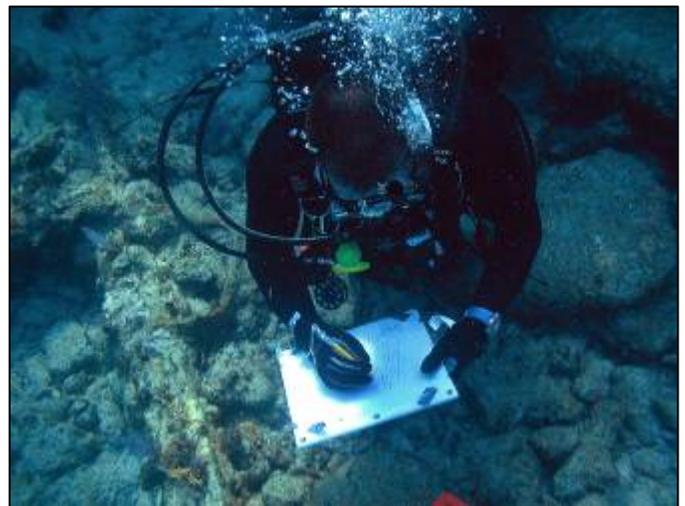
*S. Anthony and P. Kalmanson installing one of two datum points for the project baseline.*



*J. Kalmanson placing tiles marking 5-meter intervals along the video lanes.*



*G. Patton conducting the video survey.*



*J. Landon making a detailed drawing of one of the artifacts in the debris field.*

*Photos on this page by J. Smailes, T. Berkey, and D. Knepper.*



*T. Berkey conducting supplementary videography.*



*Railing, to the left of the video lane centerline.*

**Examples of images from the video survey**



*Railing, crossing the centerline from upper left to lower right.*



*Large timbers along the centerline.*

*Images from video by G. Patton.*



*Mast hoops or spar parrels: scale bar is 1 meter.  
Photo by J. Smailes.*



*Metal framing: scale is in 1- and 2-centimeter increments.  
Photo by J. Smailes.*

walk through to insure that the students were familiar with the procedure and to give them a chance to practice it without the constraints of working underwater.

Trilateration on-location at Molasses Reef was done using the baseline established for the video survey. After an initial reconnaissance dive that included sketching the site area, followed by selecting and tagging artifacts or features to be mapped, the teams surfaced to discuss their dive plans with the MAHS trainers. With dive plans in order, the teams returned to the site to begin recording data. The divers also made measured sketches of a number of the artifacts that they had mapped within the site area. At the end of each day, the teams plotted their new data thereby constructing a map of the site.

A large amount of debris was present within the area

encompassed by the video survey grid and in the immediately surrounding portion of the reef. Most of the artifacts consisted of various large and small metal objects, including bars; channel iron and other framing material; rods, poles or rails; pump or plumbing fragments; and at least one sea cock. Most of the metal appeared to be iron, although this was not always clear since the artifacts were typically encrusted with marine growth or were partially covered with sand. Two heavy wooden timbers and several fragments of wood planking were also noted. All of the artifacts were photographed or drawn in place without being moved, cleaned or otherwise disturbed. No articulated ship remains were observed. Few of the artifacts were immediately identifiable as to function, and none of the items was clearly datable. The density of the debris in terms of horizontal distribution throughout the reef grooves

**Documenting the archaeological material is a critical part of protecting the reef**

suggested the remains of a large vessel or, as likely, that several vessels had wrecked and broken up in this location.

While this portion of Molasses Reef lies within the Florida Keys National Marine Sanctuary and thus is a protected area, it is also a popular dive and snorkeling location. The area is relatively close to shore and thus is easy to reach. A system of mooring buoys has been established by the Marine Sanctuary allowing boats to visit the reef without having to anchor among the live coral. The reef is also shallow, making it ideal for novice divers and snorkelers. And indeed, in the time we spent on the reef we witnessed a constant flow of boats, both private and from several local dive shops.

Documenting the archaeological material on the reef is, therefore, a critical part of protecting it by providing a detailed record of the artifacts and features that are present. The high definition video survey represents an accurate and essentially unfiltered catalog or inventory of the wreckage or other debris. The field school, in addition to providing significant training in some of the procedures used in historic preservation, also produced valuable information that will be combined with the results of the video survey to more fully describe the distribution of artifacts on the reef.

*We would especially like to thank Roger Smith (Florida Bureau of Historic Preservation), John Halas (Florida Keys National Marine Sanctuary), and Rob Bleser and the folks at Quiescence Dive Services. ⚓*

# The Anguilla Archaeological and Historical Society's 2009 Shipwreck Survey

by Lillian Azevedo

**M**y PhD research at the University of Southampton examines current underwater heritage management practices in the Caribbean region and how positive attitudes can be fostered so that communities will assume a more active role in local underwater cultural heritage management.

But before local management can be effective, island residents need to understand the extent and nature of their resources. The island of Anguilla, which lies just north of the popular tourist destination of St. Maarten in the eastern Caribbean, has no effective heritage management program, and there has been no effort to date to systematically record the nation's underwater cultural resources. Underwater heritage and history in general has in the past been and now remains a low priority for many Anguillians. Public education includes little information on the island's history before the revolution in 1967, in which Anguilla separated from Nevis and St. Kitts, eventually becoming a UK Overseas Territory. This lack of interest has left the island's underwater cultural resources vulnerable and without official protection.

As early as 1971, underwater archaeologists recognized that there was potential for research on Anguilla. That year Alan Albright, from the college of the U.S. Virgin Islands, visited Anguilla to look for shipwreck sites. Unfortunately, he left no record as to the results of his work. His efforts were not built upon, and the underwater cultural heritage of Anguilla remained largely unacknowledged until 1994, when sport divers began recovering artifacts from the wreck of *El Buen Consejo*, an 18<sup>th</sup>-century Spanish ship that reportedly sank off the northeast coast of the island.

