Field Week Expedition
October 20th to 22nd

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October's week-long field expedition was a great success as we were able to relocate all of our old mooring blocks and add two more, recover our first anchor, and continue the *in situ* monitoring and conservation project initiated last fall. Despite not having money to continue major recovery, archaeologists and conservators have been observing and monitoring the *QAR* site throughout the year and used this mini-expedition to facilitate that important work.

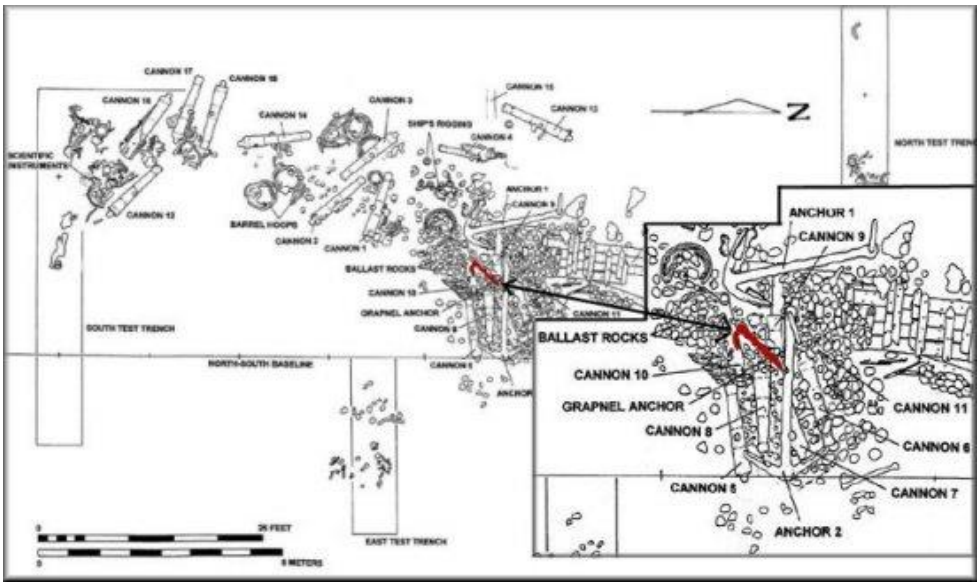
Site Condition

Throughout the year, mostly thanks to our Dive Down program, sand coverage on and around the site has been measured. Results show that the placement of the sand berm in 2006 just offshore has been successful in feeding sand to the site. Nearly two feet of sand has been deposited in most places since the lowest point recorded in 2005 and is at levels not seen since the shipwreck's discovery in 1996. With no funding to continue full recovery operations, this is a good development. When sand covers artifacts it is generally conducive to artifact preservation because it puts them in an anaerobic environment and buffers impacts from currents and critters.

Mooring Blocks

Throughout the three day expedition the weather was fantastic – air temperatures in the 70's and water temperatures in the 60's, light winds and calm seas, and visibility never less than 3 feet. The first task of the expedition set the stage for a successful project. UAB chief archaeologist Richard Lawrence led the operation by finding the 5 existing moorings and re-establishing their buoys within the first two hours! Thus archaeologists moved quickly to the next task of establishing locations for and installing two more moorings that will allow the captain of the recovery vessel even better leverage in positioning directly over working divers when full excavation continues. These mooring anchors were old, individual railroad wheels with chain attached. Each weighed half of a ton. They were generously donated by Tony Whipple, a researcher at the UNC- Chapel Hill Institute of Marine Sciences. *QAR* archaeologist Chris Southerly took the lead in determining a desired position for each of the new moorings and calculating their locations on the seabed Divers then used tapes from the baseline to triangulate and place a marker buoy. R/V *Shell Point* was then maneuvered over the buoy using lines to existing moorings and when set, Captain Tom Piner, using the vessels lifting crane, picked up the mooring, swung it over the side and deftly lowered each to the bottom. Both drops were perfectly positioned leaving only for the divers to unhook the crane hook, and place short buoys on the ends of the chain. Over the course of the year, the railroad wheels will work themselves in the sand and then have the strength to hold the research vessel.

Grapnel Anchor



When archaeologists and conservators were out on site in September, they noticed the small grapnel anchor had come loose from the other concreted anchors and cannon it had been attached to since it was first observed in 1996. This unstable condition was confirmed on the first day of the October expedition and thus plans were made to recover it from the seafloor to avoid further impacts from strong storm currents and transport it to the safety of the conservation laboratory.

The grapnel anchor is one of four anchors on the site and the smallest measuring 4’9” long and weighing approximately 80 pounds when cleaned. It originally had four or five prongs and was used as the ship's boat anchor. The other three anchors are ship’s anchors with lengths between 11 and 13 feet and tipping the scales at nearly a ton each. Recovery of the grapnel anchor was deemed a relatively light job and on Wednesday, the grapnel anchor was recovered with R/V *Shell Point’s* crane lift and the operation was a total success. Archaeologist rigged up the anchor on the bottom and attached lift bags to raise it to the surface. Once the anchor was on board the vessel, conservators tried to save some sea life such as crabs, sea urchins and starfish by removing them from the anchor and throwing them overboard. The anchor was wrapped in wet rags and plastic to keep the object from drying out. Once the anchor was taken to shore, it was weighed, photographed and stored for display and transport the next day.