In the 1980s, three companies petitioned Anguilla's government for the right to excavate the *El Buen*

*Consejo*. The authorities were at the time unaware that selling artifacts is unethical, and it was only through lucky intervention that a concerned Anguillan contacted an "off-Island expert," Dr. Margaret "Peggy" Leshikar-Denton. Denton is an archaeologist with the Cayman Islands National Museum and also serves on the Society for Historical Archaeology's United Nations Educational, Scientific and Cultural Organization

(UNESCO) Committee. Together they managed to convince an island committee that granting excavation rights would make Anguilla a pariah in the eyes of ethical archaeologists and museums. Salvage rights were amended so that artifacts were not allowed to be sold, and the site eventually became an underwater archaeological preserve.

In 1996, in response to concerns that sport divers were looting the shipwreck, East Carolina University and the Maritime Archaeological Historical Society (MAHS) were invited to Anguilla to survey and map the site (*MAHSNEWS* Vol. 8, No. 6). Shortly thereafter, the government of Anguilla declared the site an Underwater Archaeological Preserve. Poor diving conditions and a remote location have made

developing the site for tourism difficult. Twelve years later the site has been heavily impacted by over a decade of amateur and semi-professional looters. Over 40 religious medallions from the site were recovered by the FBI and returned to Anguilla after a medallion was listed for sale on eBay in the USA. Despite this success, Anguilla has a very poor idea of the type and variety of artifacts from the wreck site, or even the number of cannon presently on the site.

Effective management requires that Anguillians need to understand the nature of their maritime archaeological resources. Trying to convince island



*One of two large anchors at a wreck site near Prickly Pear Island. Photo by C Grout.*



*Above and left, divers recording a cluster of cannons using the direct survey method. Below, J. Smailes documenting a small anchor. Photos by R. Hayes.*

officials to protect things they do not believe exist is obviously a difficult task. For this reason, the island's submerged landscape must be surveyed and the resources that are present must be identified. On the Cayman Islands, a survey in 1979 and 1980 by the Institute of Nautical Archaeology (INA) at Texas A&M University demonstrated that scientific scrutiny, rather than the hunt for treasure, can bring aspects of national heritage to light. That survey provided baseline information which could be added to over time. Today, the Cayman Islands have over 140 recorded sites of both historic and prehistoric significance.

In June and July of 2009, I organized the Anguilla Shipwreck Survey, a field project designed to begin the process of developing widespread public interest in Anguilla's maritime cultural heritage. The primary objective of the project was to bring together a team of archaeologists and archaeologically trained volunteer divers to survey areas of potential significance and demonstrate to Anguillians that their underwater cultural heritage is a real, non-renewable resource that deserves protection. Like INA's Cayman Islands survey, the Anguilla Shipwreck Survey is intended to reveal the extent of a previously unknown resource base and create a set of baseline data that can be built upon in the future. Moreover, by involving the community from the start, Anguillians will learn first-hand how to record and manage the island's underwater cultural resources. Hopefully they will choose to become more involved in actively managing their past.

I have received tremendous support from the Anguilla Archaeological and Historical Society, who encouraged me to focus the survey on a search for evidence of Anguilla's earliest shipwreck, a 1628 Spanish nao, a form of small, three- or four-masted sailing ship that was used by the Spanish and Portuguese in the 15<sup>th</sup>-through-early-17<sup>th</sup>-centuries. We



believe that if we can locate this wreck or a similar site of major historical significance, effective resource management and protection will be easier to make a reality on Anguilla. By involving the local community we hope to generate concern for the island's underwater cultural heritage, making it a focal point for local and national cultural identity.

Research at the Archivo de Indies by myself and historian John DeBry has located documents showing that the nao (its name is still unknown) was a merchant vessel that left San Juan, Puerto Rico, on December 12, 1628 carrying "frutas de terra," and that it was lost off the north coast of Anguilla shortly thereafter. The records show that the pilot, Juan de Acosta, reached Spain two months later, in February 1629.

My interpretation of the data suggests that this could be an area where local divers have reported several anchors of unknown date.

The project this summer was a three-week underwater archaeological survey designed to assess the island's archaeological potential. It was a multinational effort to catalogue a unique set of resources and simultaneously educate the public to its existence and importance. Volunteer divers from Southampton University, MAHS, and several local organizations participated in the work. We were directly supported by the Ministry of Fisheries, who provided a boat three days each week for use as a dive platform, along with an able and knowledgeable captain and crew. The project was sponsored by the Anguilla Archaeological and Historical Society.

As a result of the survey we located 13 sites ranging from the late 18<sup>th</sup>-century to the present. Methods used to actually locate the sites included informant interviews, in which we spoke with fishermen who led us directly to the locations of wrecks or features, and general systematic survey techniques such as tow surveys and snorkel surveys.

Two or possibly three 19<sup>th</sup>-century shipwrecks were identified by anchors, windlasses, hawse pipes, anchor chain, and copper sheathing; another possible wreck was indicated by a cluster of four anchors and ballast stone lying in troughs between reef spurs; another site consisted of a cluster of nine cannons; the location of a wooden wreck that may be 18<sup>th</sup>-century in date was verified; a known ballast dump was examined; additional anchors and cannons associated with *El Buen Consejo* site were documented; two 20<sup>th</sup>-century metal wrecks—a barge and a small tanker—were documented; and finally, several isolated or spot finds were recorded, including two cannon and three individual anchors.

Various recording techniques were used for preliminary documentation of these sites, ranging from sketch maps, drawings, and photographs to trilateration mapping and direct survey method mapping.

I believe the 2009 Anguilla Shipwreck Survey has the potential to radically change both the way Anguillians think about their island's past and the way that past is managed. On islands where local heritage is often an unpleasant reminder of an inequality that continues to exist, heritage managers must find new ways of



*J. Adams, of Southampton University, documenting a windlass at a wreck site near Seal Island. Photo by D. Knepper.*



*The author documenting a large anchor at the El Buen Consejo wreck site. Photo by C Grout.*



*M. Crossthwaite and the author measuring cannons at a site near Seal Island. Photo by C Grout.*



*Trilateration mapping on a wreck site near Seal Island. Photo by the author.*

Education is a key part of meeting the challenges. I feel strongly that Anguilla's youth can be empowered through knowledge about their island's cultural heritage. In September, I taught 38 students from the 4th, 5th, and 6th grades at the Alwyn Allison Primary School about their island's maritime heritage, and I encouraged them to think about how the sites I described to them might be developed to encourage tourism.

**Education is a key part of demonstrating benefit to the island**

Earlier in the summer, I organized a field trip for students to the shoreline of the *El Buen Consejo* site near Junk's Hole. From a vantage point overlooking the crashing waves, I explained where the vessel struck the coast. Nine children and their parents then spread out along the coast and we soon began to find evidence of the wreck. I enlisted several children to help record data (using a GPS unit and slate). Square nails, iron pins, and various concretions (which may have been parts of cases packed with pins but are now merely impressions), were discovered among the rocks. I asked the children to think about what the twisted, broken bits might have been from, and together we imagined the boxes of trade goods that would have been part of the ship's cargo. Later, the children were encouraged to fill in archaeological record sheets to document their discoveries, and I showed them several underwater images of the site. It was a very successful morning. As one student said, "It was very exciting when we began identifying bolts, stakes, nails, and even what we thought looked like a pair of scissors. I found it very interesting and would do it again in a heartbeat." That is the kind of enthusiasm that can be moulded into a real appreciation in the next generation for the island's maritime heritage. ⚓



*Student recording data with a GPS unit on the shore at the El Buen Consejo site. Photo by the author.*

engaging the public interest in a positive way. Part of the solution, as has been identified in many heritage contexts before, is education. Many Anguillians' apathy lies in their belief that nothing of interest is to be found around their island. Combined with an attitude that asks "what's in it for me," the challenge to cultural resource managers is great and requires an effective program that must demonstrate to the public that underwater archaeology can actually benefit the average islander.

# The Last of the Civil War Double-Enders: The USS *Otsego* as an Archaeological Site

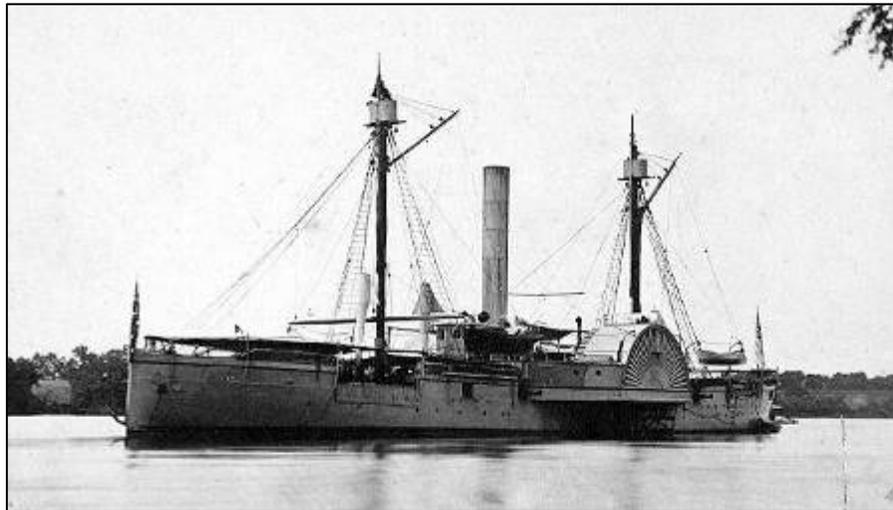
by Lawrence E. Babits

The Roanoke River Basin in North Carolina was the scene of intense conflict during the Civil War, and residues of the conflict can still be seen there today. Over a three year period, Northern forces sought to enforce the U.S. blockade of Southern ports, to interdict Southern railway lines where they crossed the Roanoke just above Halifax, and to interrupt naval construction at Edwards Ferry and Halifax, especially the Edwards Ferry Navy Yard where the ironclad CSS *Albemarle* was built. Today the river conceals at least a dozen vessels that ended their careers between 1862 and 1865. Among them are two vessels that relate directly to the Union's demands for boats that could operate in southern waters—the USS *Southfield* and the USS *Otsego*.

In the shallow Southern waters, the ability to reverse direction under control was important. Sidewheel steamers could change direction by reversing their paddlewheels, but the ability to conduct delicate steering operations was compromised unless a vessel shipped rudders both fore and aft. The first response to the need for maneuverable river vessels was to utilize merchant ships, and in particular ferry boats, that were double-ended and had large open spaces suitable for mounting guns.

Such was the USS *Southfield*, a New York ferry and sister ship of the USS *Hunchback*. These were sizeable vessels with heavy timbers, most of their machinery protected below the waterline and with open space to work guns. After two years of service in North Carolina waters, *Southfield* was rammed and sunk in the Roanoke River by the CSS *Albemarle*.

The wreck of the *Southfield* was discovered in 1990, and a field school was conducted on the site by East Carolina University the following year. The investigation exposed stern decking, penetrated one hatch and examined the rudder. The deck edge provided information about how the guns were protected and restrained during recoil. Inspection under the deck by one hatchway showed that the hull was full of cultural material. But without funding for conservation, no material from the hold was removed and the hatch area was reburied. Information from the rudder assembly, in conjunction with an examination of the exposed engine



USS *Agawam* a double-ender of the *Sassacus* class in the James River, 1864. Image from the U.S. Naval Historical Center.

spaces, allowed determination that this was the *Southfield*'s stern. A follow-up dive several months later confirmed that the excavated area was completely covered.

The U.S. Navy's program of purpose-built double-enders began in 1862. The advantage of the double-enders' design was primarily in their shallow draft, their ability to change directions, and the higher speeds they could attain—up to 15 knots. There were ultimately three double-ended classes: the *Octorara* class, with twelve vessels; the *Sassacus* class, with 28 vessels; and the *Mohongo* class with seven vessels. The *Sassacus*-class was largely a response to problems associated with the *Octorara*-class. The *Sassacus* double-enders were not only larger but were also built from one homogenous design plan that adhered, for the most part, to strict conventions used in class specifications. The vessels of the later, *Mohongo* class were generally larger than the *Sassacus*-class vessels, had a greater draft, and were constructed using iron-hulled building techniques. These vessels were to become some of the navy's most efficient and best-built warships, indeed some of the largest naval warships to serve in the U.S. Navy until 1914.