The following day, the anchor was on display at the North Carolina Maritime Museum front patio from 9:30am-11:30 am. Several reporters from both newspaper and television stations filmed the event while curiosity seekers caught a glimpse of this freshly retrieved artifact. Many commented on its pungent smells and crusty look. The grapnel anchor was then wrapped up tightly again and transported to Greenville where it was again displayed from 1:00 to 3:00 pm to the delight of more media and public viewers. Finally, after a little more than a day from when it first emerged from the Atlantic Ocean after nearly three centuries, the first anchor to be recovered from *QAR* was lowered into a tank of fresh water and safely secured.

It will now undergo cleaning and conservation, a process that will take at least three years, before it is available for exhibit. When that does occur the grapnel anchor will make a very nice display piece – one that will invite the public to imagine life with the pirates, as they rowed about in their long boats.

***In Situ* Monitoring/Conservation**

Last fall conservators and archaeologists decided to initiate an *in situ* monitoring/conservation project on the northern-most anchor, A3. Throughout the year corrosion potential readings have been periodically recorded, however, complicating the experiment has been the burial of the sacrificial aluminum anode under the large amount of sand that has moved onto the site. While sand is great for creating an anaerobic environment for the artifacts, the sacrificial anode is less effective to the *in situ* conservation process buried so deep.

On September 2nd aboard UAB's 25-foot vessel R/V *Snapdragon,* project staff used a small 5 hp pump to run a 3-inch dredge with the hopes of digging out the sacrificial aluminum anode housed on a PVC frame. It was possible to dig out the test area on the crown of A3 to obtain a corrosion potential reading, but the sacrificial anode frame could not be relocated. Furthermore, the wire running from the anode to the anchor was found disconnected and thus the experiment was not operational. It became evident that a larger pump and dredge system was needed to relocate the anode and restart the experiment.

This became the major focus of the October expedition. Prior to fieldwork, staff were preparing in the event that the original old aluminum anode was not found and a replacement was needed. To this end a combined effort produced great results. UAB Dive Safety Officer Julep Gillman-Bryan provided the project two aluminum dive tanks to use as sacrificial anodes and Captain Gerry Compeau of UNCW's Center of Marine Sciences was kind enough to cut up the tanks in such a way as to provide not just one but four sacrificial anodes. UAB

archaeologist Nathan Henry ground away paint from the newly cut anodes and placed stainless steel fittings in the center for the wire connection. Meanwhile at the lab, Myron Rolston and Jon Schleier prepared 1018 mild steel coupons, approx. 3.0”(7.62cm) wide x 4.0”(10.16cm) long x 0.14” (0.35cm) thick, to be placed around the *QAR* site for corrosion potential testing. Placing mild steel coupons in different environmental conditions will set the stage for establishing baseline data to enhance the overall corrosion study.

With extra anodes available and given the success of the project over the first day and a half, archaeologists and conservators realized that there was an opportunity to expand the *in situ* monitoring project to other large artifacts beyond the current experiment at anchor A3. It was decided that a second anchor would provide the best comparative data. Anchor A1 was chosen because it is the highest artifact in the main ballast pile and is expected to remain accessible. Researchers decided if time permitted, they would attempt to hook up and monitor two of the cannon buried at the south end of the site.

Operations from R/V *Shell Point* continued to go off without a hitch. The same methodologies were followed for this field project as were used during the fall 2008 initiation of this project. A3 was the first order of business where a new test site was drilled into the anchor. A corrosion potential reading was obtained both from the original site and the new test site located on the upper arm which is in the water column. The new sacrificial aluminum anode was attached to the actual shank of A3 and the connection to the exposed metal in the drill hole was secured using a “G” clamp. A1 was the second large artifact to be monitored on site and its test site was also made on the upper arm where pH and corrosion potential readings were obtained and a sacrificial anode was attached in the same manner as A3 with the anode secured to its shank. Mild steel coupons were placed on

the exposed and buried portions of both anchors to test the corrosion rates of what is taking place in the water column and in the anaerobic environments.

Archaeologists only had time to uncover cannon C12 (QAR2100.000) for testing. It had been moved during the 2007 field season from its original position on site to the south end for storage. The test site on C12 was determined by where we could fit the "G" clamp around the gun and was ultimately placed on the right side of the cannon just behind the trunnions. The hole was drilled to solid metal, pH and corrosion potential readings were obtained, and then a sacrificial aluminum anode was connected to the solid metal of the cannon and secured to the top of the chase (forward portion of the cannon). C12 had to be excavated from under several feet of sand and will quickly rebury, thus providing a cast iron artifact in a totally anaerobic environment from which to obtain corrosion potential data. This will offer a comparison to the wrought iron anchors with portions constantly exposed in the water column.

Conservators and archaeologists will continue to monitor and test the artifacts and coupons for corrosion potential data. This project will hopefully give us a larger understanding of what is currently happening to the artifacts that still remain on site. If the attachment of sacrificial anodes is successful, conservation time may be reduced once these large artifacts reach the lab. This in turn will reduce costs and expedite the time it takes for them to be stabilized and ready for public display. Data from this project will be formally presented at the ICOM-Metals October 2010 conference in Charleston, SC.

A Big Thank You …

The success of the project was due in part to the experience and professionalism of the *QAR* project staff. A greater contribution came, however, from our partners without whom the project would not have been possible. Captain Tom Piner, his mate Mike Guthrie, and R/V *Shell Point* provided their expertise and the perfect work platform to accomplish all major tasks. The Office of the National Marine Sanctuary gave invaluable support and provided staff archaeologist Joe Hoyt for the duration of the project. US Coast Guard Station Fort Macon allowed us to use their basin, staging area, and cafeteria for breakfast. Fort Macon State Park provided staff housing and the NC Maritime Museum hosted the public viewing of the grapnel anchor.