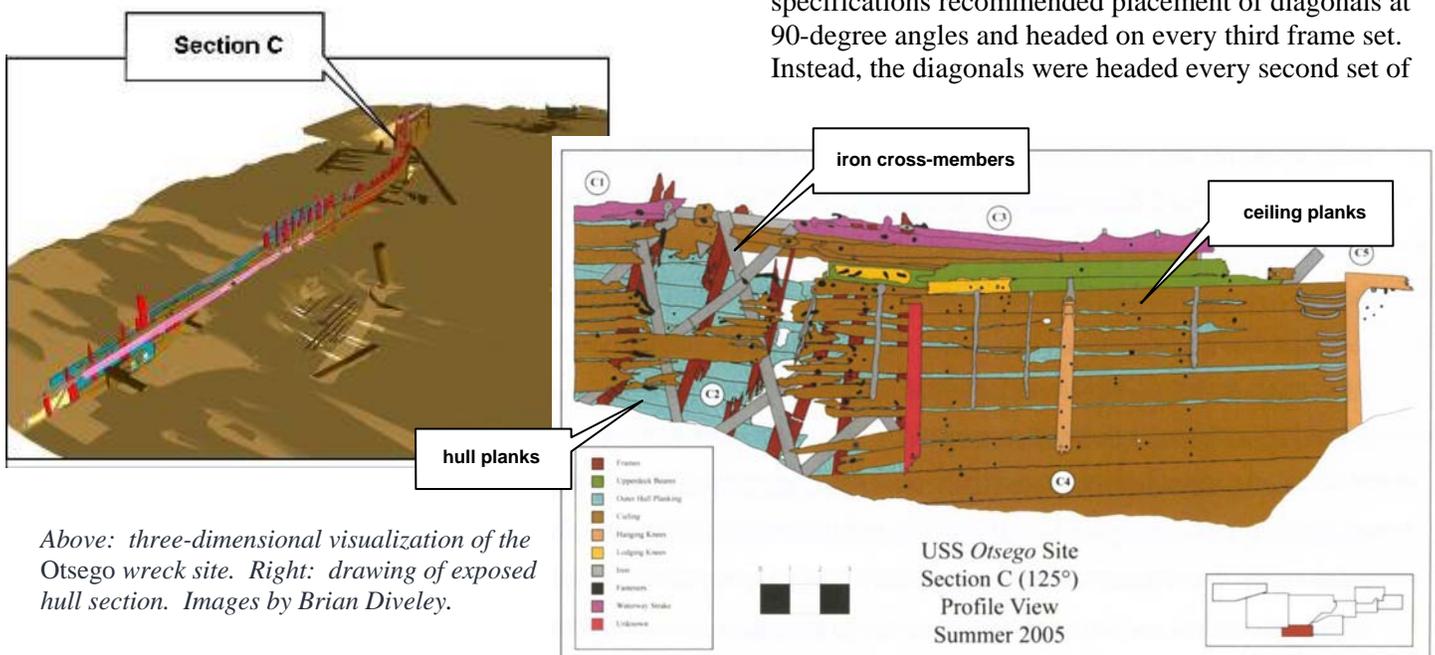
In December 1864, after recapturing Plymouth, North Carolina, Federal forces moving further upriver encountered torpedoes that sank two Union ships, the *Bazely* and *Otsego*. The remains of the *Otsego*, a *Sassacus* class double-ended craft, were recorded during

Today the Roanoke River conceals at least a dozen vessels that ended their careers between 1862 and 1865

*Bazely* and *Otsego*. The remains of the *Otsego*, a *Sassacus* class double-ended craft, were recorded during a non-invasive survey in 2005. The investigation included magnetometer and side-scan sonar surveys, along with visual inspection or ground truthing. During the project, damage to the vessel commensurate with period weaponry was noted. The archaeological remains were matched against photographs of the same class (there are no known photos of the *Otsego* itself). As the last survivor of its class, *Otsego* has considerable significance for providing information about a vessel built during the transition from wood to iron hulls, sail to steam power, and the introduction of light armor plating and rifled weaponry. Despite a variety of archival holdings, evidence directly related to the *Otsego* is conflicting and often hard to find. The ambiguous documentary background means that archaeology can play a key role toward illuminating the vessel for history.

The *Otsego* lies in less than 25 feet of water a mile below Jamesville, North Carolina. This is *Otsego*'s ultimate resting place after the Corps of Engineers cleared the channel in the late nineteenth century. The ship is covered at various points with river debris including whole trees, logs and fishing nets. The river current varies, but during the archaeological survey described herein was usually running about 2-3 knots, with visibility rarely exceeding 18 inches.

Fieldwork was designed to minimize impact while retrieving maximum information. No dredging occurred as efforts concentrated on recording visible hull elements, freeboard/bulkhead and collapsed decking. The site was roughly divided into eleven distinct, but arbitrary sections, some of which are described here.



Above: three-dimensional visualization of the *Otsego* wreck site. Right: drawing of exposed hull section. Images by Brian Diveley.

### Section A - The starboard bulwark

This area was the last to be inspected and was not fully recorded. It is believed to be some of the forward starboard bulwark because the deadeyes and chainplates were different from those associated with the aft mast. There were also two pinrail platforms. A hexagonal porthole was quite different from those noted in other locations. Two sets of four vertical pairs of shackle bolts suggest this zone was a gun port for the pivot gun.

### Section B – The forward decking

The forward deck area was the largest and most diagnostic vessel remnant. It extended along the midships line allowing identification of hatchways, mast partner assembly, and basal elements of a fife rail. Shot garlands on hatch coamings agreed with photographs and made identification a simple matter.

Some of the ship interior once under the deck was also exposed. There were hooks on two timbers made of iron and yellow metal. Given that they were different, the iron hooks were possibly for slinging hammocks while the brass hooks were for equipment. A disarticulated segment of two-inch thick planking in the same area may have been a remnant of the hurricane deck.

### Section C – Forward portside bulwark

Here the portside hull disappeared into river debris. It was the only large exposed portion of the exterior hull and provided data for understanding hull construction. Section C was identified as an area of the forward portside hull, located parallel to the paddlewheel assembly. While many of the features recorded on-site were consistent with the specifications of the *Sassacus* class, two major features were not. The first was iron diagonal bracing recorded in Section C. Class specifications recommended placement of diagonals at 90-degree angles and headed on every third frame set. Instead, the diagonals were headed every second set of

frames and thus were set at a more acute angle of 60 degrees. Additionally, triple frame sets along the engine spaces were greater in number than called for in class specifications. Given how strictly the navy adhered to 'called-for' specifications, these changes likely resulted from the influence of Jacob Westervelt, the prolific New York shipbuilder in whose yard the *Otsego* was constructed. The damage at C1 in the figure on the previous page was quite probably due to the Confederate torpedoes that sank the *Otsego*. This interpretation is based on descriptions of the torpedoes exploding under the forward pivot gun. The rupture of the interior and exterior hull at this point suggests an exterior explosion.

Section F – Portside hull segment

This section was from the aft sponson to the paddlewheel shaft. Frames here were triple sets on 2.1-foot centers. A fourth futtock was added indicating a need for greater strength.

Section G – Hull segment with broadside gunport

Section G was arbitrarily designated for control purposes. One end began where exterior iron plating stopped at the sponson mortise. Upper elements included a broadside gunport with its rail two feet above the deck running along the vessel side. Here, the bulwark's exterior was plated with 3/8-inch iron. A circular hole (ca. 7-x-6 inches) may have been a blast hole. The dimensions are consistent with the U.S. Navy's intentional destruction of the *Otsego* using 100-pounder shot. The Navy had fired upon the *Otsego*'s remains to prevent the Confederates from using the machinery

Section H – Mainmast rigging aft portside bulwark

Here, the port bulwark had the mainmast deadeyes and five chainplates. The visible 3/8-inch iron hull plating and diagonal bracing between the frames and ceiling planks allowed better understanding of hull construction, especially as the framing was in good condition and accessible. An iron hawse pipe was also noted.

Section I – Port pivot gun port

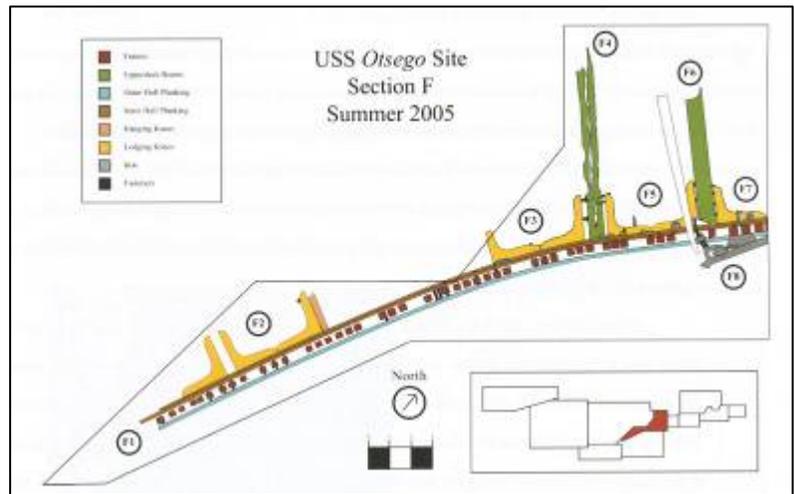
The bulwark here still had breaching and training tackle anchor points for the aft pivot gun. The presence of yellow metal stanchion sockets was unexpected but helped clarify where this bulwark section was located on the vessel.

Section J – Aft portside hull

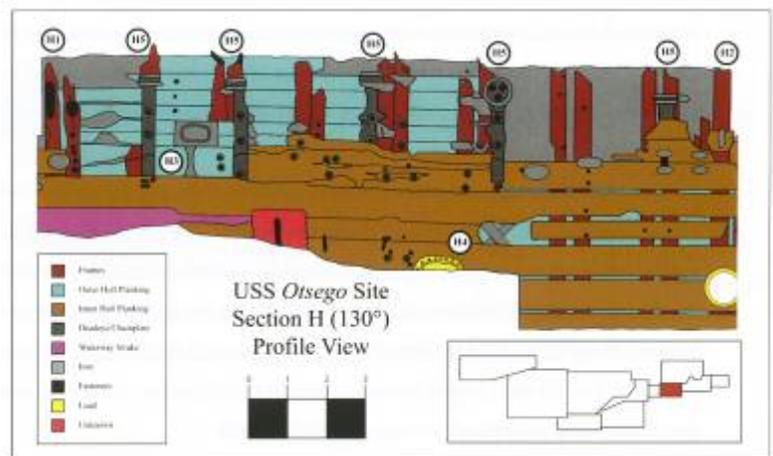
The portside stern quarter ends about where the hull should begin angling toward the vessel's centerline. The portholes in this section were close together suggesting officers' quarters.

Section K – Aft hatch and pivot gundeck

This section represents visible remnants of the after gun deck. Most of the area is under sediment but the few places that were recordable could be identified by



Plan view of Section F. Image by xyz.



Profile of Section H. Images by Brian Diveley.

recourse to extant *Sassacus*-class photographs, including the hatch with shot garland and the brass in-deck fitting.

In conclusion, our preliminary evaluation of the *Otsego* suggests a well-built and designed vessel powerful enough to bring heavy artillery into nearly any riverine territory. In terms of vessel type alone, the Civil War double-enders were obsolete almost as soon as they were built. Screw propelled ships, as proven with the *Monitors*, showed that smaller armored gunboats could operate with more efficiency than sidewheelers without giving up gun power or protection. Because the U.S. Navy generally lagged behind commercial changes, any major change would first have to be proven outside the Navy. The "Navy culture" limited new ideas. Even successful new Civil War vessel types were not necessarily seen as good. In many ways, the Navy fought a personnel battle of attrition, and as the old command structure left the Navy, new innovations became more integrated into the system. While the application of technology and design innovation is

certainly open to much interpretation, the ideas set forth here help better understand the context of vessel change over the later nineteenth-century, showing how an archaeological site can provide illumination for naval history.

Author's note: some of the imagery in this article was created by Brian Diveley, an ECU student who wrote his masters thesis, *Naval Development and the Diffusion of Nineteenth-Century Maritime Innovation: An Archaeological and Historical Investigation of the Sassacus-Class Double-Ender, USS Otsego* (2008) on the *Otsego* Project. That thesis formed the basis of the present article. Nathan Richards was Co-Principal Investigator on the project. A dozen ECU students participated in the project—without their help, this article could not have been prepared

Other sources consulted for this article include Thomas Dickey and Peter George's *Field Artillery Projectiles of the American Civil War*, Arsenal Press, Atlanta (1980); Paul Silverstone's *Warships of the Civil War Navies*, Naval Institute Press, Annapolis (1989); and James Spirek's *The USS Southfield: An Historical and Archaeological Investigation of a Converted Gunboat*, an unpublished masters thesis, East Carolina University (1993). The photograph of USS *Agawam* on page 11 is from the on-line photographic collection of the U.S. Naval Historical Center (<http://www.history.navy.mil/photos/sh-usn/usnsh-a/agawam.htm>).

*The author is the Director of East Carolina University's Program in Maritime Studies. ⚓*

## Barcelona Maritime Museum

*By James Smailes*

Barcelona is the capital of Catalonia, a large Spanish province on the Mediterranean coast that borders France. One of Spain's most historic cities, Barcelona was founded as Barcino by the Romans in 15 A.D. Much of this ancient city survives today including Roman ruins, the medieval city, as well as part of the ancient city walls, some of which are on the property of the Maritime Museum. The city's waterfront was revitalized before the 1992 Olympics, and the area has been a popular outdoor recreation area ever since

The *Museu Maritim de Barcelona*,<sup>1</sup> or Barcelona Maritime Museum (BMM), is the outgrowth of two institutions with links to the sea: the *Institut Oceanografic de Catalunya* (Catalonia Oceanographic Institute) and the *Escola Nautica de Barcelona* (Barcelona Nautical School). Early in the 20<sup>th</sup> century, both institutions worked independently to develop facilities to support their own educational activities and provide a home to Catalonia's maritime culture. Almost 20 years later, in 1936, the *Museu Maritim de Catalunya* (Catalonia Maritime Museum) was created. The work of the museum—assembling artifacts and ship models, developing educational programs—were slowed but not halted by the Spanish Civil War that

began that year. The war did, though, cause a delay in the museum opening to the public. When it did finally open in 1941, the museum was under a newly created organization, the *Museu Maritim de Barcelona*.

The Barcelona Maritime Museum is located in the medieval Royal Shipyards, known as the *Reials Drassanes*. This collection of buildings with columns, arches and vaulted ceilings that was once at the water's edge, remains magnificently intact and is one of the most beautiful Gothic civil structures still standing in Europe.



*The Barcelona Maritime Museum is housed in the former Royal Shipyards. War galleys could be produced on an assembly line in each of the bays. The walls and towers on the left of this model are remnants of the city walls that date to the Middle Ages. The small object on the lower left represents a city bus, providing a sense of scale. All photos by the author.*

<sup>1</sup> Note that the language is not Spanish, but Catalan, the language of Catalonia. Catalan is more than just a dialect of Spanish, and although it sounds similar to Spanish, spelling and grammar are different. The Catalonians are very proud of their heritage so all of the signs in the museum are in Catalan first, then Spanish, and then English (sometimes). Not everything is translated into English.

This is where the Catalonian kingdom's ships were constructed, dry docked, and repaired. The harbor is being expanded for the 21<sup>st</sup> century, and adjacent private marinas make for a beautiful backdrop for the museum.

The buildings demonstrate the political and economic power that the Kingdom of Catalonia enjoyed in the 13<sup>th</sup>-15<sup>th</sup> centuries, power that was later inherited by the Spanish monarchy. Used as a warehouse for military stores since 1802, the complex of the royal shipyards required an extensive and expensive restoration before opening as a museum.

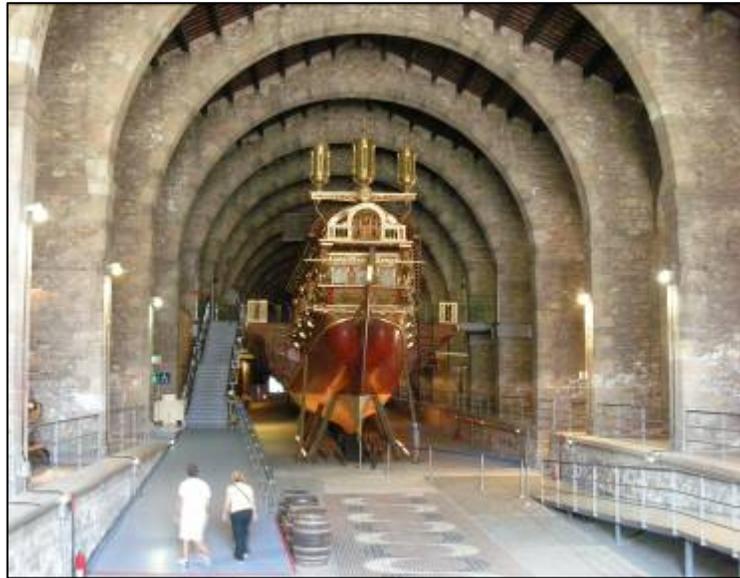
The results are spectacular. The facility has been restored, adapted, and expanded since the museum opened its doors in 1941 and is today a truly world-class museum. Traveling through the arched hallways that originally housed galleys under construction, one proceeds from antiquity through the Middle Ages and the Age of Exploration to the development of steam power and the modern era. Information available on ancient shipbuilding techniques is sparse and fragmented, much of it based on evaluating archaeological remains. Creating models of ships based on those remains is very important in discovering the techniques employed by

shipwrights in the past. Since Barcelona is on the Mediterranean and not the Atlantic Ocean, many of the ships and boats are of lighter construction, and the types may not be familiar to those who have worked on ocean-going vessels.

There is a large section on the Age of Galleys, which were the most fearsome war machine to sail the Mediterranean until the advent of gunpowder. A full-scale reproduction of the *Royal Galley*, commanded by Juan de Austria and flagship of the Christian forces at the Battle of Lepanto in 1571, dominates the center of the museum.

The Royal Shipyards are mentioned in historic documents as early as 1243. Commercial and fishing vessels as well as warships were constructed at the yards. The Museum contains dozens of ship models demonstrating the evolution of ships from small vessels to large, from sail power to steam. Other sections explain the evolution of navigation equipment, nautical cartography, or what it was like to be a sailor or passenger on board a ship at sea.

The Age of Exploration exhibit begins with Columbus' three ships and extends through the conquest of the Americas by the Spanish and the other European powers as well as the development of their ships. In the



*The Royal Galley, 1571, dominates the center bay on the museum. Galleys like this, but not as ornate, were mass produced on assembly lines inside each bay.*



*A diorama of the manufacture of rope, just one of the many trades housed in the Royal Shipyards.*

The exhibit continues through the 18<sup>th</sup> and 19<sup>th</sup> centuries with the discovery of new lands in the Pacific, the Antarctic, and includes scientific explorations as well, such as the voyage of Charles Darwin in the *Beagle*.

A final exhibit on the development of the port and the entire infrastructure that such a project entails completes the tour of the museum. The current expansion of Barcelona's port facilities will make it the

largest port in the Mediterranean, surpassing Marseilles and providing many new jobs for a city that began as a small outpost on the edge of the Roman Empire.

Visit the museum's web site at <http://www.mmb.cat/default.asp?idApartado=96> 



Above: *The Ictineo, Spain's first submarine, 1859. Built of olive wood she was designed for coral fishing and oceanographic research. Below: The propeller and rudder on the Ictineo.*

## Submarine *Ictineo*

To those familiar with the *CSS Hunley* and other early submarine designs, perhaps the name *Ictineo* will be familiar. Conceived by the Spanish inventor Narcis Monturiol and launched in 1859, the *Ictineo* (from the Greek *ichthys* [fish] and *naus* [boat]) was originally designed to facilitate underwater coral fishing. Her purpose was later expanded to encompass oceanographic research and the recovery of wrecked ships. The submarine was made from olive wood, was seven meters long, two-and-one-half meters wide and three meters high (23-x-8.2-x-9.8 feet). With a capacity of five people, she was propelled by human power and could stay submerged only for as long as the air inside allowed (as much as 2 hours). Sea trials in 1861 were not successful and financial support for the submarine was not provided by the Spanish Government, although the sea trials generated a great deal of popular interest.

Building on this interest, Monturiol constructed a second submarine, the *Ictineo II*, financed through popular subscription. The new submarine was 17 meters long, 3 meters wide and 3.5 meters high (55.5-x-9.8-x-11.5 feet) and could accommodate 30 people. The vessel was fitted with a mechanical propulsion system (which failed to work in the sea trials) and a means of controlling immersion, surfacing, and stability in the water. A device for regenerating air was also incorporated. Initial tests in 1867 were only partially successful. In early 1868 the vessel was impounded by the workshops at Nuevo Volcano, where she had been built, in order to collect outstanding debts. She was eventually stripped, broken up and her parts sold off, bringing a sad end to Spain's earliest submarine.

# MAHS Bodkin Creek Survey: Fieldwork Update

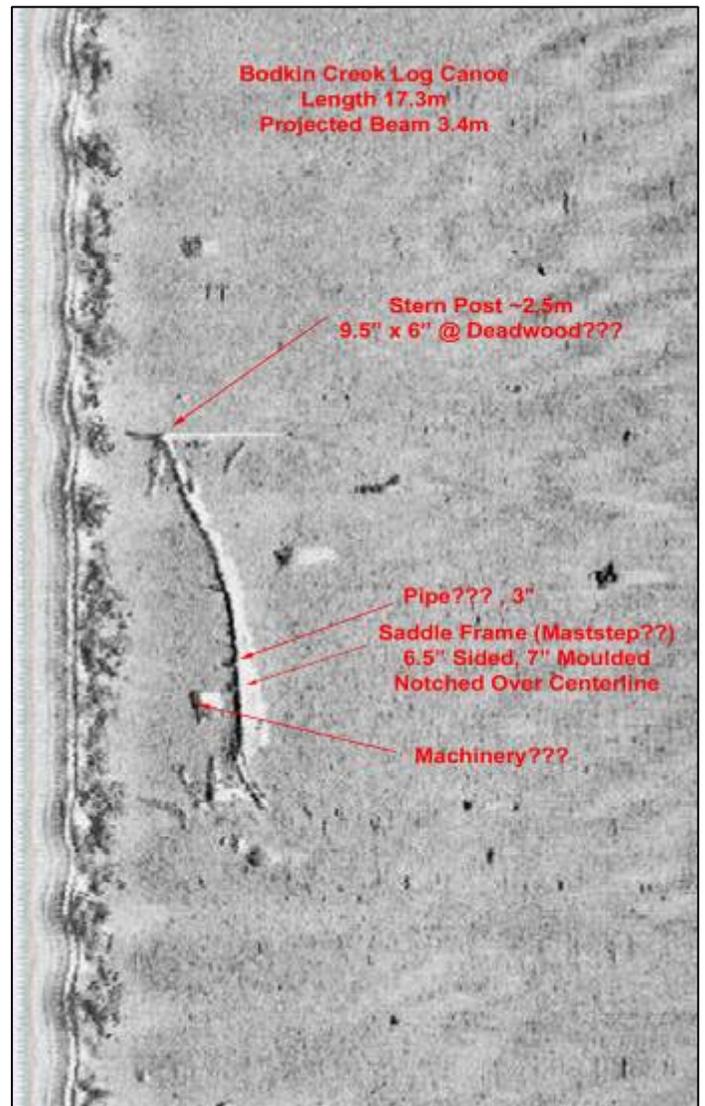
By Steven Anthony and Will Blodgett

Diving operations continued in Bodkin Creek this year. The research plan under the Maryland Non-Capital Historic Preservation Grant awarded last year provides that MAHS team with Geomar Research, LLC, a professional maritime archaeological consulting firm, to ground-truth anomalies identified during their remote sensing survey of the creek. Among a number of targets that resulted from that survey were three that were clearly visible in side-scan sonar returns as shipwrecks.

In early summer, MAHS co-project managers Steven Anthony and David Shaw joined Geomar's Jeff Morris and Steve Bilicki, and Maryland State Underwater Archaeologists Susan Langley and Brian Jordan to inspect the first of the wrecks identified in the remote sensing survey, a site simply labeled Bodkin Survey Wrecksite #1.

The weather was warm and mild, but the current was very strong, especially in the early afternoon, finally tapering off toward evening. The team was out all day and did not arrive back to the dock until approximately 6:00 pm. The site was reacquired using GPS coordinates and was imaged with sonar from several angles. But due to the currents, the team experienced some difficulty actually setting a buoy on the site. It required more than one dive to find the wreck, but perseverance and systematic searching eventually paid off.

The divers examined what they believe to be the sternpost, a straight, one-piece timber emerging from the bottom. There appeared to be no frames present, but wide, longitudinal timbers with large spaces in-between and strapping holding the timbers together were noted. This type of structure is consistent with a log-built boat, which for centuries has been a typical form of work boat in the Bay. The dimensions indicate that it could be a bugeye, a large log-built vessel that was widely used in the 19<sup>th</sup> and 20<sup>th</sup> centuries. However, there was also evidence of a hard chine, referring to the sharp angle at which the sides and bottom of the boat meet. This feature is not consistent with log-built craft. And finally, there was evidence of machinery, although of what type was not determined.



*Bodkin Survey Wrecksite #1, May 2009.  
Sonar image by Geomar, LLC.*



*The MAHS Bodkin Creek Fleet, September 2009. Photo by J. Landon.*

On a beautiful morning in September, Dave Shaw was joined by MAHS volunteers Tom Berkey, Jim Smailes, Will Blodgett, and Jim Landon to locate Bodkin Survey Wrecksite #2. The team left from Shaw's home port of Turkey Point Marina, in Edgewater, Maryland. The day was spectacular with blue skies, light winds, and temperatures in the mid-70's. A great day for diving!

The wreck was easily located using GPS coordinates. After a couple of passes, the crew managed to set a buoy directly on the site. The divers suited up, and Smailes and Landon entered the water first. The water temperature was a comfortable 73 degrees, but visibility was poor, barely two feet at the surface and only one foot on the bottom, at least until the bottom sediment was stirred up, when it effectively went to zero. Each team had a photographer and light-man and carried a measuring device and a wreck reel. The reel was going to be used in a circle search to find the wreck, but since the buoy landed right on the site the search was not needed. Smailes and Landon identified a log or rounded beam about 8-12 inches in diameter and more than 30 feet long, as estimated using their body lengths.

The second dive team consisted of Berkey and Blodgett, equipped with a tape measure and Nikonos V with a 15-mm wide-angle lens. They followed the buoy line down to the wreck at 14 feet. Realizing they had landed right on the wreck they hung close together within arm's length and searched the site. Unable to see much, they felt their way around the wreck. There were a number of small mussels attached to a series of structures protruding up from the wreck. A rope or line about 2-2.5 inches in diameter attached to the wreck



MAHS divers prepare to enter the water on Bodkin Creek, September 2009. Photo by J. Landon.

was also covered with mussels. Wooden structure that could be felt may have been hull planking. The wood ran for about 40 cm in one direction and then disappeared into the sediment, suggesting that the vessel was longitudinally planked. Examining the top the wreck the team noted long smooth boards and an indentation that measured about 3-by-4 feet. It was unclear what the structure might have represented.

All of the data collected during these underwater investigations form an integral part of our project research and will be provided in our final report to the State of Maryland at the completion of the project. ⚓

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*continued from page 2*

Judge Mark Pizzo's decision confirmed that Odyssey illegally ransacked one of Spain's national treasures when it tried to salvage the wreck site codenamed "Black Swan" for commercial purposes. This was an important day for archaeology and a worldwide victory for shipwreck stewardship

Finally, I would like to extend my appreciation to Brant Jones for volunteering to assist MAHS with our dive safety program this year. Brant is a DAN Certified Diving Medical Technician and DAN Instructor and will play an important role in the ongoing development of our dive safety program.

See you on the water,

Steven Anthony  
President



MARITIME ARCHAEOLOGICAL AND HISTORICAL SOCIETY

Statement of Ethics

The Maritime Archaeological and Historical Society is organized for the purpose of enhancing public awareness and appreciation of the significance of submerged cultural resources and the science of maritime archaeology. In pursuit of this mandate, members may come in contact with unique information and cultural material associated with terrestrial and underwater sites containing evidence of the history of humankind. To protect these sites from destruction by commercial salvors and amateur souvenir hunters, the Society seeks to encourage its members to abide by the highest ethical standards. Therefore, as a condition of membership and pursuant to Article 2, Section 1 (A) of the bylaws, the undersigned executes this statement of ethics acknowledging adherence to the standards and policies of the Society, and further agrees as follows:

- 1. To regard all archaeological sites, artifacts and related information as potentially significant cultural resources in accordance with federal, state, and international law and the principles and standards of contemporary archaeological science.
2. To maintain the confidentiality of the location of archaeological sites.
3. To excavate, or otherwise disturb an archaeological site solely for the purpose of scientific research conducted under the supervision of a qualified archaeologist operating in accordance with the rules and regulations of federal, state, or foreign governments. Artifacts shall not be removed until their context and provenience have been recorded, and only when the artifact and related data have been designated for research, public display or otherwise for the common good.
4. To conduct oneself in a manner that protects the ethical integrity of the member, the archaeological site and the Society, and prevent involvement in criminal violations of applicable vandalism statutes.
5. To observe these ethical standards and aid in securing observance of these standards by fellow members and non-members.
6. To recognize that any member who violates the standards and policies of the Society shall be subject to sanctions and possible expulsion in accordance with Article 2, Section 4 of the bylaws.

Signature \_\_\_\_\_ Date \_\_\_\_\_

(Revised 1993)

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General membership meetings of the Maritime Archaeological and Historical Society (MAHS) are held at 7:30 p.m. on the second Tuesday of each month. MAHS meets at McLean High School, in McLean, Virginia, except in July, August and December. The school is located on Davidson Road, just inside the Capital Beltway (I-495) - use Exit 45, coming from Maryland, or Exit 46, coming from Virginia. Meetings in July, August and December are held at other locations for special events and holiday parties. Please join us and bring a friend.  
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